

PAC Network for EH Sequence Position Control



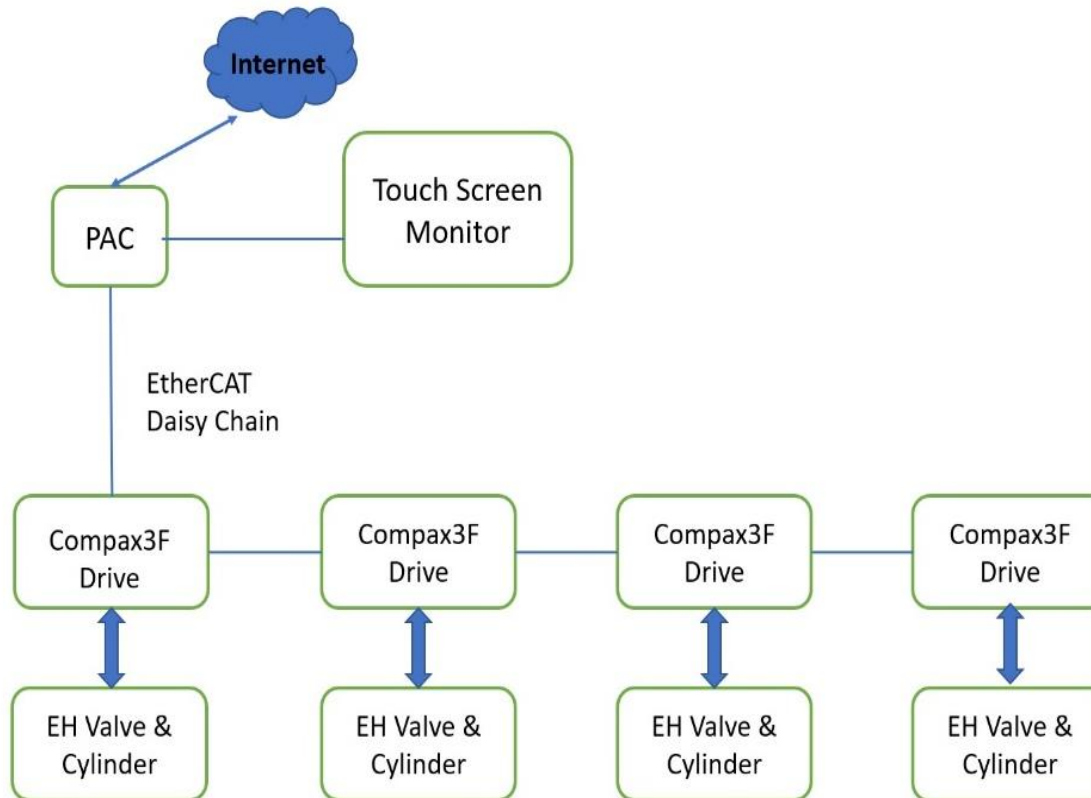
Introduction

- 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.

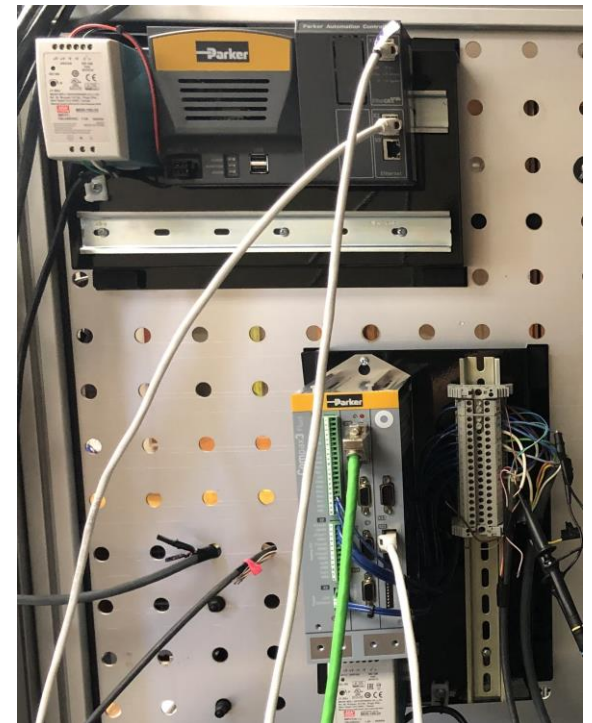
System Overview



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



System Overview



The Setup with PAC Controller and Two EH Station



Hardware

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



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**



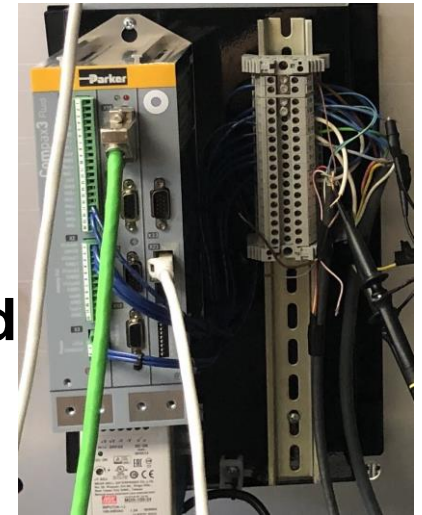
System Programming and Configuration

- **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 **Cylinders**
- 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

Parker C3 F001 D2 F12 I11 T30 M00 **Compax3**

Click to Start "Hardware setup wizard"

Overview	Device selection wizard
Software Device Type (as currently configured in C3Mgr)	C3 F001 D2 F12 I11 T30 M00
Model	F - C3 Fluid
Drive Input Voltage	24 V
Interface Option	I11 <Digital inputs/outputs>
Technology Function	T30 <Full Motion Control via IEC61131>
Feedback Option	F12 < Rotary/Linear Encoder SinCos RS422 EnDat, SSI,Start/stop, Analog>
Mxx Option	M00 <No Options>

Parker C3 F001 D2 F12 I11 T30 M00 **Compax3**

Click to Start "Selection and configuration of axis (drives) for C3F"

Overview	C3F drive selection & configuration axis (drive)
Number of axes (drives)	1
Physical system	Differential pressure
Units	Imperial
Reverse Orientation	OFF
	Main axis (drive 1)
Control mode	Position- and Force-/Pressure- controlling
Cylinder / motor	40x_xxHmXPFx2xMxxxxxxx
Drive type	Linear drive
Feedback system	Analog Feedback
Load configuration	CONFIGURED
min. Inertia	0.00 Nm
max. Inertia	0.00 Nm

Compax3F Configuration

COMPAX3_SLAVE_DRIVE.C3P - C3Mgr2

File Edit View Options Tools ?

Device selection
C3F I31 T40 configuration
Signal source
IEC61131-3 Programming (Codesys)
Cam functions
Communication
RS-485 Settings (Compax3)
Modem settings
EtherCAT
Scaling factors Y2/Y4
Optimization
Download (PC -> Compax3)
Upload (Compax3 -> PC)
Online device functions

Parker C3 F001 D2 F12 I31 T40 M00 Compax3

Click to Configure "EtherCAT settings"

Overview	EtherCAT
Mode	SLAVE: Configuration via Master
EtherCAT error reaction (0x8120,0x8130,0x81F1)	2 - Stop, controller inactive
Online net data	
IP Address	0.0.0.0
Netmask (Subnet Mask)	0.0.0.0
Gateway IP	0.0.0.0
Host Name	
MAC Address	00 00 00 00 00 00

NOR COM 1 CLOSED NF NUM

Interact Xpre... PAC control PAC control PAC_Project PAC_Project COMPAX3_S... C3F_1.projec... PAC_3.jpg - ... 4:27 PM 11/4/2019

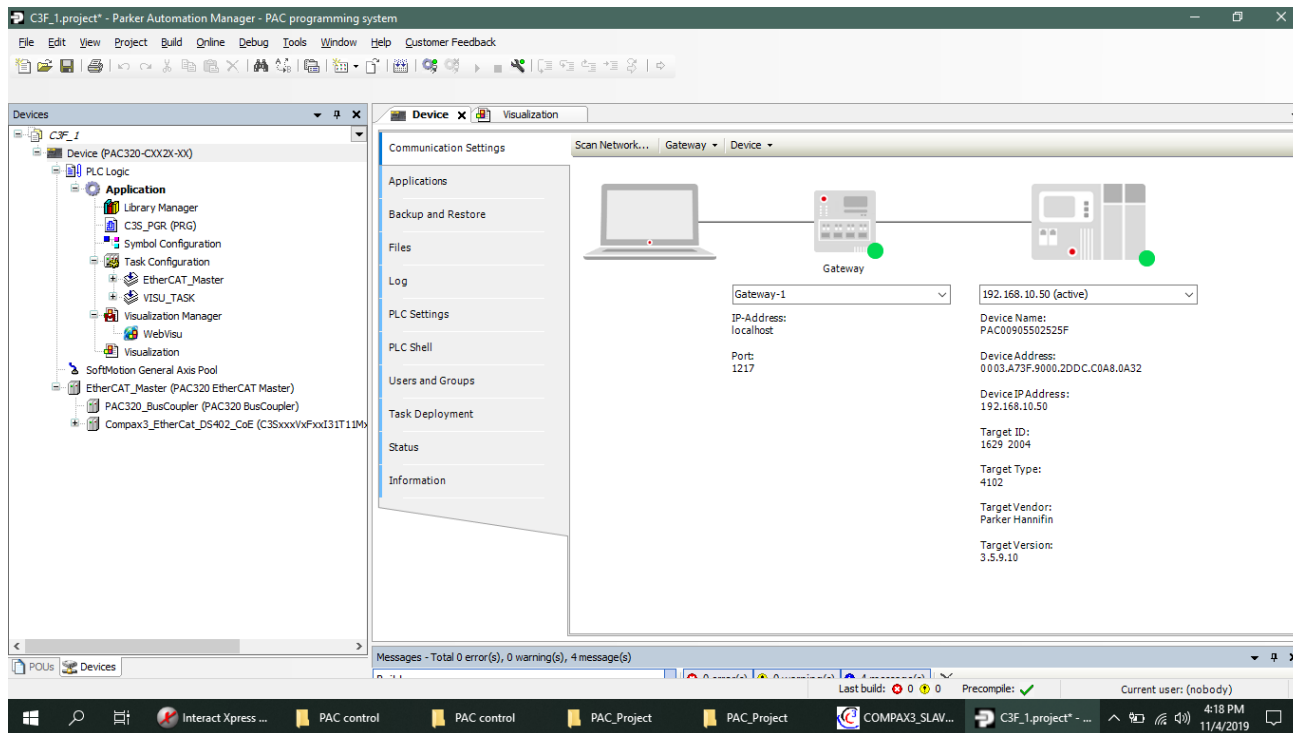


Parker Automation Controller (PAC)

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



PAC Configuration



PAC Programming

The screenshot displays the Parker Automation Manager software interface for PAC programming. The top window shows the 'C3F_1.project' environment with a menu bar (File, Edit, View, Project, Visualization, Build, Online, Debug, Tools, Window, Help, Customer Feedback) and a toolbar. The left sidebar shows the project tree with 'Application' and 'SoftMotion General Axis Pool' sections. The main workspace is divided into two parts: a top section showing five function blocks (MC_Power, MC_Reset, MC_Home, MC_Jog, MC_MoveRelative) and a bottom section showing a ladder logic diagram for 'C3F'. The function blocks are arranged in a grid, each with a 'PLCopen Motion Control' icon. The ladder logic diagram shows a network starting with 'C3F' connected to five function blocks: MC_Power_0 (0), MC_Reset_0 (1), MC_Home_0 (2), MC_Jog_0 (3), and MC_MoveRelative_0 (4). Each block has its own set of inputs and outputs, such as 'Axis', 'Execute', 'Done', 'Busy', 'Error', and 'ErrorID'. The bottom status bar shows 'Messages - Total 0 error(s), 0 warning(s), 4 message(s)' and system information like 'Last build: 0 0 0', 'Precompile: ✓', and 'Current user: (nobody)'. The Windows taskbar at the bottom shows several open applications including 'Interact Xpre...', 'PAC control', and 'COMPAX3_S...'.

DAC Integrated UMI 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

Power Reset

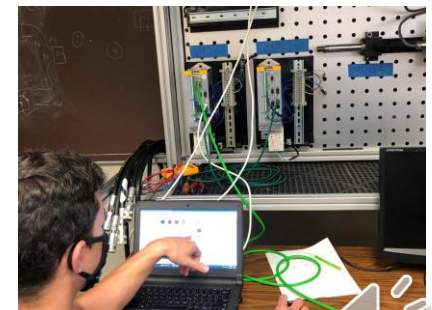
Presets

Sequence 1

Sequence 2

Sequence 3

Stop



PAC Networked Control System

