

УДК 681.518.3

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Information and Measurement System

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An information and measurement system (IMS) is a set of functionally integrated measuring, computing and other auxiliary technical means for obtaining measurement information, converting it, processing it in order to present it to the consumer in the required form, or automatically performing logical functions of control, diagnostics, identification, etc.

Depending on the functions performed, IMS are implemented in the form of measurement systems (MS), automatic control systems, technical diagnostics, etc.

In turn, depending on the purpose, measuring systems are divided into measuring information, measuring control, measuring control systems, etc.

Measuring system (MS) - a set of measuring instruments (measuring transducers, measures, measuring switches, measuring instruments) and other technical devices (components of a measuring system), which form measuring channels, which implements the measuring process and provides automatic (automated)) obtaining measurement results (expressed by a number or a code) in the general case of time-varying and distributed in space quantities that characterize certain properties (state) of the measurement object.

The largest structural unit for which metrological characteristics (MC) can be normalized is the measuring channel (MC) of the MS

The measuring channel of the MS is a structurally or functionally allocated part of the MS that performs a complete function from the perception of the measured value to the receipt of the result of its measurements, expressed by a number or a corresponding code, or to the receipt of an analog signal, one of the parameters of which is a function of the measured value [1].

It is a serial connection of the SI forming the MS (some of these SI themselves can be multi-channel, in this case we should talk about the serial connection of the MS of these SI). Such a SI connection, provided for by the functioning algorithm, performs a complete function from the perception of the measured value to the indication or registration of the measurement result, inclusive, or converting it into a signal convenient for further use outside the MS, for input into a digital or analog computing device that is part of the MS, for joint conversion with other values, for influencing the actuators.

A typical MC structure includes a primary measuring converter, a connecting component of the measuring system (a technical device or part of the environment intended or used for transmitting signals with minimal possible distortion that carry information about the measured value from one MS component to another (a wired communication line, a radio channel, a telephone communication line, a high - voltage power line with the corresponding channel-forming equipment, as well as transition devices-terminal blocks, cable connectors, etc.)), an intermediate (unifying) measuring converter, analog-to-digital converter, processor, digital-to-analog converter.

There are simple MC that implement direct measurements of a quantity, and complex MC that implement indirect, cumulative, or joint measurements, the initial part of which is divided into several simple MC.

The length of the MC can range from tens of meters to several hundred kilometers, and their number - from several tens to several thousand. Information from the sensors is usually transmitted by electrical signals (less often - pneumatic) - current, voltage, pulse repetition rate. In some measurement areas, modern sensors have a digital output. Radio signals are used for long MC distances. The secondary part of the MC, after the communication lines connecting it to the sensors, is usually called the measurement and computing (MCC), (complex component of the measuring system (complex component of the MC, measuring and computing complex): A structurally integrated or geographically localized set of components that make up part of the MC, usually completing measurement transformations, computational and logical operations provided for by the measurement process and algorithms for processing measurement results for other purposes, as well as generating output signals of the system.), or software and hardware (SHC) complex. A significant part of modern MCC (SHC) is built on the basis of controllers, usually of modular design, including analog-to-digital and digital-to-analog converters, a processor, discrete (binary) information modules (input and output), auxiliary devices [2].

References:

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2. “Информационно-измерительные системы и технологии” [Электронный ресурс]. – Mode of access: <https://pandia.ru/text/78/408/65587.php> – Date of access: 15.03.2021.