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Proceedings editor:
Marjana Pardanjac, Ph. D, Associate Professor

Technical design:
Snežana Jokić, Ph. D, Assistant Professor
Maja Gaborov MSc, Assistant
Nemanja Tasić MSc, Assistant

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INTRODUCTION

This Proceedings comprises papers from the International conference on Information technology and development of education that is held on line on November 25th 2022. The International conference on Information technology and development of education has had a goal to contribute to the development of education in Serbia and in the region, as well as, to gather experts in natural and technical sciences' teaching fields. The expected scientific-skilled analysis of the accomplishment in the field of the contemporary information and communication technologies, as well as analysis of state, needs and tendencies in education all around the world and in our country have been realized. The authors and the participants of the Conference have dealt with the following thematic areas: - Theoretical and methodological questions of contemporary pedagogy - Personalization and learning styles - Social networks and their influence on education - Children security and safety on the Internet - Curriculum of contemporary teaching - Methodical questions of natural and technical sciences subject teaching - Lifelong learning and teachers' professional training - E-learning - Education management - Development and influence of IT on teaching - Information communication infrastructure in teaching process All submitted papers have been reviewed.

The papers presented on the Conference and published in this Proceedings can be useful for teacher while learning and teaching in the fields of IT, informatics, technics and other teaching subjects and activities. At the end of the conference, and based on the papers of our participants, we conclude that the main focus points of this moment in education. Contribution to science and teaching development in this region and wider has been achieved in this way.

The ITRO Organizing Committee would like to thank the authors of papers, reviewers and participants in the Conference who have contributed to its tradition and successful realization.

Chairman of the Organizing Committee
Ph.D Dragana Glušac

IN MEMORIAM PROFESSOR DIJANA KARUOVIĆ
1978-2022.

We especially want to pay tribute to our late colleague professor Dijana Karuović PhD, as one of the founders of the ITRO conference.

To all of us who knew her, professor Dijana Karuović will be a symbol of professional attitude towards work, dedication and loyalty to the institution to which she belonged. Behind HER remain her wonderful children, her many scientific works, her goodness and her love.

We are grateful to have known her.

Also, we will always remember our dear colleague professor Ivan Tasić, PhD, who passed away in 2019.

Our team thus suffered an irreparable loss, and their names will forever remain on the pages of the conference proceedings.

Professor Dijana Karuović and professor Ivan Tasić

CONTENTS

INVITED LECTURE

SCIENTIFIC PAPERS

INVITED

LECTURE

Microcomputer TK8-A for Solar System

D. Bogatinov*, A. Stojanova Ilievska**
*Faculty of electrical engineering, Stip, Republic of North Macedonia
**Faculty of computer science Stip, Republic of North Macedonia
darko.bogatinov@ugd.edu.mk, aleksandra.stojanova@ugd.edu.mk

Abstract – In this paper we consider the main parts of the TK8-A microcomputer. We explain how all the elements work and what function the individual parts of the TK8-A microcomputer have in a solar system for water heating

Keywords: microcomputer TK8-A, solar system, sensor, valve, tank

I. INTRODUCTION

In this paper we will focus on non-pressurized solar water heater and the TK8-A microcomputer.

Solar water heater is the conversion of sunlight into renewable energy for water heating using a solar thermal collector. 'Solar Water Heating' systems, or 'Solar Thermal' systems, use free heat from the sun to warm domestic hot water.

There are mainly two types of solar systems for water heating:

- Pressurized solar water heater
- Non-pressurized solar water heater

Pressurized solar water heater also called phase change thermal conductivity full pressure solar water heater is typically characterized by an enclosed heating unit containing copper tubes connected indirectly to a tank. . The phase change thermal conductivity collector is composed of vacuum tube, phase change heat pipe and heat transfer aluminum wing. Because of the threaded connection between the phase change heat pipe and the water tank, and there is no liquid in the vacuum pipe, it can withstand pressure.The high-pressure Direct Pressure Solar Water Heating System features evacuated tubes and heat pipes. The heat pipes absorbs solar energy and converts it into heat energy, this energy is then used in the process of heating water. There is no direct connection between the heating fluids in the copper tubes and the water being heated. Pressurized systems allow you to have a closed loop and a circulation pump so that the water in the pipes is constantly pumped through the solar collectors where the water gets hot, then around all the pipes so there is always hot water instantly at the tap Pressurized solar systems work on the same principle as a regular water heater. If we have a hot water outlet, the system automatically receives cold water and the tank is constantly refilled, so the water pressure at the inlet is the water pressure at the outlet. The controllers used in this type of systems are mainly for observing the characteristics.

Non-pressurized system are also called straight-in all-glass vacuum tube solar water heaters. Because the vacuum collector and water tank are sealed by sealing rubber ring, they can not withstand pressure.The non-pressure solar water heater normally uses the non-pressure water shutdown, the efficiency is high and the service life is long. The low-pressure gravity system consists of a vacuum glass tube collector, an insulated storage tank and optional stand parts (make up tank). The water is delivered to the tank on the roof by a pump of some kind or from a water tower, which naturally means there is some pressure and then the evacuated glass tubes are filled with water and exposed to sun, thus heating up the water in the glass tubes.This system is completely compatible with shower pumps and other household pumps to add water pressure in the house. But the tanks and the panels or tubes are not pressurized themselves.

Non-pressurized solar water heater has microcomputer that regulates the level of water in the tank. In non-pressurized solar water heater, the tank is not loaded with water automatically, when the user spend water from tank the system not load automatically cold water. The user can use up all the water in the tank and then add cold water in the tank. The loading of the water in the tank and heating of the water with electric heater the user is made it with microcomputer TK8-A.

In this paper we will focus only on the non-pressurized solar water heater and the TK8-A microcomputer and we are going to explain withc part need to be active so user can load cold wather in tank and how can user whart the wather in thank with electic heater.

II. MICROCOMPUTER TK8-A FOR SOLAR SYSTEM

The microcomputer TK8A is using for controlling the working of the solar system for water heating. The microcomputer can perform an operation like fill the tank with cold water, turn on the electric heater for heating the weather in the tank and other operation.

For controlling the solar system with microcomputer TK8-A the user needs to have also the other parts that need to be attach to the microcomputer so he can make the function of controlling.

The parts that need to be attached for the micromicrocomputer are listed below:

- Top sensor
- Solenoid valve
- Electric heater

A. Top sensor

The top sensor is the part that is on the picture 1. The top sensor is on the top of the tank and it have 4 sensors on his body. If the water level in the tank is higher than the first sensor, then the microcomputer light that the tank is filled with water 25%. If the water level is higher than the second sensor than the microcomputer light that the tank is filled with water 50%. If the water level is higher than the third sensor than the microcomputer light that the tank is filled with water 75%. If the water level is higher than the fourth sensor than the microcomputer light that the tank is full of water 100%. In the picture 2 is show the part where the microcomputer gives information for level on the water in tank.

Also the top sensor is using not only to show the level of the wather in tank nut also to show the temperature of the whater. So the top sensor is also a termostat that measures the temperature and give that information to the microcomputer.

On the picture 3 is swohen the place whre the top senson need to be attached on the microcomputer.

Figure 1. Top sensor

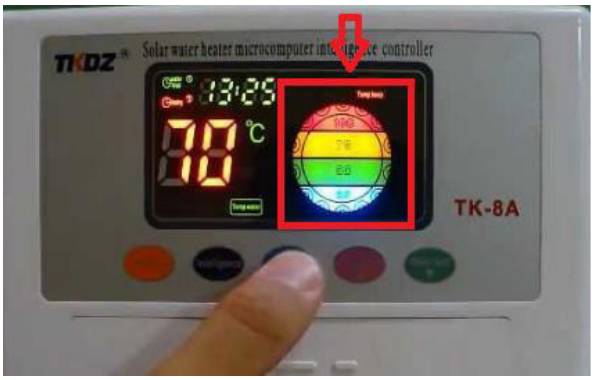

Figure 2. information for level on the water in tank

Figure 3. Plug in for top sensor

B. Solenoid valve

The solenoid valve is using for filling the tank of the sollar system with cold whater. So when the user press the button on microcontroler that want to fill with cold whater that the solenoid valve is opening and cold whater is filled to the tank. For give the comand on solenoid valve to open the user need to press the green butoon on the micromicrocomputer that is named “Water load▼”. When the user press the button “Water load▼”, then the solenoid valve open and fill the tank with cold water. When the level of the water in the tank it reach the forth sensor on the top sensor than the solenoid valve is closing because the tank if full with water 100%.

On the picture 4 is showen the solenoid valve, and on the picture 5 is showen where the solenoid valve need to be attached on the micromicrocomputer TK8-A.

Figure 4. Solenoid valve

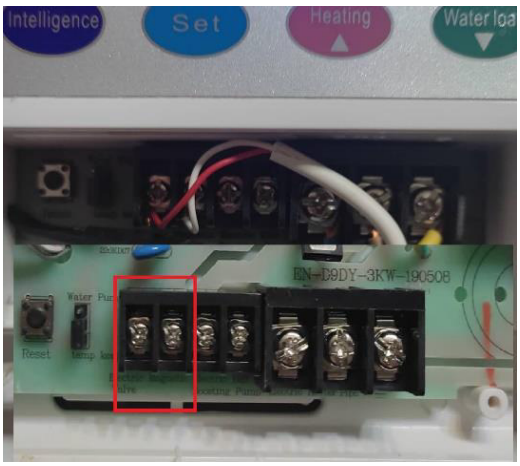

Figure 5. Plug in for solenoid valve

The solenoid valve have specifications that are listed bellow:

- 1/2" Nominal NPS
- Working Pressure: 0.02 Mpa - 0.8 Mpa
- Working Temperature: 1°C ~ 75°C
- Response time (open): ≤ 0.15 sec
- Response time (close): ≤ 0.3 sec
- Actuating voltage: 12VDC
- Actuating life: ≥ 50 million cycles
- Weight: 4.3 oz
- Dimensions: 3.3" x 1.69" x 2.24"

C. Electric heater

Electric heater is attached in the tank and is coneccted also with the microcomputer TK8-A. The electric heater is using for heating the whaet in the tank. So when the user of a sollar system is not satisfied with the temperature of the whater in the tank he can activate the electric heater. The electric heater is activating on the button on the microcomputer that is named "Heating▲". But first before to activate the electric heater the user need to define the temperature that want to reach , this can be done with pressing the button Set and user can define the temperature with press on the buttons "▲" UP and "▼" DOW. After selecting the temperature that want to reach the user is activating the electric theater. On the picture 6 is shown the electric heater and on the picture 7 is shown where the electric heater need to be attached to ne microcomputer.

Figure 6. Electric heater

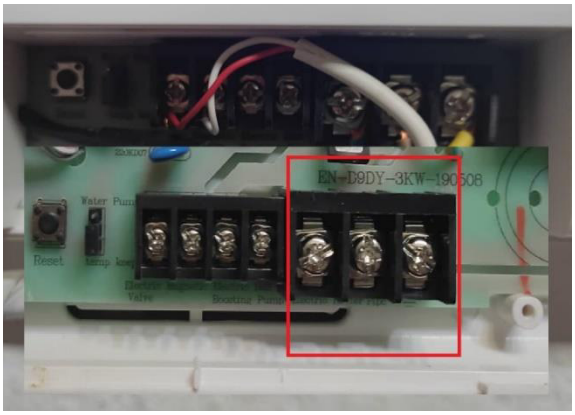

Figure 7. Plug in for electric heater

Wen the user have attached all the parts whit the microcomputer than can start with the controlling of the working on the sollar sustem. On the picture 8 is showen where the parts (Top sensor, magnetic valve and the electric heater) need to be attached.

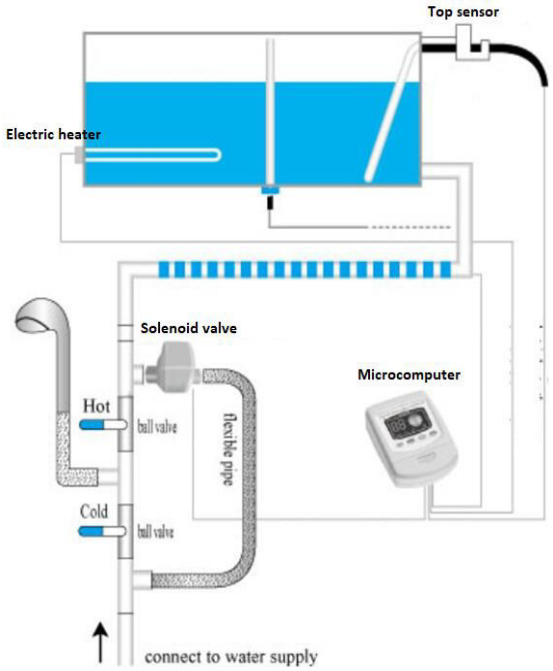

Figure 8. Installation diagram

III. CONCLUSION

The microcomputer itself has the appropriate settings for the solar system and it works and communicates perfectly with the peripheral parts. Improvements to the next series are possible in the part with remote control, the user can have information about the level and temperature of the water in the tank from a distance and manage them according to his needs.

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