Control Instrumentation

Study programme, specialization: B0715A270012 Engineering, S05 Machine and Process Control
Academic year: 2024/2025

1. Building elements of control circuits (control circuit, element, subsystem, communication links and hierarchical structure of control system, distributed control system).
2. Static and dynamic properties of the members of control circuits (static characteristics, step response, sensitivity, accuracy).
3. Technical and software means of automatic control (types, description, basic properties, I/O signals).
4. Sensors and methods for measuring the temperature (principles, properties, designs, examples).
5. Sensors and methods for measuring position, dimensions, displacement, forces, weight (principles, properties, designs, examples).
6. Sensors and methods for measuring pressure, water level and flow rate (principles, properties, designs, examples).
7. Sensors and methods for measuring speed, acceleration, vibration (principles, properties, designs, examples).
8. Smart sensors (description of internal structure, description of functions, example of deployment, description of interface for data transmission).
9. I/O interface of industrial control systems (I/O signal types, communication interface structure and properties, analogy and discrete I/O channels).
10. A/D converter and D/A converter (A/D and D/A converter configurations, internal structure, description of conversion methods).
11. Controllers and computer control systems (internal structure, I/O types, communication interface).
12. Electric drives and their control, basic principle of drive control, their function and different types (scheme, types, use).
13. Basic logical functions (truth tables, implementation of logic functions using contacts, circuit elements and gates).
14. Basic Flip-Flops (J-K, R-S, D, description, timing, truth table, application).
15. Combinational and sequential circuit (description, differences, definition of variables, solution procedure).
16. PLC - Programmable Logic Controller (types, use, internal structure, galvanic isolation, expansion modules).
17. Programming of PLC - description of programming languages, programming of basic logical functions.
18. ILAN - description and usage of industrial networks (properties, advantages, use, description of physical layer, ...).
19. SCADA/HMI systems (hierarchical structure and their level description, communication interfaces, example, design and configuration of tasks for monitoring applications, access rights and security).

Updated: 12. 3. 2025