

# Portable Basic Hydraulics | eLearning Course

Hydraulic Power Systems - V19144-XA01UEN-E1

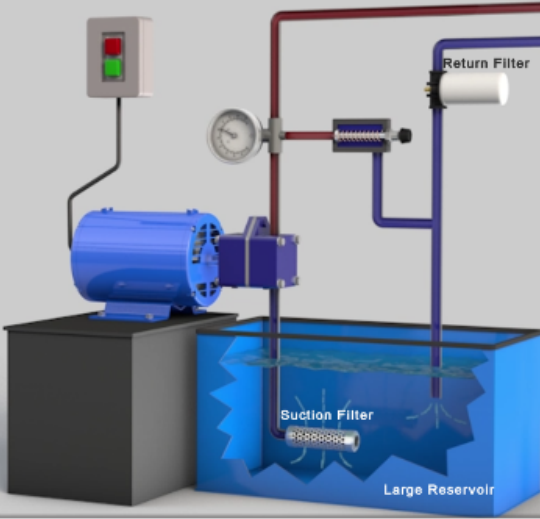
Objective 5: Describe the Operation of a Hydraulic Power Unit

Power Unit Functions

It is the job of the power unit to not only produce a flow of oil to the system but to make sure it is clean and not too hot.

To clean the oil, most power units have a suction filter and a return filter.

To cool the oil, many power units use a heat exchanger that uses cool water or air. However, some power units allow the oil to cool by having a large reservoir.



The diagram illustrates a hydraulic power unit. It features a blue electric motor pump mounted on a black base. A red line (pressure line) connects the pump to a pressure gauge and then to a blue line (return line). The blue line passes through a return filter and then down into a large blue reservoir. Inside the reservoir, there is a suction filter. The reservoir is labeled 'Large Reservoir'. The suction filter is labeled 'Suction Filter'. The return filter is labeled 'Return Filter'. The pump has a control panel with a red and green button. The diagram is set against a light gray background.

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## eLearning Course: M19144

Amatrol's Portable Basic Hydraulics eLearning course (M19144) teaches learners about essential basic hydraulics concepts applicable across a variety of modern industries, such as manufacturing, transportation, agriculture, and construction. Learners using this course begin by studying the physical principles of hydraulics, such as pressure and flow, and how hydraulic mechanisms are used in real world applications. From this building block, learners begin practicing industry-relevant hydraulic skills, like constructing hydraulic circuits.

## Teach Hydraulic Systems & Circuits

### Essential Knowledge Connected to Real-World Skills

Amatrol's eLearning curriculum is unique in that it thoughtfully combines in-depth theoretical knowledge with practical, hands-on skills. This powerful combination of knowledge and skills solidifies understanding and creates a strong foundation for pursuing more advanced skills.

For example, the basic hydraulics eLearning course covers important topics, such as:

### Hydraulic Power Systems

Learners begin with an introduction to hydraulics, including power unit operation, circuit connections, and basic cylinder circuits. Individual lessons focus on topics like hydraulic pressure, the five basic components of a hydraulic system, hydraulic schematics, and the function and operation of various types of hydraulic cylinders. Learners will also practice skills, such as reading a hydraulic pressure gauge, using a tee to connect two circuit branches together, and designing a dual cylinder hydraulic circuit.

### Basic Hydraulic Circuits

Learners will study the components and operation of basic hydraulic circuits, including pumps, needle valves, basic motor circuits, and hydraulic schematics. Individual lessons focus on topics like flow rate, flow meters, fixed-displacement pumps, hydraulic motors, and hydraulic circuit schematics. Learners will also practice skills, such as controlling the speed of an actuator using a manually-operated directional control valve, connecting and operating a bi-directional hydraulic motor using a 3-position, manually-operated directional control valve, and designing and

drawing a schematic for a multiple actuator hydraulic circuit.

## **Principles of Hydraulic Pressure and Flow**

Learners using Amatrol's basic hydraulics eLearning course will study basic principles of hydraulic pressure and flow, including pressure vs. cylinder force, hydraulic leverage, fluid friction, and absolute vs. gauge pressure. Individual lessons focus on topics like the force output of extending and retracting cylinders, Pascal's Law, resistance in hydraulic systems, Delta P, and characteristics of circuit pressure drops. Learners will also practice skills, such as calculating the retraction force of a cylinder given its size and pressure, measuring Delta P across a hydraulic component, and converting between absolute pressure and gauge hydraulic pressure.

## **Hydraulic Speed Control**

Learners will study various aspects and components of hydraulic speed control, including: relief, check, and flow control valves; meter-in and meter-out circuits; flow control circuit design; and flow rate vs. cylinder speed. Individual lessons focus on topics like the function and operation of various types of valves, operation and applications of meter-in and meter-out flow control circuits, independent speed control, and cylinder stroke time. Learners will also practice skills, such as connecting a relief valve in a circuit to limit pressure in the system, designing a circuit to provide bypass flow, connecting and adjusting a flow control valve to control speed of an actuator, and calculating the extend and retract speed of a hydraulic cylinder given its size and a flow rate.

## **Pressure Control Circuits**

Learners using Amatrol's basic hydraulics eLearning course will study various aspects and components of pressure control circuits, including sequence valves and pressure reducing valves. Individual lessons focus on topics like operation and applications of sequence valves, function and operation of bypass check valves and integral check valves, operation and applications of pressure reducing valves, and external draining of sequence and pressure reducing valves. Learners will also practice skills, such as connecting and operating a pressure sequence circuit, designing a two-sequence valve control circuit, and designing a hydraulic circuit that uses a pressure reducing valve.

## **Interactive eLearning**

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### **Highly-Interactive Multimedia Format Appeals to All Learning Styles**

Amatrol's Portable Basic Hydraulics eLearning course curriculum features a highly-interactive multimedia format. Stunning 3D animations, videos, pictures, voiceovers of all text, and interactive quizzes and exercises bring learning to life. Amatrol's multimedia curriculum contains elements that will appeal to every learning style, keeping learners motivated and engaged.

### **Anytime, Anywhere Access Promotes Self-Paced Learning**

In today's fast-paced, technology-driven world, it's more important than ever to extend the reach of industrial skill training beyond the borders of traditional classrooms. Amatrol's eLearning meets the challenge for flexibility by offering in-depth, comprehensive technical skills training via an intuitive, easy-to-use web-based Learning Management System (LMS).

With anytime, anywhere online access, Amatrol's eLearning allows learners to set their own pace at home, on the job, in a traditional class setting, or a blended approach of these options.

## **Virtual Simulator**

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### **Virtual Training Systems Replicate Hands-On Skills**

Amatrol's Portable Basic Hydraulics eLearning course also features a virtual trainer option that allows learners to practice hands-on skills using an online simulator rather than physical equipment. Amatrol's virtual simulators mirror actual Amatrol training equipment, expertly replicating hands-on skills practice with industrial realism.

In addition to expanding training options for users, Amatrol's virtual simulators help to reduce initial training program startup costs and space requirements. They also offer seamless integration with Amatrol's hardware

systems if added in the future.

## **Additional Info**

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### **Requires:**

- Computer ([see Computer Requirements](#))

### **Options:**

- Portable Basic Hydraulics Learning System (990-BH1)
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#### **Address**

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