CONFIRM

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«_____»_____ 2019 г.

Brief technical description

30 kW wind turbine

VDM-30 kW

2019

CONTENTS

1 MAIN INFORMATION. PURPOSE

30 kW wind turbine (VDM-30 kW) belongs to Class IV according to IEC 61400-2 and is designed for operating in the territories with the extended range of annual average wind speeds, including low wind speed from 3 to 6 m/s.

The wind turbine transforms the energy of the wind flow to the electric energy, this unit may be used for:

1. Operating in course of the local system of energy supply of the consumers (for example, communication, military objects, households etc.).
2. Operating in parallel with the local or central network.

Terms of operation – 20 years.

2 MAIN TECHNICAL PARAMETERS OF VDM-30 KW

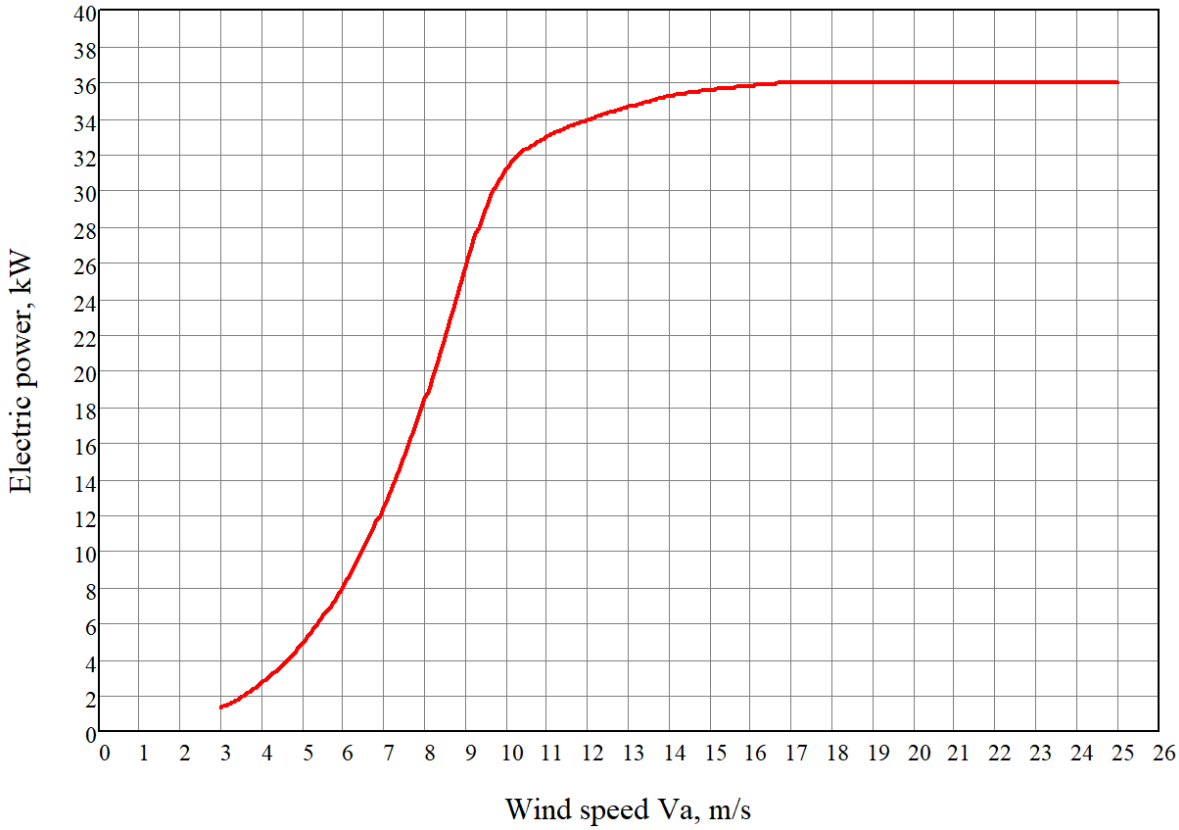
Main technical parameters of VDM-30 kW are shown in table 1.

Table 1

Parameter	Measure	Quantity or quality
Class of the wind turbine	IEC	IV
Rated output power	kW	30,0
Maximum output power	kW	36,0
Rated wind speed	m/s	9,5
Minimum operational wind speed	m/s	3,0
Maximum operational wind speed	m/s	25,0
Basic (extreme) wind speed	m/s	50,0
Number of blades	pcs	3
Diameter of the wind wheel	m	14,0
Height of the hub (minimum)	m	18,0
Direction according to the wind	–	downwind
Control over the wind wheel operations	–	passive pitch–control by the centrifugal-spring regulator
Braking of the wind turbine (failure stop)	–	– force feathering mechanism; – electrical braking by shorting of the windings of the generator
Weight of the wind turbine (excluding the mast) (maximum)	kg	2000
Operational air temperature (minimum) (IEC 61400-2)	°C	- 30

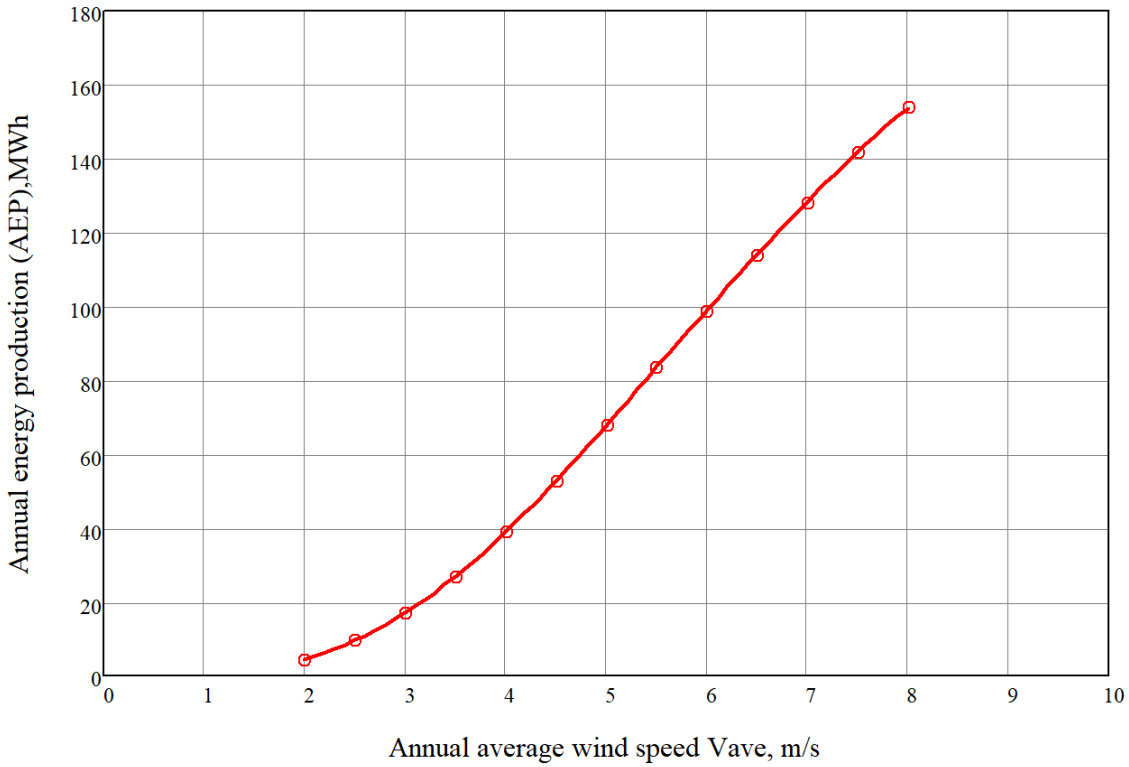
Technical decisions ensure operations of the wind turbine VDM-30 kW with regular frequency of rotations, control over the torque on the shaft of the generator, using efficient power take-off algorithms.

Calculated dependence of power of VDM-30 kW from wind speed is shown in picture 1.



Picture 1 – Dependence of power of VDM-30 kW from wind speed

Picture 2 shows dependence of the annual energy production (AEP) from the annual average wind speed in the certain territory.



Picture 2 – Dependence of AEP from the annual average wind speed in the certain territory

For the territories with the average annual wind speed of 5,5 m/s and more, the power coefficient is no less than 0,30.

3 CONSTRUCTION OF VDM-30 KW

Specific features of the construction of VDM-30 kW.

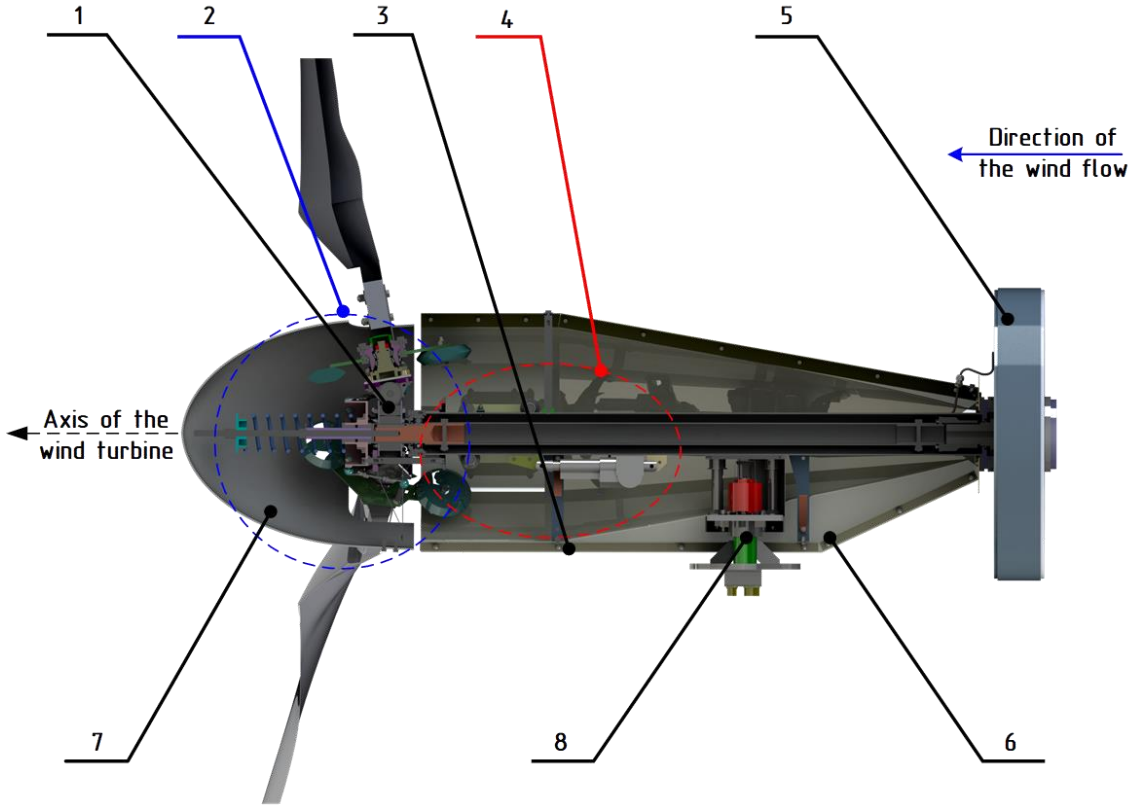
1. Direct drive gearless wind turbine.
2. Synchronous generator with permanent magnets.
3. Wind wheel with three blades and horizontal rotation axis is downwind.
4. Control over the wind wheel operating by the centrifugal-spring regulator (passive pitch-control).
5. Orientation to the wind is made by the aerodynamic forces, performed to wind wheel (passive yaw system).
6. Prevention of the cable twisting is performed by the current collector.
7. First braking stage includes turning of the blades to the feathering position by the actuator. Second braking stage includes the circuit of the windings of the generator.
8. Type of mast is tubular. Lifting/lowering of the mast is performed with the usage of the hydraulic cylinder.

Main units of VDM-30 kW are listed in table 2.

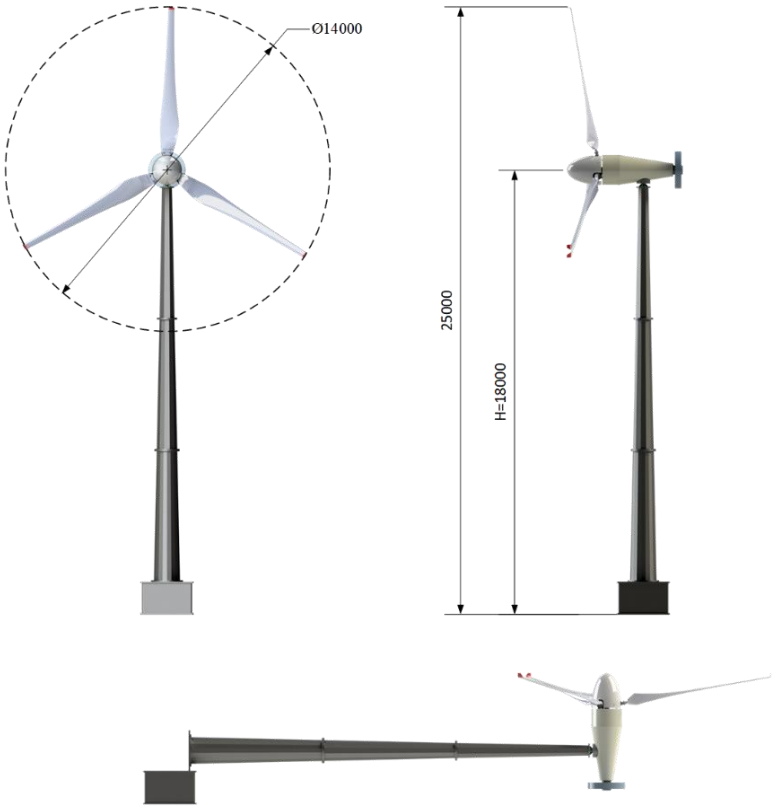
Table 2

№	Title	Quantity	Notes
1	Wind wheel with the hub	1	
2	Centrifugal-spring regulation mechanism	1	
3	Nacelle	1	
4	Force feathering mechanism	1	
5	Synchronous generator	1	
6	Nacelle cowling	1	
7	Hub cowling	1	
8	Slewing bearing	1	
9	Mast	1	Is shown in picture 4

Composition of the main units of VDM-30 kW is shown in picture 3.



Picture 3 – Composition of the main units of VDM-30 kW



Picture 4 – Appearance of VDM-30 kW with the mast (height of 18 m)

4 MAIN COMPETITIVE ADVANTAGES

1. Using the passive pitch-control with the centrifugal-spring regulator allows to raise reliability, to reduce the cost of the wind turbine, to reduce consumption of the electrical energy by the exclusion of electric drive and controller of the pitch-control.
2. Passive yaw system is better in comparison with the active system: it allows to raise reliability, to reduce costs and to reduce consumption of the electrical energy for your own needs by the exclusion of the following units: slewing bearing with gearbox, intermediate gearbox, electric drive, controller of electric drive, wind speed sensors and wind direction sensors.
3. The absence of gearboxes, hydraulic systems and control electronics in nacelle allows to raise reliability of wind turbine operations in conditions of the cold climate.
4. Using rubber hinges of the blades in the construction of the hub allows to reduce greatly vibrations and burdens to the construction of the wind turbine, to ensure the decline in the weight of the wind wheel and in the costs of the hub and of the shaft of the wind turbine and of the slewing bearing.
5. Using domestic automobile components in the construction of the wind turbine allows to raise reliability and to reduce costs, because these components are produced at wholesale, have been checked out through the time and have been designed for exploitation in the hard operational conditions.

5 ACTIVITIES FOR ADOPTATION TO THE COLD CLIMATE

For adapting the wind turbine to the conditions of the cold climate we suppose to follow these steps:

1. Using specific steel grades for the construction of the wind turbine.
2. Using frost-resistant components (bearings, seals etc.).
3. Using special coating for the blades of the wind turbine.
4. Using temperature sensor for issuing signal about stop of the wind turbine at the temperature below 30°C (for example).
5. Using sensors for issuing signal about stop of the wind turbine when the blades freeze.