Improve Productivity
Reduce Downtime
Get Certified
## Table of Contents

### Course Offerings & Descriptions, Training Products

#### Fluid Conveyance Product Courses
- **Instructor Led Training**
  - Eaton’s Aeroquip Fluid Conveying Product School - Level 200
  - Eaton’s Aeroquip Products Specialist School - Level 300/400
  - Eaton’s Weatherhead Fluid Conveying Product School - Level 200
  - Eaton’s Weatherhead Products Specialist School - Level 300/400
  - Eaton’s LifeSense® Certification School
  - Eaton’s Industrial Hose School

#### Technology Courses
- **Instructor Led Training**
  - Fundamentals of Industrial Hydraulics
  - Industrial Basics
  - Industrial Hydraulics
  - Advanced Industrial Hydraulics
  - Hydraulic Schematics
  - Fundamentals of Mobile Hydraulics
  - Mobile Hydraulics
  - Advanced Mobile Hydraulics
  - Troubleshooting
  - Cartridge Valves
  - Fundamentals of Electrohydraulics
  - Electrohydraulics Maintenance and Troubleshooting
  - Circuit Design (Industrial Level 400)
  - Pump Controls

#### Power, Motion & Control Product Courses
- **e-Learning / Web Based Training**
  - Eaton’s Power, Motion & Control eLearning Activities

- **Instructor Led Training**
  - Eaton’s Power and Controls Product Training (Level 200/300)
  - Eaton’s Gear/Vane and Char-Lynn® Products Service School
  - Warranty Center Failure Analysis
  - Closed and Open Circuit Piston Products Service School
  - AxisPro™
  - CLS Mobile Valves
  - CMA Mobile Valves
  - DuraForce Outside Sales Certification - Level 200/300
  - Eaton’s Pro-FX™ Sales Course
  - Eaton’s Pro-FX™ Application Course
  - Eaton’s Pro-FX™ Advanced Application Course

#### eLearning
- CANbus Online Training Courses

### Int’l Fluid Power Society (IFPS) Certifications

<table>
<thead>
<tr>
<th>Recommended Course Progressions for Industry Certifications</th>
<th>26-27</th>
</tr>
</thead>
<tbody>
<tr>
<td>IFPS Hydraulic Specialist Review</td>
<td>28</td>
</tr>
<tr>
<td>IFPS Connector &amp; Conductor Review and Job Performance</td>
<td>28</td>
</tr>
<tr>
<td>IFPS Electronic Controls Specialist Review</td>
<td>29</td>
</tr>
<tr>
<td>IFPS Certified Technician Review and Job Performance</td>
<td>29</td>
</tr>
<tr>
<td>IFPS Certified Mechanic Review &amp; Job Performance</td>
<td>30</td>
</tr>
</tbody>
</table>

### Classroom Materials and Lab Equipment

#### Training Simulators
- HTS-2 Hydraulics Training Simulator
- MTS-1 Mobile Training Simulator
- PETS-II Portable Electrohydraulic Training Simulator

#### Component Model Cutaways
- Component Cutaways

### Textbooks
- Industrial Hydraulics Manual
- Mobile Hydraulics Manual
- Closed Loop Electrohydraulics Systems Manual
- Bird, Bones and Sludge

### Literature/Reference Materials
- Lightning Reference Handbook
- Industrial Hydraulics Manual Answer Key
- Mobile Hydraulics Manual Answer Key
- Introduction to Hydraulics Technology Student Workbook

### Multimedia/Miscellaneous
- Industrial Hydraulics Manual Graphics Flash Drive
- Mobile Hydraulics Manual Graphics CD
- Aeration/Cavitation Demonstration DVD
- Hydraulic Formulas Reference Card
About Us
Eaton’s Hydraulics Group Training Services - North America

Our Commitment to Excellence
Eaton’s (formerly Vickers®) Hydraulics Group training center was established in 1945. Since then, our world-class instructors and state-of-the-art facilities have made Eaton the educational standard for the industry. We are the first choice of many customers for their fluid power training needs.

It is a bold statement, but here at Eaton’s Hydraulics Training, we live for the world of hydraulics education. Our organization was created to bring you the absolute latest in hydraulic technology, and we are confident that we can do it in the most efficient, cost-effective way possible. Each class is constructed to convey the knowledge you desire, and each instructor is outfitted with years of industry field experience to back it up. Our entire curriculum is focused completely around hydraulics, and we take pride in our ability to offer industry-specific courses and products.

Training Services is able to ensure quality in its courses by maintaining a limited class size, utilizing advanced equipment that includes simulators, cutaways and take-aparts, and by providing materials that directly coincide with the course presentation.

Both product and technology courses are offered which cover a wide array of fluid power related topics. Our courses suit the needs of anyone involved in the industry, from newcomers to application specialists.

This brochure contains complete descriptions of training courses as well as our full line of training products.

Improve Productivity
Whether for hydraulic repair personnel, supervisors, engineers, sales or purchasing, our courses will solidify hydraulic knowledge and aid increased job performance. Our technical training instructors are International Fluid Power Society (IFPS) Certified Fluid Power Specialists and Certified Fluid Power Accredited Instructors, ensuring a consistent and high quality experience for our students.

Reduce Downtime
Training in hydraulics from Eaton is an investment in the future, for both your career and your company. Properly trained personnel save employers significant dollars by reducing unplanned downtime, and maximizing the effectiveness of planned downtime. Our program is based on decades of experience in the hydraulics field, as well as the feedback we receive from companies and their employees who are committed to offering the highest quality services available.

Get Certified
Courses offered in this brochure are led by the finest instructors available. Students attending training at our facilities are provided with all of the necessary training materials needed to be successful. We provide Continuing Education Units (CEUs) for students who attend and successfully pass a comprehensive exam. Obtaining a certification from Eaton’s Hydraulics Training Services will be recognized by the entire Fluid Power industry as a significant achievement. Continuing your professional development with Eaton will help you continue to build and enhance your ability to operate, maintain and design any hydraulic system. Count on Eaton’s Hydraulics Training Services to get you prepared for any of the IFPS Certifications, and to enhance your qualifications for your next opportunity.

Capabilities
Eaton’s Hydraulics Group Training Services is continually taking great strides in progressive hydraulics education. In addition to our centralized facilities, our versatile instructors are capable of taking many of their classes on the road to you. At Eaton, we don’t just talk about training, we deliver. With a large array of technical and product courses, and numerous training materials which include manuals, multi-media, and hands-on equipment, the investment made in training today can pay off with significant results for the future.

Facilities
Our 23,000 ft² state-of-the-art training facility, headquartered in Maumee, OH (Toledo area), can accommodate all training offerings. In addition, we have another training facility in Eden Prairie, MN, which is also fully equipped to offer technical and product training courses.
Registration and Payment Policies
Registrations are processed on a first-come, first-served basis and must be accompanied by payment. Accepted payment methods include purchase order or credit card. A seat in class can be reserved only upon receipt of a form of payment for tuition. Registrations made with credit card (Visa, Mastercard, AMEX, Discover) will be billed upon registration to the class. Registrations made with purchase order (for customers with established lines of credit through Eaton Hydraulics, LLC) will be billed upon attendance in class. Form of payment must be received at Eaton’s Hydraulics Training Services prior to the first day of class.

All training materials are included in the tuition payment. Lunch and drinks will be provided throughout the class, except when the last day of class ends at noon.

Students are responsible for transportation and lodging expenses/arrangements. Confirmation letters with detailed travel, lodging and class information will be sent via email to registered students approximately 30 days before the start date of the class.

Cancellation Policy
An enrollment can be cancelled up to FOUR weeks prior to the first day of class without penalty. Cancellations occurring within four weeks of the first day of class are subject to a 100% cancellation fee. No tuition refunds will be processed for “no-show” student that registered with a credit card. In addition, students that registered with a purchase order will be charged the full tuition for a “no show.”

Students have the ability to cancel their own registrations in the Eaton University system. However, if you are not able to access Eaton University to cancel your registration it is recommended that all enrollment cancellations be communicated via telephone or email.

Class Cancellations
Eaton reserves the right to cancel classes for any reason. If a class cancellation occurs, each registered student will be notified at approximately four weeks prior to the first day of class and receive alternative class dates. If credit card was used for payment, a full refund will be issued back to the credit card used at the time of registration. If purchase order was used for payment during registration, no refund will be required as no billing will have taken place.

It is strongly recommended that students do NOT book any travel arrangements for a class unless they have received the 30 day confirmation letter stating they are registered in the class and expected to attend. Eaton assumes no responsibility for transportation charges incurred relative to cancelled or changed classes.

Prerequisites
Eaton’s Hydraulics Training Services offers courses from basic to advanced. Our basic programs will set a foundation for students to build upon as they continue developing their skills in the Fluid Power industry. We believe it is crucial for students to develop a basic understanding of theory and principles in order to be successful in our more advanced classes. As a result, some courses in this brochure will have prerequisites that are strongly recommended or possibly required in order for a student to be allowed to register. Course prerequisites will be noted at the bottom of a course description. If a course does not have a prerequisite noted then none are required. If you have taken formal hydraulics training at another institute and believe you have met the prerequisite of an advanced class, please contact the training department to approve your registration, before trying to register.

Completion Requirements
Unless otherwise stated, successful completion in all courses includes passing written exercises and exams, attendance during the entire class, and participation in all sessions. Certificates will be awarded to students who have met all of the above course completion requirements. Those students in technology courses who are unable to meet the completion requirements will be provided a certificate of attendance.

Upon successful completion of a training course, students are issued a certificate to validate and recognize their learning and competency (except for the IFPS certification review courses). The International Fluid Power Society (IFPS) conducts the exam for their respective certifications the day after Eaton’s review session is completed. To register for an IFPS certification exam call the IFPS at 800-308-6005 or go to www.ifps.org.

More Information
Classes offered through Eaton’s Hydraulics Training Services are very popular and fill quickly. To check availability, cost, locations and dates of our training classes please visit http://www.eaton.com/HydraulicsTraining
Registering for Training Courses

1. Log into your account, or create a new account at http://my.eaton.com

2. Navigate to the Training link.

3. Click on the link to Eaton University

4. Click on the “Learner” tab, if applicable.

5. Search for the course code in the search box.

6. Click on the “Register” button to proceed with registration for the course.

7. Contact hydraulictraining@eaton.com with any questions or issues you may have regarding registration procedures.
## The Training You Need to Succeed

<table>
<thead>
<tr>
<th>Course Name</th>
<th>Pg #</th>
<th>Inside Sales</th>
<th>Outside Sales</th>
<th>Field Svc/Maint. or Technical Service Personnel</th>
<th>Engineers</th>
<th>Available off-site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eaton’s Aeroquip Fluid Conveying Product School (Level 200)</td>
<td>7</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Eaton’s Aeroquip Products Specialist School (Level 300/400)</td>
<td>7</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eaton’s Weatherhead Fluid Conveying Product School (Level 200)</td>
<td>8</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eaton’s Weatherhead Products Specialist School (Level 300/400)</td>
<td>8</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eaton’s LifeSense® Certification School</td>
<td>9</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eaton’s Industrial Hose School</td>
<td>9</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fundamentals of Industrial Hydraulics</td>
<td>10</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Industrial Basics</td>
<td>10</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Industrial Hydraulics</td>
<td>11</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Advanced Industrial Hydraulics</td>
<td>11</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Hydraulic Schematics</td>
<td>12</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Fundamentals of Mobile Hydraulics</td>
<td>12</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Mobile Hydraulics</td>
<td>13</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Advanced Mobile Hydraulics</td>
<td>13</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Troubleshooting</td>
<td>14</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Cartridge Valves</td>
<td>14</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Fundamentals of Electrohydraulics</td>
<td>15</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Electrohydraulics Maintenance and Troubleshooting</td>
<td>15</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Circuit Design (Industrial Level 400)</td>
<td>16</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pump Controls</td>
<td>16</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eaton’s Power and Controls Product Training (Level 200/300)</td>
<td>19</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eaton’s Gear/Vane and Char-Lynn® Products Service School</td>
<td>20</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warranty Center Failure Analysis</td>
<td>20</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closed and Open Circuit Piston Products Service School</td>
<td>21</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AxisPro™</td>
<td>21</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLS and CMA Mobile Valves</td>
<td>22</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DuraForce Outside Sales Certification - Level 200/300</td>
<td>23</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eaton’s ProFX™ Sales Course</td>
<td>23</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eaton’s ProFX™ Application Course</td>
<td>24</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eaton’s ProFX™ Advanced Application Course</td>
<td>24</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CANbus Online Training Course</td>
<td>25</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>IFPS Hydraulic Specialist Certification Review</td>
<td>28</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>IFPS Connector &amp; Conductor Review &amp; Job Performance</td>
<td>28</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>IFPS Electronic Controls Specialist Review</td>
<td>29</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>IFPS Certified Technician Review &amp; Job Performance</td>
<td>29</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>IFPS Certified Mechanic Review &amp; Job Performance</td>
<td>30</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

Customized training is available, please contact us at hydraulictraining@eaton.com for more information.
Eaton’s Aeroquip Fluid Conveying Product School (Level 200)
Course Registration Code: Hyx_ILT_AFCPS
Duration: 3 or 3.5 Days

This course is a three-and-a-half day session in Maumee, OH, or three-day session in Eden Prairie, MN, or remote locations.

Prerequisites: None

Who Should Attend
For Eaton’s authorized Aeroquip product distributors and Eaton employees only. This school is appropriate for all employees and principals of Eaton’s authorized Aeroquip product distributors.

Topics Covered
• Hose construction and fitting design analysis
• Proper hose and fitting selection
• Construction of hose assemblies with hand tools and assembly equipment
• Extensive assembly equipment review with hands-on assembly practice (Maumee, OH location only)
• Hands-on identification and sizing of threaded port and line connectors for American, ISO, German, French, British and Japanese
• Ermeto® and Walterscheid™ tube connection product reviews
• Eaton’s brand technical and promotional literature
• Product selection to meet customer needs
• Eaton air-conditioning product review
• Overview of Eaton’s PowerSource® application

Completion Requirements
Students will be required to attend and participate in all sessions, exercises, and assignments. In addition, successful completion of this course will require passing a written exam with a score of 70% or higher.

Eaton’s Aeroquip Products Specialist School (Levels 300/400)
Course Registration Code: Hyx_ILT_AQSS
Duration: 3.5 Days

This three-and-a-half-day school includes expanded training on Eaton’s Aeroquip brand’s most popular products and is designed to illustrate the market and applications into which Eaton’s Aeroquip products are installed. Included in the training will be product hands-on identification techniques, procedures for troubleshooting leaks, hose routing techniques, methods to analyze hose failure and how to identify, assemble and install Eaton’s Aeroquip products in real life applications. This course meets the criteria stated in the Channel Compensation Resources (CCR) program manual.

Prerequisites: Prior to enrollment the student must be current with Eaton’s Aeroquip Fluid Conveying Product School (Level 200) certification.

Who Should Attend
For Eaton’s authorized Aeroquip product distributors and Eaton employees only. Eaton’s Aeroquip Products Specialist School (Levels 300/400) is recommended for experienced Aeroquip distributor’s inside and outside sales personnel.

Topics Covered
• Eaton’s authorized Synflex® and Everflex® hose products
• Selection of Eaton’s Quick Disconnect™ couplings
• Eaton’s Brass, Swivel Joint and Flexmaster Joint product offerings
• FLOCS™ fast lube oil change system
• Brazing of Eaton’s Lifesaver™ fittings
• Hydraulic tube bending exercise
• Extensive assembly equipment review with hands-on assembly practice
• Leaks, causes and cures for connectors with hands-on lab exercise
• Hose routing and safety - principles and techniques
• Analyzing hose failures
• Routing and installation hose assembly exercise

Completion Requirements
Students will be required to attend and participate in all sessions, demonstrate proficiency in the course topics, and successfully complete a written exam with a score of 70% or higher.
Course Offerings & Descriptions: Fluid Conveyance Product Courses

Eaton’s Weatherhead Fluid Conveying Product School (Level 200)
Course Registration Code: Hyx_ILT_WFCPS
Duration: 3 or 3.5 Days

This course is a three-and-a-half day session in Maumee, OH, or three-day session in Eden Prairie, MN, or remote locations.

Prerequisites: None

Who Should Attend
For Eaton’s authorized Weatherhead product distributors and Eaton employees only. This school is appropriate for all employees and principals of Eaton’s authorized Weatherhead product distributors.

Topics Covered
- Hose construction and fitting design analysis
- Proper hose and fitting selection
- Construction of hose assemblies with hand tools and assembly equipment
- Extensive assembly equipment review with hands-on assembly practice (Maumee, OH location only)
- Hands-on identification and sizing of threaded port and line connectors for American, ISO, German, French, British and Japanese
- Ermeto® and Walterscheid™ tube connection product reviews
- Eaton’s brand technical and promotional literature
- Product selection to meet customer needs
- Eaton air-conditioning product review
- Overview of Eaton’s PowerSource® application

Completion Requirements
Students will be required to attend and participate in all sessions, exercises, and assignments. In addition, successful completion of this course will require passing a written exam with a score of 70% or higher.

Eaton’s Weatherhead Products Specialist School (Levels 300/400)
Course Registration Code: Hyx_ILT_WHSS
Duration: 3.5 Days

This three-and-a-half day school includes expanded training on Eaton’s Weatherhead brand’s most popular products and is designed to illustrate the market and applications into which Eaton’s Weatherhead products are installed. Included in the training will be product hands-on identification techniques, procedures for troubleshooting leaks, hose routing techniques, methods to analyze hose failure and how to identify, assemble and install Eaton’s Weatherhead products in real life applications. This course meets the criteria stated in the Channel Compensation Resources (CCR) program manual.

Prerequisites: Prior to enrollment the student must be current with Eaton’s Weatherhead Fluid Conveying Product School (Level 200) certification.

Who Should Attend
For Eaton’s authorized Weatherhead product distributors and Eaton employees only. Eaton’s Weatherhead Products Specialist School (Levels 300/400) is recommended for experienced Weatherhead distributor’s inside and outside sales personnel.

Topics Covered
- Eaton’s authorized Synflex® and Everflex® hose products
- Selection of Eaton’s Quick Disconnect™ couplings
- Eaton’s Brass, Swivel Joint and Flexmaster Joint product offerings
- FLOCS™ fast lube oil change system
- Brazing of Eaton’s Lifesaver™ fittings
- Hydraulic tube bending exercise
- Extensive assembly equipment review with hands-on assembly practice
- Leaks, causes and cures for connectors with hands-on lab exercise
- Hose routing and safety - principles and techniques
- Analyzing hose failures
- Routing and installation hose assembly exercise

Completion Requirements
Students will be required to attend and participate in all sessions, demonstrate proficiency in the course topics, and successfully complete a written exam with a score of 70% or higher.
Eaton’s LifeSense® Certification School
Course Registration Code: HyxILT_LS
Duration: 2 Days

This two-day session is offered in Maumee, OH. It is designed to qualify Eaton distributors to successfully manufacture, test and install Eaton LifeSense® systems and hose assemblies.

Recommended Prerequisites: None

Who Should Attend
For distributors’ experienced inside and outside sales personnel and Eaton employees.

Topics Covered
- Introduction to LifeSense®
- Building a hose assembly with hands-on assembly practice
- Wired design technology with hands-on assembly practice
- Wireless design technology with hands-on assembly practice
- How to sell

Completion Requirements
Students will be required to attend and participate in all sessions and exercises and demonstrate proficiency in the course topics. In addition, successful completion of this course will require passing a written exam and a hands-on exam with a score of 70% or higher.

Eaton’s Industrial Hose School
Course Registration Code: HyxILT_EIHS
Duration: 2.5 Days

This two-and-a-half day session is offered in Maumee, OH. Included in the training will be a complete product catalog review and hands-on equipment training.

Recommended Prerequisites: None

Who Should Attend
For Eatons’ authorized Industrial Hose product distributors and Eaton employees only. End customers may attend with prior approval from their Eaton Area Sales Manager Representative.

Topics Covered
- Hose construction designs
- Compounds & elastomer options
- Industrial hose master catalog review
- New hose offerings
- Hose coupling selection techniques
- Assembly equipment options
- Hands-on hose preparation and assembly
- Hands-on build session using Eaton approved hose couplings
- Hose failures analysis
- Overview of Eaton’s PowerSource® application

Completion Requirements
Students will be required to attend and participate in all sessions and exercises. In addition, successful completion of this course will require passing a written exam with a score of 70% or higher.
Fundamentals of Industrial Hydraulics
Course Registration Code: Hyx_ILT_FH
Duration: 3 Days

This three-day course emphasizes the fundamentals and principles of hydraulic system operation. The course focuses on component construction and operation, as well as the role of the individual components used in a hydraulic system. Fundamentals of Industrial Hydraulics is deployed as in-plant or regional training only.

Recommended Prerequisites: None

Customized In-Plant Training
Eaton Hydraulics Training Services also has the ability and equipment to perform this training at a customer location. In addition, we can tailor the curriculum to specific applications and concepts of the customer’s choosing and incorporate a customer’s schematics to enhance the employees’ understanding of specific systems.

Who Should Attend
This course is for companies & institutions that would like a Fluid Power Certified instructor to come to their facility to perform hydraulics training.

Topics Covered
- Hydraulic principles and fundamentals
- Reservoirs and fluids
- Gear, vane, and piston pumps
- Pressure controls
- Directional controls
- Flow controls
- Cylinders
- Vane and piston motors
- Contamination control
- Proportional and servo valves
- Cartridge valves
- Accumulators

Completion Requirements
Students will be required to attend and participate in all sessions, exercises, and assignments. In addition, successful completion of this course will require passing a written exam with a score of 70% or higher.

Industrial Basics
Course Registration Code: Hyx_ILT_IB
Duration: 4.5 Days

This four-and-a-half-day course is a condensed version of the Industrial Hydraulics course that includes hands-on exercises which focus on industrial component construction and operation, as well as on the role of the individual components in an operating industrial hydraulic system. Basic hydraulic formulas will be used for enhancing understanding.

Recommended Prerequisites: None

Customized In-Plant Training
Eaton Hydraulics Training Services also has the ability and equipment to perform this training at a customer location. In addition, we can tailor the curriculum to specific applications and concepts of the customer’s choosing and incorporate a customer’s schematics to enhance the employees’ understanding of specific systems.

Who Should Attend
This course is appropriate for operations, sales, design, maintenance, and repair personnel who work with industrial machinery.

Topics Covered
- Hydraulic principles and fundamentals
- Reservoirs and fluids
- Gear, vane, and piston pumps
- Pressure controls
- Directional controls
- Flow controls
- Cylinders
- Vane and piston motors
- Contamination control
- Proportional and servo valves
- Cartridge valves
- Accumulators

Completion Requirements
Students will be required to attend and participate in all sessions, exercises, and assignments. In addition, successful completion of this course will require passing a written exam with a score of 70% or higher.
**Industrial Hydraulics**  
Course Registration Code: Hyx_ILT_IH  
Duration: 9.5 Days

This two-week course covers the fundamentals and principles of industrial hydraulics with the additional emphasis on hands-on exercises. The construction, operation, and uses of individual hydraulic components are a major focus of this program. Basic hydraulic formulas will be used for enhancing understanding.

Recommended Prerequisites: None

**Customized In-Plant Training**

Eaton Hydraulics Training Services also has the ability and equipment to perform this training at a customer location. In addition, we can tailor the curriculum to specific applications and concepts of the customer’s choosing and incorporate a customer’s schematics to enhance the employees’ understanding of specific systems.

**Who Should Attend**

This course is appropriate for operations, sales, design, maintenance, and repair personnel who work with industrial machinery.

**Topics Covered**

- Hydraulic principles and fundamentals
- Basic system troubleshooting
- Fluids
- Reservoirs
- Pumps and pumping principles
- Pressure controls
- Directional controls
- Flow controls
- Cartridge valves
- Contamination control
- Filters
- Accumulators
- Gear, vane, and piston motors
- Electrohydraulic systems
- Hydraulic circuits

**Completion Requirements**

Students will be required to attend and participate in all sessions, exercises, and assignments. In addition, successful completion of this course will require passing a written exam with a score of 70% or higher.

---

**Advanced Industrial Hydraulics**  
Course Registration Code: Hyx_ILT_AIH  
Duration: 4.5 Days

This four-and-a-half day course is designed for individuals interested in learning about industrial component selection and sizing. This course will teach you the best methods for selection of a component.

Recommended Prerequisites: Students should have completed Industrial Hydraulics, Industrial Basics or equivalent training.

**Who Should Attend**

This course is appropriate for operations, sales, design, maintenance, and repair personnel who work with industrial machinery.

**Topics Covered**

- Pump sizing and control analysis
- Relief valves
- Direct acting directional control valves
- Pilot operated directional control valves
- Pressure control valve selection
- Flow control selection
- Cylinder specification and selection
- Motor and control selection
- Cartridge valve selection

**Completion Requirements**

Students will be required to attend and participate in all sessions, exercises, and assignments. In addition, successful completion of this course will require passing a written exam with a score of 70% or higher.
Hydraulic Schematics  
Course Registration Code: Hyx_ILT_HYDSCH  
Duration: 4.5 Days

This four-and-a-half-day course is designed to teach students how to create schematics from customer specifications. The course begins with building blocks of typical applications and progresses to more complex applications, and teaches how to integrate them into one system.

Recommended Prerequisites: None

Who Should Attend  
This course is appropriate for operations, sales, maintenance, and repair personnel.

Topics Covered  
- Cylinder synchronization  
- Designing with long actuator lines  
- Regenerative systems  
- Pressure and flow control systems  
- Safety clamp, lift and locking systems  
- Single and multi-pump relief and unloading  
- Anti-cavitation circuits  
- Accumulator control systems  
- Remote pressure limit systems  
- Load sensing systems  
- Motor circuit design  
- Steering systems  
- Designing with mobile valves

Completion Requirements  
Students will be required to attend and participate in all sessions, exercises, and assignments. In addition, successful completion of this course will require passing a written exam with a score of 70% or higher.

Fundamentals of Mobile Hydraulics  
Course Registration Code: Hyx_ILT_MH3  
Duration: 3 Days

This three-day course is a condensed version of the 4.5 day Mobile Hydraulics course, focusing on mobile hydraulic components and applications. In addition, this course will include hands-on exercises which teach students how to make hydraulic circuits, component tear-down exercises, and the individual role of each component in a circuit. Basic hydraulic formulas will be used for enhancing understanding.

Recommended Prerequisites: None

Customized In-Plant Training  
Eaton Hydraulics Training Services also has the ability and equipment to perform this training at a customer location. In addition, we can tailor the curriculum to specific applications and concepts of the customer’s choosing and incorporate a customer’s schematics to enhance the employees’ understanding of specific systems.

Who Should Attend  
This course is appropriate for operations, sales, maintenance, and repair personnel.

Topics Covered  
- Hydraulic principles and fundamentals  
- Reservoirs and fluids  
- Actuators  
- Fixed pump principles  
- Variable pump principles  
- Hydrostatic transmissions  
- Pressure controls  
- Directional valves  
- Flow controls  
- Contamination controls  
- Cartridge valves  
- Steering  
- Accumulators  
- Mobile hydraulic circuits

Completion Requirements  
Students will be required to attend and participate in all sessions, exercises, and assignments. In addition, successful completion of this course will require passing a written exam with a score of 70% or higher.
Mobile Hydraulics
Course Registration Code: Hyx_ILT_MH
Duration: 4.5 Days

This four-and-a-half-day course is a condensed version of the Industrial Hydraulics course, but focuses solely on mobile hydraulic components and applications. In addition, this course will include hands-on exercises which teach students how to make hydraulic circuits, component tear-down exercises, and the individual role of each component in a circuit. Basic hydraulic formulas will be used for enhancing understanding.

Recommended Prerequisites: None

Customized In-Plant Training
Eaton Hydraulics Training Services also has the ability and equipment to perform this training at a customer location. In addition, we can tailor the curriculum to specific applications and concepts of the customer’s choosing and incorporate a customer’s schematics to enhance the employees’ understanding of specific systems.

Who Should Attend
This course is appropriate for operations, sales, maintenance, and repair personnel.

Topics Covered
- Hydraulic principles and fundamentals
- Reservoirs and fluids
- Actuators
- Fixed pump principles
- Variable pump principles
- Hydrostatic transmissions
- Pressure controls
- Directional valves
- Flow controls
- Contamination controls
- Cartridge valves
- Steering
- Accumulators
- Mobile hydraulic circuits

Completion Requirements
Students will be required to attend and participate in all sessions, exercises, and assignments. In addition, successful completion of this course will require passing a written exam with a score of 70% or higher.

Advanced Mobile Hydraulics (Level 400)
Course Registration Code: Hyx_ILT_AMH
Duration: 4.5 Days

This four-and-a-half-day course will cover how to select and properly size components used in mobile hydraulic circuits. It will not cover industrial applications. Students will learn the correct methods for properly sizing components selected and not relying on “general rules” to optimize the energy use within a system. The course is math intensive, as basic math and physics are used to calculate required performance requirements for applications.

Recommended Prerequisites: Eaton’s distributor’s personnel should complete all authorized brand certifications (either on-line or by instructor led courses) through level 300, as well as Industrial Hydraulics/Industrial Basics, Electrohydraulics Maintenance & Troubleshooting and Troubleshooting.

Non-distributor personnel should have completed Industrial Hydraulics/Industrial Basics or Mobile Hydraulics, Electrohydraulics Maintenance & Troubleshooting and Troubleshooting.

Who Should Attend
This course is appropriate for personnel involved with the application and design of hydraulic systems and for product application specialists.

NOTE: This course will meet the requirements for the Eaton 400 level certification for distributors and employees as part of the Channel Compensation Resource (CCR) program. Certification is valid 3 years.

Topics Covered
- Pump energy utilization
- Open circuit pump controls including pressure comp, load sensing and torque limiting
- Pump sizing
- Pressure controls (reducing, unloading, sequencing, counterbalance) selection and sizing
- Directional controls - selection and sizing
- Flow controls - selection and sizing
- Light/medium/heavy duty transmission sizing and selection
- Cylinders - selection, sizing and mounting styles
- Motors - selection and sizing
- Hydrostatic steering selection and sizing
- Heat load calculations
- Heat exchanger sizing
- Filtration selection and sizing
- Reservoir selection and sizing

Completion Requirements
Students will be required to attend and participate in all sessions, exercises, and assignments. In addition, successful completion of this course will require passing a written exam with a score of 70% or higher.
**Troubleshooting**
Course Registration Code: Hyx_ILT_TS  
Duration: 4.5 Days

This four-and-a-half-day course is designed for those individuals involved with troubleshooting hydraulic systems in the industrial environment. The objective of this course is to familiarize students with the proper techniques to perform systematic troubleshooting from symptom identification to fault isolation. Hands-on training is utilized to provide students the opportunity to perform troubleshooting techniques.

Recommended Prerequisites: Students should have completed either Industrial Hydraulics or Industrial Basics, or equivalent training.

**Who Should Attend**
This course is appropriate for application engineers, maintenance and repair personnel.

**Topics Covered**
- Hydraulic fundamentals
- Component functions and failures
- Graphic symbology review
- Circuit and control analysis
- Clamp and work circuits
- Contamination control
- Diagnostic instruments
- Systematic troubleshooting procedures

**Completion Requirements**
Students will be required to attend and participate in all sessions, exercises, and assignments. In addition, successful completion of this course will require passing a written exam with a score of 70% or higher.

**Cartridge Valves**
Course Registration Code: Hyx_ILT_CV  
Duration: 3 Days

This three-day course covers both the theory and operations of DIN (slip-in) and screw-in cartridge valves. Operating principles of the most commonly used cartridge valves will be described and students will perform lab exercises to reinforce the concepts of how these components are used in both mobile and industrial hydraulic circuits.

Recommended Prerequisites: Students should have completed Industrial Hydraulics, Industrial Basics, Mobile Hydraulics or equivalent training.

**Who Should Attend**
This course is appropriate for personnel involved with the maintenance and application of hydraulic systems and for product application specialists. It is not intended to be an engineering design level course.

**Topics Covered**
- Cartridge valve basics
- Pressure control concepts
- Load holding - over center and pilot operated
- Systemic contamination control
- Flow control concepts
- Directional valve concepts
- Proportional valves
- Logic valves
- Check valves

**Completion Requirements**
Students will be required to attend and participate in all sessions, exercises, and assignments. In addition, successful completion of this course will require passing a written exam with a score of 70% or higher.
Fundamentals of Electrohydraulics
Course Registration Code: Hyx_ILT_EHMT3
Duration: 3 Days

This three-day course emphasizes the fundamentals and principles of electrohydraulic system components and circuit operation. The course focuses on open and closed loop proportional control systems. Attendees will work hands-on with a wide series of control products in a laboratory environment to set-up, tune and troubleshoot flow and direction control circuits. In addition, students will learn how to properly maintain their hydraulic system to maximize efficiency and reduce system downtime by learning various troubleshooting techniques. Basic electrical/electronics formulas will be used for enhancing understanding.

Recommended Prerequisites: Students should have completed Industrial Hydraulics, Industrial Basics, Mobile Hydraulics or equivalent training.

Who Should Attend
This course is appropriate for application engineers, and maintenance and repair personnel. Attendees are encouraged to have a background in hydraulics, but electronics knowledge is not a requirement.

Topics Covered
• Hydraulic and electronic principles and equivalents
• Operational amplifiers
• Proportional valves operation
• Proportional flow, directional and pressure control valves
• Servo valves and amplifiers
• Proportional power plugs
• Proportional amplifiers
• On-board electronic proportional valves
• Controller basics, data communication networks overview

Completion Requirements
Students will be required to attend and participate in all sessions, exercises, and assignments. In addition, successful completion of this course will require passing a written exam with a score of 70% or higher.

Electrohydraulics Maintenance and Troubleshooting
Course Registration Code: Hyx_ILT_EHMT
Duration: 4.5 Days

This four-and-a-half-day course emphasizes the fundamentals and principles of electrohydraulic system components and circuit operation. The course focuses on open and closed loop proportional as well as servo control systems. Attendees will work hands-on with a wide series of control products in a laboratory environment to set-up, tune and troubleshoot flow, direction, and pressure control circuits. In addition, students will learn how to properly maintain their hydraulic system to maximize efficiency and reduce system downtime by learning various troubleshooting techniques. Basic electrical/electronics formulas will be used for enhancing understanding.

Recommended Prerequisites: Students should have completed Industrial Hydraulics, Industrial Basics, Mobile Hydraulics or equivalent training.

Who Should Attend
This course is appropriate for application engineers, and maintenance and repair personnel. Attendees are encouraged to have a background in hydraulics, but electronics knowledge is not a requirement.

Topics Covered
• Hydraulic and electronic principles and equivalents
• Operational amplifiers
• Proportional valves operation
• Proportional flow, directional and pressure control valves
• Servo valves and amplifiers
• Proportional power plugs
• Proportional amplifiers
• On-board electronic proportional valves
• Controller basics, data communication networks overview

Completion Requirements
Students will be required to attend and participate in all sessions, exercises, and assignments. In addition, successful completion of this course will require passing a written exam with a score of 70% or higher.
Course Offerings & Descriptions: Technology Courses

Pump Controls
Course Registration Code: Hyx_ILT_PC
Duration: 3 Days

This three-day course will familiarize students with the theory of operation of variable displacement pumps (both open and closed circuit). Students will learn the principles of operation for pressure compensation, load-sensing, and torque limiting for open loop pumps. Mechanical, hydraulic, and electro-hydraulic controls for closed loop pump applications will be taught as well as the differences between a pressure override control and power limiting. In addition, students will gain an understanding of how to optimize a fixed displacement pump system to minimize energy loss during operation.

Recommended Prerequisites: Mobile Hydraulics, Industrial Hydraulics or Industrial Basics

Who Should Attend
This course is ideal for anyone that has a need to understand the proper application and use of pump controls in open and closed circuit applications.

Topics Covered
- Benefits of variable displacement vs. fixed displacement pumps
- Pressure compensation
- Load sensing (flow compensation)
- Torque limiting
- Horsepower regulation
- Manual pump controls
- Master slave arrangements
- Directional controls selection and sizing
- Flow controls selection and sizing
- Cylinders selection, sizing, and mounting styles
- Motors selection and sizing
- Heat load calculations
- Heat exchanger sizing
- Filtration selection and sizing
- Fluid conductor sizing
- Power units

Completion Requirements
Students will be required to attend and participate in all sessions, exercises, and assignments. In addition, successful completion of this course will require passing a written exam with a score of 70% or higher.

---

Circuit Design (Industrial Level 400)
Course Registration Code: Hyx_ILT_CD
Duration: 4.5 Days

This four-and-a-half day course will cover how to select and properly size components used in industrial hydraulic circuits. It will not cover mobile applications. Students will learn the correct methods for properly sizing components selected, and not relying on “general rules” to optimize the energy use within a system. The course is math intensive, as basic math and physics are used to calculate required performance requirements for applications.

Recommended Prerequisites:
Eaton’s distributor’s personnel should complete all authorized brand certifications (either on-line or by instructor led courses) through level 300, as well as Industrial Hydraulics/Industrial Basics, Electrohydraulics Maintenance & Troubleshooting and Troubleshooting.

Non-distributor personnel should have completed Industrial Hydraulics/Industrial Basics or Mobile Hydraulics, Electrohydraulics Maintenance & Troubleshooting and Troubleshooting.

Who Should Attend
This course is appropriate for personnel involved with the application and design of hydraulic systems and for product application specialists.

Topics Covered
- Reservoir selection and sizing
- Pump selection
- Pump sizing & control analysis (pressure comp and torque limiting)
- Pressure controls (reducing, unloading, counterbalance, sequence, back-pressure) selection and sizing
- Directional controls selection and sizing
- Flow controls selection and sizing
- Cylinders selection, sizing, and mounting styles
- Motors selection and sizing
- Heat load calculations
- Heat exchanger sizing
- Filtration selection and sizing
- Fluid conductor sizing
- Power units

Completion Requirements
Students will be required to attend and participate in all sessions, exercises, and assignments. In addition, successful completion of this course will require passing a written exam with a score of 70% or higher.
Eaton's Power, Motion & Control Product eLearning Activities

Each course in this section is an e-Learning activity available in Eaton University. Some require brand authorization for an Eaton’s distributor personnel to be able to register. We offer study courses for learners, hydraulics technology, Eaton’s products and product certifications. Fulfillment of the certification activities are required for Channel Compensation Resources (CCR). Ask your Eaton Area Sales Manager for details. The respective Eaton University course registration codes are included.

**Basic Hydraulic Technology**

- **Module 1:** Basic Hydraulic Principles  
  Hyx_BRNSH_BHP101C
- **Module 2:** Hydraulic Pumps  
  Hyx_BRNSH_HP102C
- **Module 3:** Hydraulic Actuators  
  Hyx_BRNSH_HA103C
- **Module 4:** Hydraulic Pressure Control Valves  
  Hyx_BRNSH_HPCV104C
- **Module 5:** Hydraulic Directional Valves  
  Hyx_BRNSH_HDV105C
- **Module 6:** Hydraulic Flow Control Valves  
  Hyx_BRNSH_HFCV106C
- **Module 7:** Hydrostatic Transmissions  
  Hyx_BRNSH_HT107C
- **Module 8:** Hydraulic Circuits  
  Hyx_BRNSH_BHP108C

**Cylinder Terminology Study Course - Lv 100**  
Hyx_BRNSH_CY100C

**Fundamental Hydraulics Assessment - Lv 200**  
Hyx_ADBCP_FH200A

**Systemic Contamination Ctrl Assessment - Level 200**  
Hyx_ADBCP_SC200A

**CANBus Module 1:** Transmitting Analog Signals  
Hyx_CANBUS_Mod1

**CANBus Module 2:** Transmitting Digital Signals  
Hyx_CANBUS_Mod2

**CANBus Module 3:** Networks  
Hyx_CANBUS_Mod3

**CANBus Module 4:** Higher Level Protocols  
Hyx_CANBUS_Mod4

**Level 200 Product Courses & Certifications**

All personnel working towards a 200 level certification for a specific Eaton brand should be able to perform and/or explain the following:

- Product offerings and features
- Where to locate catalog information
- Model coding based on given criteria
- Interpreting catalog tables

The following is a list of all Eaton 200 level e-Learning activities:

**Eaton’s Char-Lynn Brand**

- **G/G Motor Products Study Course**  
  Hyx_ARTSL_CL200C
- **Steering Study Course**  
  Hyx_BRNSH_CHST200C
- **Char-Lynn Inside Sales Certification**  
  *Geroter/Geroler Motor Products
  *Steering Control Unit Products
  Hyx_ADBPS_CL200AC

**Char-Lynn Inside Sales Recertification**  
*Required every 3 years

**Eaton’s Hydro-Line Brand**

- **Hydro-Line Cylinders Product Study Course**  
  Hyx_BRNSH_HL200C
- **Hydro-Line Inside Sales Certification**  
  Hyx_ADBPS_HL200AC

**Eaton’s Vickers Brand (Study Courses)**

- **DuraForce Piston Products**  
  Hyx_ADBCP_DF200AC
- **Cartridge Valves Product Study Course**  
  Hyx_BRNSH_ETCV200C
- **Ind Valves Directional Controls Study Course**  
  Hyx_BRNSH_IVDC200C
- **Industrial Valves Flow Controls Study Course**  
  Hyx_BRNSH_IVFC200C
- **Ind Valves Pressure Controls Study Course**  
  Hyx_BRNSH_IVPC200C
- **Open Circuit Piston Study Course**  
  Hyx_BRNSH_ETOC200C
- **Vane Products Study Course**  
  Hyx_BRNSH_VKVN200C

**Eaton’s Vickers Brand (Certification Assessments)**

- **DuraForce Certification**  
  Hyx_ADBCP_DF200AC
- **Screw In Cartridge Valves Product Certification - Quiz 1**  
  Hyx_ADBCP_ETCV200A
- **Screw In Cartridge Valves Products Recertification - Quiz 1**  
  Hyx_ADBCP_ETCV200R
  *Required every 3 years
- **Med Duty Piston Prod Certification - Quiz 2**  
  Hyx_ADBCP_ETMD200A
- **Med Duty Piston Prod Recertification - Quiz 2**  
  Hyx_ADBCP_ETMD200R
- **Heavy Duty Products Certification - Quiz 3**  
  Hyx_ADBCP_ETHD200A
- **Heavy Duty Products Recertification - Quiz 3**  
  Hyx_ADBCP_ETHD200R

**Eaton’s Vickers Brand Cylinders**

- **Cylinder Products Study Course**  
  Hyx_BRNSH_VKC200C
- **Cylinder Inside Sales Cert Assessment**  
  Hyx_ADBPS_VKC200AC
- **Vickers Cylinders Inside Sales Recert**  
  Hyx_ADBPS_VKC200R
Level 300 Product Courses & Certifications

All personnel working towards a 300 level certification for a specific Eaton brand should be able to meet all the 200 level objectives as well as:
- Features and benefits of specific Eaton product offerings
- Key application selection criteria
- Major competitor names
- Key selling differentiators
- Appropriate product selection based on application criteria

The following is a list of all Eaton 300 level e-Learning activities:

**Eaton’s Char-Lynn Brand**

- Steering Study Course
  Hyx_BRNSH_CHST300C
- Char-Lynn Outside Sales Certification
  Hyx_ADBPS_CL300AC
  *Gerotor/Geroler Motor Products
  *Steering Control Unit Products
- Char-Lynn Outside Sales Recertification
  Hyx_ADBPS_CL300R
  *Required every 3 years

**Eaton Brand (Study Courses)**

- Cartridge Valves Product Study Course
  Hyx_BRNSH_ETCV300C
- Gear Products Study Course
  Hyx_BRNSH_ETGR300C
- Jeil Motors
  EUHYXEJPSTD
- Jeil Valves
  EUHYXEJP
- Light Duty Hydrostatics Study Course
  Hyx_BRNSH_ETLD300C
- Medium Duty Closed Circuit Piston
  Hyx_BRNSH_ETMD300C
- Open Circuit Piston Study Course
  Hyx_BRNSH_ETOC300C

**Eaton’s Vickers Brand (Study Courses)**

- Cartridge Valves Product Study Course
  Hyx_BRNSH_ETCV300C
- Open Circuit Piston Study Course
  Hyx_BRNSH_ETOC300C

**Eaton’s Hydro-Line Brand**

- Hydro-Line Outside Sales Certification
  Hyx_ADBPS_HL300AC
- Hydro-Line Outside Sales Recertification
  Hyx_ADBPS_HL300R

**Eaton’s Vickers Brand (Certification Assessments)**

- Proportional Valve Prod Certification - Quiz 1
  Hyx_ADBCP_VPV300A
- Industrial Valve Product Certification - Quiz 2
  Hyx_ADBCP_VIV300A
- Cartridge Valves Prod Certification - Quiz 3
  Hyx_ADBCP_VCV300A
- Piston Product Certification - Quiz 4
  Hyx_ADBCP_VPP300A
- Vane Product Certification - Quiz 5
  Hyx_ADBCP_VVP300A

**Eaton’s Vickers Brand Cylinders**

- Cylinder Outside Sales Certification Assessment
  Hyx_ADBPS_VKC300AC
- Cylinders Outside Sales Recertification
  Hyx_ADBPS_VKC300R

**Application Specialists Level 400 Certifications**

All personnel working towards a 400 level certification for either the mobile or industrial markets which Eaton services should expect to be able to meet all of the 200 level and 300 level objectives, as well as:
- Understand correct methods for properly sizing components
- How to optimize energy use within a system
- Component selection, sizing and mounting for hydraulic circuits
- Strong analytical and mathematic skills

The following is a list of the Eaton 400 level e-Learning activities:

**Mobile Hydraulics Application Assessment**
Hyx_CSAV_MH401A

**Mobile Hydraulics Application Recertification Assessment**
Hyx_CSAV_MH403R

**Industrial Hydraulics Application Assessment**
Hyx_CSAV_IA402A

**Industrial Hydraulics Application Recertification Assessment**
Hyx_CSAV_IH405R
**Eaton’s Power and Controls Product Training (Level 200/300)**

Course Registration Code: Hyx_ILT_PCPT  
Duration: 4.5 days

This four-and-a-half-day class covers Eaton branded power and control products. Participants will gain knowledge needed to recognize and identify the products offered under the Eaton, Vickers, Hydroline and Char-Lynn brand names. This class will fulfill both level 200 (required for inside sales) and level 300 (required for outside sales).

**Recommended Prerequisites:** Mobile Hydraulics, Industrial Basics, Industrial Hydraulics, or equivalent experience

**Who Should Attend**  
For authorized Eaton hydraulic components distributors and Eaton employees only. This class is recommended for distributors, sales representatives, service personnel and sales support staff.

**Topics Covered**

**Vickers**
- Product features and offering
- Vane and piston pumps and motors
- Valves - proportional, servo, screw-in, slip-in cartridge and industrial
- Cylinders
- Locating catalog information
- Model coding based on given data
- Interpreting catalog tables
- Determining part numbers for components and/or kits

**Char-Lynn**
- Product features and offering
- Geroter and Geroler® (spool, disc valve, VIS and HP 30 motors)
- Steering control units
- Torque generators
- Locating catalog information
- Model coding based on given data
- Interpreting catalog tables
- Determining part numbers for components and/or kits

**Eaton**
- Series one heavy duty closed circuit variable piston pumps, fixed and variable piston motors
- Series two heavy duty closed circuit variable piston pumps
- ME fixed displacement piston motors
- Gear products
- Mobile valve products
- Hydroline cylinders
- Filters and accumulators
- Model coding based on given data
- Interpreting catalog tables
- Determining part numbers for components and/or kits

**Completion Requirements**

Students will be required to attend and participate in all sessions to successfully complete this course. In addition, successful completion of this course will require passing a written exam with a score of 70% or higher.
Eaton’s Gear, Vane and Char-Lynn® Products Service School

Course Registration Code: Hyx_ILT_CLSS
Duration: 4 Days

This four-day service and repair school covers all of Eaton’s gear and vane products as well as Char-Lynn® brand low-speed, high-torque motors and steering control units. This school combines both classroom and hands-on lab time. Students will review the principle of operation, product catalog information, and parts and service bulletins in a classroom setting. They will also learn first-hand how to tear down, repair and reassemble each of the different products.

Recommended Prerequisites: Mobile Hydraulics, Industrial Basics or Industrial Hydraulics

Who Should Attend
This class is for Eaton’s Char-Lynn® and Eaton brand authorized distributors and Eaton employees only. This class is recommended for sales and service personnel who sell and/or repair Char-Lynn® and Eaton Brand products.

Topics Covered
• Product function and identification
• Model coding
• Disassembly and reassembly
• Repair kits
• Performance data
• Total servicing
• Troubleshooting

Completion Requirements
Students will be required to attend and participate in all sessions, exercises, and assignments. In addition, successful completion of this course will require passing a written exam with a score of 70% or higher.

Warranty Center Failure Analysis

Course Registration Code: Hyx_ILT_FA
Duration: 2.5 Days

This two-and-a-half-day failure and warranty analysis class focuses on typical causes of component failures, warranty analysis, product testing requirements and a review of how to process warranty claims. This course incorporates both hands-on exercises and lectures to ensure students get a good understanding of how to analyze component failures. The products covered in class include piston, vane, and gear pumps, directional control valves, low-speed high torque motors, light duty hydrostatic transmissions and steering valves.

Recommended Prerequisites: Industrial Hydraulics/Industrial Basics, Mobile Hydraulics or equivalent. Complete all level 200 Eaton certifications for Vickers®, Eaton, and Char-Lynn® product schools. We also recommend that students attend the available Eaton and Char-Lynn® service schools.

Who Should Attend
For Eaton’s authorized warranty center personnel only and Eaton employees. This course is intended for technical service and repair personnel who work for Eaton’s authorized warranty centers.

Topics Covered
• Failures covered by warranty
• Failures caused by contamination
• Failures caused by bad material
• Failures that cause leakage
• Failures caused by improper assembly
• Failures that cause parts to break
• Root cause of failures that show signs of smearing, seizing, sticking or gulling
• Failure diagnoses
• Product test procedures
• Warranty analysis program
• Identify product manufacturing locations
• Best practices for populating a warranty reimbursement form

Completion Requirements
Students will be required to attend and participate in all sessions, exercises, and assignments. In addition, successful completion of this course will require passing a written exam with a score of 70% or higher.
Closed and Open Circuit Piston Products Service School
Course Registration Code: Hyx_ILT_CCOC
Duration: 4 Days

This four-day service and repair school covers all of Eaton’s light, medium and heavy-duty open and closed circuit hydrostatic pumps, motors, and transmission products. This school combines both classroom and hands-on lab time. Students will review the principle of operation, product catalog information, parts and service bulletins in a classroom setting. They will also learn first-hand how to tear down, repair and reassemble each of the different products. The products covered will be series one pumps and motors, series two pumps, medium duty 70160, 70360, 72400, light duty model 600, 700, and 1100. We will also cover the x20 series and PVM pumps.

Who Should Attend
This class is for Eaton customers, authorized distributors and Eaton employees only. This class is recommended for sales & service personnel who sell and/or repair Eaton’s hydrostatic products.

Topics Covered
- Closed circuit principle of operation
- Open circuit principle of operation
- Product function and identification
- Model & assembly coding
- Disassembly & reassembly
- Closed circuit controls
- Open circuit controls
- Performance data
- Troubleshooting
- Servicing

Completion Requirements
Students will be required to attend and participate in all sessions, exercises, and assignments. In addition, successful completion of this course will require passing a written exam with a score of 70% or higher.

AxisPro™
Course Registration Code: Hyx_ILT_APRO
Duration: 2 Days

This two-day course is designed for those individuals who have intimate working knowledge of high performance proportional valves and how they should be applied in the field of electro-hydraulics. The foundation of this course assumes the attendee is familiar with Servo Proportional Valve Technology; PID theory and application and principles of open and closed loop systems as it applies to electro-hydraulics. The AxisPro valve levels one through four are discussed, identifying key features and benefits with heavy concentration on the level 2 and 3 valve. In addition to a classroom setting, attendees will work hands-on in a laboratory environment with AxisPro utilizing Eaton’s ProFx Configure software. The final measure of this course is the effective commission of an AxisPro valve which includes the exporting and importing of valve parameters and performing basic valve functions.

Who Should Attend
This course is appropriate for personnel who have working knowledge of high performance proportional valves and how they should be applied in the field of electro-hydraulics. Attendees should already be familiar with Servo Proportional Valve Technology; PID theory and application and principles of Open and Closed loop systems as it applies to electro-hydraulics.

Topics Covered
- Pro-FX Configure Software
- Initialization
- Operation
- Data Plotting
- VSC Mode
- DPC Mode
- DSC Mode
- DFPC Mode

Completion Requirements
Students will be required to attend and participate in all sessions, exercises, and assignments. In addition, successful completion of this course will require passing a comprehensive written exam with a score of 70% or higher.
**CLS Mobile Valves**

Course Registration Code: Hyx_ILT_CLS  
Duration: 2 days

This two-day class covers Eaton’s new CLS mobile valves portfolio. Participants will gain insights and knowledge from a sales and technical overview of the latest technological products in the industry. This class will fulfill levels 200 thru 400 by combining classroom and hands-on lab time.

Recommended Prerequisites: None

Who Should Attend  
For authorized Eaton hydraulic components distributors and Eaton employees only. This class is recommended for distributors, sales representatives, service personnel and sales support staff.

Topics Covered  
- Strategic imperative  
- Load sense of principle of operation  
- CLS Product Portfolio Review  
- Specifications  
- Features and benefits  
- Pre comp vs Post comp  
- Model coding  
- Value proposition - market advantages  
- Sales tools  
- Configuring the valve  
- Pricing using Power Source  
- Build program  
- Rebate program  
- Valve sizing exercises  
- Competition  
- Compare competitor model costs to Eaton’s  
- Review differentiators  
- Comparison exercise  
- How to find opportunities  
- Key timeline deliverables  
- Hardware review  
- Conversion review

Completion Requirements  
Students will be required to attend and participate in all sessions, exercises, and assignments.

---

**CMA Mobile Valves**

Course Registration Code: Hyx_ILT_CMA  
Duration: 2 days

This class covers Eaton’s new CMA mobile valve portfolio. Participants will gain insights and knowledge from a sales and technical overview of the latest technological products in the industry. This class will fulfill levels 100 thru 400 by combining classroom and hands-on lab time.

Recommended Prerequisites: None

Who Should Attend  
This class is intended for authorized Eaton hydraulic components distributors and Eaton employees. This class is recommended for Eaton sales representatives, service personnel and sales support staff. This class satisfies the training requirement for authorized participants of the CMA Authorized Distributor Program.

Topics Covered  
- CMA product overview  
- Features and benefits  
- Performance data  
- Sales review  
- Value proposition  
- Value specifications  
- Model coding  
- Hardware review  
- Cabling requirements  
- Software review  
- Modes of operation  
- Installation requirements  
- Valve setup and configuration  
- Diagnostics  
- Troubleshooting

Completion Requirements  
Students will be required to attend and participate in all sessions, exercises, and assignments.
DuraForce Outside Sales Certification (Levels 200/300)
Course Registration Code: Hyx_ILT_DF300
Duration: 3 Days

This three-day class covers DuraForce pump and motor products. Participants will gain knowledge needed to recognize and identify the products offered under the DuraForce brand. This 200/300 level course covers principle of operation, features, benefits, model code options, controls, competitive information and selling tips.

Recommended Prerequisites: Mobile Hydraulics, Industrial Basics, Industrial Hydraulics or equivalent experience

Who Should Attend
For authorized Eaton hydraulic components distributors and Eaton employees only. This class is recommended for distributors, sales representatives, service personnel and sales support staff.

Products Covered
- HPV
- HPR
- HMF
- HMV
- HMR

Topics Covered
- General design overview
- Features and benefits
- Product specifications (displacements, pressure, speed, input torque, etc)
- Product model codes and options
- Circuit information and principles of operation
- Controls
- Competitive information
- Selling points
- Applications

Completion Requirements
Students will be required to attend and participate in all sessions, exercises, and assignments.

Eaton’s Pro-FX™ Sales Course
Course Registration Code: Hyx_ILT_FXS
Duration: 1 day

Eaton offers this one-day course designed to introduce participants to the Eaton Pro-FX product line. It includes overview of basic concepts of Electrohydraulics for better understanding of the role of the product. Features of the programming software, HFX controllers and VFX displays are discussed. Example project with real hardware is demonstrated for familiarity of software capabilities.

Recommended Prerequisites: None

Who Should Attend
This course is for sales team personnel who need introductory knowledge of the Pro-FX product line and its capabilities.

Topics Covered
- HFX controller
- VFX displays
- Pro-FX Control software
- Components of Electrohydraulic system
- Factors affecting proportional valves
- Feedback transducers overview
- Data communication networks

Completion Requirements
Students will be required to attend and participate in all sessions, exercises, and assignments.
**Eaton’s Pro-FX™ Applications Course**
Course Registration Code: Hyx_ILT_CFX
Duration: 2 Days

Eaton offers this two-day course designed to introduce participants to the Eaton Pro-FX Control software which is based on the IEC 61131-3 compliant CoDeSys version 3.5 integrated development environment. Functions and features of the programming software, HFX controllers and VFX displays are covered. The Pro-FX libraries are introduced and many of the capabilities are discussed. Visualization capabilities within Pro-FX Control library are addressed. Attendees will create, download, and test hands on project with real hardware.

Recommended Prerequisites: None

Who Should Attend
This course is appropriate for personnel involved in design and/or creation of electrohydraulic systems. A basic understanding of PLC’s or microprocessors, as well as familiarity with programming languages, is highly recommended for attendees.

Topics Covered
- Pro-FX Control user interface
- Keywords, character set and identifiers
- Data types, variables, and arrays
- Function block library overview
- Tasks in Pro-FX
- Structured text overview
- Using Eaton’s Function Block libraries
- Logic development with real life example
- HFX Controller configuration and setup
- VFX configuration and setup
- Creating visualizations
- Communicating with CAN interface
- Compiling/downloading/debugging project

Completion Requirements
Students will be required to attend and participate in all sessions, exercises, and assignments.

**Eaton’s Pro-FX™ Advanced Applications Course**
Course Registration Code: Hyx_ILT_FXADV
Duration: 2 Days

Eaton offers this two-day course designed to introduce participants to the advanced concepts in Eaton Pro-FX Control software which is based on the IEC 61131-3 compliant CoDeSys version 3.5 integrated development environment. Advanced features of the programming software, HFX controllers and VFX displays are covered. The software development and project development considerations are addressed.

Recommended Prerequisites: Eaton’s Pro-FX™ Applications Course

Who Should Attend
This course is appropriate for personnel involved in developing applications with Eaton’s controllers in electrohydraulic systems. A basic understanding of controllers, projects, as well as familiarity with programming languages is highly recommended for attendees.

Topics Covered
- Pro-FX Control
  - Project development
  - Libraries development
- Software
  - OOPs concepts
  - Data structures
  - Process overview
  - Testing
  - Best practices
- Projects demonstrating advanced features
  - HFX Controller
  - VFX displays
- Overview of CAN network: CANOpen, J1939 communication
- Miscellaneous projects including data logging, H bridge

Completion Requirements
Students will be required to attend and participate in all sessions, exercises and assignments.
CANbus Online Training Course

Course Registration Codes:
- Hyx_CANbus_Mod1
- Hyx_CANbus_Mod2
- Hyx_CANbus_Mod3
- Hyx_CANbus_Mod4

This online, self-paced course emphasizes the fundamentals and principles of Controller Area Network communication protocol known as CANbus. The course, delivered in four separate modules, focuses on computer number systems, hardware connections, message formats, the CANbus Protocols and error handling methods along with associated messages. It is a good primer to familiarize learners with the CANbus Communication Standard in preparation for setting up a CANbus controlled system. Each module in this curriculum is between 1-2 hours in length.

Recommended Prerequisites: None

Who Should Attend
This course is appropriate for application designers and engineers, electronic technicians and system maintenance staff with appropriate electrical background.

Topics Covered
- Electronic signal transmission
- Voltage vs. current signals
- Analog vs. digital signals
- Common number systems
- Signal transmission methods
- Transmission industry standards
- Communication buses and types of networks
- Message types
- CANbus transmission rates and cabling
- Message frame types
- Error handling and associated messages
- Higher level protocols

Completion Requirements
Students will be required to study all modules, complete review questions and successfully complete a comprehensive final knowledge check to successfully complete this course. Certification will be awarded to students who have met all course completion requirements.
Recommended Course Progressions for Industry Certifications

Professional Development: Eaton’s Technical Training Course Progressions
Courses Listed in Recommended Sequence

IFPS Hydraulic Specialist
- Industrial Hydraulics or Mobile Hydraulics
- Troubleshooting
- Cartridge Valves
- Electrohydraulics Maintenance & Troubleshooting
- Circuit Design or Advanced Mobile Hydraulics
- Eaton’s IFPS Hydraulic Specialist Review
- IFPS Hydraulic Specialist Certification

IFPS Electronic Controls Specialist
- CANbus Online Training Course
- Electrohydraulics Maintenance and Troubleshooting
- Eaton’s IFPS Electronic Controls Specialist Review
- IFPS Electronic Controls Specialist Certification

IFPS Connectors & Conductors Specialist
- Basic Hose Technology
- Eaton’s IFPS Connectors & Conductors Review
- IFPS Connectors & Conductors Certification
Recommended Course Progressions for Industry Certifications

Professional Development: Eaton’s Technical Training Course Progressions
Courses Listed in Recommended Sequence

**IFPS Certified Technician**
- Industrial Hydraulics or Mobile Hydraulics
- Troubleshooting
- Cartridge Valves
- Electrohydraulics Maintenance & Troubleshooting
- Circuit Design or Advanced Mobile Hydraulics
- Eaton’s IFPS Hydraulic Specialist Review
- IFPS Hydraulic Specialist Certification

**IFPS Certified Mechanic**
- CANbus Online Training Course
- Electrohydraulics Maintenance and Troubleshooting
- Eaton’s IFPS Electronic Controls Specialist Review
- IFPS Electronic Controls Specialist Certification
International Fluid Power Society (IFPS) Certifications

IFPS Hydraulic Specialist Review
Course Registration Code: Hyx_ILT_FPS-SP
Duration: 3 Days

This three-day review course is appropriate for individuals who have been trained and work in the field of fluid power and need to sharpen their skills in various areas to become certified as an International Fluid Power Society Hydraulic Specialist.

Recommended Prerequisites: IFPS has created a study manual for candidates who wish to prepare for the Hydraulic Specialist exam. This course is a review session and students should prepare themselves by reviewing this manual prior to attending.

Who Should Attend
Any fluid power professional involved in application, design or sales of hydraulic systems.

Topics Covered
- Hydraulic symbols
- Circuit diagrams, size components, recognizing functions
- System parameters
- Force, distance, work, torque, speed, velocity and power
- Load calculations
- Motor characteristics
- Hydraulic pump and motor applications
- Valve sizing for hydraulic circuits
- Electrohydraulics: prop valves & amplifier cards
- Accumulators, intensifiers & boosters
- Heat exchangers & fluid conductors
- Filtration, fluids and lubricants
- Troubleshooting

IFPS Exam
The three (3) hour written test will be offered at the same location on the following day after the review.

Test registrations must be made through the International Fluid Power Society at www.ifps.org for both the job performance and the written test, and are charged separately from the review session.

IFPS Connector & Conductor Review & Job Performance
Course Registration Code: Hyx_ILT_FPS-CC
Duration: 1.5 Days

This one-and-a-half day course is appropriate for individuals who have been trained in the field of fluid power and need to sharpen their skills by achieving Fluid Power Connector & Conductor Certification. The Connector & Conductor certifications require a three (3) hour job performance (hands-on) test and a three (3) hour written test.

Recommended Prerequisites: IFPS has created a study manual for candidates who wish to prepare for the Connector & Conductor Certification exam. This course is a review session and students should prepare themselves by reviewing this manual prior to attending.

Who Should Attend
Any fluid power professional involved in the selection, application, installation or sales of connectors and components.

Topics Covered
- Product identification
  - Hose and coupling identification
  - Identifying threads and selecting the proper O-ring
- Assembly component selection
  - S-T-A-M-P-E-D method for selecting proper tubing & fittings
  - Selecting abrasion protection
  - Converting English and metric units - pressure conversions
- Assembly procedure and operation
  - Measuring hose assemblies
  - Cutting and skiving hose
  - How to measure using a dial caliper or micrometer
  - Determining displacement angles
  - Cleaning of hose assemblies and cleanliness levels
  - Flaring tubing and brazing assemblies
  - Nomographic chart
- Related topics
  - Leakage safety
  - Fastener standards, specifications and markings
  - Basic fastener types, terminology, measurements and strength classes
  - Hose assembly routing tips

IFPS Exam
The corresponding three (3) hour written test will be offered at the same location on the following day after the job performance (hands-on) test.

Test registrations must be made through the International Fluid Power Society at www.ifps.org for both the job performance and the written test, and are charged separately from the review session.
**IFPS Electronic Controls Specialist Review**

Course Registration Code: Hyx_ILT_FPS-EC  
Duration: 4.5 Days

This four-and-a-half-day course is appropriate for individuals who have been trained in the field of fluid power and electronics that need to sharpen their skills by achieving IFPS Electronic Controls Specialist Certification. Eaton’s review will help prepare students for the IFPS certification that is designed to review and test understanding, specification, and application of the full breadth of electronics used in the fluid power industry 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 of the electronics for both mobile and industrial fluid power equipment.

Recommended Prerequisites: IFPS has created a study manual for candidates who wish to prepare for the Electronic Controls Specialist exam. This course is a review session and students should prepare themselves by reviewing this manual prior to attending.

**Who Should Attend**

Any fluid power professional involved in the field of fluid power and electronics.

**Topics Covered**

- Fluid power systems
- Electronic and electrical solutions
- Input/output devices
- Applying control theory
- Interacting with controllers
- Utilize industrial networks

**IFPS Exam**

The three (3) hour written test will NOT be offered at the same location due to this review ending on a Friday. Students attending the review should register for the exam at a time and location that will best fit their schedule.

Test registrations must be made through the International Fluid Power Society at www.ifps.org for both the job performance and the written test, and are charged separately from the review session.

---

**IFPS Certified Technician Review & Job Performance**

Course Registration Code: Hyx_ILT_FPS-TC  
Duration: 2.5 Days

This two-and-a-half-day course is appropriate for individuals who have been trained in the field of fluid power and need to sharpen their skills by achieving Fluid Power Certified Technician. Four different mechanic certifications exist: Industrial, Mobile, Pneumatic & Master level. Training Services with Eaton’s Hydraulics Group will provide reviews for the Industrial and Mobile Certified Technician. A hydraulic technician applies fluid power theory and related knowledge to test and troubleshoot operational hydraulic systems and applications. They also read schematics, perform basic cylinder and hydraulic motor calculations and are able to supervise system installations and commissioning.

Prerequisites: IFPS has created a study manual for candidates who wish to prepare for the job performance and written exam. This course is a review session and students should prepare themselves by reviewing this manual prior to attending.

**Who Should Attend**

Any fluid power professional involved in the field of fluid power.

**Topics Covered**

- Set-up and tests systems and components under direction of engineering and scientific staff
- Recommends modifications to circuit and components to improve performance
- Supervises system installation, flushing and commissioning
- Provides leak-free piping
- Knows how, where and when to take fluid samples and read lab reports
- Can establish ISO cleanliness level for a system
- Target Cleanliness Chart
- Understands accumulator use and operation
- Understands hydrostatic drives
- Sets pump load sensing and compensator controls
- Understands basic electrical controls and their application
- Calculates decompression volume
- Understands regenerative circuits and their use
- Understands sequence and counterbalance circuits and associated valving

**IFPS Exam**

All Technician certifications require a three (3) hour written and a three (3) hour job performance (hands on) test taken in the afternoon of the third day.

Test registrations must be made through the International Fluid Power Society at www.ifps.org for both the job performance and the written test, and are charged separately from the review session.
IFPS Certified Mechanic Review & Job Performance
Course Registration Code: Hyx_ILT_FPS-MC
Duration: 2.5 Days

This two-and-a-half-day course is appropriate for individuals who have been trained in the field of fluid power and need to sharpen their skills by achieving Fluid Power Certified Mechanic. Four different mechanic certifications exist: Industrial, Mobile, Pneumatic & Master level. Training Services with Eaton’s Hydraulics Group will provide reviews for the Industrial and Mobile Certified Mechanic. The mechanic fabricates, assembles, services, maintains, and tests hydraulic equipment. They also understand hydraulic symbols, read system schematics, understand electrical principles, and are skilled in using hand tools, power tools, micrometers, and testing equipment.

Prerequisites: IFPS has created a study manual for candidates who wish to prepare for the job performance and written exam. This course is a review session and students should prepare themselves by reviewing this manual prior to attending.

Who Should Attend
Any fluid power professional involved in the selection, application, installation or sales of hydraulic equipment.

Topics Covered
- Read hydraulic symbols and circuit diagrams
- Use dial calipers and micrometers
- Know various tube fittings and select the proper replacement
- Make up tube assemblies
- Know how to prevent and repair system leaks
- Perform contamination control
  - Add fluid to system with filter cart
  - Aid in system flushing and commissioning
  - Know how, when, and where to take fluid samples
  - Use “Target Cleanliness Chart” for each system
  - Check condition of hydraulic filters
  - Check systems for water
- Make up a crimped hose assembly
  - Replace a hose assembly
  - Inspect hose applications for twist and minimum bend radius
- Service and charge accumulators
- Assist technicians in start-up and commissioning
- Promote safe working conditions with pressurized systems

IFPS Exam(s)
All Mechanic certifications require a three (3) hour written and a three (3) hour job performance (hands-on) test done during the afternoon of the third day of the review.

Test registrations must be made through the International Fluid Power Society at www.ifps.org for both the job performance and the written test, and are charged separately from the review session.
Training Products - Overview

Training Services with Eaton’s Hydraulics group has long been a leader in the hydraulics training market for textbooks, cutaways and simulators. Our full line of textbooks, multimedia and other materials give instructors a turn-key solution to developing an entire curriculum from scratch or updating their existing content.

Order & Shipping Policy

Orders can be placed online at www.hydraulicsliteraturestore.com via MasterCard, VISA or purchase order. In addition, orders are also accepted via fax at 952-906-3731 from companies with an established line of credit with Eaton Hydraulics, LLC.

To avoid delays in order processing, purchase orders should include:
- Billing/shipping address
- Contact name, phone number and email address
- Item number and quantity
- Eaton customer account number

Typically, all products (except simulators and cutaways) are in stock at all times. Most orders received during normal business hours will ship the same day, depending on quantity. However, shipments can be delayed around certain holidays.

Shipping and handling will be charged and added to all invoices as estimated by the e-commerce store. If a purchase order is faxed, Eaton will estimate the shipping charges via UPS and add the shipping charges to a customer’s invoice.

If a customer prefers to use their preferred carrier for shipping, the carriers name and valid customer account number must be provided on the order. If a customer does not provide their preferred carrier and account number, Eaton will use the e-commerce store estimate or UPS estimate and add the cost to the invoice.

International shipments will follow the same procedures as noted above. In addition, the customer will be responsible for paying the duties and taxes on their shipments. Eaton will not attempt to estimate these charges.

Discount Policy

Training Services offers a 25% discount on the following items if a quantity of 6 or more are ordered per item:
- Industrial Hydraulics Manual (6th edition, 1st printing)
- Mobile Hydraulics Manual (2nd edition)
- Closed Loop Electrohydraulics Systems Manual
- Bird Bones & Sludge: Comprehensive Guide to Filtration

Return Policy

Return requests must be submitted within 181 days of the invoice date.

Only the following items qualify for return:
- Industrial Hydraulics Manual (6th edition, 1st printing)
- Mobile Hydraulics Manual (2nd edition)
- Closed Loop Electrohydraulics Systems Manual
- Bird Bones & Sludge: Comprehensive Guide to Filtration

Any return shipments must include written authorization from Eaton Hydraulics Training Services to be accepted for credit.

To receive written authorization to return manuals:
- Return request must be from a paid invoice
- Manuals must be in “like new” condition to be accepted and credited
- Return requests for damaged manuals must be made within 15 days of the shipment date
- Return request must be submitted in writing (via mail, fax or email) and include:
  - Number of books to be returned
  - Eaton invoice number
  - Reason for return
  - Customer contact information (name, phone, email)

All items must be returned to the address noted on the “Authorization to Return” form and this form must accompany return shipment. Failure to return materials to this address will delay issuance of credit and any additional shipping charges incurred by Eaton to redirect shipment will be deducted from customer’s credit. If P.O.D. is unable to be provided, the credit will NOT be authorized.

Customer is responsible for return shipping charges.

Books MUST be bubble wrapped, lying cover/back down in a tight fitting box, and received in “like new” condition. No credit will be issued for books received damaged.

All manual returns meeting these requirements will result in a credit memo being issued to the customer account, less a 25% re-stocking fee (based on list price, not discount price). Refund checks will only be issued on request.
Training Services of Eaton’s Hydraulics group redesigned the Hydraulic Training Simulator (HTS-2). This latest model is based on changes in technology and many years of experience in producing the highest quality and most effective training aids for the marketplace. This fluid power training simulator is designed to ensure that those involved with the study of hydraulics have the most cost effective, hands-on method of presenting a practical demonstration of the principles taught within the classroom. The HTS-2 unit has been designed, built and is exclusively available through the Eaton Hydraulics Group Training Services department, with a 1-year limited warranty.

The HTS-2 is a dual operator station simulator with a central power unit that supplies one or both sides and can accommodate up to 4 students at a time. The power unit is capable of supplying a total flow of 3 GPM at 500 PSI and will operate on a standard 120VAC 15 amp lighting circuit.

The components mounted on each panel are representative of those found in today’s hydraulic applications and allow the students to visually reinforce the learning concepts. Each HTS-2 comes with a detailed instructor guide that explains the exercises, provides a pictorial guide to ensure proper assembly, and a video demonstrating the proper performance of each exercise.

Components can be easily connected together through flexible hoses and leak-free quick disconnects to configure many variations of basic hydraulic circuits which reinforce the theory and principles of operations taught in class. Each operator station panel is equipped with the following hydraulic components:

- Directional control valve – lever operated, 4-way, three position, tandem center
- Sequence valve
- Pressure reducing/relieving valve
- Check valve
- Pressure compensated flow control valve
- Counterbalance valve
- Normally open 2-position solenoid valve
- Two cylinders - one equipped with adjustable proximity switch and another equipped with resistive spring load
- Fixed volume Vickers® V10 vane pump
- Pressure gages
- 2 plumbing tees

Using the HTS-2, students will become familiar with the principles of aeration and cavitation, sequencing circuits, operation of components in series and parallel, flow control characteristics and types of applications, hydraulically counterbalancing an actuator and many other fundamental concepts.

To obtain a quotation, please contact Training Services at 800-413-8809 or hydraulicstraining@eaton.com.
MTS-1 - Mobile Training Simulator

The Mobile Hydraulics Training Simulator is the newest simulator offered by Eaton Hydraulics Training Services. This simulator is based on many years of instructional and field experience, and was designed to ensure those involved with the study of hydraulics, specifically mobile applications, have the most cost effective, hands-on method of presenting a practical demonstration of the principles taught within the classroom. In addition, this simulator is designed to allow an instructor to easily place a fault within the unit at the flick of a switch. There are 7 faults that can be selected to provide advanced training for troubleshooting. The MTS-1 has been designed, built, and is exclusively available through Eaton’s Hydraulics Training Services.

The MTS-1 is a single operator simulator with a hydrostatic propel circuit and auxiliary charge circuit that also supplies steering, and lift/tilt functions to simulate the operation of a fork lift. The power unit is capable of supplying a total flow of 3 GPM at 500 PSI (propel only or combination of propel, steering and lift/tilt functions) and will operate on a standard 120VAC, 20 amp lighting circuit.

The components mounted on the unit are representative of those found in today’s mobile hydraulic equipment and allows the students to visually reinforce the learning concepts. Eaton’s MTS-1 comes with a detailed instructor’s manual that explains the exercises, provides a pictorial guide to ensure proper assembly, and a video demonstrating the proper performance of each exercise.

Components can be easily connected together through flexible hoses and leak-free quick disconnects to configure many variations of mobile hydraulic circuits which reinforce the theory and principles of operations in class. The Mobile Hydraulics Training Simulator is equipped with the following hydraulic components:

- Orbital steering valve
- Hydrostatic transmission pump
- Priority flow control valve
- Orbital propel motors
- Steering and work cylinders
- Hoses with quick disconnects and built-in storage rack
- Control panel with gauges and tachometer
- Instructor control box for troubleshooting scenarios
- Tees, gages, and a flow meter equipped with quick disconnects
- Steering column and wheel
- Propel and steering wheels and tires
- Hot oil shuttle valve
- Replenishing relief valve
- 2-section monoblock valve with power beyond
- Pilot operated check valves
- Cross port relief valves
- Charge/auxiliary vane pump
- Charge relief valve with remote control
- Aeration valve
- Suction valve
- Remote reservoir fill connection through filter
- Heat exchanger

By using the MTS-1 students will become familiar with the principles of aeration and cavitation, steering, drive and operations of mobile equipment used in the field. The unit comes with a 1-year limited warranty.

To obtain a quotation, please contact Training Services at 800-413-8809 or hydraulicstraining@eaton.com.
PETS-II - Portable Electrohydraulic Training Simulator

The recently redesigned Portable Electrohydraulic Training Simulator (PETS-II) is based on many years of instructional experience and our previous, highly acclaimed designs. This fluid power training simulator is designed to ensure that those involved with the study of electrohydraulics have the most cost effective, hands-on method of presenting a practical demonstration of the principles taught within the classroom. The PETS-II unit has been designed, built, and is exclusively available through the Eaton Hydraulics Training Services Department, with a 1-year limited warranty.

The PETS-II is a portable desktop simulator with a compact power unit that supplies flow to the directional control valve in order to accommodate up to 2-3 students at a time. The power unit is capable of supplying a total flow of 0.25 GPM at 200 PSI and will operate on a standard 120VAC, 15 amp lighting circuit.

The components mounted on each panel are representative of those found in today’s hydraulic applications and allow the students to visually reinforce the learning concepts. Each PETS-II unit comes with a detailed instructor guide that explains the exercises and provides a pictorial guide to ensure proper assembly.

The PETS-II unit comes complete with the following components:

- Motor/pump with 1 liter tank, 0.25 GPM pump at 300 PSI
- Extruded aluminum enclosure with carrying handles
- Non-feedback proportional directional control valve
- 7” hydraulic cylinder
- 5K Ohm linear potentiometer (cylinder position feedback)
- 5K Ohm 10 turn command potentiometer on the front panel
- 3 push button switches on the front panel for enable and step command signals
- DIN-rail mounted Eaton ELC programmable controller with digital and analog I/O
- DIN-rail mounted PID amplifier
- Patch cord set to connect proportional lab experiments

Using the PETS-II unit, students will become familiar with the principles of electrohydraulic control of position, velocity and the electrical wiring, tuning, and troubleshooting of the proportional amplifier. The lab experiments include both open and closed loop control of the cylinder position or velocity. Students will wire the proportional amplifier and adjust the gain, deadband compensation, and acceleration and deceleration of the cylinder using on board ramps. The PID amplifier will demonstrate the adjustment of proportional, integral, and derivative gains for proper closed loop control of the cylinder.

To obtain a quotation, please contact Training Services at 800-413-8809 or hydraulicstraining@eaton.com.
Component Cutaways

Eaton Hydraulics Training Services offers a full line of the most commonly used hydraulic components as a way to supplement your hydraulics presentations and curriculum. They are designed to help students better understand internal operations, without the mess! Orders can be placed by contacting Hydraulic Training Services at 800-413-8809, or by using our e-commerce store (www.hydraulicsliteraturestore.com).

Pressure Control: Balanced Piston Relief Valve
- Item #: CAW-CS06
- Model Code: CS-06-B-50
- Assembly #: 572263
- Lead Time: 28 Weeks

Solenoid Controlled, Pilot Operated Directional Control Valve
- Item #: CAW-DG5S-8-8C
- Model Code: DG5V-8-H-8C-T-R-VM-FTWL-B-10
- Assembly #: 02-395303
- Lead Time: 20 Weeks

Pressure Control Valve (Multi-Function 'R' Valve)
- Item #: CAW-RCS06
- Model Code: RCS-06-B1-30
- Assembly #: 675204
- Lead Time: 28 Weeks

Pressure Reducing Valve
- Item #: CAW-XCS-03
- Model Code: XCS-03-1B-30
- Assembly #: 590387
- Lead Time: 28 Weeks

26000 Series Pump
- Item #: CAW-26000
- Model Code: ACNAL01ABA00100000000A
- Assembly #: 26001-LZA
- Lead Time: 15 Weeks

Fixed Volume Vane Pump
- Item #: CAW-V10
- Model Code: V10-1S1S-1C20-3
- Assembly #: 386496-3
- Lead Time: 14 Weeks

Stack Valve - Aluminum Sandwich Crossover Relief Valve
- Item #: CAW-RV3-A321W
- Model Code: RV3-10-NS-A321W-A-03-B-3618 0000A
- Assembly #: 615AA00015A
- Lead Time: 15 Weeks

20V IntraVane Pump
- Item #: CAW-20V
- Model Code: 20V-02-A-1C-10
- Assembly #: 02-348426-3
- Lead Time: 14 Weeks

Manually Operated Variable Piston Pump
- Item #: CAW-70160
- Model Code: ADB14L1FRC11HH1 P0A00301A00000A0C
- Assembly #: 70160-LAG-03
- Lead Time: 30 Weeks

Proportional Directional Control Valve with Feedback and On-Board Electronics
- Item #: CAW-KBFDG4V
- Model Code: KBFDG4V-3-2C07N-Z-M-1-PC7-H7-11
- Assembly #: 5995968-001
- Lead Time: 18 Weeks
Component Cutaways

Training Products & Descriptions: Classroom Materials and Lab Equipment

**420 Piston Pump w/Pressure and Flow Compensation**
Item #: CAW-420-041  
Model Code: ADU041R02AE  
10C43000000100100CD0B  
Assembly #: 421AK00031B  
Lead Time: 19 Weeks

**Hydraulic Cylinder: 1.5” Bore X 5/8” Rod X 6” Stoke**
Item #: CAW-15-063-6  
Model Code: NSF-1.50X6.00-N-0.63-2-S-H-V-1-1  
Lead Time: 12 Weeks

**Low Speed High Torque Motor (‘H’ Series Spool Valve Motor)**
Item #: CAW-MHO-022  
Model Code: MHO 022 AA 01 000 00 0 00 0 00 J  
Assembly #: 101-2808-009  
Lead Time: 12 Weeks

**Series 5 Hydrostatic Steering Control Unit**
Item #: CAW-ABR1  
Model Code: ABR1CA350AA0100004AAN3A0AA10AB  
Assembly #: 291-1196-002  
Lead Time: 14 Weeks

**Bladder Accumulator**
Item #: CAW-A2-30-B  
Model Code: A2 30 B 060 BN M 21  
Assembly #: 5003930  
Lead Time: 14 Weeks

**2K Disc Valve Motor**
Item #: CAW-104-1003  
Model Code: M0206C01A0000F  
Assembly #: 104-1003-006  
Lead Time: 16 Weeks

**Medium Duty Fixed Displacement Piston Motor**
Item #: CAW-74111-DAS  
Model Code: AAVAABA0B000A0B  
Assembly #: 74111-DAS-01  
Lead Time: 27 Weeks

**Model 1100 Transmission**
Item #: CAW-1100  
Assembly #: 1100-003  
Lead Time: 15 Weeks

**25M Vane Motor**
Item #: CAW-25M  
Model Code: 25M42A-11B20  
Assembly #: 313457-2  
Lead Time: 14 Weeks

**CML60 2-Section Valve**
Item #: CAW-CML60-2  
Model Code: CML601CS1L0200-EMSP1H30-E000010  
Assembly #: 220AP00063A  
Lead Time: 14 Weeks
**Industrial Hydraulics Manual**  
*Item # TC-101-06-E-1*

Edition: 6th, Published 2016  
ISBN: 978-0-692-53210-0

Our color-illustrated, 600+ pages, hardbound textbook covers everything you need to know about hydraulics and electrohydraulics, including the principles of basic hydraulics, basic electricity and electronics, amplifiers, pumps, cartridge valves and circuits. A systems chapter focuses on the operation of industrial hydraulics circuits and injection molding systems. Included in the appendices are commonly used formulas, conversion charts, tables that can be used as on-the-job reference materials and much more. Additionally, we have included metric values throughout the textbook. This manual is perfect for individuals who are just starting in the hydraulics industry as well as those with years of experience. The end of each chapter contains review questions to test comprehension of the material as you progress.

**Mobile Hydraulics Manual**  
*Item # TC-102-02-E*

Edition: 2nd, Published 2010  
ISBN-10: 0-9634162-5-1

Our 2nd Edition Mobile Hydraulics Manual was reprinted in 2010. It is hardbound with over 500 pages and 475 colored illustrations. This edition has improved graphics and new end of chapter test questions. Every major aspect of mobile hydraulics theory and application is covered, including basic hydraulic theory, basic electrical theory, hydrostatic transmissions, and fixed and variable displacement pumps. If you work on mobile applications or are teaching a fluid power course with mobile concepts, this manual is the perfect companion to support your professional development and curriculum.

**Closed Loop Electrohydraulics Systems Manual**  
*Item # TC-103-01-E*

Edition: 2nd, Published 1998  
ISBN: 0-9634162-1-9

This text was designed to help people involved with closed loop electrohydraulic control systems. Because the discussion of the fundamental principles of amplifiers, ramp generators and comparators requires a working knowledge of electronics, the student will learn about voltage, current, resistance and capacitance in DC circuits. The manual covers the operation of open and closed loop servo valve and proportional valve systems, and design considerations such as valve sizing, actuator selection and feedback transducers. It was prepared assuming the reader has a solid understanding of fluid power concepts.

**Bird Bones & Sludge: Comprehensive Guide to Filtration**  
*Item # TC-104-01-E*

Edition: 1st, Published 1996  
ISBN: 0-9634162-4-3

You’d be surprised what you’ll find in a hydraulic system. Bird bones, feathers, sandwiches and shop rags are just a few of the items routinely found. In fact, just about anything that’s used on a typical shop floor can end up in a hydraulics system as contamination. Bird Bones and Sludge is a book published by Eaton’s Hydraulics Training Services that provides a comprehensive reference on contamination control of hydraulic systems. Written for individuals with a basic knowledge of hydraulics, the book’s purpose is to help people find ways to identify and eliminate particles as small as a few microns in order to prolong hydraulic machine and component life.
Item # LRH-8
The Fluid Power Designers’ Standard Engineering Data handbook is, quite simply, the best fluid power engineering reference book in existence. Complete with full conversion tables, formulas and shortcut component size tables, as well as current graphic symbology for several different applications. It covers standards and practices, fluid power data, fluids, actuators, conductors, valves, connectors, seals…etc. If you are in the fluid power industry you should have this manual, no excuses.

Item # TC-101-6/1
This book contains the answers to all of the questions shown in the sixth edition of the Industrial Hydraulics Manual. It was written as a training aid for instructors who are currently using our textbook.

Item # TC-102
This book contains the answers to all of the questions shown in the second edition of the Mobile Hydraulics Manual. It was written as a training aid for instructors who are currently using our textbook.

Intro to Hydraulics Technology – Student Workbook
Item # LIT-442
This workbook was designed to complement our Industrial Hydraulics Manual. It is a perfect guide for students wanting extra practice in graphic symbols, circuits, reinforcing principles and fundamental concepts. Complete with test questions for each section and answers in back to validate comprehension. New students to the fluid power industry will be able to reduce the amount of time required to learn and master basic fluid power concepts when this workbook is added to their library.
Item # TC-101-06-FD
The Industrial Hydraulics textbook is a great resource for instructors and students. Available for purchase, this graphics flash drive contains all of the textbook images, which have proven to be valuable visual aids for instructors. We have converted the images to convenient to use PowerPoint® slides. The Industrial Hydraulics Manual graphics flash drive consists of over 600 images from the Industrial Hydraulics Manual. These slides are divided by chapter and are in order as they exist in the Industrial Hydraulics Manual. It is the perfect companion for anyone who wishes to teach from the best textbook in the fluid power training industry.

Item # TC-102-01-CD
The Mobile Hydraulics textbook is a great resource for instructors and students. Available for purchase, this graphics CD contains all of the textbook images, which have proven to be valuable visual aids for instructors. We have converted the images to convenient to use PowerPoint® slides. The Mobile Hydraulics Manual graphics CD consists of over 400 images from the Mobile Hydraulics Manual. These slides are divided by chapter and are in order as they exist in the Mobile Hydraulics Manual. It is the perfect companion for anyone who wishes to teach from the best textbook in the fluid power training industry.

Aeration & Cavitation Demonstration DVD
Item # AC-V
Completely redone in 2012, this DVD demonstrates the effects of an aerated system using the Eaton Hydraulics Training Services’ aeration simulator. This simulator permits air to be introduced into a hydraulic system under controlled circumstances. Cavitation is a similar problem created when a vacuum arises upstream of the pump producing bubbles from air coming out of the fluid. This DVD is approximately six (6) minutes long.

Hydraulic Formulas Reference Card
Item # HF-101
Pocket-size reference card, 2-sided, which contains many of the formulas used in hydraulics calculations.