

Electronic Controls Specialist Certification

WHAT YOU NEED TO KNOW

The ECS certification is designed to review and test the understanding, specification, and application of the full breadth of electronics used in fluid power, from simple sensors and limits to HMIs, controllers, and networks. It includes a brief review of applicable pneumatic and hydraulic principles, as well as in-depth examples for both mobile and industrial fluid power equipment.

In-depth knowledge in the following areas is necessary to be successful in achieving an ECS Certification.

Fluid Power Systems

- Read and interpret fluid power schematics
- Perform calculations that describe the motion and force of fluid power actuators
- Demonstrate an understanding of friction and leakage in fluid power components and their effects on system performance
- Identify the causes and minimize the effects of hydraulic shock in a system
- Demonstrate knowledge of the operation and application of proportional valves
- Describe the operation and application of electric flow control devices
- Describe the operation and application of electric pressure control devices
- Demonstrate a knowledge of the effects of pressure compensated components on control systems
- Demonstrate knowledge of the operation and the application of servo valves
- Demonstrate knowledge of the effects of mechanical nulling on control systems

Electronic and Electrical Principles

- Basic Electrical Quantities and Measurements
- Inductance/Capacitance

- Block Diagrams
- Power Supply
- Circuit Protection
- NEC Wiring Considerations
- Power and Signal Quality
- Grounding

Input/Output Devices

- Switches
- Input Potentiometers and Joysticks
- Sensors
- Application of Sensors
- Sensor Sinking, Sourcing and Wiring
- Understanding Encoders, Linear Sensors, and Transducers and Joysticks
- Solenoids
- Operating Environmental Considerations

Applying Control Theory

- Determine Hydraulic Stiffness of a System
- Determine Actuator Natural Frequency
- Describe Frequency Response of a System

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WHAT YOU NEED TO KNOW

- Interpret Bode Diagrams
- Identify General Control System Design
- Understand Control Techniques Used in Fluid Power Systems
- Interpret and Create Block Diagram
- Evaluate Basic System Physics
- Discuss the Effect of PID Loop Tuning on a Fluid Power System

Interacting with Controllers

- Select Controller Architecture
- Specify Controller Performance Parameters
- Select Controller Interface Hardware
- Understand IEC 61131-3 Logic Programming
- Recognize Common Program Solutions
- Trace and Influence Data

Utilize Industrial Networks

- Open System Interconnect Model
- Select Network Architecture and Components
- Network Implementation Considerations
- Wireless Networking in Fluid Power
- Human Machine Interfacing



The International Fluid Power Society (IFPS) believes that implementation of safe procedures is paramount in all fluid power systems, the electrical and electronic controls that guide them, and all associated technologies. The IFPS recommends that, in every circumstance, factory, piece of mobile equipment, or application of any fluid power product or its controls, every employee and employer is responsible to know, understand, and practice the safety policies and procedures already in place. Consult manufacturer's safety specifications for each machine. Take the responsibility to improve the safety standards whenever an opportunity presents itself. No one knows the equipment better than the people who work with it daily – they are the most important ones to improve that equipment's safety.

Warning: Never operate any machinery unless you have read and understood the instructions in the operator's guide. Improper machinery operation is dangerous and could cause injury or death.

