

Level 1: Fundamentals

Fluid Power—Hydraulics

This hydraulic training course is designed to familiarize students with the construction and operation of hydraulic components. Investigating the construction and operation of a range of hydraulic equipment, this hydraulic training course covers the fundamental principles of hydraulics as well as the individual components. Valves controlling pressure, flow rate, sequence and direction of flow are included and practical exercises are used to demonstrate their operation, based on standard symbol circuits. Maintenance and a systematic approach to fault finding are also covered.

Course Topics

- Equipment and circuit diagram symbols, reading and interpreting basic hydraulic circuit diagrams
- Physical principles of hydraulics
- Structure and mode of operation of basic components
- Measure volumetric flow and pressure
- Technology and characteristic data of valves and drive elements
- Intensive training for industrial practice: setting up systems in accordance with circuit diagrams, commissioning systems
- Fundamentals of proportional hydraulics

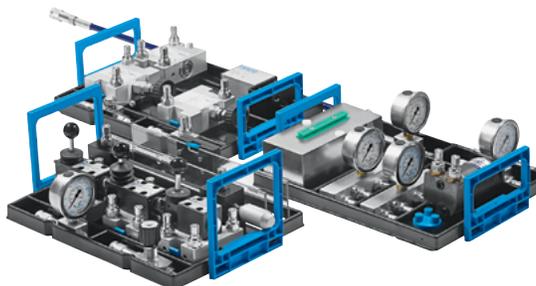
Core Competencies

- Design, assemble, test, and troubleshoot basic hydraulic circuits
- Identify and describe the construction, design features, and operation of hydraulic components
- Interpret technical specifications and data relating to hydraulic components and systems
- Identify and explain graphical symbols for hydraulic components
- Describe fundamentals of oil flow

Equipment

Basic Hydraulics Training Package

- Hydraulic trainer engineered for extreme ease of use and durability
- Exceeds industrial safety standards
- Many work surface options, including an “A” frame top to allow experiments on both sides of a bench
- Lockable storage available
- Industrial-grade components pre-labeled with appropriate circuit symbol, providing learning reinforcement
- Teachers can create their own circuits to reproduce specific hydraulic applications
- Faulty component package for real-world troubleshooting



**The same bench system is used for Pneumatics and Hydraulics.
Further use of the bench is realized in Level 2 certifications**



Level 1: Fundamentals

Fluid Power—Pneumatics

This pneumatic training course covers the use of compressed air for pneumatic control and as a signaling medium. A complete overview is given, covering compressors, storage, dryers and distribution as well as the design, construction and operation of a range of actuators, valves and ancillary equipment. The relevant ISO symbols are introduced and included in the circuit diagrams. This course ensures a sound competence the safe operation and maintenance of one of the most common automation elements in industry.

Course Topics

- Structure, function and application of single-acting and double-acting cylinders
- Calculating basic parameters
- Direct and indirect actuation
- Application and function of 3/2 and 5/2-way valves
- Methods of actuation of directional control valves
- Analyzing circuits
- Options for pressure measurement
- Pressure-dependent control systems
- Distinguishing flow control
- Logic operations: explaining and implementing AND/OR/NOT operations
- Function and application of limit switches
- Time delay valves
- Realizing oscillating movement
- Economic considerations of using pneumatic components

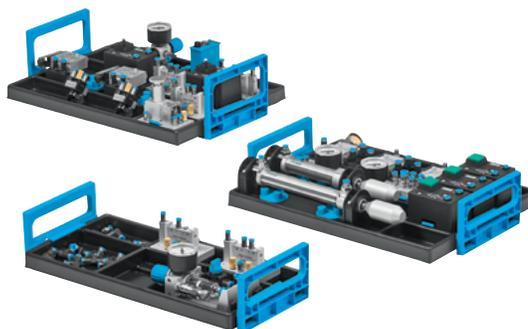
Core Competencies

- Interpret and draw pneumatic symbols
- Construct and troubleshoot pneumatic circuits
- Determine root cause of component failure
- Make speed adjustments to actuators
- Explain the force/pressure/area relationship
- Describe the different states an actuator can assume and the importance of each
- Identify/explain function of pneumatic components

Equipment

Basic Pneumatics Training Package

- Industrial-grade components pre-labeled with appropriate circuit symbols, providing learning reinforcement
- Repositionable components build a foundation of knowledge one device at a time, making it easier to teach circuit assembly
- Teachers can create their own circuits to reproduce specific pneumatic applications
- Pneumatic trainer engineered for extreme ease of use and durability
- Exceeds industrial safety standards
- Faulty component package for real-world troubleshooting



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Level 2: Advanced Mechatronics

Applied Fluid Power—Maintenance & Troubleshooting

Estimated Duration: 16 hours

Level 2

This course adds on to the Basic Pneumatics course in Level I. Students will learn how to read and interpret electro-pneumatics circuits and dive deeper into how to maintain, troubleshoot, and repair pneumatic systems. This extends your knowledge of complex pneumatic systems and improves your troubleshooting skills. Practical exercises on training equipment for setup, commissioning, troubleshooting, and fault elimination facilitate the transfer of knowledge to real world industrial applications.

Course Topics

- Setup and commissioning of pneumatic and electro-pneumatic systems
- Analysis of control tasks using GRAFCET in accordance with DIN EN 60848
- Design and function of pneumatic and electro-pneumatic circuits
- Common failures of components
- Characteristics and behaviors of failing components
- Disassembly, inspection, and repair of failed components
- Identifying root causes of component failures
- Troubleshooting of various pneumatic circuits

Core Competencies

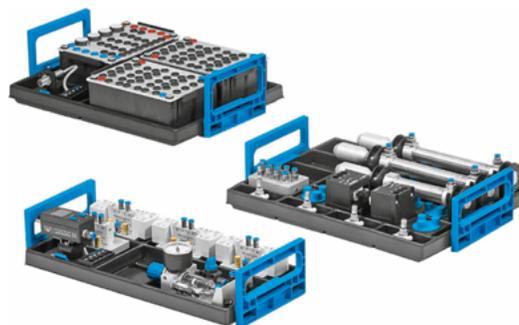
- Set up and commission complex pneumatic systems
- Systematically troubleshoot pneumatic systems
- Know the role of PLC in automation and to integrate the PLC into the control section
- Work with valve terminals
- Interpret latest standards and regulations

Equipment

Electropneumatics System Training Package

This training systems is a direct add-on to the level one Pneumatics Systems. It easily integrates into the bench and includes the following elements:

- Signal input, electrical
- Relay, three-fold
- Mechanical Limit Switches
- Proximity sensor, optical and magnetic
- 2 x 3/2-way solenoid valve with LED, normally closed
- 5/2-way solenoid valve with LED
- 5/2-way double solenoid valve with LED
- Pressure sensor with display
- One-way flow control valve
- Single-acting and Double-acting cylinders
- Faulty component package for real-world troubleshooting



Level 2: Advanced Mechatronics

Applied Fluid Power—Vacuum Technology

Estimated Duration: 8 hours

Level 2

The use of suction grippers to handle workpieces has become an integral part of handling technology as they offer advantages such as the ease of construction and the gentleness of the grippers. Suction grippers also enable rapid cycle times, and the investment required is comparatively low. Yet, many technicians are not familiar with how it works. This course follows Basic Electropneumatics Training, focusing on the topic of handling technology using a vacuum.

Course Topics

- Introduction to vacuum technology
- Vacuum generation in handling technology
- Vacuum components in handling technology
- Component selection criteria

Core Competencies

- Understand and explain the generation and provision of vacuum
- Able to describe the fundamentals of vacuum
- Select and dimensions suction cups
- Interpret the material properties of handling with vacuum
- Interpret the vacuum generator properties
- Design simple vacuum circuits

Equipment

Vacuum Technology Training Package

This learning package directly integrates into the other pneumatics systems and includes a wide range of vacuum elements:

- Air pressure reservoir
- Pressure switch
- Vacuum gauge
- Flow control valve
- Vacuum generator, type H
- Vacuum generator, type L
- Non-return valve
- Non-return valve, delockable
- Six types of suction grippers

