Electro-hydraulic Control Systems 5
(Proportional Hydraulics)

MEM18022B Maintain fluid power controls

HYDAC unit number: ST-T09-2
Duration: 32 hours (4 days)

This training unit can be nationally recognised through an association with AiGroup.

Outline

Electronic control of hydraulic systems has become commonplace. Understanding proportional electro-hydraulic technology is essential for system designers and service technicians.

This course demonstrates working examples of the interaction between various valves, controllers and amplifier cards through practical exercises.

Program

Day 1
Welcome, introductions and overview

Introduction to proportional hydraulics – ST-T09-2
What is a proportional system? Understanding proportional technology.
What is electro-hydraulic control?
Open loop control and closed loop control

Introduction to electronics – EL45-T04-0
What is electrical energy?
Electrical circuits.
Terms and units of measurement.
Using Ohm’s Law.
Measuring electrical energy.

Solenoid technology – EL45-T05-0
Coils
Relays
Solenoid construction
Switch solenoids vs. proportional solenoids.

Proportional valves – CH99-T08-0
Valve construction
Reading the catalogues.

Hands-on exercises (Part 1)
Switches and solenoids

Hands-on exercises (Part 2)
Relay circuit
Latching relay circuit
Set up a hydraulic circuit and control it with latching relays.
Timer functions.

Day 2
Overview and revision of day 1.

Proximity switches (Part 3)
Relay circuit

Automation with hard-wired logic (Part 4)
Using electrical wiring to control a hydraulic circuit.
Create a simple PLC ladder program to achieve the same result.

Simple PLC functions using function block language (Part 5)
Industrial logic – EL45-T07-0
Introduction to Programmable Logic Controllers (PLC’s)
Industrial ladder logic
Function block diagrams
Introducing the Siemens LOGO! PLC
LOGO! Basic functions and special functions.

Reciprocating cylinder automation using function block language (Part 6)
Using a PLC to control a hydraulic circuit.

Three cylinder machine cycle using function block language (Part 7)
Change the system outcome by modifying a PLC program to meet a requirement.
Recording of program changes, and completion of service reports.

Day 3
Overview and revision of day 2.
Three cylinder machine cycle (Continued).

Press circuit using function block language (Part 8)
Change the system outcome by modifying a PLC program to meet a requirement.
Troubleshoot a PLC program with multiple faults.

Testing of electronic system components (Part 9)
Troubleshoot sensor faults.

Practical demonstration of setting proportional amplifier card (Part 10)
The basic operation of an electro-hydraulic proportional valve.
• Setting parameters through trim pots.
• The ENABLE command.
• The operation and setting of MIN (Offset).
• The operation and setting of MAX. (Gain).
• The operation and setting of RAMPS.
• Pulse Width Modulation (PWM).
• Low frequency dither through the PWM frequency adjustment.
• High frequency dither though a super-imposed excitation of the PWM signal.
Closed loop pressure control exercise (Part 11)
Install and commission the closed loop pressure control system. This system used to demonstrate the following:
• The basic operation of an electro-hydraulic proportional pressure valve.
• Setting parameters through software.
• The ENABLE command.
• The COMMAND signal through PLC output and manual command.
• The difference in accuracy between open and closed control loops.
• A digital display used in a 4-20mA current loop.

Day 4
Overview and revision of day 3.

Closed loop pressure control exercise (Continued)
Install and commission the closed loop positional control system. This system used to demonstrate the following:
• The basic operation of an electro-hydraulic proportional directional control valve.
• On-board electronics.
• Closed loop positional control.

Written assessments etc.

Prerequisites

Prerequisites for attending the course:
HYDAC Basic Hydraulics 1 course or equivalent.
This course can only be provided for those fluent in English. Participants must be able to read and write, and to follow instructions.

Prerequisites for the issuance of the TAFE nationally recognised certificate:
It must be established that the following units have been completed before the nationally recognised certificate can be awarded:

For the issuance of MEM18022B Maintain fluid power controls:
MEM18020B Maintain hydraulic system components, and it’s pre-requisites. (See HYDAC Maintain Hydraulics 2).

It is incumbent on the participant to provide clear evidence that these units or equivalents have been completed. Please bring the original documents, or certified copies of transcripts of results, or any relevant statements of attainment to the course so that we can make copies of them to use as evidence on your behalf.

What do we mean by certified copies?
Information about those who may legally certify a copy of a document in Australia can be found here: https://www.legislation.gov.au/Details/F2018L01296

If you do not hold any of the above-mentioned units or certificates, you are still very much encouraged to attend the course, however only a HYDAC training certificate can be issued. This is not nationally recognised.
Clothing and equipment

Pens, paper, tools and training resources are provided.

Clothing should be neat casual, or cotton drill work clothing is fine, but they must be clean.

Dirty work boots are not to be worn, fully covered footwear such as runners are acceptable. Open toed footwear must not be worn.

Lunches

Morning tea, lunch and afternoon tea are provided. If you have any special dietary needs, please contact HYDAC beforehand to arrange alternatives.

Course dates, times and venues

We are offering the majority of our courses around Australia and New Zealand. They are subject to availability and minimum numbers.

The prices listed in this document are for training courses conducted in Australia only. Please contact HYDAC Training Centre for more information.

Times: 8:30AM to 5:00PM
Dates: Please check our website (www.hydac.com.au/hydac-training) for information on available dates.

Course fee

Course fee is AUD $1720 per participant, plus GST.

The optional surcharge for a nationally recognised statement of attainment issued through AI Group is $180 per participant, plus GST.

Therefore, the total fee for the course and the optional nationally recognised statement of attainment is $1900 plus GST.

Maximum class size is 12 people.
Flights, accommodation and taxi charges are not included in the course fee.

Unique Student Identifier (USI)

If you are interested in applying for the nationally recognised statement of attainment, you will need to come to the course with a USI, (Unique Student Identifier). A nationally recognised statement of attainment cannot be issued to an individual without a USI to match it to.
Information about the USI initiative can be found at the Australian Government website: www.usi.gov.au

A USI is linked to the National Vocational Education and Training (VET) data collection. This means that an individual’s nationally recognised training and qualifications gained anywhere in Australia, from different training organisations, will be kept all together.
If you are a New Zealand resident, you will not be able to create your USI with your New Zealand passport as identification until you have crossed through customs into Australia. This is because New Zealand nationals do not need a visa to enter Australia.

If you are an international student from elsewhere, you will be able to create a USI by using your Australian visa as identification.

**Text book**

We also have a 173 page text book available, entitled “Basics of electronics and measurement technology”, it is a supporting text for this course. It can only be purchased by those who attend this course.

Part No:  3802481  
Nett price: $155 plus GST

**Contact**

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