International Journal of Scientific Research in Mechanical and Materials Engineering
© 2023 IJSRMME | ISSN : 2457-0435

Fabrication of Submersible Water Pump with Automatic Water Level Controller

D. Balaji*[1], R. Sugundan[#2], D. Karthikeyan[#2]

[*1] Assistant professor, Department of Mechanical Engineering

[#2]UG Student, Department of Mechanical Engineering

Ponnaiyah Ramajayam Institute of Science and Technology (PRIST), Tamil Nadu, India

Email: balajibala81@gmail.com

Article Info

Volume 7, Issue 1

Page Number : 32-35

Publication Issue :

Januaty-February-2023

Article History

Accepted : 20 Jan 2023

Published : 05 Feb 2023

ABSTRACT

Nowadays, the drinking water is becomes a big issue. It might very big global problem. As we say that the third world war might be for water. Hence, it is time to think to preserve water. In home based water tank, the one problem is very common to us that the control of water level of overhead tank, as a result the wastage of water is increasing day by day. But we all know water is very precious to us. This problem can be controlled by an electronic circuit consists with some electronic components, that circuit is called 'Arduino based Smart Submersible Pump Controller'. The operation of Adriano based Smart Submersible Pump Controller works upon the fact that water conducts electricity. So water can be used to open or close a circuit. As the water level rises or falls, different circuits in the controller send different signals. These signals are used to switch ON or switch OFF the motor pump as per our requirements. This automatic water level controller is a useful device for homes, hospitals, industries, etc. This product saves water, electricity and time and helps in preventing the overflow of water from the overhead tank, enabling you to efficiently manage your water resource and prevent any wastage. This automatic water level controller is a useful device for homes, hospitals, industries, etc. Out of three sensors, one sensor is put at the bottom, another is put in the middle, and the third sensor is put at the top level of the tank. When the water level in the tank becomes low, it flows down through the middle sensor and the motor gets switched on automatically, filling up the tank. When the water level increases, the top level sensor senses it and the motor automatically gets switched off without requiring any man power. Automatic Water level controllers are highly recommended for metro cities or areas where drinking water is supplied through pipelines which are further distributed in homes, hotels, societies.

Keywords: Automatic water level controller, Smart Submersible Pump Controller, Arduino Controller.

I. INTRODUCTION

The everyday routine begins with water. This is one of the basic survival needs. People depend on the upper reservoir for everyday use. The upper tank is made of an opaque or cement (concrete) material to prevent algae growth and is closed with a cap to protect from dust and mosquito infestation. So, the level of water in the tank is unknown. Oftentimes, we turn on the motor and forget to turn it off, because of this most of the water will be lost unknowingly. This leads to water scarcity. Therefore, there is a need for a replacement that can start automatically, and shut off the motor when the water is filled to the desired level. Automatic water level controllers are a product created to automatically control the motor, which helps to ensure that there is a constant reserve of water in the storage tank. These automatic water level controllers are used to automatically fill the overheadtank when it starts up or when it becomes empty and also monitor the water level in it. Automatic water level controllers start the motor when the water level drops below a certain level and turn off the motor when the water rises above a fixed level. The motor will also shut off when the sump water runs out before it fills the upper tank, or if the pump is dry and also maintains voltage fluctuations.

The Total amount of water available on Earth has been estimated at 104 billion cubic kilometers, enough to cover the planet with a layer of about 3 kilometers. About 95% of the Earth's water is in the oceans, which is unfit for human consumption. About 4% is locked in the polar ice caps, and the rest 1% constitutes all fresh water found in rivers, streams and lakes which are suitable for our consumption. A study estimated that a person in India consumes an average of 135 liters per day. This consumption would rise by 40% by the year 2025. This signifies the need to preserve our fresh water resources. This circuit is a smart functional submersible controller using Arduino.

II. WORKING PRINCIPLE

Automatic water level controllers are a product that was created to automatically control a motor, which helps to ensure a constant reserve of water in a storage tank. Contact Water Level Controller. Here a simple circuit to control the Water pumps. When the water level in the overhead tank exceeds the required level, the pump automatically turns off and stops the pumping process thus preventing the over flow of water. Here is a simple, automatic water-level controller for overhead tanks that switches on/off the pump motor when water in the tank goes below/above the minimum/maximum level. The water level is sensed by two floats to operate the switches for controlling the pump motor. 3 Probe water level indicators use a reference probe, fill start probe and fill stop probe to manage water levels. These probes work together to manage the water levels in a tank. The reference is the lowest point you want the water level to go to before the water starts filling again

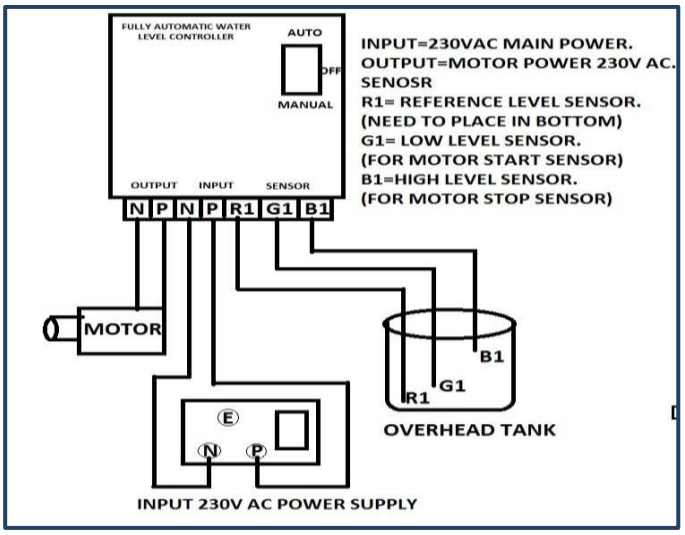

Figure 1. Block Diagram

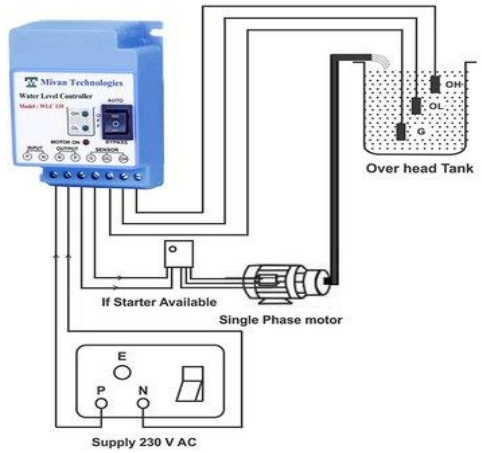

Figure 2. Water Level Indicator and Controler

III. SUBMERGIBLE WATER PUMP

The first submersible pump was invented by Armais Arutunoff in the year 1928. He is an engineer in the Armenian oil delivery system. The name of the pump is submersible oil pump and this was installed in an oil field. The pump's design was established in the year 1929 by the Pleuger Pumps. This is a device coupled with a completely airtight sealed motor to the pump. The entire assembly can be submerged within the liquid to be pushed. These pumps are mainly used for preventing the cavitations of the pump.

Figure 3. Submergible Water Pump

The function of this pump is dissimilar to jet pumps because, submersible water pumps push liquid toward the surface, whereas the jet pumps pull the liquid. So these pumps are more efficient than jet pumps. This article discusses an overview of submersible pumps. The submersible pump definition is, as the name suggests these pumps are designed because they are immersed in a well, tank, otherwise container. Submersible pump designers have designed several general types of pumps to make them appropriate for immersion. The submersible pumps motors are enclosed within compartments which are filled with oil that don't have contact by the material they are pushing. The submersible pump diagram is shown below.

3.1 Selection of Submersible Pump

The selection of submersible pump can be done based on several specifications. Choosing the first and leading submersible pumps mainly depends on type, application, and after that, the utmost flow of discharge must be decided. The maximum flow of submersible pumps can be decided by the pressure head of the pump. This related to the maximum amount of force the pump can hold. These pumps are estimated in horsepower. It is a work generated at a speed 550 foot-pounds for every sec, and equivalent to 745.7 watts of energy. Lastly, the size of the discharge must be estimated. This calculated value has an orientation toward the exit links of submersible pumps.

3.2 Features

A Smart Submersible Pump Controller is a device that manages water levels on a variety of systems such as water tanks, pumps and swimming pools. The basic function of a water level controller is to regulate water flow and optimize system performance. These devices have four main advantages.

Acting on a basic function of water flow regulation and system performance optimization, a water level indicator measures and manages the levels of water in multiple different systems such as swimming pools, cooling towers, and water pumps/tanks, etc. There are many advantages of water level controllers. First, let's

explore the problem with old water level control designs.

Another notable advantage with these devices is that they regulate on their own. Eliminating manual operations with a timer switch, the frustrations of manual monitoring water tanks are minimized. Water levels are maintained at the appropriate levels thanks to the automatic operations of these devices.

Living in an age where we need to be more conscious of the energy that we use, a water level controller is ideal at saving power. Normally, regulating water levels can consume electricity and wastewater. However, with automatic controllers, the electricity usage is limited as well as less water needed to regulate supply.

3.3 Advantages

This model will automatically switch ON and automatically switch OFF the motor. Has AUTO ON and AUTO OFF operation. AUTO ON occurs when the tank level is low confirming. AUTO OFF when tank is full. Suitable for Overhead Tank set up. Has LED indications for motor ON. Also has high and low level LED indications to know the level of Tank. Has MANUAL Mode and AUTO Mode functions. In AUTO Mode, AUTO ON and AUTO OFF operation occurs. In MANUAL Mode, the motor pump will be constantly running. Long life & Easy to install. Advanced Embedded technology. Save Electricity.

IV. RESULTS

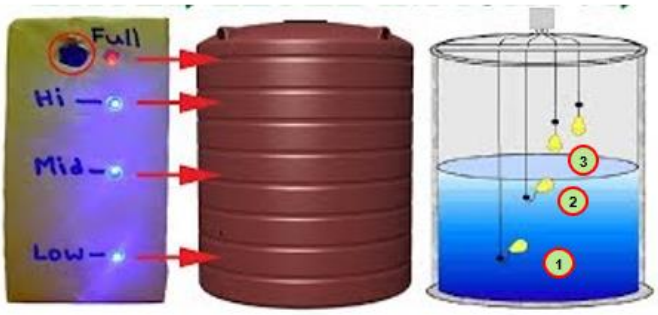

Figure 4. Storage Tank with Level Indication

1. Low Level, 2. Middle Level and 3. High Level

V. CONCLUSION

Using a smart submersible controller saves power. This is because water levels are controlled automatically, which limits the amount of electricity used. As a result, less water and power are used to regulate a water supply. In an age where energy conservation is of utmost importance, using one of these devices is very beneficial. Since a smart submersible controller conserves power, it saves money, as well. Basically, water regulation is optimized through these devices, which means that wasted electricity and wasted water is kept at a minimum. That saves a substantial amount of money over time. Another big advantage is that this device works it-self. Thanks to timer switches, there is no need to operate them manually. This means that the frustrations involved with monitoring something like a water tank is minimized, and the water levels will be where they should be.

Additionally, water usage can be maximized with a smart submersible controller. Often, submersible pumps get more use during the middle of the day. A smart submersible controller is helpful because it automatically provides more water during the middle of the day and less water at night. As a result, water remains at its appropriate level at all times. This Smart Submersible Pump Controller can be used in Hotels, Factories, Homes, Apartments, Commercial complexes, Drainage, etc. It can be fixed for single phase motor, three phase motors, and Fuel level indicator in vehicles. This is also used in the huge container companies on the tank walls.

VI. REFERENCES

[1]. Asaad Ahmed Mohammedahmed Eltaieb, Zhang Jian Min,"Automatic Water Level Control System", China – Tianjin

[2]. Ria Sood, Manjit Kaur, Hemant Lenka, "Design and Development of Automatic Water Flowmeter", Mohali, India

[3]. Sanam Pudasaini, Anuj Pathak, Sukirti Dhakal, Milan Paudel,"Automatic Water Level Controller with Short Messaging Service (Sms) Notification", Kathmandu University, Nepal

[4]. Lukman Adewale Ajao, Blessing Olatunde Abisoye, James Agajo,Abdulzeez Olorundare Ajao, Muhammed Bashir Muazu, Abdulazeez Femi Salami, Automated Multiple Water Tanks Control System Using Atmega And Fpga Technology, Ieee Mac 2019, Pp 347-353.

[5]. R. M. Shrenika, S. S. Chikmath, A. V. R. Kumar, Y. V. Divyashree And R. K. Swamy, "Non-Contact Water Level Monitoring System Implemented Using Labview And Arduino," 2017 International Conference On Recent Advances In Electronics And Communication Technology (Icraect), Bangalore, 2017, Pp. 306-309. [CrossRef]

[6]. Teetla Asha, Vidadala Srija, Design And Implemntation Of Wireless Based Water Level Monitoring Using Arduino And Bluetooth, International Research Journal Of Motorering And Technology (Ijert), Volume: 07, Issue: 01| Jan 2020.

[7]. Siddartha Shankar, Dr M Dakshayini, Iot-Mobile Enabled Smart Water Level Controlling System To Regulate Water Wastage, 2018 Ieee, Pp 2045-2048. [CrossRef]

[8]. Shandong Jianzhu "Design Of Intrinsically Safe Intelligent WaterLevel Monitor Used In Coal Mine ", Ieee Trans. On Industrial Applications, Vol. 19, Pp.1052 -1056 1983

[9]. K. Santhosh Kumar, G. Mukesh, K. Deepti, Microcontroller Based Automatic Water Level Control System, International Refereed Journal of Motorering And Science (Irjes) Volume 4, Issue 11, November 2015.

[10]. Beza Negash Getu and Hussain A. Attia, Automatic Water Level Sensor and Controller System, Â©2016 Ieee.

[11]. Teetla Asha, Vidadala Srija, Design And Implemntation Of Wireless Based Water Level Monitoring Using Arduino And Bluetooth, International Research Journal Of Motorering And Technology (Ijert), Volume: 07, Issue: 01| Jan 2020.

[12]. Priya J, Sailusha Chekuri, Water Level Monitoring System Using Iot, International Research Journal Of Motorering And Technology (Irjet) Volume: 04 Issue: 12, Dec-2017.

[13]. Madhurima Santra, Sanjoy Biswas, Sibasis Bandhapadhyay And Kaushik Palit, Smart Wireless Water Level Monitoring & Pump Controlling System, International Journal Of Advances In Scientific Research And Motorering (Ijasre), Vol. 03, Issue 4, May -2017.

Cite this article as :

D. Balaji, R. Sugundan, D. Karthikeyan, "Fabrication of Submersible Water Pump with Automatic Water Level Controller",International Journal of Scientific Research in Mechanical and Materials Engineering (IJSRMME), ISSN : 2457-0435, Volume 7 Issue 1, pp. 32-35, January-February 2023.

URL : https://ijsrmme.com/IJSRMME23716