

<b>Worksheet HC01 &amp; Training Record</b>		<b>Hydraulic Circuits</b>
<b>Hydraulic Circuit Supply Options</b>		
Email:	Course:	Provider:

Learning Objectives/Expected Outcomes: (60-120mins)

1. Appreciate the range of different hydraulic supply circuit configurations.
2. Be able to recognize each system from the hydraulic circuit symbols.
3. Appreciate the benefits and disadvantages of each different approach.
4. Be able to predict the energy consumption for each circuit.

Previous Knowledge Required:

Students should have already completed the 'valves (HV)', 'pumps (HD)', and 'hydraulics symbols (HP03)' worksheets.

Terminology:

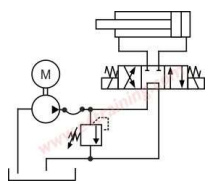
Fixed and variable displacement, open and closed center valves, pressure compensated pump, load sensing.

Record of Achievement:



Click the email button (that will appear within each app) to post your results, once training is complete. Enter your LRS endpoint details or training provider email address. Also record progress, times, scores, etc. on this training record sheet and keep together with any additional written work to include in the assessment process.

*Coursework investigations*



Review all circuit descriptions at [www.e4training.com/hydraulic\\_circuits/supply1.php](http://www.e4training.com/hydraulic_circuits/supply1.php) & supply2.php

Be confident you understand how the circuit works from looking at the symbols. Revise the symbol explanations if not.

Circuits will include:

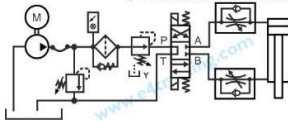
- Fixed displacement pump with a single open-center valve.
- Fixed displacement pump with series open-center valves.
- Fixed displacement pump with closed-center valves.
- Fixed displacement pump with accumulator storage.
- Variable displacement pump with closed-center valves.
- Fixed displacement pump with load-sensing valves.
- Variable displacement pump with load-sensing valves.

Complete

Complete

### Hydraulic Circuit Symbols

Symbols are based on ISO 1219-1 and 2

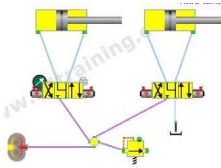


Symbols explanations can be found at [www.e4training.com/hyd\\_princip/symbols1.php](http://www.e4training.com/hyd_princip/symbols1.php)

Complete

### Virtual test rig experiments

Click the links in each section to open a simulation of that circuit.



- Operate each circuit to fully understand how it works.
- Change the cylinder loads on each system to observe how the operating pressures change.
- Record the operating pressures and input power for each system both while the cylinder is moving and at the end of the stroke.

App date & duration:

Complete

#### Suggested exercises and observations

- Experiment 1: Operate the directional valve to observe how the cylinder moves up and down.
- Question 1: What does a hydraulic directional valve do?
- Experiment 2: Observe where the flow goes when the valve is shut or cylinder at maximum stroke.
- Question 2: Where does the fluid go when the valve is shut?
- Experiment 3: Change the load mass on the cylinder and observe what happens to the pressure.
- Question 3: Does the pump set the pressure?
- Experiment 4: Change the load mass on the cylinder and observe what happens to the flow.
- Question 4: Does the speed change when the load pressure changes?

Complete the suggested exercises and observations section below the simulation model at

[www.e4training.com/hydraulic\\_circuits/supply3.php](http://www.e4training.com/hydraulic_circuits/supply3.php)

Submit review notes:

Complete

### Practical & Coursework exercises



Consider your project assignment example or equipment from your company or daily work. Identify the type of power supply system used and discuss why this is preferable to the other options.

Submit review notes:

Submit separate review sheet

### Key questions / Plenary

- Which pump would you use with an open center system?
- What happens to the pressure when the cylinder reaches the end of the stroke?
- Is there one supply type that is always the most energy-efficient?

Record answers:

Repeat course if you answer no or tick when complete

**And Finally:**

Complete this worksheet and keep for your certification records. Submit any written coursework etc. to your training course provider.

**Follow-on Course Worksheets:**

Potential follow-on worksheets include: HC02 – Safety circuit examples.

Or refer to your individual lesson plan or search the worksheet lists at [www.e4training.com/hydraulic\\_courses/worksheets1.php](http://www.e4training.com/hydraulic_courses/worksheets1.php) or [courses1.php](http://www.e4training.com/hydraulic_courses/courses1.php)

*Notes*