Motion & Control Training
Hydraulic Training Equipment

aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding
Table of Contents

Introduction ............................................................................................................................................... 1
Modular Platform Frame Options ........................................................................................................ 4
Modular Platform Accessory Options .................................................................................................. 5
Modular Training Products .................................................................................................................... 6
Training Curriculum .............................................................................................................................. 14
HTU00 Training Stand ........................................................................................................................... 21
Equipment Specifications ....................................................................................................................... 22
  Modular Platform Option ...................................................................................................................... 22
  BHLM01 - Basic Hydraulic Learning Module ..................................................................................... 22
  BHEM02 - Basic Hydraulic Expansion Module .................................................................................. 23
  EHTM01 - Electrohydraulic Training Module 01 .............................................................................. 23
  EHTM02 - Electrohydraulic Training Module 02 .............................................................................. 23
  EHTM03 - Electrohydraulic Training Module 03 .............................................................................. 24
  EHTM04 - Electrohydraulic Training Module 04 .............................................................................. 24
  EHTM05 - Electrohydraulic Training Module 05 .............................................................................. 24
  MHTM01 - Mobile Hydraulic Training Module 01 ........................................................................... 25
  EHMC01 - Electrohydraulic Motion Controller Training Module ..................................................... 25
  HTU00 - Basic Hydraulic Trainer Stand ............................................................................................ 25

A global Fortune 300 company with customers in 48 countries, Parker Hannifin is the world’s leading supplier of hydraulic, pneumatic and electromechanical systems and components. Customers rely on Parker for engineering excellence, world-class manufacturing and outstanding customer service to provide comprehensive application solutions that are second to none.

- More than $10.3 billion in sales
- 298 plants worldwide
- 12,000 distributors
- 449,000 customers
- Serving 1,200 distinct markets

Industrial markets served:
- Amusement Rides & Simulators
- Bailers & Compactors
- Hydraulic Presses
- Industrial Machinery
- In-Plant Automotive
- Machine Tool
- Marine
- Medical Equipment
- Oil & Gas
- Paper
- Plastics & Rubber
- Power Generation
- Testing Machines
Parker’s Value Proposition

Training Systems
Continued growth in the demand for sources of renewable energy has led Parker Hannifin, the global leader in motion and control technologies, to expand still further its range of training products and systems in the hydraulic sector.

Based on Parker’s long term experience in designing, manufacturing and servicing fluid-power components worldwide, the Modular Hydraulic Trainer System is designed to be a tool for learning hydraulic technology principles and circuitry. It has been engineered for ruggedness, portability, and ease of operation.

Component Selection
Components on the Training Equipment are industrial grade and used in industry every day. This approach allows the student to learn with the components used in the most demanding hydraulic applications.

Parker’s Commitment
Parker believes that it takes more than our great products, competitive prices and on-time delivery to satisfy customer demands. It takes a commitment to provide exceptional value.

For today’s customer, an outstanding total experience is the benchmark by which many suppliers are evaluated. Parker delivers tangible and measurable benefits that are designed to reduce your total cost while enhancing the learning experience.
Parker’s Value Proposition

Training Excellence

Parker’s technical training for hydraulic, pneumatic and electromechanical technology is the best in the world. We offer complete and comprehensive texts, web-based training and hands-on classes for employees, distributors and customers. Hundreds of North American colleges and universities use Parker textbooks in motion and control courses. In addition to texts, Parker provides these institutions instructor guides, computer-based training discs, digital images, final exams, drafting and simulation software, lab manuals and trainer stands.

Find out more about Parker training by visiting: www.parker.com/training, or call 216-896-2495.
Modular Platform Frame Options

This State of the art Modular Hydraulic Training System is a flexible training platform to accommodate the user’s needs and budget. The Modular Frame can host one panel for a single sided training station or two panels mounted back-to-back for a double-sided training station. Panels can also be purchased individually in different sizes and placed onto a secure horizontal surface. The Modular Frame and Power Unit are mounted on casters that enable the units to be easily relocated to another training location or stored for shared facility usage.

PSKMF - Modular Frame

The lightweight aluminum frame is ideal for a versatile training environment. Components from any learning module easily snap onto the panel in any configuration. An additional panel can be mounted to the back for a double-sided learning platform.

Circuits can be created with ease and brought into the classroom to reinforce learning objectives.

68” high x 54” wide x 31” deep
4” swivel locking casters
Hose rack

PSKPL48X28 - Modular Panel

Aluminum Panel can be mounted onto PSKMF for a double-sided stand or can be mounted on a flat surface as the primary training surface for attaching Learning modules.

PSKPL32X24 - Modular Panel

Portable frame for integrating training modules. Work surface measures 32”X24” and can lay on a flat surface or be carried into the classroom to enhance the learning experience.
Modular Platform Accessory Options

**PSKPL24X16 - Modular Panel**

Portable frame for integrating training modules. Work surface measures 24”X16” and can lay on a flat surface or be carried into the classroom for demonstration purposes.

**PSKPU1 - Power Unit**

This Industrial Power Unit is used in many hydraulic applications and connects directly to any of the hydraulic components or through a manifold (PSK20600). It offers a unique training opportunity for students to learn about industry standards and proper maintenance.

- 1 Horse Power
- 115 volt electric motor
- Pressure Gauge
- Filter
- Motor starter
- Tank Gauge
- Bypass valve

**PSK20607 - Hose Assemblies**

13 Total Hose Assemblies includes a mix of 60 inch and 30 inch length for connecting Power Unit and Hydraulic learning modules. Each end is connected to a Flush Face coupler for easy connections and promotes a leak free training environment.

**PSK9T66 - Storage Cart**

This Storage Cart rolls beneath the Modular Frame for easy storage or can be used to transport training modules into the classroom to support a visual learning experience.

**PSK*** - Modular Plates**

Individual Plates can be ordered for users to incorporate their own technology to the modular frame. Hydraulic Pneumatic or electronic components mounted on these plates will easily snap onto any of the Modular Panels.
Modular Training Products

BHLM01 - Basic Hydraulic Learning Module, includes 14 experiments to provide a hands-on approach to learning hydraulics. All of the components in this module are mounted on individual fixtures that snap onto the Modular Panels. The Lab Manual Bulletin 0213.1 describes the step-by-step procedure for all 14 exercises and references the learning's to the Industrial Hydraulic Technology textbook.

PSK20601
3 position, 4 way, Closed Center Lever Operated

PSK20604
6" double acting cylinder

PSK20614
Pressure Reducing Valve

PSK20608
Needle Valve

PSK20611
Pressure Compensated Flow Control Valve

PSK20606
Tee's

PSK20612
Flow Meter

PSK20615
0-1000psi gauges
Modular Training Products

BHEM02 - Basic Hydraulic Expansion Module must be used with the Level 1 Hydraulic Module. The Lab Manual Bulletin 0213.1 describes the details for an additional 16 experiments. All of the components in this module are mounted on individual fixtures that snap onto a Modular Panel. The 12” stroke cylinder is equipped with all the electronics to be used with the Electrohydraulic Valves and Digital Amplifiers provided with the Electrohydraulics Modules purchased separately.

PSK20609
Flow Control Valve with Bi-pass check
Comes with: BHEM02

PSK20610
Check Valve
Comes with: BHEM02

PSK20602
3 position, 4 way, Open Center Lever Operated
Comes with: BHEM02

PSK20603
12” double acting cylinder 0-10volt position feedback
Comes with: BHEM02

PSK20613
Sequencing Valve
Comes with: BHEM02

PSK20618
Bi directional Gerotor Motor
Comes with: BHEM02
Modular Training Products

SKHD1FX
Comes with: EHTM01

The D1FX Series of proportional directional control valves provide variable output flow in response to voltage or current command signals. The valves are fully integrated units with on-board electronics and a spool position feedback device.

SKHD1FB
Comes with: EHTM02

Proportional Valve
The spool and sleeve combination with wire EDM window geometry is suited for standard applications in combination with the digital proportional amplifier PSKPWD, the valve parameters can be saved, changed and duplicated.

SKHD1FP
Comes with: EHTM03

Servo/Proportional Valve
High response control valves with VCD® technology. In contrast to standard proportional solenoid drives, this technology actuates the spool by using a moveable coil. The spool is rigidly connected to the coil, which moves over a permanent magnetic cylinder free of friction. When the coil is energized, the spool is moved to the desired position. The spool position is fed back into the control electronics via a high resolution feedback system. When the power supply is powered down, the spool is driven by a spring to a defined position.

SKPD1FH
Comes with: EHTM04

This valve can be used with the SKPCYL1 for demonstrating hydraulic control using compressed air. Both components are configured to snap onto the modular platform frames provided with any of the other learning modules.
Features:
- On-Board Electronic Drive Amplifier
- High Frequency Response
- Four Position Spool Capability
- Spool Position Feedback
- Drive Enable Feature
- High Resolution Around Null
Modular Training Products

SKPCYL1
Pneumatic Cylinder with analog feedback transducer. This cylinder can be used in combination with the SKPD1FH for demonstrating position and force control.

SKBD101
Signal Conditioning Card
Closed loop options are switch selectable with integral and proportional control. Feedback scaling, input bias, and gain adjustments are provided. Outputs currents up to ±150 mA or voltage output of ±10 VDC are available. Current command of ±20 mA can be converted to ±10 VDC.

SKPWO0
Digital Proportional Amplifier
- Interface and tuning for spool position feedback.
- Programmable parameters.
- ±10V, ± 20 mA, 4-20 mA position transducer input.
- RS-232 Interface.
- User friendly programming software.
- Plug-in terminals.
- Four independent ramps.
- Input Enable with Status indicator.
- Differential command input.
- Compliant with European EMC Standards.

SKPID
Digital Servo Amplifier
The described electronic unit combines all necessary functions for the optimal operation of closed loop controls. The most important features are:
- Extended PID controls
- Speed control with position feedback
- Differential input stage with different signal options
- Output stage with different output options
- Four-quadrant ramp function
- Status indicator
- Digital circuit design
- Connection by disconnectable terminals
- Compatible to the relevant European EMC standards
Modular Training Products

SKPWDX

Digital Proportional Amplifier
- Interface and tuning for spool position feedback.
- Programmable parameters.
- ±10V, ±20 mA, 4-20 mA position transducer input.
- RS-232 Interface.
- User friendly programming software.
- Plug-in terminals.
- Four independent ramps.
- Input Enable with Status indicator.
- Differential command input.
- Compliant with European EMC Standards.

SKPCD0

Digital Proportional Amplifier
The described electronic unit combines all necessary functions for the optimal operation of two proportional pressure/flow control valves. The most important features are:
- Digital circuit design
- Two independent operable amplifiers
- Four parameterizable preset recall channels
- Constant current control
- Two input stages 0...10V
- Status output
- Two up/down ramp functions
- Enable input for solenoid driver
- Status indicator
- Parametering by serial interface RS-232C
- Compatible to the relevant European EMC standards
- Comfortable Interface and tuning for spool position feedback

SKPNULL

Null Modem Cable for communicating with SKPID and SKPWD

Comes with: EHTM02, 03, 04, 05

Comes with: EHTM02, 03, 04, 05

Comes with: EHTM05

Comes with: EHTM02, 03, 04, 05
The Compax3F was especially designed to meet the requirements of electrohydraulic systems for the control of position and force of hydraulic axes.

Motion control with motion profiles, suitable for position and force/pressure control for up to 2 axes. Due to its high functionality, Compax3 in the version "IEC 61131-3 – Positioning with function modules based on PLCopen" forms an ideal basis for many applications in high-performance motion automation. A standard with general applicability was created with Standard IEC 61131-3. The programming system is equipped with a series of functions in addition to the compliant editor. The Motion Control functions specified in PLCopen are also provided by Parker as a library with the device and control software. The graphical program editor supports the following functions:

- Ladder diagram
- Function block diagram (structurally guided)
- Function block diagram (free graphical editor)
- The text-oriented editor supports programming in
- Instruction list
- Structured text
- Independent of your motion automation you can access

Compax3 externally via different interfaces (e.g. with the superordinate control):

- via RS232 / RS485
- via digital Inputs/Outputs
- via Profibus
- via CANopen
Terminal blocks can be used to route the Compax3 plug connector for further wiring to a terminal strip and to a Sub-D plug connector. Via a supporting rail, the terminal block can be installed on a mounting rail on the modular platform. The terminal Block is available in 2 variants:

- Without luminous indicator (SKTB01) or with luminous indicator (SKTB02)

**SKTB01/SKTB02**

Corresponding connection cable for SKTB01

| SKTBCL1 | Comes with: EHMC01 |

**SKTBLCL2**

Corresponding connection cable for SKTB01

| SKRS232 | Comes with: EHMC01 |

**SKRS232**

RS232 Cable for communicating with SKC3F

| SKEHC | Comes with: EHTM03, 04, 05 |

**SKEHC**

7 pin Valve Cable

| SK0866 | Comes with: EHTM02, 03, 04, 05 |

**SK0866**

Cylinder cable

| SKPS2401 | Comes with: EHTM02, 03, 04, 05 |

**SKPS2401**

Power Supply

24 Volt - 4 Amps
Modular Training Products

SSKHVMY
Comes with: EHTM05

Proportional Pilot Operated Proportional Reducing Valve

Proportional pressure reducing valves allow the variable adjustment of the reduced pressure from 0 bar up to the nominal pressure.

The valve consists of a spool type main stage and a proportionally operated pilot stage. The desired pressure can be variably set corresponding to the command signal specified on the amplifier. The proportional solenoid converts the current of the amplifier into force on the valve poppet of the pilot stage. Typical applications are pressure systems, test equipment, or counterweight systems.

The optimum performance can be achieved in combination with the digital amplifier module SKPCD0 for open loop systems or with SKPWDX for closed loop systems.

SKMV01
Comes with: MHTM01

Mobile Directional Control Valve

The VO40 incorporates traditional open-center technology. It is usually interfaced with a constant flow pump, whose flow is routed directly to tank when the spools are in neutral. When one or more spools are selected, flow is directed to the actuators. The throttling of that flow depends upon the spool position.

Additionally, each work section has a transition check to ensure that a load does not “dip” during simultaneous operation. These features were intended to take machine controllability to the next level.

SKASH06
Comes with: MHTM01

Shuttle Valve
For Mobile Hydraulic Module
Training Curriculum

Bulletin 0216.1

BHL01 - Basic Hydraulic Learning Module - Lab Manual

Learning Exercises

- Maximum Relief Pressure
- Flow Rate of Pump
- Standard Closed Center Circuit
- Setting Flow Rate Through a Flow Control Valve
- Cylinder Leak Test
- Regeneration
- Measuring Flow Out of a Cylinder
- Meter-In
- Meter-Out
- Meter-Out with a Pressure Compensated Flow Control Valve
- Bleed-Off Flow Control, Retract
- Bleed-Off Flow Control, Bidirectional
- Pressure Reducing Valve Adjustment
- Pressure Reducing Circuit

Bulletin 0216.2

BHEM02 - Basic Hydraulic Expansion Module - Lab Manual

Learning Exercises

- Standard Open Center Circuit
- Closed Center Pressure Buildup
- Regeneration Without Full Flow Through Directional Valve
- Synchronize on Extend Only
- Synchronize Both Ways Without Flow Control
- Hydraulic Motor Meter-In Flow Circuit
- Hydraulic Motor Meter-Out Flow Circuit
- Flow Divider
- Counterbalance
- Counterbalancing a Hydraulic Motor
- Sequence Valve Adjustment
- Sequencing Cylinders
- Sequencing Cylinder and Motor
- Sequencing and Pressure Reducing
- Sequencing and Pressure Reducing
- Crossover Relief
- Solenoid Operated Relief Valve
- Directional Control Without Directional Control Valve
  (Introductory Lab for Cartridge Valve Systems)
Training Curriculum

**Bulletin 0217.1**

EHTM01 - Electrohydraulic Training Module 01 - Lab Manual

Learning Exercises
- Electrohydraulic Valve
- LVDT (linear variable differential transformer)
- PC Board Input/Output Connections
- “On Board” Driver Card Current and Bias Options
- “On Board” Driver Card Electronic Limits
- “On Board” Driver Card Deadband Compensators
- Open Loop Operation with Cylinder
- Proportional Valve Characteristics
- Open Loop Operation with a Motor
- Closed Loop Operation with a Cylinder

**Bulletin 0217.2**

EHTM02 - Electrohydraulic Training Module 02 - Lab Manual

Learning Exercises
- Electrohydraulic Valve
- Software Installation and Overview
- Digital Amplifier Input/Output Connections
- Digital Amplifier Electronic Limits
- Digital Amplifier Deadband Compensators
- Open Loop Operation with Cylinder
- Proportional Valve Characteristics
- Digital Amplifier Dither and Amplitude Adjustments
- Open Loop Operation with a Motor
- Closed Loop Operation with a Cylinder

**Bulletin 0218.1**

MHTM01 - Mobile Hydraulic Training Module 01 - Lab Manual
- Over 20 learning exercises tailored to mobile applications

**Bulletin 0218.1**

HMAIN01 - Hydraulic Maintenance Training Module 01 - Lab Manual
- Over 14 learning exercises tailored to maintenance solutions
- Requires both BLM01 and BHEM02 Learning Modules
Training Curriculum

**Bulletin 0232-B1**

Industrial Hydraulic Technology - 2nd Edition - Textbook

ISBN 1-55769-025-1 The Industrial Hydraulic Technology textbook is designed to introduce a student to hydraulics as it relates to industrial machinery. This 330-page text is organized into fifteen chapters which include:

- The Physical World of a Machine
- Hydraulic Transmission of Force and Energy
- Petroleum Base Hydraulic Fluid
- Fire Resistant Hydraulic Fluid
- Operation at the Suction Side of the Pump
- Hydraulic Actuators
- Control of Hydraulic Energy
- Check valves, Accumulators and Cylinders
- Flow Control Valves
- Directional Control Valves
- Pressure Control Valves
- Pilot Operated Pressure Control Valves
- Hydraulic Pumps
- Hydraulic Motors
- Reservoirs, Coolers and Filters

Each chapter incorporates an exercise reviewing the lesson’s main points.

**Bulletin 0232-B7**

IHT Answer Booklet

This booklet contains the answers to the chapter quizzes found in Bul. 0232-B1, Industrial Hydraulic Technology, 2nd Edition.

**Bulletin 0232-B5**

IHT Final Exam

This package includes 10 copies the IHT final exam. This 50-question exam is taken directly from the Bul. 0232-B1 student textbook. The answer key to this exam is found in Bul. 0232-B2 IHT Instructor’s Guide.

**Bulletin 0232-B2**

IHT Instructor Guide

ISBN 1/55769-028-6 This is the Instructor’s Guide for the student textbook (Bul. 0232-B1). The Instructor’s Guide includes the answers to the chapter quizzes, margin notes for the instructors, as well as the Final Exam (Bul. 0232-B5) answer key.
Training Curriculum

Bulletin 0232-B3/CD

IHT Digital Images CD-ROM
This CD contains all the graphics from the Bul. 0232-B1 student textbook. This packaged CD includes graphics, videos and animations and does not require special software to run.

Bulletin 0232-B9

Technology Oleohidraulica Industrial - Textbook
ISBN 1-55769-035-9 This text is the Industrial Hydraulic Technology textbook in Spanish.

Bulletin 0274-B1

Mobile Hydraulic Technology - Textbook
ISBN 1-55769-039-1 Mobile Hydraulic Technology is one of our most recent additions to the line of Parker technical textbooks. Over 400 pages, this text covers such technical topics of steering systems, directional control valves, hydraulic cylinders, fluids and applications.

This text is a must as a fundamental introduction to mobile hydraulics. Chapters include:

- Introduction to Mobile Hydraulics
- Basic Hydraulic Principles
- Mobile Hydraulic Pumps
- Hydraulic Motors and Hydraulic Drives
- Hydraulic Cylinders
- Pressure Control Valves
- Flow Control Valves
- Directional Control Valves
- Remote Controls in Mobile Hydraulic Systems
- Fluids
- Hydraulic Filters
- Fluid Conductors
- Steering Hydraulic Systems & Accumulators
- Reservoirs and Coolers
- Unit Conversions
- Applications
- Hydraulic Fluid Filter Selection.
Recent advancements in electronic and hydraulic hardware have combined to make the design and installation of Electrohydraulic systems more intuitive, reliable, cost effective and user friendly. These advancements have made Electrohydraulics an increasingly popular motion and control technology and serve as the foundation of this book. Understanding the variables that affect Electrohydraulic systems and their performance will benefit customers by reducing down time, improving process efficiencies and reducing pressure spikes, vibration and noise in existing systems. The content of this text will help to improve the design of new systems by considering the application requirements, as well as the performance criteria of applications before system implementation. These concepts are highlighted by the chapter descriptions:

Chapter 1: Electrohydraulic Valves  
(Servo and proportional valves)  
Chapter 2: Defining Force Requirements  
Open loop considerations  
Chapter 3: Motion Profiles  
Establishing target position, velocity and acceleration  
Chapter 4: Sizing Hydraulic System Parameters  
Meeting force and velocity requirements  
Chapter 5: Hydraulic System Dynamics  
Meeting closed loop requirements  
Position and following error tolerances  
Chapter 6: Optimizing System Performance  
Tuning parameters and their effects
Training Curriculum

**Bulletin 0240-B1**

Hydraulic Maintenance Technology - Textbook

ISBN 1-55769-019-7 The Hydraulic Maintenance Technology textbook provides detailed maintenance and troubleshooting information for the user of industrial hydraulic equipment and is a valuable reference for designers of industrial hydraulic equipment.

This 148-page text contains troubleshooting charts with lists of common problems, causes and possible remedies in addition to ten chapters which include:

- Hydraulic Maintenance Introduction
- Hydraulic Graphic Symbology
- Power Unit Maintenance
- Pump Maintenance
- Pressure Control
- Valve Maintenance
- Directional Control Valve Maintenance
- Flow Control Valve and Check Valve Maintenance
- Cylinders
- Motors
- Accumulator Maintenance
- Leakage Elimination in Hydraulic Systems
- Fluids and Filter Maintenance

**Bulletin 0240-B7**

HMT Answer Booklet

This answer booklet contains the solutions to chapter quizzes in Bullet 0240-B1, Hydraulic Maintenance Technology.

**Bulletin 0240-B5**

HMT Final Exam, Package of 10

This package contains 10 copies of a 50-question exam. These questions are taken directly from information contained in Bul. 0240-B1, Hydraulic Maintenance Technology.

**Bulletin 0240-B2**

HMT Instructor's Guide

ISBN 1/55769-024-3 This Instructor’s Guide contains the answers to chapter quizzes for Bul. 0240-B1, Hydraulic Maintenance Technology, margin notes for the instructor, as well as the answer key to Bul. 0240-B5 HMT Final Exam.
Training Curriculum

This handbook has been prepared to provide, in one document, technical data and reference material to the designer, builder and user of equipment incorporating hydraulic components.

It is the purpose of this handbook to help the reader to become proficient in the analysis and evaluation of hydraulic systems. With this knowledge, the reader is prepared for advanced study in basic hydraulic system development. Components and circuitry are analyzed from an energy conservation standpoint. Efficiency and heat generation in the system are examined. The illustrations and circuits are useful to improve understanding, application, troubleshooting and service.

It takes good conceptual design to achieve a unit which will continue to function efficiently. Errors in circuit analysis and design in the selection of components will certainly show up in the operation of the machine. Inefficient operation, excessive heating, shocks, noise, vibration and a need for frequent maintenance are a few of the symptoms that can result from poor design procedure. These problems show up rather quickly after initial start-up. Circuit errors, no matter how small, tend to be compounded, and can result in expensive and excessive downtime and even expensive redesign and/or repair.

The information contained in this handbook is organized to assist the machine designer and manufacturer as well as service and maintenance personnel, it should prove to be equally valuable to the college and vocational school student preparing to enter any of these fields. The material in this handbook includes pertinent information on the selection, installation and maintenance of hydraulic components most commonly used in industry today. The table of contents and a complete index have been organized to allow for rapid identification and location of information in this handbook.
Modular Training Products

HTU00

Basic Hydraulic Trainer Stand

The Basic Hydraulic Trainer Stand (HTU00) is a self contained training system that includes all the necessary components for learning basic hydraulic technology. The lab manual instructs the users to implement over 30 exercises and is desired when the hydraulic training curriculum is restricted to one or two weeks.

- Fused start-stop button
- Heavy-duty casters
- Solenoid selector switch
- System pressure gauge
- 3.5 gpm gear pump
- Electric motor, 115V, 1 hp
- System pressure relief valve
- Ball valve for venting system pressure relief valve
- Motor isolation mount
- Ball valve for demonstrating cavitation
- Vacuum gauge
- Liquid level gauge with thermometer
- Needle valve for demonstrating aeration
- Aeration filter
- 10-gallon reservoir
- Filler/breather
- Pressure, drain and tank connection manifold
- Work bench
- Sequence valve
- Pressure reducing valve
- Check valve
- Hydraulic cylinder, 6" stroke
- Linear position sensor built into cylinder rod
- Flow control
- Check valve
- 6" rod piston scale¹
- Flow control valve
- Pressure compensated flow control
- Needle valve
- 10 sets of hose assemblies
- Two tees and one cross
- Hydraulic cylinder with protective rod guard, 12" stroke
- Pressure gauge (2)
- Flow meter
- Hydraulic motor with protective guard
- Solenoid operated 4-way closed center directional control valve
- Lever operated 4-way open center directional control valve
- Electrical cord (not shown)
- Storage cabinet
# Equipment Specifications

## Hydraulic Learning Module Specifications

Training Products can be ordered individually or they can be grouped with other components and curriculum into Learning Modules. Our most popular Learning Modules are used in hundreds of colleges and universities to produce talented individuals for the Motion & Control Industry.

### Modular Platform Options

#### Frame Options

<table>
<thead>
<tr>
<th>Part Number</th>
<th>QTY</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSKMF</td>
<td>1</td>
<td>Modular Frame</td>
</tr>
<tr>
<td>PSKPL48X28</td>
<td>1</td>
<td>Modular Panel</td>
</tr>
<tr>
<td>PSKPL32X24</td>
<td>1</td>
<td>Modular Panel</td>
</tr>
<tr>
<td>PSKPL24X16</td>
<td>1</td>
<td>Modular Panel</td>
</tr>
<tr>
<td>PSK***</td>
<td>1</td>
<td>Modular Plates</td>
</tr>
</tbody>
</table>

#### Accessory Options

<table>
<thead>
<tr>
<th>Part Number</th>
<th>QTY</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSKPU1</td>
<td>1</td>
<td>Power Unit</td>
</tr>
<tr>
<td>PSK20607</td>
<td>13</td>
<td>Hydraulic Hoses</td>
</tr>
<tr>
<td>PSK9T66</td>
<td>1</td>
<td>Storage Cart</td>
</tr>
</tbody>
</table>

### BHLM01 - Basic Hydraulic Learning Module

#### Basic Hydraulic Learning Module

<table>
<thead>
<tr>
<th>Part Number</th>
<th>QTY</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSK20601</td>
<td>1</td>
<td>Closed Center Lever Operated Valve</td>
</tr>
<tr>
<td>PSK20604</td>
<td>1</td>
<td>6” double acting cylinder</td>
</tr>
<tr>
<td>PSK20614</td>
<td>1</td>
<td>Pressure Reducing Valve</td>
</tr>
<tr>
<td>PSK20608</td>
<td>1</td>
<td>Needle Valve</td>
</tr>
<tr>
<td>PSK20611</td>
<td>1</td>
<td>Pressure Compensated Flow Control Valve</td>
</tr>
<tr>
<td>PSK20606</td>
<td>4</td>
<td>Tee's</td>
</tr>
<tr>
<td>PSK20612</td>
<td>1</td>
<td>Flow Meter</td>
</tr>
<tr>
<td>PSK20615</td>
<td>2</td>
<td>0-1000psi gauges</td>
</tr>
<tr>
<td>PSK20609</td>
<td>1</td>
<td>Flow Control Valve with Bi-pass check</td>
</tr>
<tr>
<td>PSK20610</td>
<td>1</td>
<td>Check Valve</td>
</tr>
<tr>
<td>Bulletin 0232-B1</td>
<td>1</td>
<td>Textbook</td>
</tr>
<tr>
<td>Bulletin 0232-B3</td>
<td>1</td>
<td>Digital Images</td>
</tr>
<tr>
<td>Bulletin 0249</td>
<td>1</td>
<td>Lab Manual</td>
</tr>
</tbody>
</table>
# Equipment Specifications

## BHEM02 - Basic Hydraulic Expansion Module

<table>
<thead>
<tr>
<th>Part Number</th>
<th>QTY</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSK20602</td>
<td>1</td>
<td>3 position, 4 way, Open Center Lever Operated</td>
</tr>
<tr>
<td>PSK20603</td>
<td>1</td>
<td>12&quot; double acting cylinder 0-10volt position feedback</td>
</tr>
<tr>
<td>PSK20613</td>
<td>1</td>
<td>Sequencing Valve</td>
</tr>
<tr>
<td>PSK20618</td>
<td>1</td>
<td>Bi directional Gerotor Motor</td>
</tr>
<tr>
<td>PSK20610</td>
<td>1</td>
<td>Check Valve</td>
</tr>
<tr>
<td>PSK20609</td>
<td>1</td>
<td>Flow Control Valve with Bi-pass check</td>
</tr>
<tr>
<td>Bulletin 2249</td>
<td>1</td>
<td>Lab Manual</td>
</tr>
</tbody>
</table>

## EHTM01 - Electrohydraulic Training Module 01

<table>
<thead>
<tr>
<th>Part Number</th>
<th>QTY</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SKHD1FX</td>
<td>1</td>
<td>Proportional directional control valve</td>
</tr>
<tr>
<td>SKBD101</td>
<td>1</td>
<td>Signal Conditioning Card</td>
</tr>
<tr>
<td>SKPS2401</td>
<td>1</td>
<td>Power Supply 24 Volt - 4 Amps</td>
</tr>
<tr>
<td>SKPDS</td>
<td>1</td>
<td>Potentiometer with Disable Switch</td>
</tr>
<tr>
<td>SKEHC</td>
<td>1</td>
<td>7 pin Valve Cable</td>
</tr>
<tr>
<td>SK0866</td>
<td>1</td>
<td>Cylinder cable</td>
</tr>
<tr>
<td>Bulletin 0211-B1</td>
<td>1</td>
<td>Textbook</td>
</tr>
<tr>
<td>Bulletin 02XX</td>
<td>1</td>
<td>Lab Manual</td>
</tr>
</tbody>
</table>

## EHTM02 - Electrohydraulic Training Module 02

<table>
<thead>
<tr>
<th>Part Number</th>
<th>QTY</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SKHD1FB</td>
<td>1</td>
<td>Proportional directional control valve</td>
</tr>
<tr>
<td>SKPWXDX</td>
<td>1</td>
<td>Digital Proportional Amplifier</td>
</tr>
<tr>
<td>SKPID</td>
<td>1</td>
<td>Digital Servo Amplifier</td>
</tr>
<tr>
<td>SKNULL</td>
<td>1</td>
<td>Null Modem Cable</td>
</tr>
<tr>
<td>SKPS2401</td>
<td>1</td>
<td>Power Supply 24 Volt - 4 Amps</td>
</tr>
<tr>
<td>SK0866</td>
<td>1</td>
<td>Cylinder cable</td>
</tr>
<tr>
<td>SKPDS</td>
<td>1</td>
<td>Potentiometer with Disable Switch</td>
</tr>
</tbody>
</table>
## Equipment Specifications

### EHTM03 - Electrohydraulic Training Module 03

<table>
<thead>
<tr>
<th>Part Number</th>
<th>QTY</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SKHD1FP</td>
<td>1</td>
<td>Servo/Proportional Valve</td>
</tr>
<tr>
<td>SKPID</td>
<td>1</td>
<td>Digital Servo Amplifier</td>
</tr>
<tr>
<td>SKPWDX</td>
<td>1</td>
<td>Digital Proportional Amplifier</td>
</tr>
<tr>
<td>SKNULL</td>
<td>1</td>
<td>Null Modem Cable</td>
</tr>
<tr>
<td>SKPS2401</td>
<td>1</td>
<td>Power Supply 24 Volt - 4 Amps</td>
</tr>
<tr>
<td>SK0866</td>
<td>1</td>
<td>Cylinder cable</td>
</tr>
<tr>
<td>SKPDS</td>
<td>1</td>
<td>Potentiometer with Disable Switch</td>
</tr>
<tr>
<td>SKEHC</td>
<td>1</td>
<td>7 pin Valve Cable</td>
</tr>
</tbody>
</table>

### EHTM04 - Electrohydraulic Training Module 04

<table>
<thead>
<tr>
<th>Part Number</th>
<th>QTY</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SKHD1FH</td>
<td>1</td>
<td>Proportional directional control valve</td>
</tr>
<tr>
<td>SKPCYL1</td>
<td>1</td>
<td>Pneumatic Cylinder</td>
</tr>
<tr>
<td>SKPID</td>
<td>1</td>
<td>Digital Servo Amplifier</td>
</tr>
<tr>
<td>SKNULL</td>
<td>1</td>
<td>Null Modem Cable</td>
</tr>
<tr>
<td>SKPS2401</td>
<td>1</td>
<td>Power Supply 24 Volt - 4 Amps</td>
</tr>
<tr>
<td>SK0866</td>
<td>1</td>
<td>Cylinder cable</td>
</tr>
<tr>
<td>SKPDS</td>
<td>1</td>
<td>Potentiometer with Disable Switch</td>
</tr>
<tr>
<td>SKEHC</td>
<td>1</td>
<td>7 pin Valve Cable</td>
</tr>
</tbody>
</table>

### EHTM05 - Electrohydraulic Training Module 05

<table>
<thead>
<tr>
<th>Part Number</th>
<th>QTY</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SKHVMY</td>
<td>1</td>
<td>Proportional Pilot Operated Proportional Reducing Valve</td>
</tr>
<tr>
<td>SKPWDX</td>
<td>1</td>
<td>Digital Proportional Amplifier</td>
</tr>
<tr>
<td>SKPCD0</td>
<td>1</td>
<td>Digital Proportional Amplifier</td>
</tr>
<tr>
<td>SKNULL</td>
<td>1</td>
<td>Null Modem Cable</td>
</tr>
<tr>
<td>SKPS2401</td>
<td>1</td>
<td>Power Supply 24 Volt - 4 Amps</td>
</tr>
<tr>
<td>SK0866</td>
<td>1</td>
<td>Cylinder cable</td>
</tr>
<tr>
<td>SKPDS</td>
<td>1</td>
<td>Potentiometer with Disable Switch</td>
</tr>
</tbody>
</table>
# Equipment Specifications

## MHTM01 - Mobile Hydraulic Training Module 01

Mobile Hydraulic Training Module 01

<table>
<thead>
<tr>
<th>Part Number</th>
<th>QTY</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SKMV01</td>
<td>1</td>
<td>Mobile Directional Control Valve</td>
</tr>
<tr>
<td>SKASH06</td>
<td>1</td>
<td>Shuttle Valve</td>
</tr>
</tbody>
</table>

## EHMC01 - Electrohydraulic Motion Controller Training Module

Electrohydraulic Motion Controller Training Module

<table>
<thead>
<tr>
<th>Part Number</th>
<th>QTY</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SKC3F01</td>
<td>1</td>
<td>Compax3F</td>
</tr>
<tr>
<td>SKRS232</td>
<td>1</td>
<td>RS232 Cable</td>
</tr>
<tr>
<td>SKTB01</td>
<td>1</td>
<td>Terminal block without luminous indicator</td>
</tr>
<tr>
<td>SKTBCL1</td>
<td>1</td>
<td>Corresponding connection cable for SKTB01</td>
</tr>
<tr>
<td>SKTB02</td>
<td>1</td>
<td>Terminal block with luminous indicator</td>
</tr>
<tr>
<td>SKTBCL2</td>
<td>1</td>
<td>Corresponding connection cable for SKTB01</td>
</tr>
</tbody>
</table>

## HTU00 - Basic Hydraulic Trainer Stand

Basic Hydraulic Trainer Stand

<table>
<thead>
<tr>
<th>Part Number</th>
<th>QTY</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTU-00</td>
<td>1</td>
<td>All inclusive Hydraulic Training System</td>
</tr>
</tbody>
</table>
Training Locations

Des Plaines Training Center
500 South Wolf Road
Des Plaines, IL 60016

Electromechanical Automation
5500 Business Park Drive
Rohnert Park, CA 94928

Elyria Training Center
520 Ternes Ave.
Elyria, OH 44036

Hose Products Division
30240 Lakeland Blvd.
Wickliffe, OH 44092

Lincolnshire Training Center
595 Schelter Road
Lincolnshire, IL 60069

Motion and Control Sales
2044 Austin Avenue
Rochester Hills, MI 48309

Pneumatic Division
135 Quadral Drive
Wadsworth, OH 44281

Calgary Training Center
3141B 16th St NE
Calgary, AB, Canada T2E 7K8

Toronto Training Center
160 Chisholm Drive
Milton, ON, Canada L9T 3G9