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DIGITAL MEASURING INSTRUMENTS

Annotation: being a digital measuring instrument, the result of a continuously measured magnitude in relation to a measurement is told to instruments that can be discretely modified and indexed in a digital recording device or a device that records numbers. Digital measuring instruments have the following advantages over analogs: high accuracy; wide working range; speed; convenient recommendation of measurement results; the possibility of connecting to automated networks; the possibility of automating the measurement process

Keywords: digital, measurement, continuous, discrete, recording

Introduction

As a digital measuring instrument, the result of a continuously measured magnitude in terms of measurement is told to instruments that can be discretely modified and indexed in a digital recording device or in a number recording device. Digital measuring instruments are now very common [1].

A functional drawing of a digital measuring instrument is shown in Figure 1 [3].

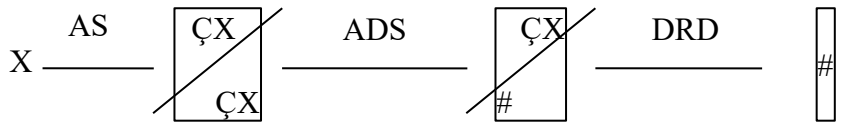

Figure 1. Functional drawing of digital measuring instrument: AS - analog switch; ADS – analog-digital switch; DRD - digital recording device.

Materials and methods

This includes empirical methods such as modeling, fact, experiment, description and observation, as well as theoretical methods such as logical and historical methods, abstraction, deduction, induction, synthesis and analysis. The research materials are: scientific facts, the results of previous observations, surveys, experiments and tests; means of idealization and rationalization of the scientific approach.

The analog signal" X " is converted to a convenient form for further modification at the input analog switch KAO, and then discretized and encoded using an analog-to-digital switch (ARO`). Finally, the digital recording device rqq displays the information encoded by the measured magnitude in a digital recording style, operator-friendly form. Due to the convenience and accuracy of the recommended information, digital measuring instruments have gained a wide place from research and development laboratories.

Digital measuring instruments have the following advantages over analog measuring instruments:

• high precision;

* wide working range;

* agility;

* convenient recommendation of measurement results;

• possible connection to automated networks;

• availability of the ability to automate the measurement process, etc.

But just as there is a fault in each spill, digital measuring instruments also have certain disadvantages [4]:

* complexity;

* height of tanning;

* relatively lower reliability.

But, as a result of the rapid development of integrated circuits, the above disadvantages are increasingly limited.

Results and discussion:

Be considered the basis of a digital measuring instrument]adi. In it, the information is discretized, then quantized and encoded. Discretization is the acquisition of records at a specific (very short) discrete time interval. Usually, an attempt is made to make the discretization step permanent. Quantization, on the other hand, is the replacement of continuous values of magnitude X(t) by a set of discrete xn values. Continuous values of magnitude are replaced by values of quantization levels based on specific orders. Coding, on the other hand, consists of recommending the numerical values expressed in a particular sequence [5].

Discretization and quantization are the main sources of error for a digital measuring instrument. In addition, the number of quantization levels also introduces self-consistent errors.

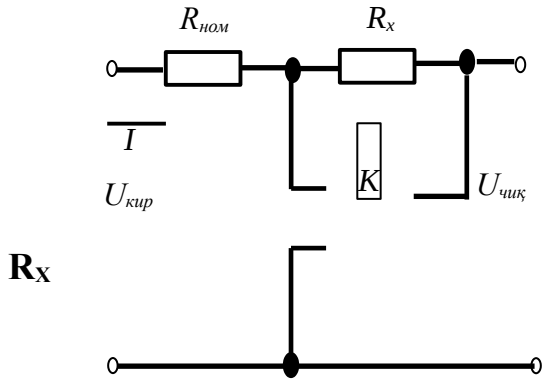

Figure 2. Combined digital instrument scheme

The rapid development of liquid crystal indicators is laying the groundwork for the compactness of digital measuring instruments, a decrease in energy consumption.The element base of modern electronics allows you to create digital measuring instruments with a wide range of capabilities.

The bulk of combined digital instruments consists of a fixed current amplifier with an integrative property. The input of combined digital instruments

is connected by switches that convert alternating current to constant current, change resistance, inductance and capacitance to voltage [6].

The digital instrument circuit measuring the resistor resistance is in Figure 2, where the R_X amplifier connects to the negative reverse bond chain of K. Since the amplifier has a very large voltage amplification factor, a voltage is generated at the output of the amplifier when the resistor is connected to the RX amplifier. Because the current passing through the input of the amplifier is small, the main current goes through the resistor resistor**.**

Therefore, the output voltage of the amplifier will be:

$$U_{chiq} = IR_x$$

Conclusion:

Combined-duty digital instruments are designed to measure constant and variable voltage from 5 mV to 500 V, constant and alternating current from 5G to A to 500 mA, resistance from 50 Om to 5000 kOm. The above recorded parameters can be measured in the frequency range of 45-20000 Hz. It is supplied from a 220 v variable voltage network or an autonomous source of 17,5 V [3].

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