

Automation of Pumping Equipment

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ABSTRACT: Automated control and dispatch systems are an integral part of the modern production process in any industry, significantly affecting the quality of equipment, ensuring the accuracy and reliability of its operation. If we are talking about pumping equipment, it should be noted that automation can reduce the energy consumption of pumps, increase stability and uptime, reduce the number of employees, reduce repair costs, while leaving the possibility of manual control.

KEYWORDS: automation, pump, energy saving, controller

I. INTRODUCTION

Automated control systems and scheduling are integral part of modern production process in any industry, greatly affecting the quality of the equipment, ensuring accuracy and reliability of his work. If we are talking about the pumping equipment, it should be noted that automation can reduce the power consumption of the pumps, to improve the stability and uptime, reduce the number of employees to reduce repair costs, leaving the possibility to perform a manual adjustment.

II. SIGNIFICANCE OF THE SYSTEM

The automation system consists of the following elements: sensors (pressure, temperature, flow, etc.), transducers, modules, input/output data of a computer or programmable controller, actuators.



The basic element of the automated systems that adaptively with high accuracy to manage workflows, is the controller.

Controllers for pumping equipment

These devices ensure reliable operation of the pump and protection from changes in pressure, without water ("dry run"), overcurrent. In addition, modern controllers, such as a multifunction programmable controller "Polytech" series "CD-M", the information provided below, to provide protection from water leaks and floods, the ability to view the consumption of water and contain the option of pump operation according to water level sensors. This functionality allows the controller to work with a wide range of equipment. This controller is used for control of downhole submersible pumps, line pumps, feed pumps, heating systems, as the controller level in the pressure tanks, to control the compressor or solenoid valve as a controller, pumps of pressure washers and other equipment to maintain pressure

in the pipeline system in a user-specified range with accuracy of 0.01 MPa and to protect equipment. It combines the functions of several devices such as pressure switches, relays, dry run, pressure gauge, and provides proper and accurate diagnosis of critical parameters.

Main functions multifunctional programmable controller

Protection against pressure drops and surges of current.

Protection against "dry-progress" and work on the blocked pipeline.

Monitoring performance, programming and maintaining the specified parameters of pressure, management of pipeline systems.

Diagnostics of the performance of the system for timely Troubleshooting and equipment maintenance.

The accumulation of statistical information on the operation of the system.

Leakage monitoring and the ability to protect against flood and inundation areas.

This controller can work in automatic mode (based on given values of the parameters), sensor levels, in manual mode and in shutdown mode the load.

The product is designed to control the pressure in non-aggressive non-combustible media: cold and hot water, non-freezing heat transfer fluids, compressed air, inert gases.

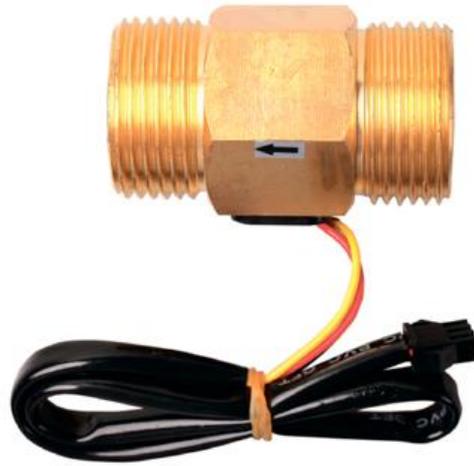


Direct level gauge for tie-in tank

Figure 1.

Direct level gauge for tie-in tank

The controller is mounted directly on the pipeline or the receiver and maintains the pressure with high accuracy. Installation can be performed in port or pressure line receiver with internal thread corresponding to the thread controller. The controllers are supplied with outer thread 3/8", 1/2", M20×1,5. For ease of operation when mounting it is recommended to use a shut-off valve (in scope of supply not included) or crane. If necessary, you can use an adapter. The controller can be placed in any plane and at any angle, but preferably to place it so that it is easy to configure and monitor the operation of the controller.



The water flow sensor
Figure 2.

The water flow sensor

Standard controller to control the operation of the pump includes a controller that perform basic functions (maintaining the required level of pressure in the system, overcurrent, and differential pressure, protection against "dry-progress" and work on the covered pipeline). If you want the advanced features (the accumulation of statistical information protection from leaks and flood, work on the levels of storage tank) use the model of the pump controller with the ability to connect additional sensors/flow switch, flow rates, leakage, level. All versions of the interface controller can be equipped with supply cable and output on the pump.



Leak sensor
Figure 3.

Leak sensor

As option can be equipped with controller external sensors.

Pulse flow sensor is mounted in the gap pressure line. With the passage of the water flow through the sensor rotates the impeller of the magnetic polymer, the pulses read by the controller, the calculation of the volume of pumped water, the flow. The sensor provides the best security settings to the pump and prevents operation on a closed highway "in the wall", guarantees protection against "dry running" the pump depletion of the well. Its presence allows you to monitor pumped volume of water with an accumulating total. In addition, can display the instantaneous flow rate. The statistics collected by the controller allows you to plan the time of maintenance of water treatment systems, to assess

the cost of water supply. The instantaneous flow rate can be used to assess the degree of clogging of filters and the condition of the well.



Flow relay
Figure 4.

Flow relay The flow switch is installed in the gap of the pressure line and is recommended for pipelines 1 – ½ "or more. When a water stream passes, a movable damper with a magnet is deflected, the position of the damper is determined using an external reed switch. The sensor accurately detects the presence of flow in the pipeline, avoiding "dry running" and work on a closed highway.

Level sensors for tapping into the storage tank can be straight and angular. It is possible to connect a low level sensor, a high level sensor, as well as an overflow sensor to the controller. Triggering occurs when the float is raised.

Leak / flood sensor is a protective sensor that allows to avoid flooding of the premises in case of damage to the piping system, if it defrosts, protects it from inattention, etc. The sensor is placed on the floor of the technical room and in places where water spills are likely to occur. If water gets on any of the sensors, the pump will be blocked.

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