PAC Network for EH
Sequence Position Control
Introduction

- The
Objectives

- Double cylinder hydraulic system is the basic hardware part of this Remote Hydraulic Lab System. It includes two Parker hydraulic servo systems and a Parker automation controller (PAC).

- The double cylinder hydraulic system allows user to control the cylinder movements by programing PAC following IEC61131-3 standards. Human machine interface can also be programed in PAC visualization environment.

- The hydraulic servo systems can achieve closed-loop control to the cylinders. The servo systems support jogging control, positioning control, and velocity control. They can also feedback running status of the cylinders to the upper computer.

- The communication between hydraulic servo systems and PAC is established on EtherCAT principle.
System Overview

An Automated Electro-Hydraulic Motion Control System with PAC controller and Four Stations

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System Overview

The Setup with PAC Controller and Two EH Station
## Hardware

<table>
<thead>
<tr>
<th>Name</th>
<th>Component Type</th>
<th>Part #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parker Automation Controller (PAC)</td>
<td>System controller</td>
<td>PAC320-CWE21-31</td>
</tr>
<tr>
<td>Compax 3F</td>
<td>Compact servo drive</td>
<td>C3F001D2F12 I31 T40 M12</td>
</tr>
<tr>
<td>DF Plus</td>
<td>Servo valve</td>
<td>D1FPE50FB9NB00 20</td>
</tr>
<tr>
<td>Parker HMI</td>
<td>HMI display</td>
<td>XPR06VT-2P3</td>
</tr>
<tr>
<td>Parker Series 3L</td>
<td>Hydraulic cylinder with position sensor</td>
<td>01.50 F3LLUS23A 12.000</td>
</tr>
<tr>
<td>Parker H-Pak</td>
<td>Hydraulic power supply</td>
<td>H1B2 7T10P0X13909/13</td>
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</tbody>
</table>
Software

- PAC Integrated Development Environment (IDE)
  - Devices Management
  - Open PLC(IEC61131-3)
  - Visualization(WebVisualization)
- Parker Servo Manager
  - Hydraulic Servo Drive Configuration
  - Link CODESYS Program
- CODESYS
  - Hydraulic Servo Drive Programming
System Programming and Configuration

- **Master**
  - Start PAC IDE
  - Install devices and set EtherCAT network parameters at PAC
  - Write open PLC and visualization program at PAC

- **Slave**
  - Configure Compax3F
  - Set EtherCAT parameters at Compax3F
  - Program Compax3F by using CODESYS
Compax3F Servo Drive

• Can be used for *velocity*, position, force and pressure controls.

• Configured in the Parker Servo Manager

• Monitor all the status of Hydraulic Cylinder

• Set hardware and software limits

• Uses a programming system based on the standard IEC61131-3, which can support function blocks, instruction lists, and structured text.
## Compax3F Configuration

### Device selection wizard

<table>
<thead>
<tr>
<th>Overview</th>
<th>Device selection wizard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software Device Type (as currently configured in C3Win)</td>
<td>C3_F011 D2_F1211 T130 M09</td>
</tr>
<tr>
<td>Model</td>
<td>P - C3 Fluid</td>
</tr>
<tr>
<td>Drive Input Voltage</td>
<td>24 V</td>
</tr>
<tr>
<td>Interface Option</td>
<td>II - Digital inputs/outputs</td>
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<tr>
<td>Technology Function</td>
<td>T30 - Full Motion Control via E3011131</td>
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<tr>
<td>Feedback Option</td>
<td>F12 - Rotary Linear Encoder SinCos RS422 ExtSet, SS1/Startstop, Analog</td>
</tr>
<tr>
<td>M00 Option</td>
<td>M00 - No Options</td>
</tr>
</tbody>
</table>

### C3Win 02P1211 T130 M09

<table>
<thead>
<tr>
<th>Overview</th>
<th>C3F drive selection &amp; configuration axis (drive)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of axes (drives)</td>
<td>1</td>
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<tr>
<td>Physical system</td>
<td>Differential pressure</td>
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<tr>
<td>Units</td>
<td>Imperial</td>
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<tr>
<td>Reverse Orientation</td>
<td>OFF</td>
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<tr>
<td>Frame axis (drive 1)</td>
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</tr>
<tr>
<td>Control mode</td>
<td>Position, and Force/Pressure controlling</td>
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<tr>
<td>Cylinder / motor</td>
<td>Linear drive</td>
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<tr>
<td>Drive type</td>
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<tr>
<td>Feedback system</td>
<td>Analog Feedback</td>
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<td>Load configuration</td>
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<td>min. Inertia</td>
<td>0.80 km</td>
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<tr>
<td>max. Inertia</td>
<td>0.80 km</td>
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</tbody>
</table>

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Compax3F Configuration
Parker Automation Controller (PAC)

- Parker Automation Controller (PAC) provides advanced logic, signal handling, multi-axis motion control
- IEC61131-3 programming
- Visualization(Web)
PAC Configuration

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PAC Integrated HMI Function

- Cylinder 1:
  - Enabled
  - Error
  - Motion
  - Home
  - Actual Position
  - Actual Velocity
  - Position Input
  - Velocity Input
  - Execute

- Cylinder 2:
  - Enabled
  - Error
  - Motion
  - Home
  - Actual Position
  - Actual Velocity
  - Position Input
  - Velocity Input
  - Execute

- Presets:
  - Sequence 1
  - Sequence 2
  - Sequence 3

- Power
- Reset

- Stop
PAC Networked Control System