Compax3
Servo Drive Systems

Setting up the Compax3 Multi-Axis Units

PN 88-029852-01

Parker

ENGINEERING YOUR SUCCESS.

Compax3M Setup in P.I.E.T.

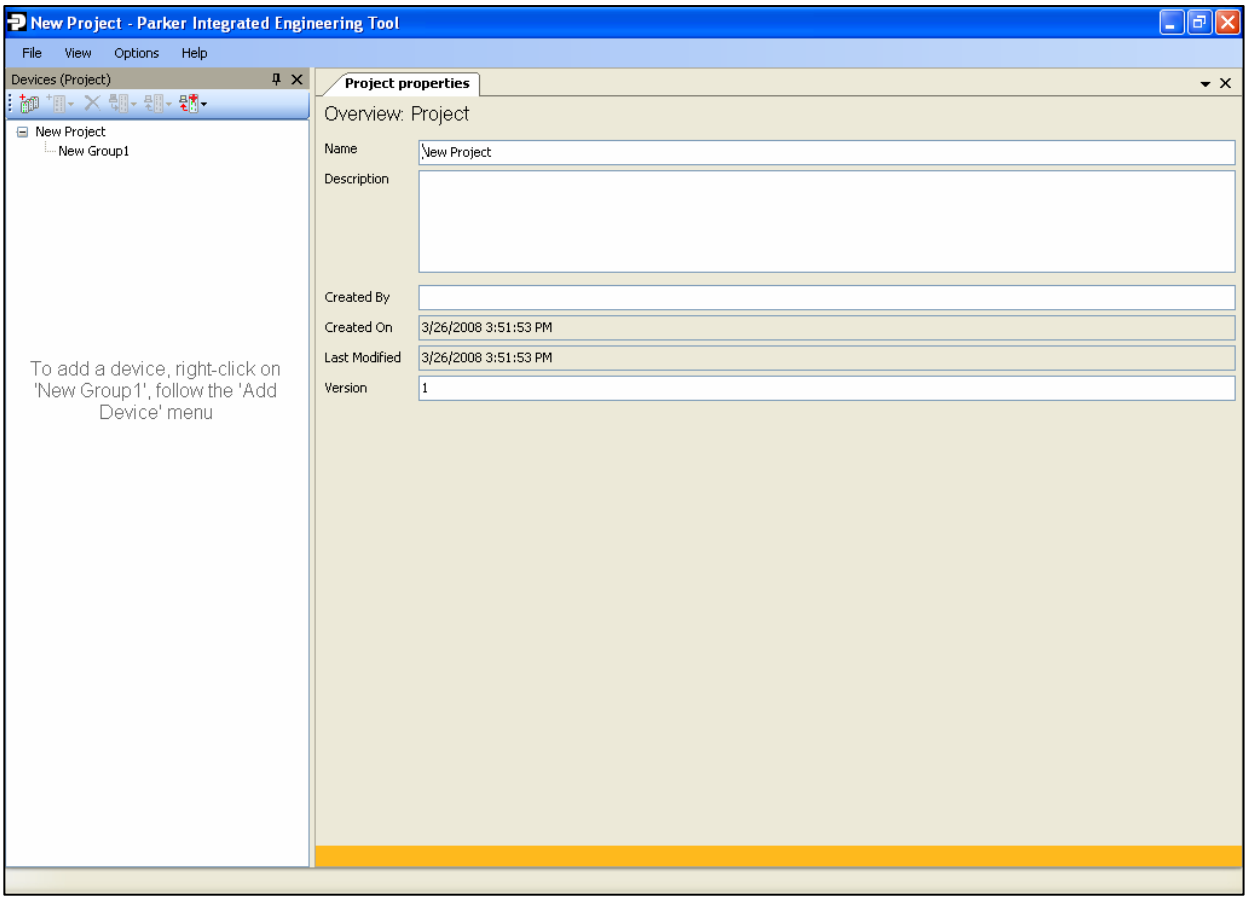
Purpose

The first 4 pages of this document describe the process by which one sets up the Compax3M – the multi-axis version of the Compax3. The remainder is dedicated to step-by-step setup of a drive with ETHERNET Powerlink.

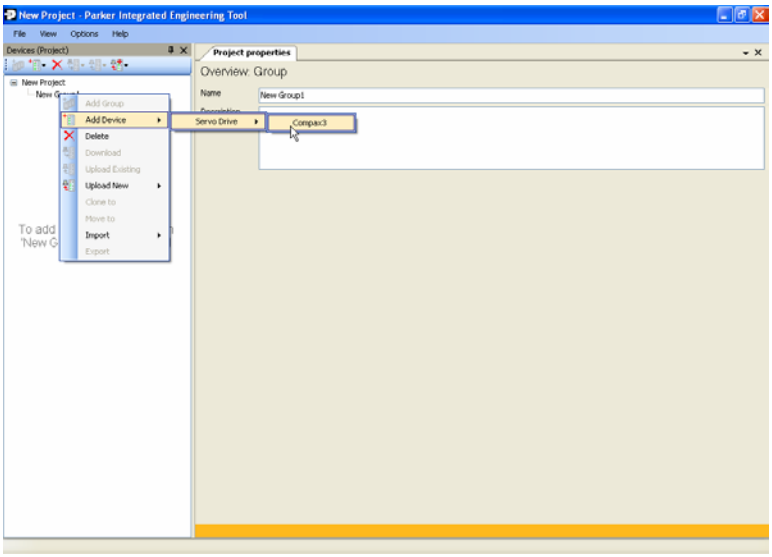
There is a new tool that "houses" ServoManager. It is called the Parker Integrated Engineering Tool. This framework will manage the multi-axis nature of Compax3M configuration and is available on the DVD.

Step 1: Opening Screen

- **The P.I.E.T.'s opening screen is shown below.**
- **This is the window that will help the user manage the axis configurations**



Compax3M Setup in P.I.E.T.

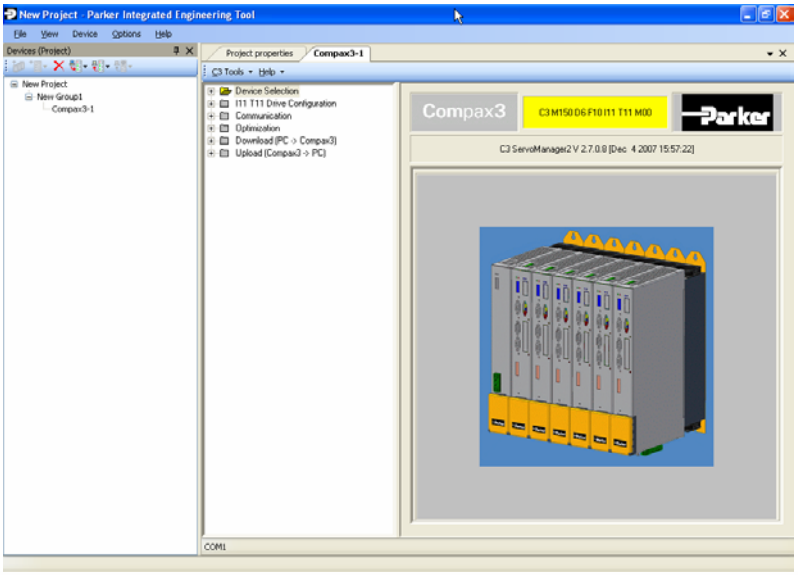


Step 2: Add a Compax3

- **Right click on "New Group1"**
  - ✓ Click "Add Device"
  - ✓ Click "Servo Drive"
  - ✓ Click "Compax3"
- **This process initiates the launch of ServoManager for this first axis**
- **You can repeat the process to add another Compax3.**

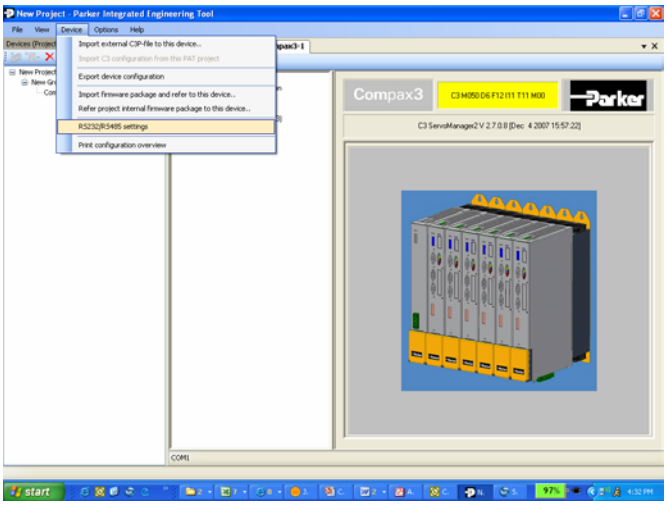
Step 3: Launching ServoManager

- **As you see in the below screen shot, an instance of ServoManager has been launched**
- **This is named "Compax3-1"**
- **If you added a second axis, there would be a third tab named, "Compax3-2"**



Essentially, as you add axes, the P.I.E.T. launches additional windows of ServoManager. You can change each axis name by clicking on the "Compax3-1" on the tree. This brings up a properties screen. Enter in a new name, if you like.

Compax3M Setup in P.I.E.T.

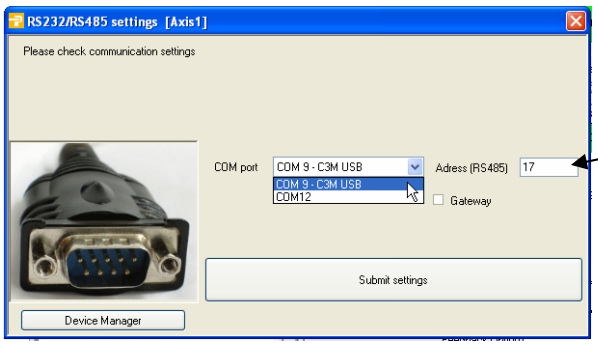


Step 4: Com Port Selection

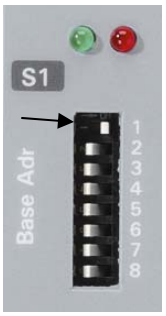
- **Click on the 1st Compax3 Axis Tab**
  - ✓ Click on "Device" in the menu
  - ✓ Find RS232/RS485 row
- **This will bring up a box to select the COM port**
- **NOTE: Be sure you have installed the USB driver from the main setup screen at installation**
- **NOTE: Be sure to also plug in the short SSK cables on the top of the Compax3 Power Supply (MP) to all the axis units.**
  - ✓ Beginning with the Compax3MP, the connection is always made from X30 to X31 of the next device. On the first device (X31) and the last device (X30) in the multi-axis combination, a bus termination plug (BUS07/01) is required. This plug looks like an Ethernet connector (RJ45) without a cable attached.

Step 5: Addressing the Power Supply & Drives

- **Select the available COM Ports**
- **You need to set the address in the RS485 box**
  - ✓ This is the base address of the Power Supply (see diagram below) plus 1
  - ✓ The Compax3 MP unit will automatically address all following axis units by adding "1" to the base address for the first axis, "2" for the second, and so on…
  - ✓ All you need to do is input that number to each of the drives through the ServoManager Axis tabs
- **Be sure you have put the bus termination plugs (two needed) in both the power supply and the last axis unit.**



PS Value = 16
axis1 = 17
axis2 = 18
axis3 = 19
axis4 = 20



S1 – Base Address of Power Supply, automatic addressing of all axis units (Power Supply address + axis number)

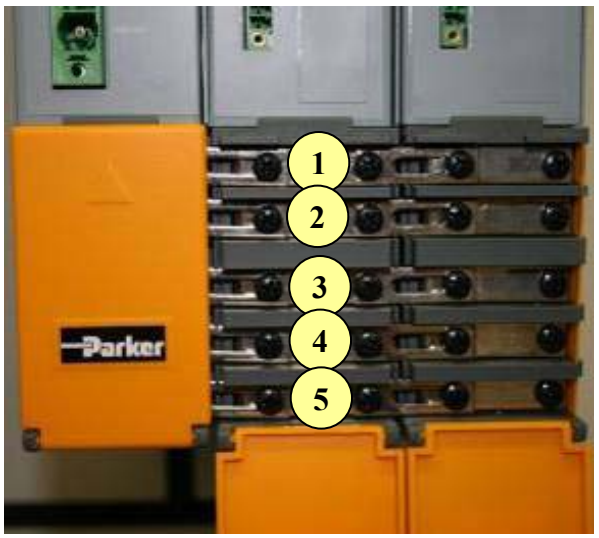
Compax3M Setup in P.I.E.T.

Notes on Hardware Installation

There isn't a rack associated with the Compax3M. The high voltage and low voltage bus bars are the only structural pieces that connect each module together. These are located under the protective plastic cover on the bottom-front portion of the modules.

All fasteners are contained within each unit. Simply loosen these screws on each module and the bus bars slide to intersect the adjacent module.

1 – 24VDC
2 – 24V GND
3 – -HV DC
4 – PE
5 – +HV DC



X14: Category 3 Safety

- The Compax3M comes with two channels for Cat.3 Safety on this X14 connector
- It is not recommended to IGNORE the safety circuit; however, if you choose not to use this safety technology, the following must be wired
  - ✓ X14/1 – 24VDC
  - ✓ X14/2 – GND
  - ✓ X14/3 – 24VDC
  - ✓ X14/4 – GND
- If you leave these open, the drive will yield a '5492 Safe torque off (STO) active' error
- There is detailed information about this circuit in the Help File on the website.

X40: Braking Resistor

- The Compax3MP (power supply) comes ready to install a braking resistor for energy dissipation across the bus
- If you are not going to use a braking resistor you MUST place a jumper wire between pins 1 and 2
- If you leave this open, the drive will yield a '4480 C3MP: Temperature of braking resistor too high' error
  - ✓ If this error is not corrected by either connecting a resistor or wiring a jumper between these two pins, the motor will not enable

For further information, please refer to the Hardware installation guide and the PDF manual. You can download these from the Compax3M page on www.parkermotion.com.

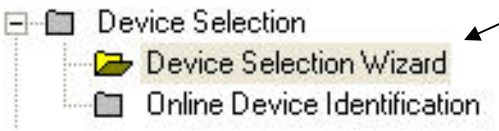
EPL Setup in ServoManager

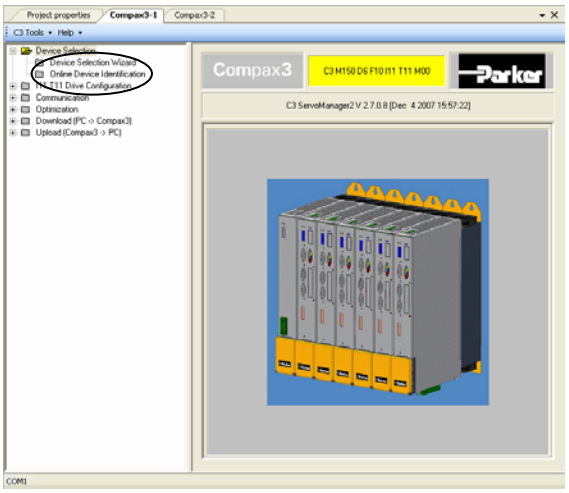
Setting up the Drive

In this section, we will show how to setup a drive. My base model drive is an ETHERNET Powerlink enabled drive, but the steps are virtually the same for other drive models.

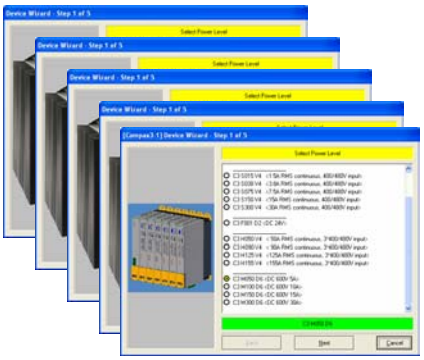
Device Selection

- **Launch Servo Manager**
- **Double-click on Device Selection Wizard**





- **This will launch the wizard that allows you to select the appropriate model**
  - ✓ **Screen 1: M050D6 (select your power level)**
  - ✓ **Screen 2: F10 (select your feedback type)**
  - ✓ **Screen 3: I30 (Choose I30 for EPL)**
  - ✓ **Screen 4: T11 (Choose T11 for EPL&ACR)**
  - ✓ **Screen 5: M00 (Choose M00 for no options)**

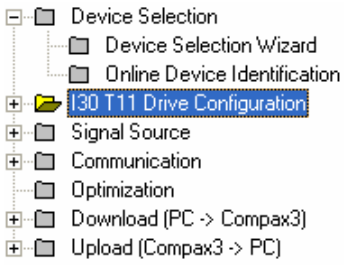


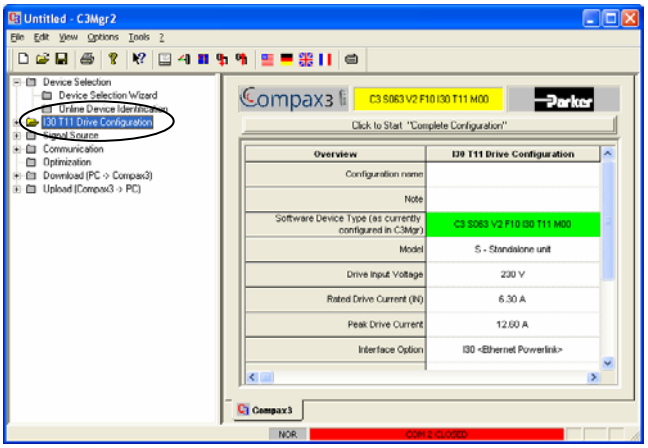
- **You will end up with a part number that looks something like: M050D6F10I30T11M00 and should match what you ordered and what the label reads on the side of your drive**

EPL Setup in ServoManager

Drive Configuration

- **Double-click on "I30T11 Drive Configuration"**
- **You will not need to change too many parameters within this section**

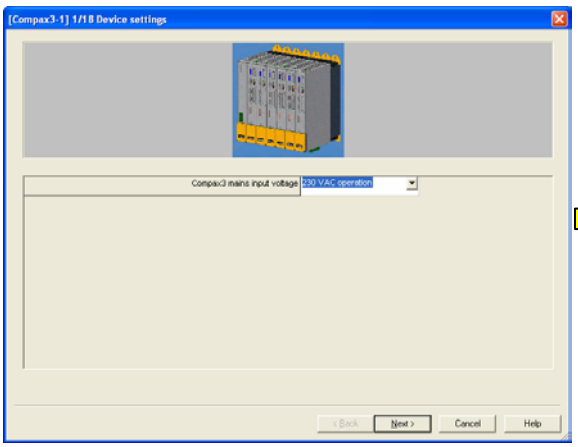




- **The Drive Configuration Wizard opens and you will need complete 15 steps – though only a few need input for EPL.**

Step 1: Motor Selection

- **You will need to select the voltage at which you will be running**
  - ✓ 230VAC
  - ✓ 400VAC
  - ✓ 480VAC

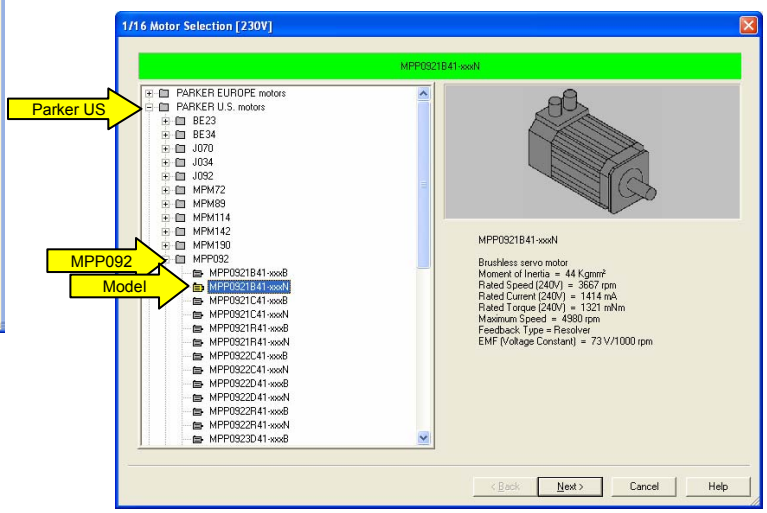


- **Click "Next"**

Step 2: Reserved for Future Use

Step 3: Motor Selection

- **You will need to select the motor you are using**
- **See the picture below to see how the MPP092 motor is found:**

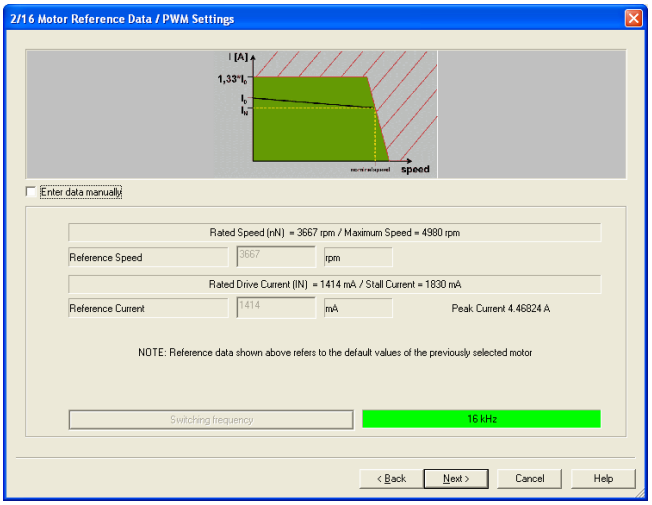


- **Click "Next"**

EPL Setup in ServoManager

Step 4: Motor Reference Data / PWM Settings

- This step needs no input from you
- This data is populated from the motor files
- Click “Next”



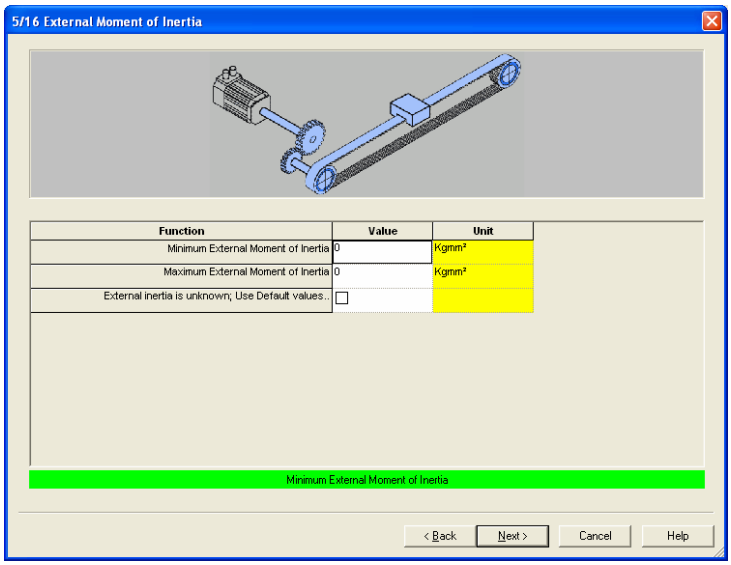
Step 5: Reserved

Step 6: Reserved for Braking Resistor

- At the release of this product, there is only one resistor; the user doesn’t need to select this for the drive

EPL Setup in ServoManager

Step 4: This step is omitted

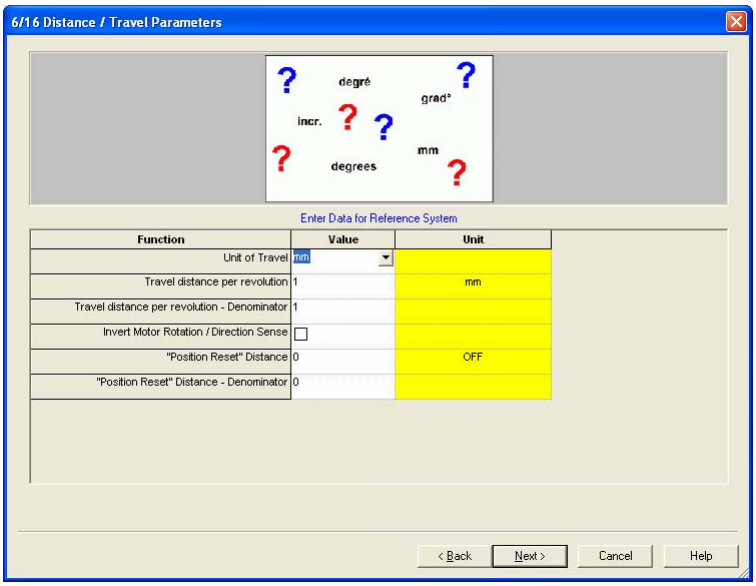


Step 7: Moment of Inertia

- **This is the most important tuning step**
  - ✓ The Compax3 uses this to establish gains
  - ✓ The closer you are to the correct inertia of your load, the better your system will be tuned
  - ✓ Suggestion: Use the value from MotionSizer.
- **Enter the same load value in both the "Minimum" and the "Maximum" locations.**
  - ✓ Only if your load isn't changing
  - ✓ If load changes (example picking up a box, then placing box) enter "Min" and "Max" respectively.
- **Do not check the box – if you do, call applications for help with this AutoTuning Feature.**
- **Click "Next"**

Step 8: Distance / Travel Parameters

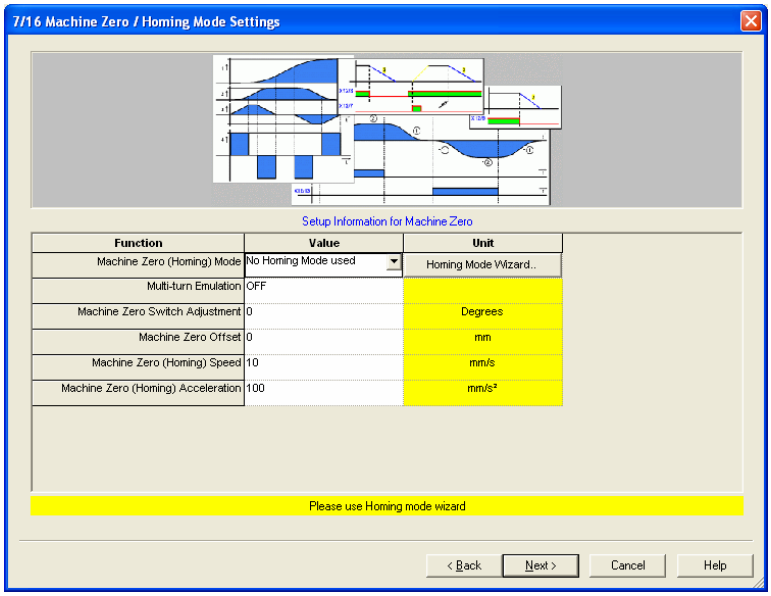
- **This step needs no input from you for use with the ACR EPL**
- **Default values are ok**
  - ✓ Make sure that the ratio is 1:1
- **Click "Next"**



The ACR9040/9030 will be responsible for all scaling. This is done by setting the PPU value in the 9040. However, you must make sure that the value here is has a 1:1 ratio. The units are not important.

See the HTML file for more information if using an intelligent drive.

EPL Setup in ServoManager



Step 9: Machine Zero / Homing

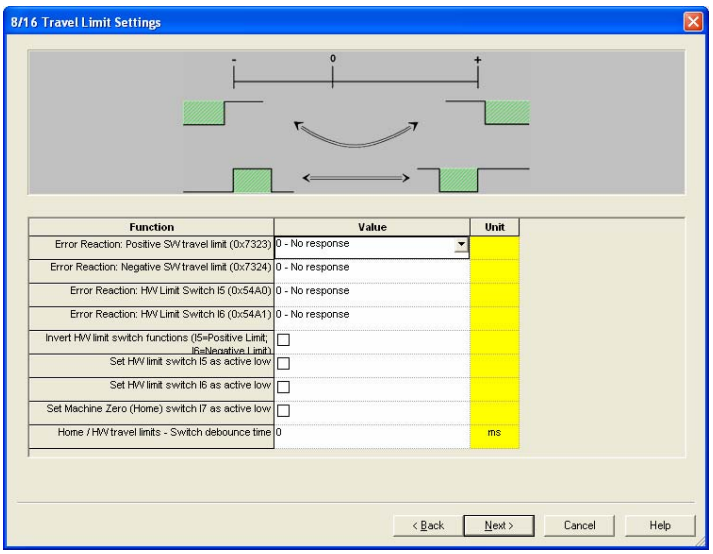
- **Make sure "No Homing Mode Used" is selected**
- **All default values are fine**
- **ACR9040 will be responsible for all homing procedures and velocities**
- **Click "Next"**

The ACR9040/9030 will be responsible for all homing moves.

If you are using a drive controller, click "Homing Mode Wizard" and that will guide you through homing types.

Step 10: Travel Limits / Settings

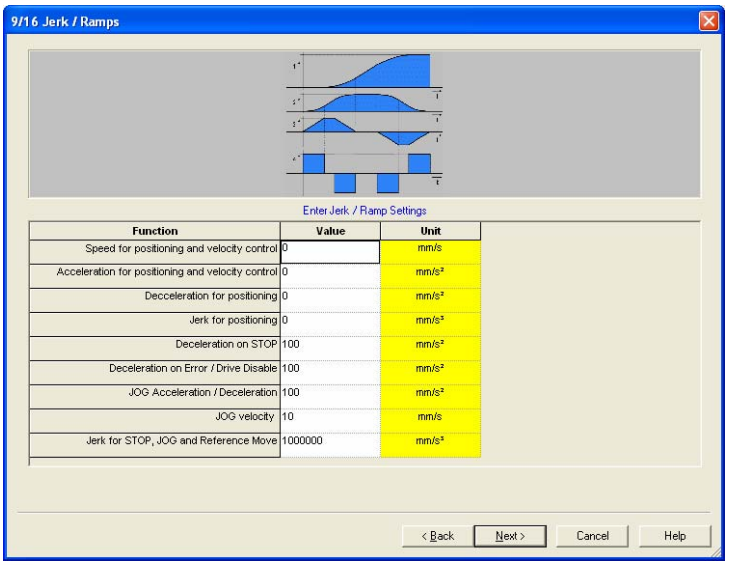
- **For the ACR90x0: In the first four rows:**
  - ✓ Positive SW: No reaction
  - ✓ Negative SW: No reaction
  - ✓ Positive HW: No reaction
  - ✓ Negative HW: No reaction
- **Make sure all box are unchecked**
- **If not using an ACR, you can select how the Compax3 reacts to the varying limit options**
- **Click "Next"**



EPL Setup in ServoManager

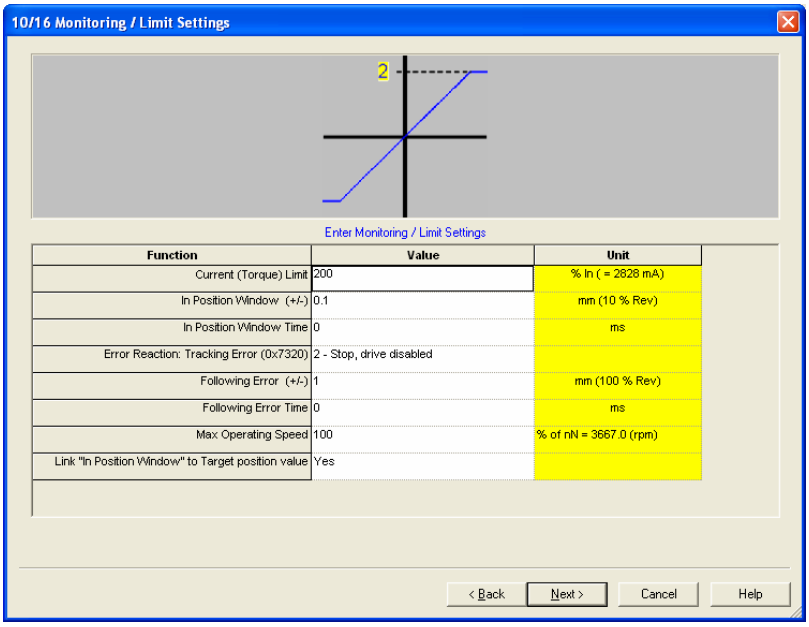
Step 11: Jerk / Ramps

- This step needs no input from you
- The default data is fine – the ACR9040 controls these value
- If you are using a drive/controller, input what the ramps and "s-curve" (jerk) acceleration should be. For jerk, the higher the number the more linear the acceleration
- Click "Next"



Step 12: Monitoring / Limit Settings

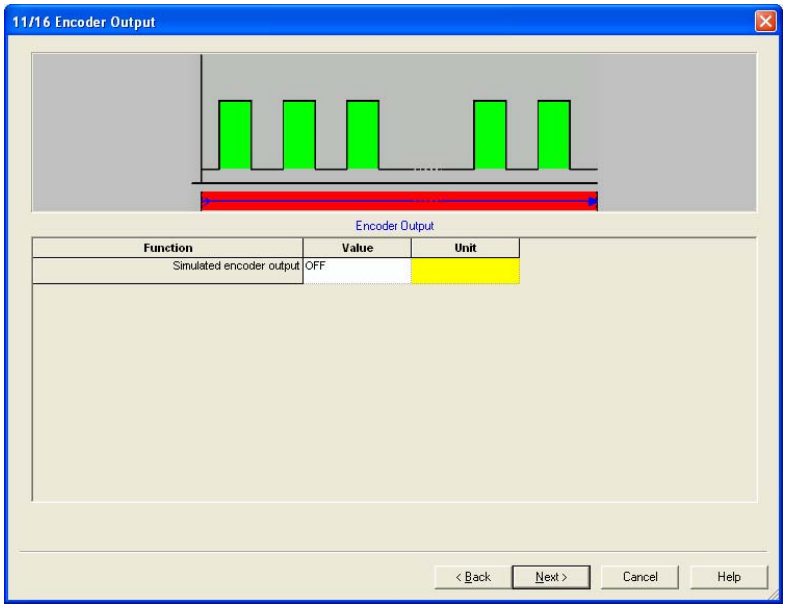
- Current Limit: Select as a percentage of motor continuous
- Following Error – make sure this value doesn't conflict with your ACR9040 value. If they differ, the value in 9040 should be tighter so the Position Error is registered there and not at the drive.



Because the Compax3 is a "smart" drive, it has algorithms checking the following error. If you are getting following errors in the Compax3 but not the ACR9040, then this value may be too tight.

- Click "Next"

EPL Setup in ServoManager

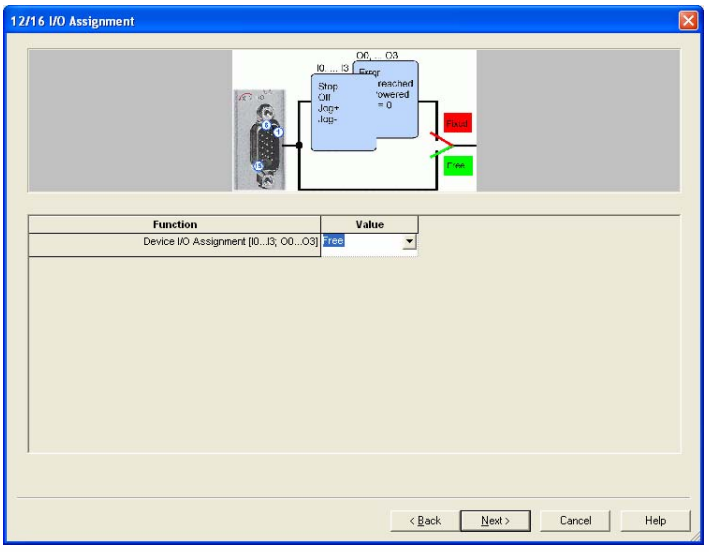


Step 13: Encoder Output

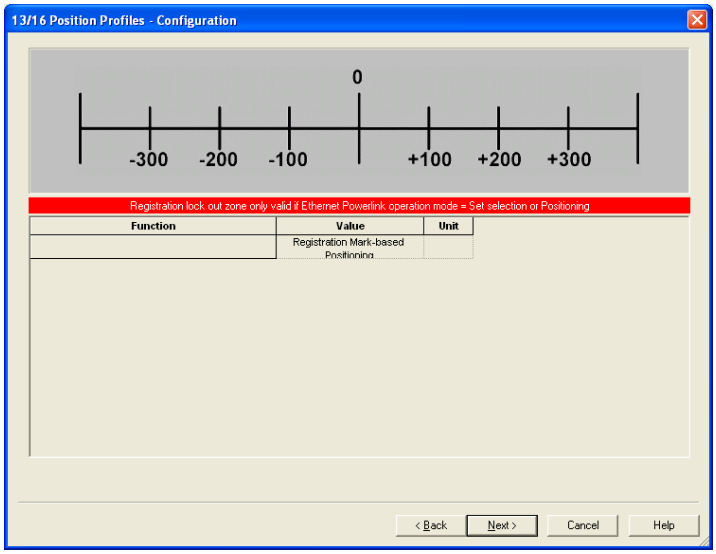
- **This can be left in the default state**
  - ✓ Select “ON” if you want to send out the motor encoder through the X11 connector on the Compax3
- **The EPL Cable automatically sends the encoder/resolver position to the 9040**

Step 14: I/O Assignment

- **Make sure the I/O assignment is select “Free”**
  - ✓ This gives the ACR9040 power over all I/O
  - ✓ If you are not using an ACR, check user guide for your specific model to see the pin assignment and if you select “free” or “fixed”
- **Click “Next”**



EPL Setup in ServoManager

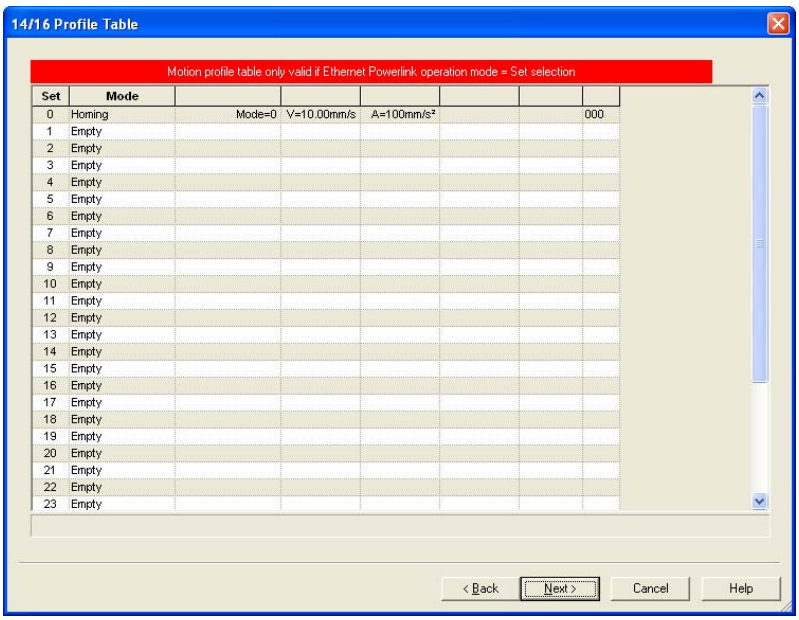


Step 15: Position Profiles - Configuration

- There is nothing to be done here
- Click “Next”

Step 16: Profile Table

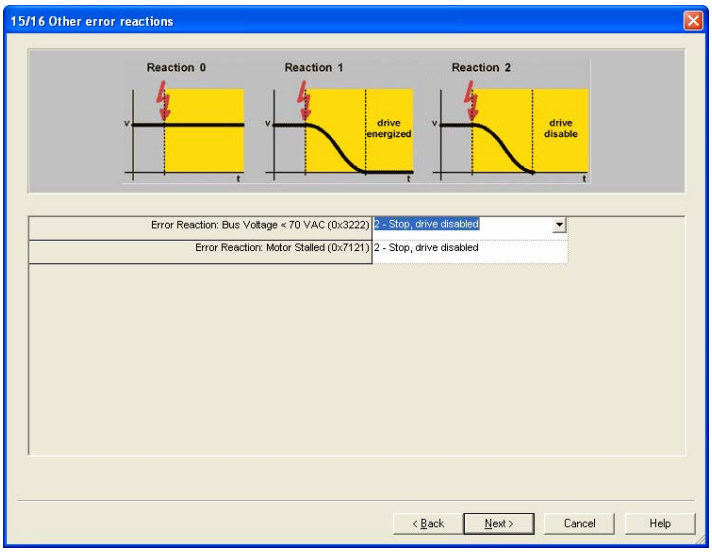
- This is where you would select the various profiles called up by a PLC or digital I/O
- There is nothing to be done here because the ACR9040 controls all positioning
- Click “Next”



EPL Setup in ServoManager

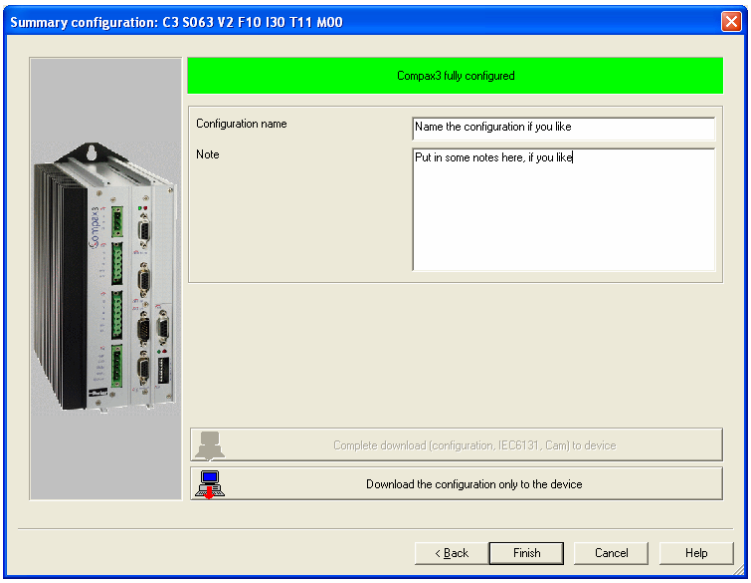
Step 17: Other Error Reactions

- Click the box to reveal an arrow to select other options
- These are the default values.
- Click “Next”



Summary Configuration: “Your Part Number”

- The Top Middle should be green – this means that the setup is done
- You can name your configuration
- You can add notes to your configuration



- Click “Finish”

You could download your configuration here, but we have setup the Ethernet Powerlink yet. You will save time if you just click “finish”. This will bring you back to the main ServoManager Screen.

EPL Setup in ServoManager

Ethernet Powerlink Setup

The Ethernet Powerlink portion of the setup is very simple. There are two steps:

- **Select the address with connector S24 on the front of the drive**
- **Select the Ethernet Powerlink Mode**

*M050V6F12I21T11M00 is shown

Hardware Setup

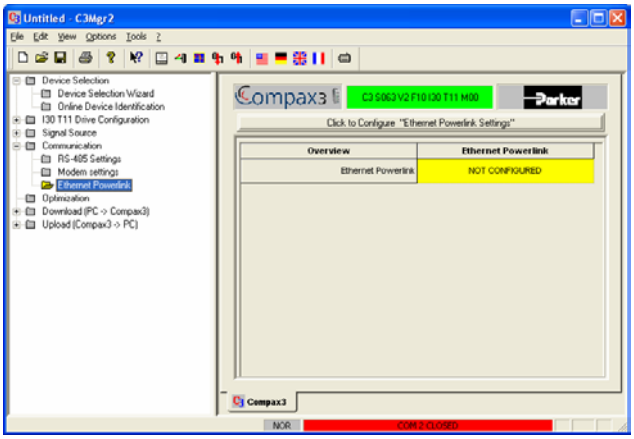
- **Values:**
  - ✓ 2^0
  - ✓ 2^1
  - ✓ 2^2 through 2^7
- **Left is OFF or "0"**
- **Right is ON or "1"**
- **An address value of zero is not valid (all off)**
- **From top to bottom: 10000000**
  - ✓ Address = 1
- **From top to bottom: 01000000**
  - ✓ Address = 2
- **From top to bottom: 11000000**
  - ✓ Address = 3

Once you complete the configuration, ServoManager will show you the address.

EPL Setup in ServoManager

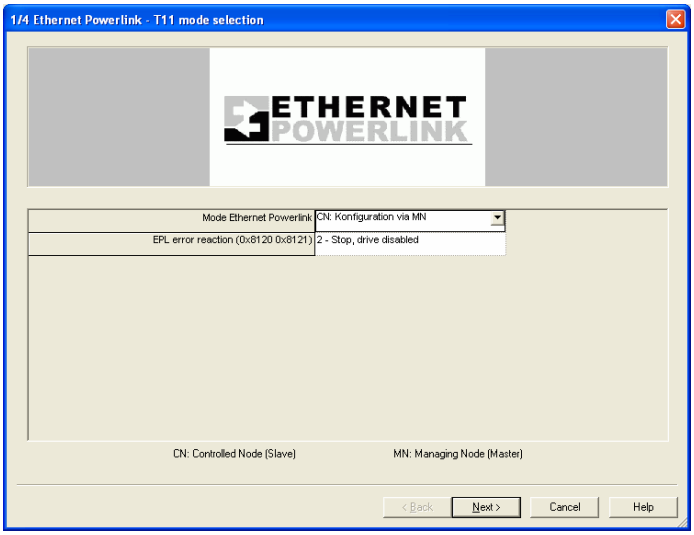
Communications: Ethernet Powerlink

- Click on the "+" sign next to the "Communication Folder – you will see:
  - ✓ RS-485
  - ✓ Modem Settings
  - ✓ Ethernet Powerlink
- Double-click on the "Ethernet Powerlink" folder



Ethernet Powerlink: Step 1

- First Row: Mode Ethernet Powerlink
  - ✓ CN: Velocity Mode
  - ✓ CN: Position Mode
  - ✓ CN: Profile Select
  - ✓ CN: Konfiguration via MN
- Select "CN: Konfiguration via MN"
- Second Row: EPL Error Reaction
  - ✓ 0 – No Response
  - ✓ 1 – Stop Drive, Energize
  - ✓ 2 – Stop Drive, Disabled
- Select "2 – Stop Drive, Disabled"
- Click "Next"



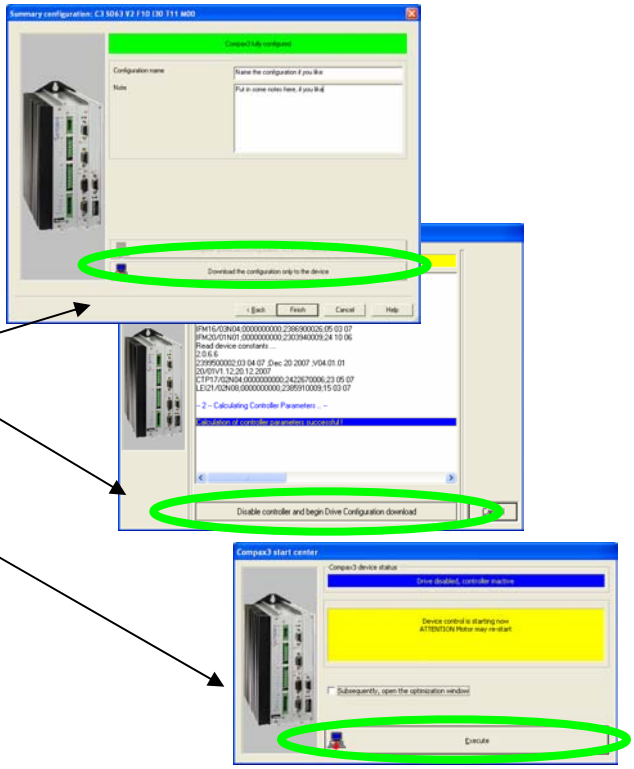
You do not need to input the device address you already selected on the S24 connector. When you download the configuration, ServoManager will automatically obtain this setting and display it for you.

EPL Setup in ServoManager

Step 2: Summary, Download Configuration

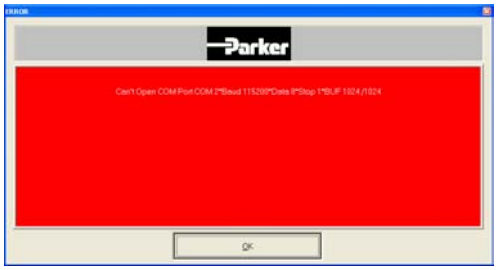
- This is where you can now download the entire configuration you went through
  - ✓ Device Selection
  - ✓ Drive Configuration
  - ✓ Ethernet Powerlink Settings

- Click on "Download Configuration Only to the device"
- Click on "Disable controller and begin Drive Configuration download"
- Click "Execute" to start the drive processing

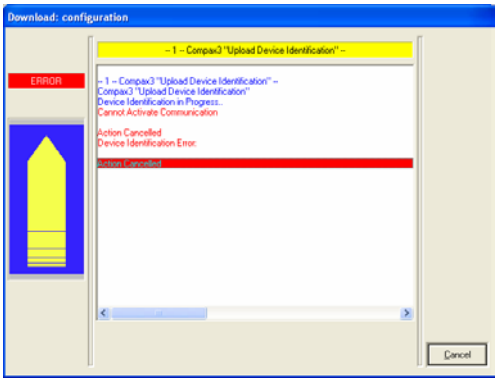


Possible Errors

- Problem 1:
  - ✓ Red Error Screen, check to see if correct COM port is selected



- Problem 2:
  - ✓ Can't Initiate Download: check to make sure power is on, correct cable is being used, USB-Serial cable is the recommended version (*Bafo BF-800 or BF-810* (http://www.bafo.com).

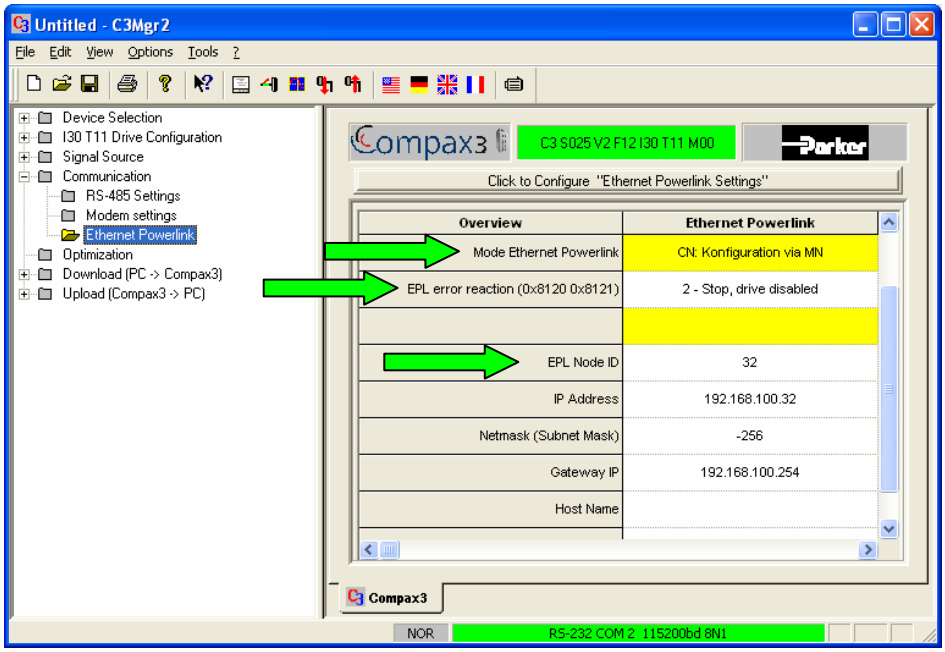


- For more information:
  - ✓ To trouble-shoot RS-232 communications, visit the FAQ section on www.parkermotion.com and type in BAFO. A write up is available.

EPL Setup in ServoManager

Ethernet Powerlink Address: Finishing Up

- **Click on the "+" sign next to the "Communication Folder – you will see:**
  - ✓ RS-485
  - ✓ Modem Settings
  - ✓ Ethernet Powerlink
- **Highlight (single-click) on the "Ethernet Powerlink" folder**
- **On the right side of the screen, scroll down half-way, here you can verify:**
  - ✓ Mode Ethernet Powerlink (Enable ACR-C3 communications)
  - ✓ EPL Error Reaction (For application safety)
  - ✓ EPL Node ID (Needed for ACR-View)



You are now done with ServoManager Configuration. Repeat this process for any other drives you have. If the drives are the same, simply change the address on the S24 connector and download the same configuration. BE SURE TO POWER CYCLE THE COMPAX3 AFTER SETUP IS COMPLETE!

EPL Setup in ServoManager

EPL Setup in ACR-View

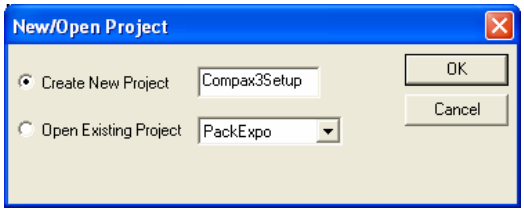
The section will go over how you can set up a Compax3 EPL axis in ACR-View.

Launch ACR-View

- **Double-click the ACR-View Icon on your desktop**

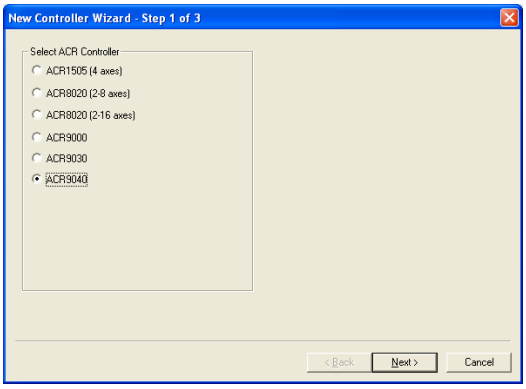
Step 1: Create/Name Project

- **Select "Create New Project" and give it a name**



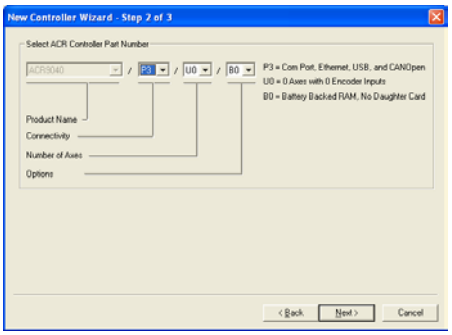
Step 2: Select Controller

- **Select ACR9040 (or 9030)**



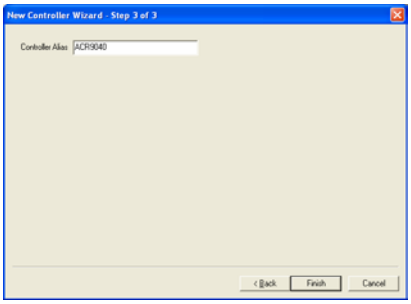
Step 3: Model Number

- **Select the specific part number of the ACR purchases**



Step 4: Name the controller

- **Select an alias for the ACR9040 (only relevant with multiple ACRs)**



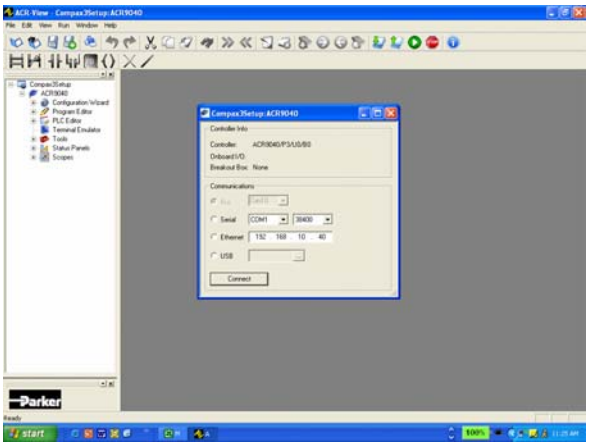
EPL Setup in ServoManager

Configuration Wizard

- The next several steps outline how you set up a Compax3 EPL Drive

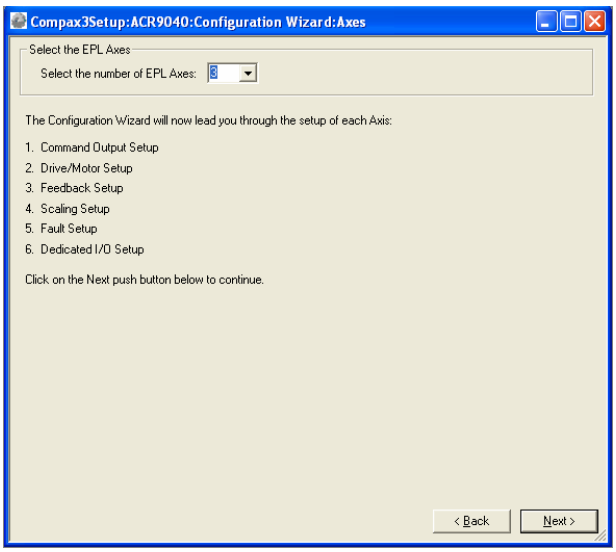
Step 1: Communications

- Select how you will communicate to the ACR9040 – I have Ethernet selected and the default IP address is shown.
- Click “Connect” and wait for communications to occure



Step 2: Axes

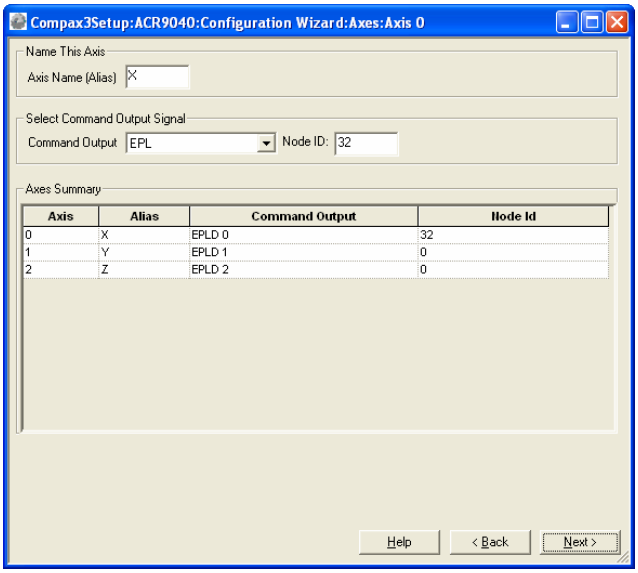
- Select how many EPL Axes will be connected – this may be a mixture of Aries and Compax3 drive. This represents the total number of drives (1 = one drive, 5 = five drives).



EPL Setup in ServoManager

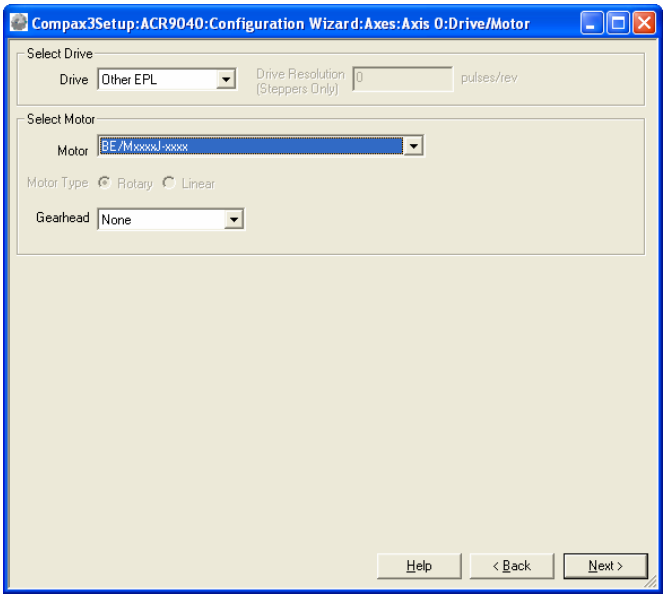
Step 3: Axis 0 Setup

- **Input the name of the axis**
  - ✓ I will use “X”
- **Input the address of this drive**
  - ✓ I will use “32” from the readout on page 15
- **Choose “EPL” for Command Output**
- **Once you click next, “32” will be displayed on the Axis Summary Table in this window**

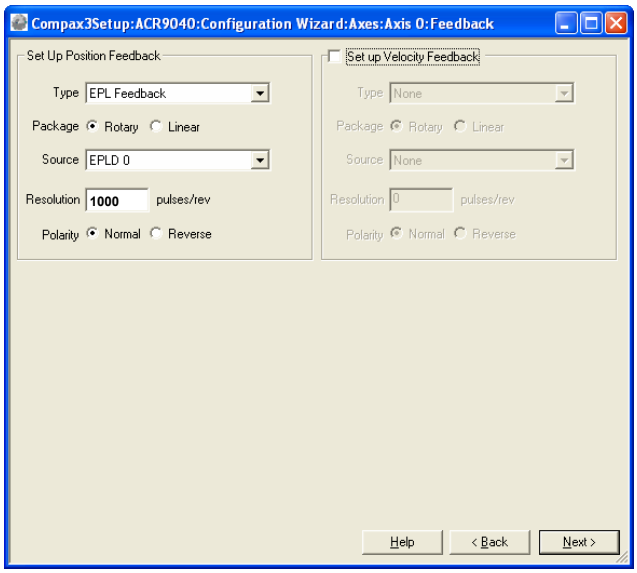


Step 4: Drive/Motor

- **Select Drive**
  - ✓ For Compa3 – select “Other EPL”
- **Select Motor**
  - ✓ Only select series of motor you are controlling
- **Gearmotor**
  - ✓ Choose whether or not you are using a gearhead integrated with the motor



EPL Setup in ServoManager



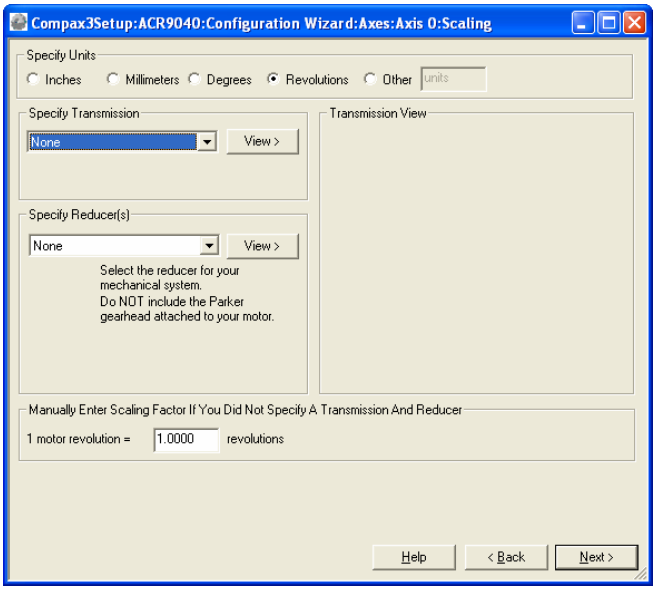
Step 5: Axis 0 Feedback

- **Type:**
  - ✓ Select “EPL Feedback”
- **Package**
  - ✓ Rotary or Linear
- **Choose “EPL” for Command Output**
- **Choose the resolution of the feedback. This is pre-quadrature. Check with motor catalog to verify counts/rev.**
- **RESOLUTION: a value of 1000 is needed to scale to revolutions**
  - ✓ The resolution of the feedback from the Compax3 to the ACR9040 is 1000 pulses per revolution – for all feedback motor feedback devices

EPL Setup in ServoManager

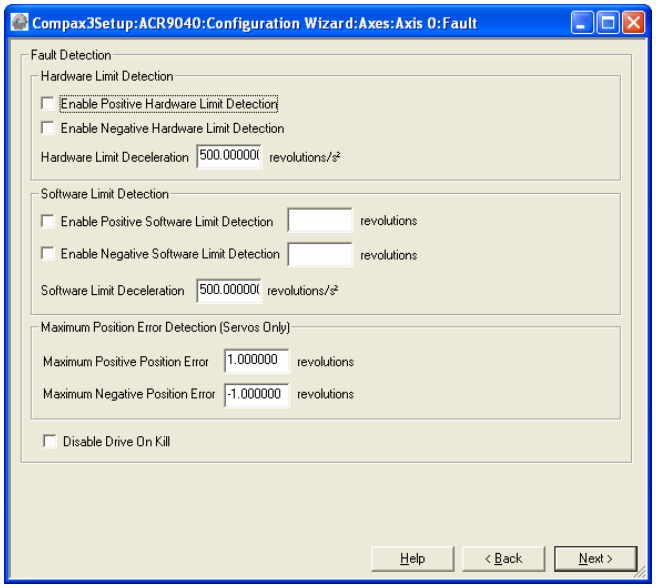
Step 6: Axis 0 Scaling

- **Specify desired units**
  - ✓ This will be what you eventually program in
- **Transmission**
  - ✓ You can select from a number of popular mechanical transmission types
- **Specify any additional reducers in the system (ie. Bayside, belt and pulley)**
- **You can manually enter the scaling factor at the bottom if you didn't specify some sort of mechanical reduction**

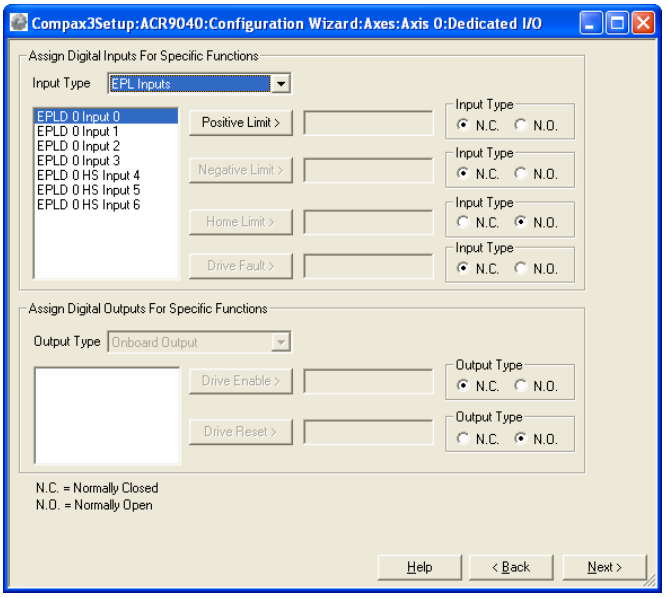


Step 7: Axis 0 Faults

- **Hardware Limit Detection**
  - ✓ This will enable your end-of-travel hardware limits. **This function should be turned off in ServoManager**
- **Software Limit Detection**
  - ✓ You can enable or disable the software limits here. **This function should be turned off in ServoManager**
- **Maximum Position Error Detection**
  - ✓ This is the controller finding the difference between actual and commanded position. **Be sure that this value is tighter than the one in ServoManager (Page 8 Step 10)**



EPL Setup in ServoManager

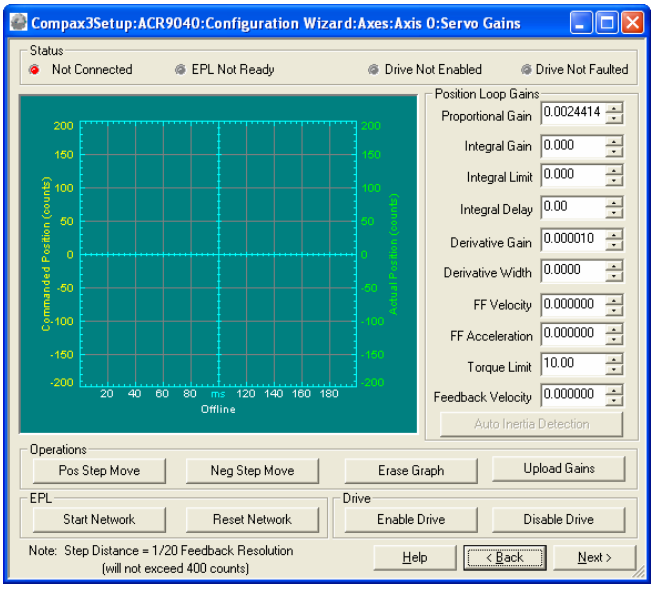


Step 8: Axis 0 Dedicated I/O

- **Input Type:**
  - ✓ Select "EPL Inputs"
  - ✓ This will allow you to choose to use the inputs on the Compax3 as hardware limits – if desired

Step 9: Servo Gains

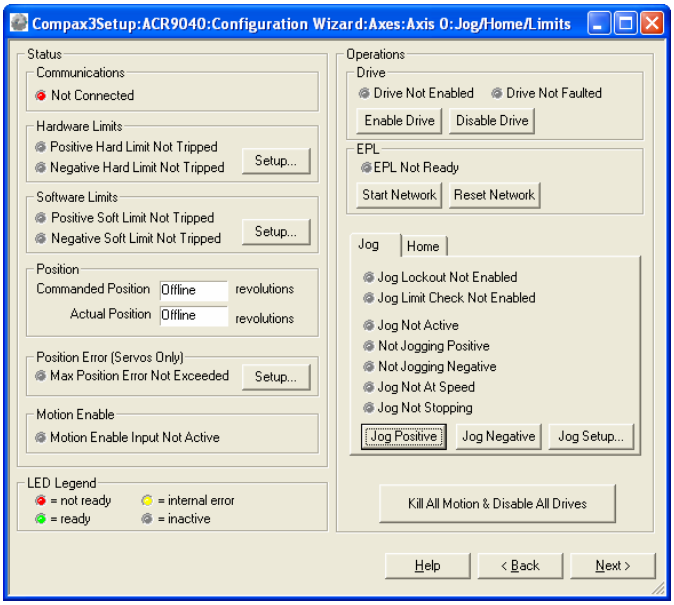
- **Completely Ignore this screen for the Compax3**
- **Use ServoManager Optimization Tool for tuning the motor**



EPL Setup in ServoManager

Step 10: Axis 0 Jog/Home/Limits

- **There are many things that can be done on this screen**
  - ✓ Enable Drive
  - ✓ Start EPL Network
  - ✓ Jog the motor
  - ✓ Home the motor
- **Be sure everything is wired correctly and that you are ready for motion.**

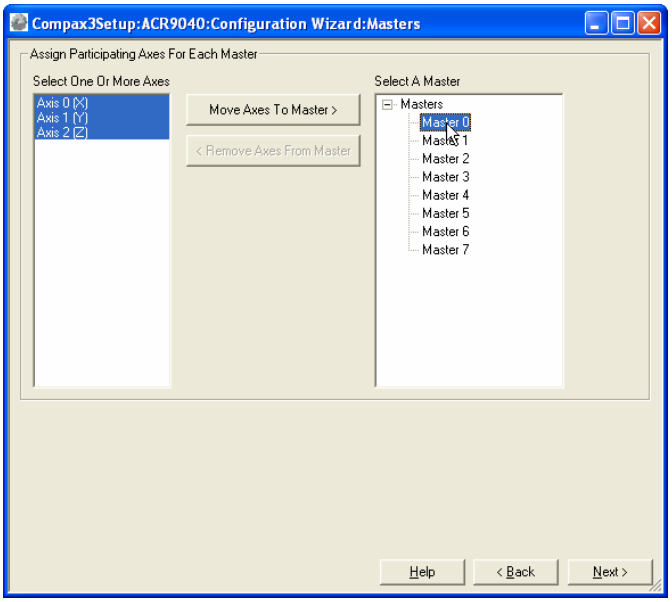


The first Compax3 EPL Axis is configured. Go through these steps again for the remaining drives.

EPL Setup in ServoManager

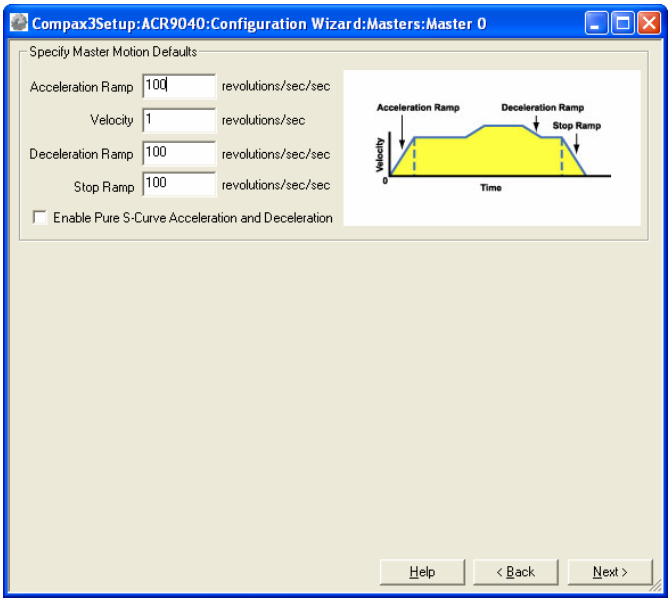
Step 11: Masters

- **You must assign each axis to a Master. For many applications, you can assign all three axes to the same master.**
  - ✓ Highlight the three Compax3 Axes
  - ✓ Highlight “Master 0”
  - ✓ Click on “Move Axes to Master”
  - ✓ After you click on “Move Axes”, all three axes should move from the left side to beneath “Master 0”
  - ✓ Click “Next”

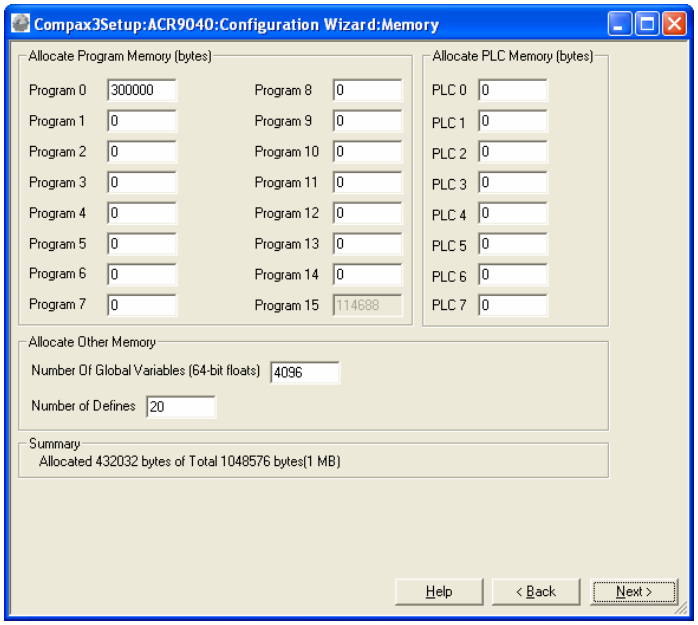


Step 11: Master 0

- **You need to assign some acceleration parameters to the Master.**
  - ✓ Acceleration Ramp
  - ✓ Initial Velocity
  - ✓ Deceleration Ramp
  - ✓ Stop Ramp
  - ✓ You can enable “s-curve” accel here.



EPL Setup in ServoManager

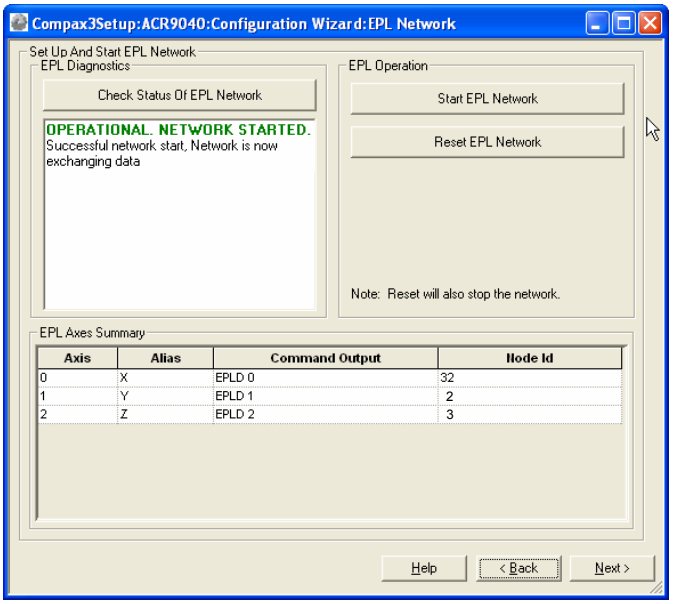


Step 12: Memory

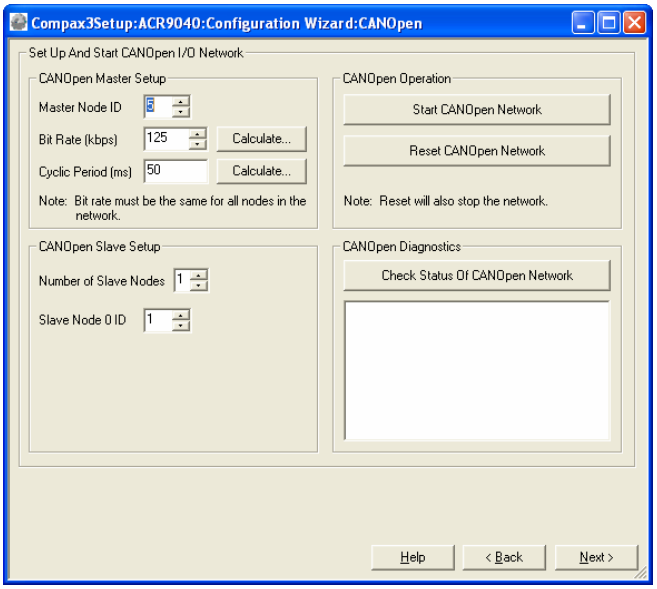
- **Input the amount of memory for each program (aka "task") that is being used**
  - ✓ **Default for Program 0 is 300000k**
  - ✓ **Enter in other values for other programs if needed.**
  - ✓ **You can also change the number of global variables in this screen**

Step 13: Check EPL Network

- **This screen allows you to check the state of the EPL network**
- **Click on "Start EPL Network"**
- **The controller will access the drive and turn on the communications. If all is well, you will see the appropriate message.**



EPL Setup in ServoManager

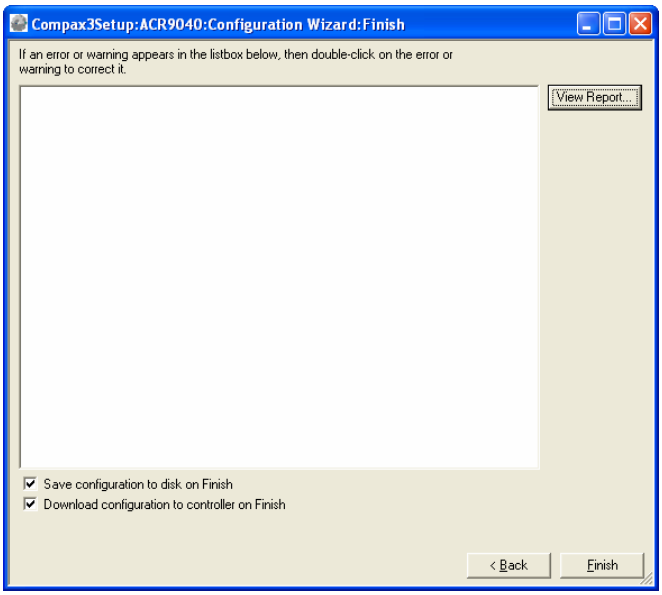


Step 14: CANOpen

- **This screen allows you to setup the CANOpen port**
  - ✓ **Talk to PIO**

Step 15: Finish

- **This is where you can download the entire configuration to the ACR**
- **Make sure the two boxes at the bottom are checked to save and download**
- **If any errors occur in the configuration, they will be listed here**

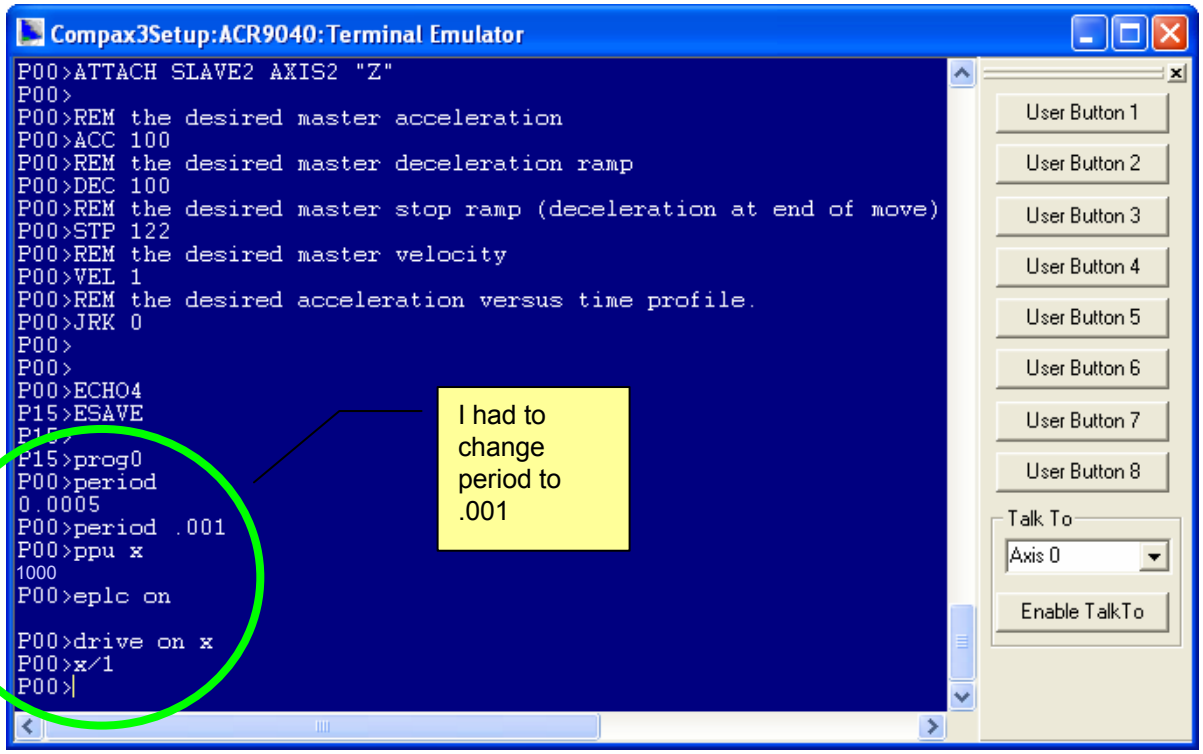


Configuration and download are finished.

EPL Setup in ServoManager

TESTING MOTION

- **On the program tree on the left, click on "Terminal Emulator"**
- **Type: prog0**
  - ✓ This takes us to our first program
- **Type: period**
  - ✓ Make sure it is .001
- **Type: eplc on**
  - ✓ Turn on EPL network
- **Type: drive on x**
  - ✓ Enable drive
- **Type: x/1**
  - ✓ Initiate a relative move of 1 revolution



EPL Setup in ServoManager

EPL in ACR-View Terminal

The section will explain some key ACR commands.

Commands

- **Period – placed at the beginning of program**
  - ✓ This should be set to .001 for 1-8 axes of Compax3
  - ✓ Add .000125 per axis for over 8 axes of Compax3
  - ✓ Example for 5 axes: period .001
  - ✓ Example for 9 axes: period .001125
  - ✓ **NOTE: EVERY TIME YOU REDOWNLOAD THE ACR-VIEW CONFIGURATION, THE PERIOD IS SET BACK TO .0005 (As of v5.4 of ACR-View)**
- **Eplc on**
  - ✓ Turns on the Ethernet Powerlink Network
- **Eplc off**
  - ✓ Turns off the Ethernet Powerlink Network
- **Eplc**
  - ✓ Checks the status of the Powerlink Network
- **Drive on x**
  - ✓ Enables the "x" axis
- **Drive off x**
  - ✓ Disables the "x" axis
- **Drive res x**
  - ✓ Clears errors from the Compax3
  - ✓ NOTE: Try not to enable drive until EPL network is enabled (may be have to issue this command if done too early)
  - ✓ Feedback Errors *require power cycle*
  - ✓ SDO Transfer Errors *require power cycle*

Compax3 Parameters and Bits

- **P38146 – Master position of additional feedback device (add 16 for next axis)**
  - ✓ This can be 5V A/B Encoder
  - ✓ SSI Feedback Device
  - ✓ Found in the Numeric Status Panel under "EPL Parameters" then "EPLD Position Parameters"
- **Inputs – 8 available on the Compax3**
  - ✓ Input0 = Bit3328
  - ✓ Input1 = Bit3329
  - ✓ Input2 = Bit3330 . . .
  - ✓ Input7 = Bit3335
  - ✓ To find the status: Click on "Status Panels", "Bit Status", "EPL Flags", "EPL Digital Inputs"
  - ✓ **NOTE: These are not high-speed inputs**
- **Outputs – 4 available on the Compax3**
  - ✓ Output0 = Bit3840
  - ✓ Output1 = Bit3841
  - ✓ Output2 = Bit3842
  - ✓ Output7 = Bit3843
  - ✓ To find the status: Click on "Status Panels", "Bit Status", "EPL Flags", "EPL Digital Outputs"
  - ✓ **NOTE: These are not high-speed outputs**

Parker Hannifin Corporation
Electromechanical Automation Division
5500 Business Park Drive
Rohnert Park, CA 94928
parkermotion.com

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