

AUTOMATION OF ELECTRICAL DRIVE OF CENTRIFUGAL PUMPS.

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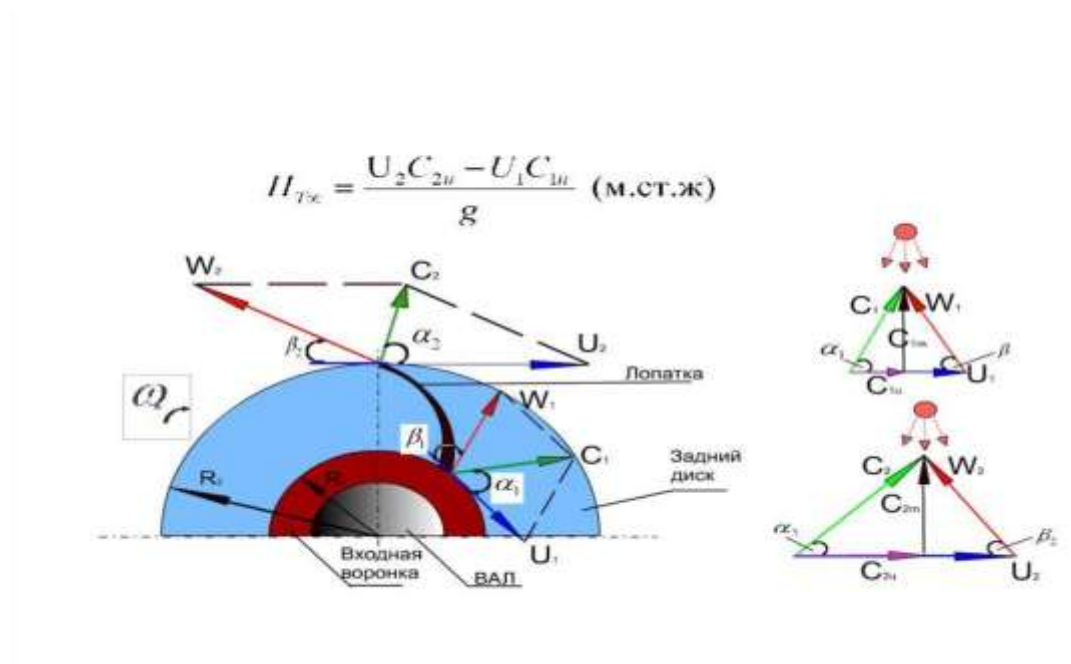
Annotation: Control of electric drive of centrifugal pumps by means of frequency converter with feedback sensor.

Keywords: Asynchronous motor, pump, sensor, frequency converter.

Centrifugal pumps are the main types of pumps used in pumping systems. There are several types of pump start-up and control. These include: changing the mains voltage, changing the stator connection group and changing the mains frequency. The most optimal of these is the method of changing the network frequency.

The main parameters to consider when choosing water dispensers:

- water consumption m³/h;
- the ability to release water upwards;
- installation angle (vertical or horizontal);
- depending on the condition of underwater or surface operation;



1-picture. Diagram of theoretical pressure: U_1 and U_2 - linear (circular) speed at the inlet and outlet; W_1 and W_2 – relative speed; C_1 and C_2 - absolute speed at input and output.

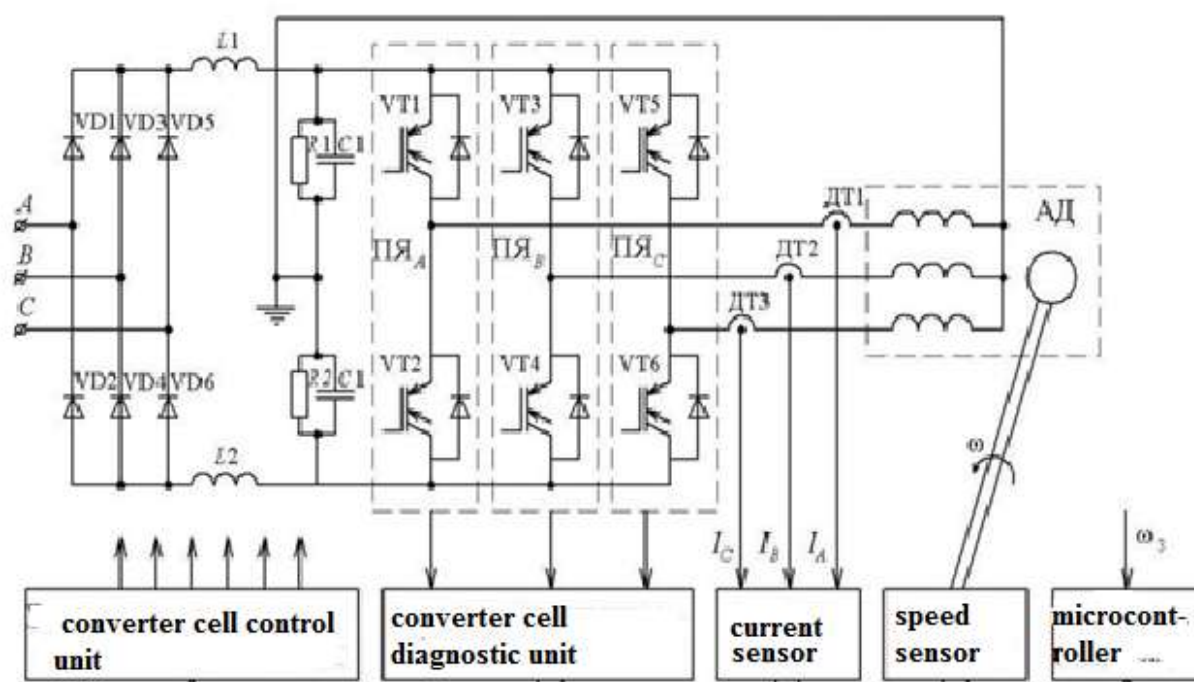
Diagram of theoretical pressure: U_1 and U_2 - linear (circular) speed at the inlet and outlet; W_1 and W_2 – relative speed; C_1 and C_2 - absolute speed at input and output.

The frequency converter is divided into two types.

- Directly
- Indirectly

Direct: this type of frequency converter changes the mains frequency directly without converting it to direct current.

Indirect: this type of frequency converter first converts the mains frequency to direct current and again to alternating current with a change in mains frequency.



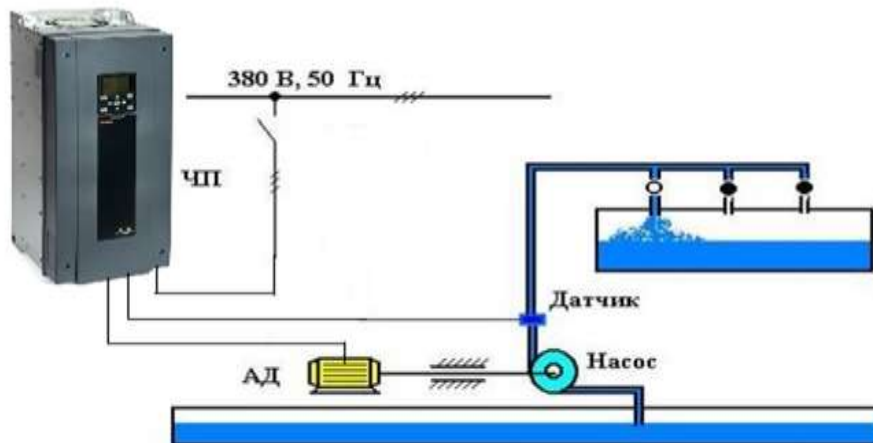
2-picture. The principle scheme of the frequency converter.

In particular, one of the most urgent issues today is the economy of electricity and drinking water. To realize this economy, it is possible to implement centrifugal pumps with automation of electric drive.

Equipment for automated electric drive systems.

- Frequency converter
- Water dispenser
- Water collecting pond
- feedback sensor

Kinematic diagram of the automation of the electric drive of the centrifugal



The principle of operation of the automatic electric drive of the centrifugal pump: in this case, one of the valves must be opened at a certain angle for the electric drive to start. When the shutter is opened, the electric drive starts in parallel mode. In order to get the required water consumption, the feedback sensor connected to the network with the control of the working machine calculates the water consumption and commands the frequency converter that controls it to work on the f_2 chart. This principle automatically saves electricity and water consumption. Ishchi formulalar:

$$U/f = \text{const}$$

$$h_{st.} = H_{din.} + H_{geo.} + \frac{p_{baka}}{\rho g}$$

$$P = \sqrt{3} UI \cos \phi$$

$$H_{din} = H_{st} + S$$

$$Q = vS$$

$$n = \frac{60f}{p}$$

Summary;

Automation of the pumping device provides an opportunity to save electricity and the amount of liquid. Pumps around the world consume 50-60% of electricity. If each pump is controlled by a frequency converter, electricity can be significantly saved.

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