

ния новых продуктов. Многие из них преодолели эту проблему, вступив в кооператив. Настоящий сдвиг в сторону рыночной ориентации означает непрерывное инвестирование в инновации о рыночных стратегиях. Более высокие маркетинговые затраты стимулируют создание более крупных кооперативы, способные извлекать выгоду из экономии масштаба и масштаба в маркетинге. В кооперативе члены фермерского хозяйства должны принимать решения о важных вещах инвестиции в рыночные стратегии, разработанные кооперативной компанией.

References

1. Bucklin L.P., Sengupta S., 1993, "Organizing Successful Co-Marketing Alliances", *Journal of Marketing*, 57, April, pp. 32–42.
2. Bucklin L.P. (ed.), 1970, *Vertical Marketing Systems*, Scott, Foresman and Company, Glenview, 111.
3. Buzzell D.L., Gale B.T., 1987, *The PIMS Principles*, The Free Press, New York.
4. Dwyer R.O., Schurr P.H., Oh S., 1987, "Developing Buyer-Seller Relationships", *Journal of Marketing*, 52, April, pp. 21–34.
5. Heide J.B., 1994, "Interorganizational Governance in Marketing Channels", *Journal of Marketing*, 58, January, pp. 71–85.

УДК 621.311.13

SURGE PROTECTOR IN THE POWER GRID BASED ON A MICROCONTROLLER

*Students – Tit P.S., 19 rpt, 1 year, TSF;
Linnik E.V., 93 e, APF;
Smolsky V.A., 93 e, APF*

*Scientific supervisor – Petrashko V.V., senior teacher
EI «Belarusian State Agrarian Technical University»,
Minsk, the Republic of Belarus*

Abstract. The article describes the appropriate surge protector in the power grid based on a microcontroller. It highlights important characteristics of a microcontroller.

Keywords: power grid, microcontroller, voltage relays, structural diagram, block diagram.

Voltage relays are devices designed to track the constant value of the voltage, and disable the load when it is exceeding the established limits, in case of the accidents in the mains. Voltage relays are intended for multiple protections of electrical consumers from an unacceptable decrease or increase of voltage in the electrical circuits. Some models are able to resume operation of the connected equipment after eliminating the causes of unacceptable voltage appearance in the mains.

To provide a minimum cost and a compact and reliable size of the device, it is based on a microcontroller. The microcontroller is a written program code that combines the functionality of several radio elements or nodes, thereby reducing their number and providing a more compact size and low cost of the device.

To define the appropriate surge protector in the power grid, the following tasks should be completed:

- analyze the terms of reference;
- develop a structural and electrical schematic diagram of the device for protection against dangerous voltages;
- perform calculation and selection of the device element base;
- determine the reliability of the protection device against dangerous voltages;
- justify economically the relevance of device development;
- describe the safe conditions for manufacturing of the device.

For the implementation of this device, a modern element base was taken as the basis for achieving the best results during the operation of this device. Namely, the achievement of trouble-free and reliable operation, its durability and maintainability in the case of failure, as well as the compactness of the entire system as a whole, low production cost price and energy efficiency.

In order to protect the equipment from emergency modes of the mains operation, a block diagram is proposed. It consists of several functional nodes: a rectifier, a comparison circuit that registers an increase in voltage in the mains, a control device, and a key.

The sensor is an unstable DC power source consisting of a T1 transformer, a VD4 diode bridge, and a C4 capacitor. When the network voltage increases, the output voltage of the VD4 bridge increases.

At a certain value of this voltage, the comparator DA1 is triggered. The comparator output signal is fed to the generator input (DD1. 1, DD1. 2) of the control device. The RS trigger is excluded from the device, since the generator is controlled by the DA1 comparator.

The switching element (key) is a VS1 connected to the generator. The generator generates pulses with a frequency of 10 kHz with a frequency of 10. The maximum pulse duration is limited only by the switching time of the key. For KU208G, the duration of the control pulse must be at least 10 MS. The control unit includes a power source assembled on the elements VD1, VD2, C1, R1, R2. Transistor VT2 is the power amplifier of the generator's pulses.

A high level from the comparator output triggers the pulse generator. At the moment of start-up, the device consumes a larger current, which at the first moment is supported by the voltage on the capacitor C1. Then the transistor VS1 is opened and, through the resistor R7, the transistor VT1 is opened. The open transistor VT1 shunts the resistor R2, thus providing even more power current. The HL1 led indicates that the load is switched on. The reference voltage applied to pin 5 sets the upper trigger threshold. When the input signal reaches the upper

threshold of operation of the comparator, i.e. U1. the output DA1 is set to the logical "0" voltage.

The generator is switched off, the VS1 remains closed, and the load is disconnected from the network. If the output voltage is then reduced, then the output level is again set to "1", and the load is connected to the network. The value of the hysteresis, and therefore the lower threshold of operation of the comparator are regulated by a resistor R9.

Based on the analysis of structural diagram of the protection device from the high voltage mains on the microcontroller, which contains nine units: the power unit, the power adjustment phase voltage, the microcontroller unit, control unit, microcontroller unit sound unit information display, block light indication, unit three-pin relay.

On the basis of the block diagram, an electrical schematic diagram has been developed. The principle of operation of the developed scheme is reviewed and the element base is determined.

References

1. Automatic overvoltage protection for 220V network [Electronic resource] / Diagram. – Ukraine. – 2000. – access mode: <http://www.diagram.com.ua/list/power/power791.shtm>. – access date: 19.04.2020.

2. Protection of equipment from emergency modes of network operation [Electronic resource] / Diagram-Ukraine. – 2009. – access mode: <http://www.diagram.com.ua/list/house/1-40.shtml>. – Date of access: 19.04.2020.

Подсекция «Белорусский и русский языки»

УДК 005.32

РОЛЯ ЗНОСІН Ў ПРАФЕСІЙНАЙ ДЗЕЙНАСЦІ

Студэнт – Савіч В.Г., 18 рпт, 2 курс, ФТС

Навуковы кіраўнік – Занкавіч А.П., к.філ.н., дацэнт

*УА «Беларускі дзяржаўны аграрны тэхнічны ўніверсітэт»,
г. Мінск, Рэспубліка Беларусь*

Анотацыя. У артыкуле разглядаецца роля зносін у прафесійнай дзейнасці сучаснага чалавека.

Ключавыя словы: дзелавыя зносіны, маўленчая камунікацыя.

Зносіны адыгрываюць важную ролю ў розных відах прафесійнай дзейнасці, але асаблівую значнасць яны набываюць для людзей, занятых у