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ENERGY-EFFICIENT MODULAR MULTIFUNCTIONAL WATER-LIFTING PLANTS FOR FARMS

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Currently it is increasingly used technology structure types "intelligent" building "intelligent" manufacturing, etc. These structures consist of elements (or modules) connected in SIS theme based on bus topology control function monitoring processes, equipment protection and others. These functions are performed by the operating system, in particular, with programmable controllers (PLCs) and using standard protocol bilateral exchange of information between modules. Rapid expansion of the functions implemented here can be carried out in stages and axis, multiframe as readiness required modules with minimal need for installation and commissioning work without disruption to the existing system. As part of these structures contains modules for different purposes, it is advisable to adapt to living conditions in rural areas.

The purpose of research - study structures unified mo-choke devices for agriculture for example, a modular multi-functional water-lifting installation of engineering systems of water supply to rural housing, manufacturing processes of small volumes of agricultural production in the conditions of farms.

Materials and methods of research. There is a large range of agricultural equipment independent water supply (life, processes, support functions, etc..). Typically, this equipment is designed to perform specific operations, and, if necessary, extend its functionality user optional devices, specialized for the required tasks. In some cases, part of the newly acquired devices are functionally duplicates existing facilities, and the total cost of the devices used water is unreasonably high.

The results of research. Designed and manufactured modular multi-purpose water-lifting plant (MMVU) rural water supply systems engineering housing, process small volumes of agricultural production in the conditions of farms. The unit provides not only the flow of water from a water source in the

home network of diluting and technological needs, but also to minimize power consumption, protects the object in case of emergencies, etc., May be part of the "smart home". The list of specifications and features MMVU formed based on the specific application and customer requirements, changing the functions and parameters of the installation destination in the operation provides a choice and replace (adding) the necessary modules and reprogramming of the control module.

MMVU modules: basic; technology; subsidiary.

The "heart" MMVU is a module based on PLC for control of equipment for a given program, and taking into account the actual operating conditions.

Control systems with PLCs characterized by small size and stoi Bridge, low power consumption, the presence of special op-tions, such as "Watchdog» (watchdog timer), automatically ne-rezapuskayuschego system in case of a "freeze", storage para-meters nonvolatile memory and others. The significant technical and economic advantages of controllers, compared with the tradition-onnymi controls are also more reliable high-ness; economic profitability at the expense of expanding the functions of the load-new units that are integrated into the instrument; maximize ease-of unification and of the design, installation, testing and maintenance of the equipment with minimal time and financial resources due to the convergence of the built-in software instrument applications; compatibility with current and future equipment of leading world manufacturers; ease of protection against external influences, the possibility of installing and configuring the industrial data networks (NET network) using interfaces (RJ-45, RS-232. RS-485 and others.

In practice, well-proven domestic controller - PLC-150 (f. "Aries"), which is used in the installation. MMVU modules (Figure 1) are connected to the outputs / inputs of the PLC.

In MMVU given the opportunity to use the two-tariff metering of electricity, according to which the cost-ogy elektroener night (23-7 hours) is significantly lower than in the daytime, when there The amplitude-voltage due to peak overloads can fall below the permissible limits, the possibility of refusal or

malfunction of the equip-tion (especially in rural networks). At night, the quality parameters of electric energy, are generally higher than during the day, and comply with the existing requirements.

Spend a technical and economic evaluation of water-lifting systems in a range of daily water consumption of 0.5-5.0 m3 / d with pump-nym equipment capacity from 0.25 to 1.0 m3 / h and a hydropneumatic accumulator with a capacity of 5 to 50% of daily water consumption using them for forced volume pumping water at night. It was found that although hydropneumatic accumulators have a relatively simple construction, the cost is relatively high and growing faster than the control volume. Therefore, the reservation 100% of the daily supply of water when using night rate electricity metering, even in homes with low water consumption, is not economically feasible, it does not provide a reasonable payback period costs associated with the increase in hydro-pneumatic accumulators.

Moving to another night-time energy-intensive process (heat water for hot water) changes the situa-tion. The volume of the hot water consumption is considerably lower, and even in homes with high levels of comfort does not exceed 50% of the cold-Watering consumption. Hot water is prepared (served) with inflated pas eters temperature, mixed with the direct use of hot water (50-55 ° C) with cold (12-20 ° C) depending on the season. Heating - considerably more energy intensive than vodopodem, capacitive heater provides accumulation and retention of water temperature (pressure in the network provides a hydropneumatic accumulator, which in this case can have a minimum size). Preparation of hot water at night in autonomous systems with DHW cylinders give a tangible economic effect.

DHW cylinders producing capacity of 5.0-500-L and the cardinality of 1.0-W, 0 kW and characterized by improved thermal insulation characteristics and long-lasting temperature of heated water (temperature reduction per day of not more than 10-12 ° C). Location of the heater in the immediate vicinity of the points of water consumption, reduces heat loss when driving the oxen from the hot water

heater to the tap. When water is heated to 60-70 ° C cylinder capacity can be reduced. Thus, when the daily water consumption to 3.0 m3, depending on number of people make cylinder capacity of 50-200 liters, and its daily work can be completely eliminated.

Sharing hydropneumatic accumulator and cylinder working on the set program of IP-use of "night" charges for electricity, will remove some of the load daily peaks, and the resulting savings allow recoup installation in less than 2 years.

Conclusions

The composition of water-lifting modular multifunction installation of engineering systems of water supply to rural housing, manufacturing processes of small volumes of agricultural products in a farm equipped with the needs of a particular customer, without redundant functions. Enhanced features installation, replacement and addition of new equipment, changes in operating conditions existing extremely simplified and then perform the required installation work carried out by reprogramming the control unit with an aggregate model installation.