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Automation of the Protection System of Electric Motors in Pumping Stations

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Abstract: *Pump stations hydroelectric buildings type belonging form irrigation , drying household-drinking or industry water taste note and sewage (waste) waters output) and other in systems water in transmission service does . Build it. Composition, their structure, placement, planting equipment number water pump of the station importance and to him/her pourable student into account received without water from the source perfect use and nature protection to do events based on is determined. For the efficient and continuous operation of electric motors used in pumping stations, it is important to protect them from various electrical and mechanical damage. This study examines the relevance and effectiveness of automation of electric motor protection systems. Automation of the protection system serves to prevent failure of electric motors in situations such as overload, short circuit, voltage drop or increase, thermal heating. The study examines the use of modern protection tools, including microcontrollers, relay protection systems and smart control panels.*

The automated protection system helps to increase the productivity of pumping stations, optimize energy consumption and reduce maintenance costs. Based on the results of the research, recommendations for the design of the optimal protection system are developed and its technical and economic efficiency is analyzed.

Keywords: *Pump equipment reliable performance almost every how engineering systems successful performance key: water supply, heating, drainage and others It is known that the pump of liquid external from the side energy to give through pressure movement (sucking and injection) for device (hydraulic (car) is considered.*

First of all, every how pump his/her own performance with described that is time in unity through it passing liquid amount. The most important technician indicators also work issued pressure or suitable coming pressure, consumption to be done power and is efficiency. Performance to the principle according to pumps two to class split: dynamic and volumetric. Volumetric cars, first in turn, hydraulic agitation in technology and sticky and dense the environment dosage or to move with related technological in processes is applied.

Water demand graph based on water passing on to give with together pump station to the facilities construction and use expenses less spent without them reliability and thoroughness , and non-stop performance required to be provided . Pump stations and devices following factors according to classified. Significance according to irrigation , drying , sprinkling irrigation , water taste sewage , water roads systems pump stations , with hydroaccumulators (water collector (electric) stations (GAES), hydro-electric battery (VAES) stations , hydraulic engineering constructions and hydromechanization works for applicable , and pump at the stations assistant pump devices. Water transmission in the direction of to the location according to irrigation from the main, intermediate , channel in the system to the channel transmitter , closed to the network transmitter , water taste note in the system first and second lifting , amplifying , transforming pump stations .

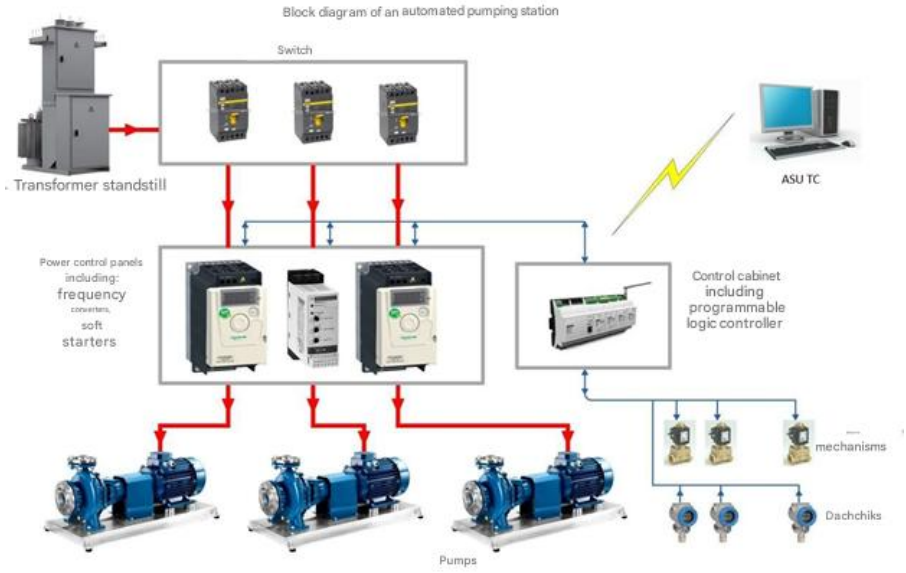

Fig. 1 Water transmission in the direction of to the location

Water to the source according to : earth upper from the source (sea , river , lake, water) warehouse , canal and hk) wire under from the source (mined) and tubular (water from wells) recipient stations. Water to the source relatively location by pump station building to the shore , to the shore and from the shore far away (derevasion) from the channel located after) pump stations. Water to take building and pump station the building to each other relatively location status by : united and separately built with structure pump stations. According to the structure immovable (permanent) and portable pump stations. Work order according to year during and seasonal working pump stations. Unstoppable on condition according to first level (one) day and night), second level (two) strong-day), third level (two) day and night more than stop permission (pump) stations. Management in style according to manual , automatic and remote automatic controllable pump stations. Irrigation to the field according to first class (irrigation area of more than 300 thousand hectares), the second class (irrigation area 100...300 thousand hectares), third class (irrigation area 50 ...100 thousand hectares), fourth class (irrigation area less than 50 thousand hectares).

The control of such a pumping unit essentially boils down to controlling the electric motor and monitoring the operation of the unit. The automatic control scheme is very simple, requires a minimum number of equipment and provides high reliability [10]. Such schemes are used, as a rule, for pumping units with axial pumps. The operation of centrifugal pumps, and especially horizontal ones, according to this scheme, is possible only with special design solutions of pumping stations that ensure the location of the pump axis under the water level and the use of individual pressure pipelines. Here, start and stop modes acquire a specific character. It is possible to exclude preliminary priming or to ensure that the

axis of the pump is level by installing the pump in recessed chambers or using a suction pipe or storage tank to fill the raised elbow [11]. The pump casing with these filling methods is constantly filled with water, which greatly facilitates start-up and shortens its duration. In pump installations with an axis located above the water level, the unit can only be started up by pre-filling it with water when the valve in the pressure pipe is closed [12].

Water transmission by: unique (water flow rate more than 100 m3/s), large (water flow rate 10. .. 100 m 3 / s), average (water flow rate 3_1.0 m3/s), small (water pump with a flow rate of less than 3 m3/s) stations. Pressure by : low (pressure less than 20 m),

The control scheme for these installations should ensure the interaction of all auxiliary mechanisms. One common method is to automatically pump pumps using a vacuum pump. The technological operation of pre-filling pumps at automated pumping stations is performed by various vacuum installations, mainly using liquid ring vacuum pumps. Solution methods. Consider one of the main methods of starting a pumping unit using a vacuum pump. Figure 1 shows the connection diagram of the vacuum pump 5 with the main pump 1. The constant water circulation required for the normal operation of the vacuum pump is ensured by the circulation tank 3, from which water enters the suction pipe 6 and enters the pump casing together with air. Then, as the impeller rotates, air and excess water through the discharge pipe 4 are thrown back into the tank [13].

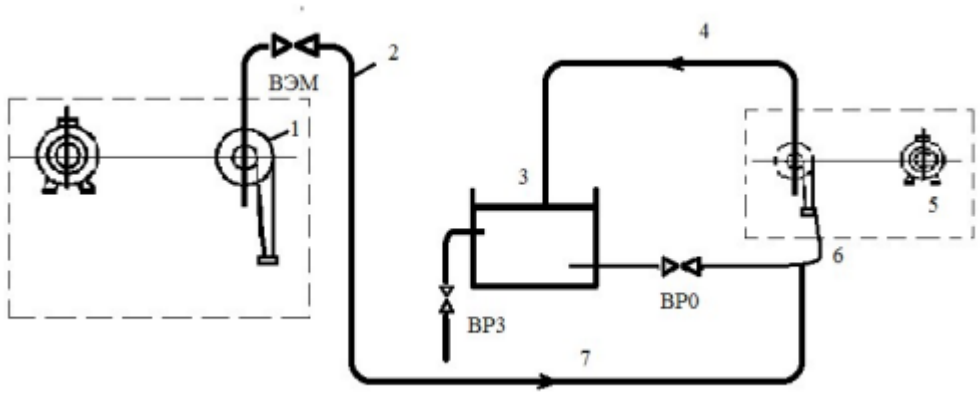

Fig. 2. Functional diagram of filling the pump unit with a vacuum pump.

Automation of this device requires the installation of a sensor or relay 2, which controls the level or flow of water and fixes the end of the fill (fill control relay) [14]. To isolate the pipeline connecting the vacuum pump to the centrifugal, a VEM electromagnetic valve is used. The vacuum pump is driven by an asynchronous squirrel-cage electric motor with a power of 1.5 or 2.2 kW [15].

average (pressure 20...60 m) and high (pressure above 60 m) pressure pump stations. Reliability level Category 1: pump stop the station people to life danger to put or people to the farm big damage to deliver possible was Station type 2: pump the station for 5 hours stop big damage to deliver possible was Stations Type 3: Pump Stopping the station for 1 hour causes material damage unproductive stations. Pump station of the building to the structure according to " earth " " superstructure " building , " compartment " building and " block " buildings pump stations . Pump , from outside taken mechanic or other kind of energy liquid of the flow to the energy turning giver hydraulic to the car It is said . Pump and engine , transmission using connect , something to the base if it is turned on , the pump aggregate It is called . Usage the deadline extension for pumps ceramic flat bearings with equipped are , they are ceramics high hardness and low- line expansion coefficient (e.g. GRUNDFOS UPS 200 series) turnover pumps) due to endurance and silent to work provides . This kind of units for water one of time in itself three function does : it works is a tool , friction lubricates parts (bearings) and electricity engine cools.

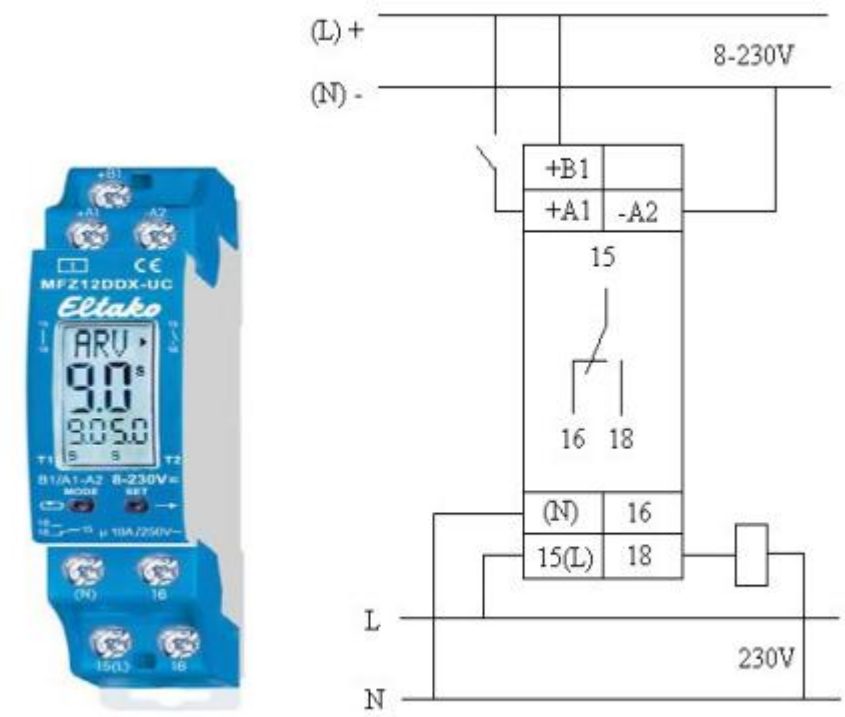

Fig. 3. Electronically programmable delay relay.

When you press the "start" button, the first unit (vacuum pump) is turned on, after completing its task, the pump vacuum must be turned off and the second pump unit (main pump unit) is turned on in parallel, after which the first unit is turned off. Switching the pumping units on and off, the staff sets the time period and operating mode.

Conclusion

Village on the farm applicable pump stations watering , drying , feeding roaring irrigation , village and pastures water supply to systems water to transfer service does . Earth under from the source water recipient pump stations small the field irrigation , land under water level reduction , construction their work in progress remove throw , and population and industry water supply for the purposes of is applied . Open from the basins water in receiving immovable pump stations technician or economic in terms of himself/herself unjustifiable in cases portable land upper and floating pump stations application to the goal appropriate will be .

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