Compax3

Servo Drive Systems

Ethernet Powerlink Setup with the ACR9040

ENGINEERING YOUR SUCCESS.

Compax3 Family

EPL Setup in ServoManager

REV 2

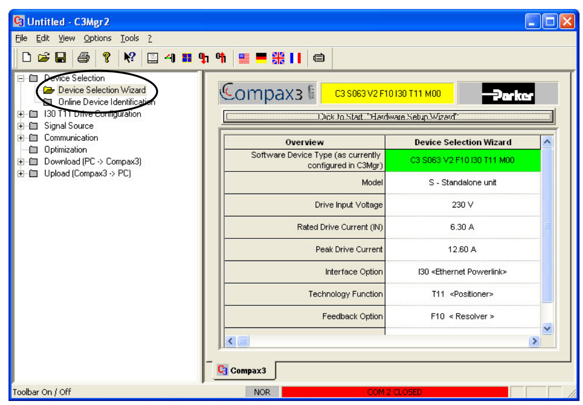
Purpose

This document describes the process by which one sets up the Compax3 with Ethernet Powerlink.

The Ethernet Powerlink option on the Compax3 is intended to be used with the ACR9040 and ACR9030 Controls.

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: SxxxVx (select your power level)
  - ✓ Screen 2: Fxx (select your feedback type)
  - ✓ Screen 3: I30 (Choose I30 for EPL)
  - ✓ Screen 4: T11 (Choose I11)
  - ✓ Screen 5: M00 (Choose M00 for no options)

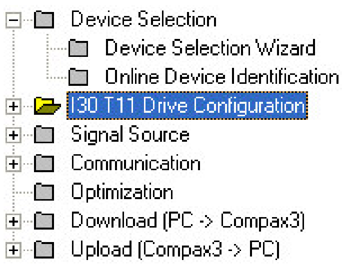
- **You will end up with a part number that looks like: S063V2F10I30T11M00 and should match what you ordered and what the label reads on the side of your drive**

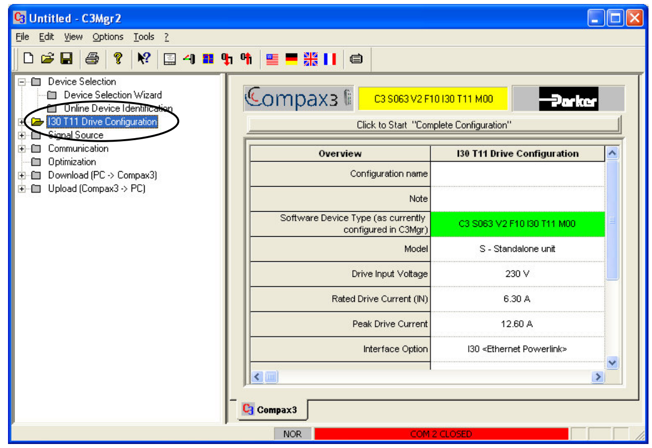
Compax3 Family

EPL Setup in ServoManager

Drive Configuration

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

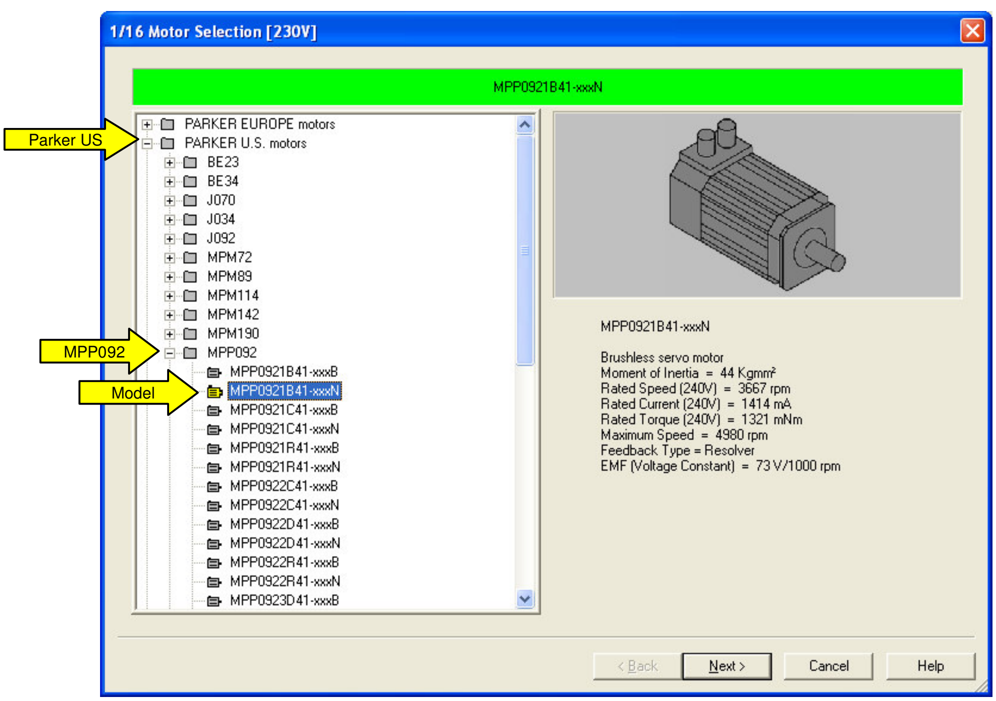




- **The Drive Configuration Wizard opens and you will need complete 16 steps – though only a few need input.**

Step 1: Motor Selection

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



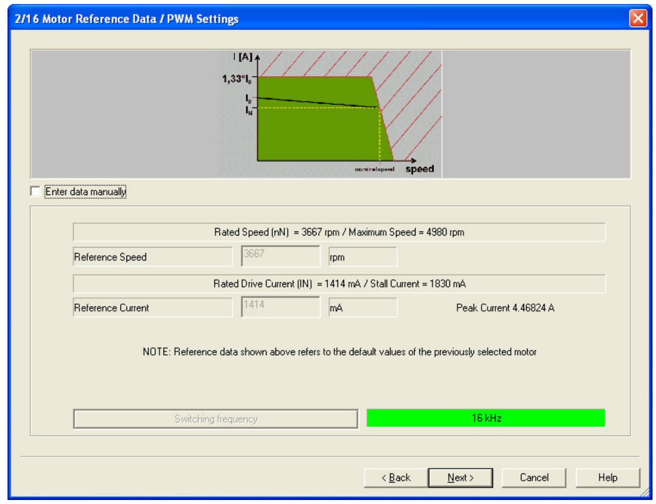
- **Click "Next"**

Compax3 Family

EPL Setup in ServoManager

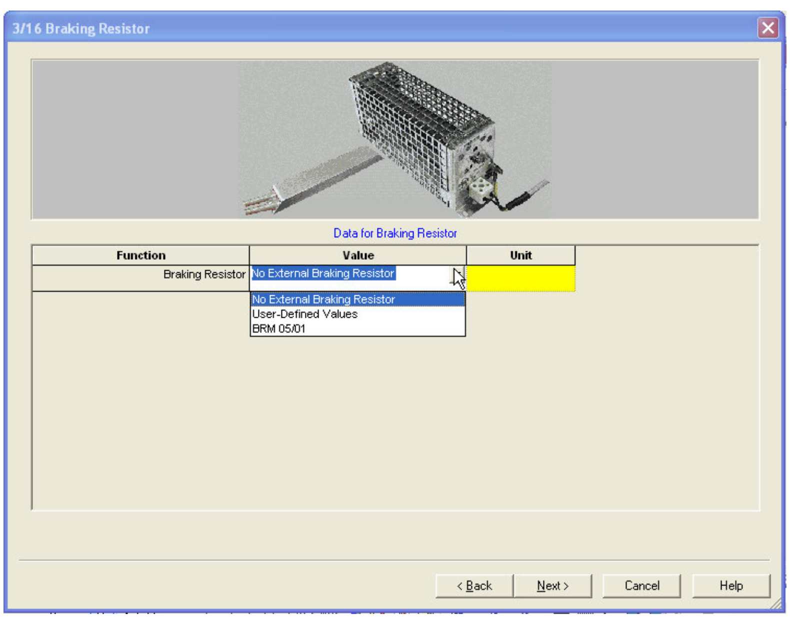
Step 2: Motor Reference Data / PWM Settings

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



Step 3: Motor Selection

- **Select the Parker part number for braking resistor using – or enter the user defined value**
- **Ignore this screen if not using a resistor**

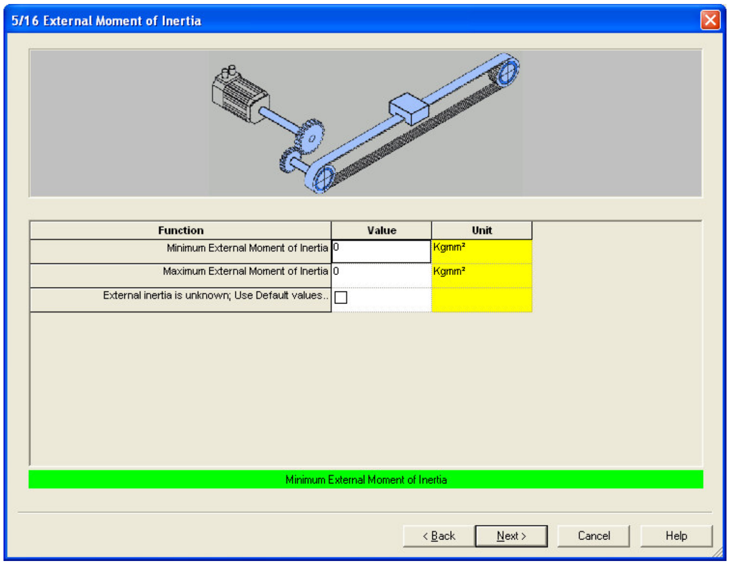


The Compax3 already has internal braking resistance, however, if your needs exceed the braking capabilities, you may need to use a Parker BRM breaking module. See manual for recommended combinations.

- **Click “Next”**

EPL Setup in ServoManager

Step 4: This step is omitted

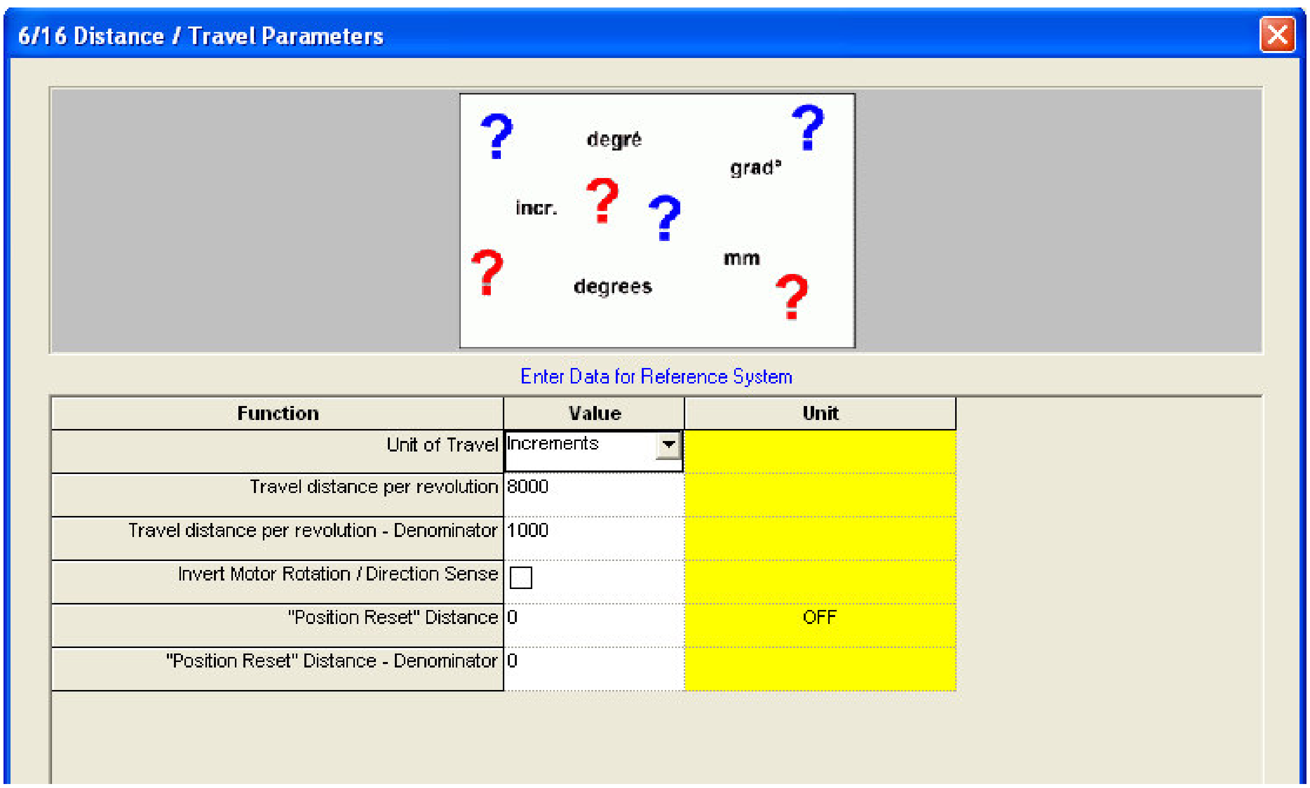


Step 5: Moment of Inertia

- **This is the most important tuning step**
  - ✓ The Compax3 uses this for 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.
- **"External Interia is unknown"**
  - ✓ Do not check the box – if you do, call Parker Applications Engineering for help with this AutoTuning Feature.
- **Click "Next"**

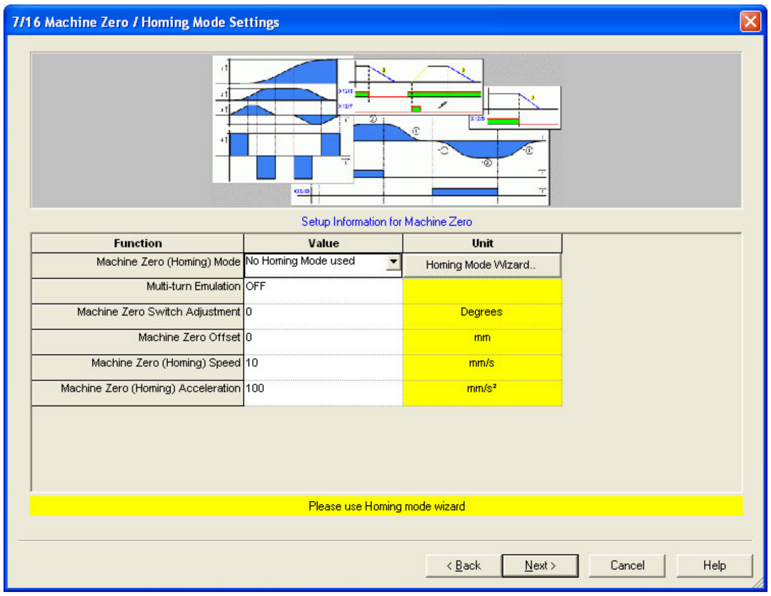
Step 6: Distance / Travel Parameters

- Select INCREMENTS for units of travel
- Travel Distance per revolution: Use Motors post-quadrature Encoder or Resolver resolution
- Travel Distance per revolution-Denominator: This should always be 1000 (based on C3's internal scaling factor)
- Leave the other fields as default as shown. Motor direction can be invert in the ACR controller if needed.



Function	Value	Unit
Unit of Travel	Increments	
Travel distance per revolution	8000	
Travel distance per revolution - Denominator	1000	
Invert Motor Rotation / Direction Sense	☐	
"Position Reset" Distance	0	OFF
"Position Reset" Distance - Denominator	0	

EPL Setup in ServoManager

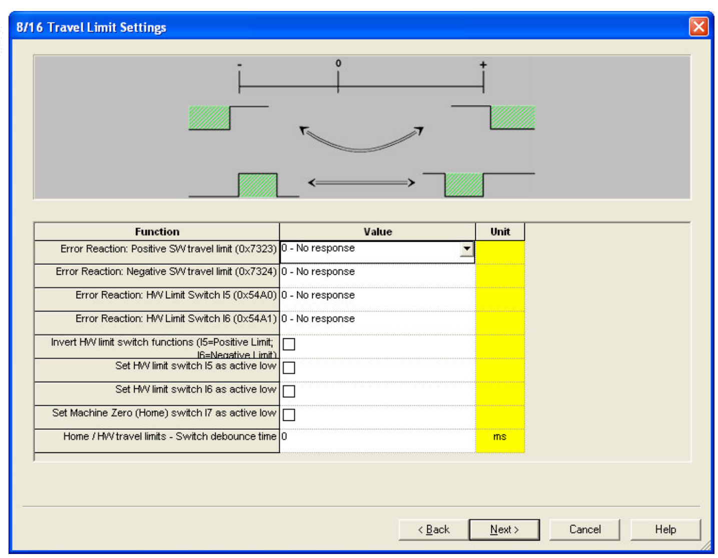


Step 7: Machine Zero / Homing

- 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”

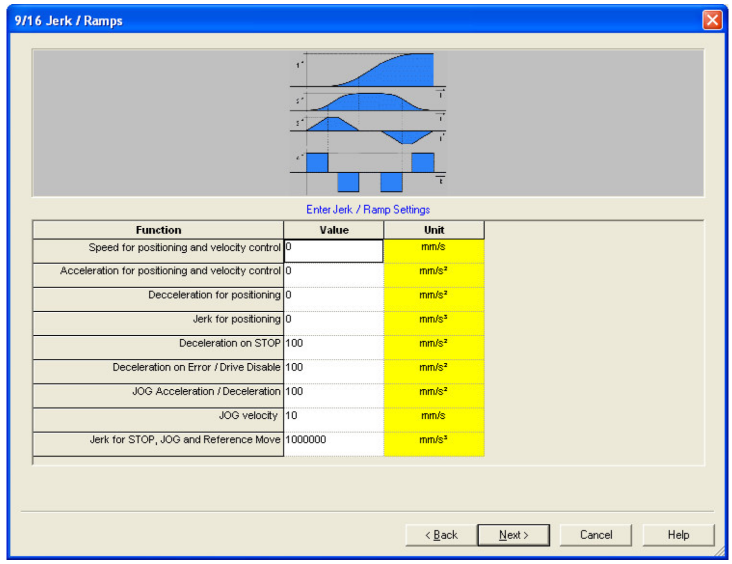
Step 8: Travel Limits / Settings

- 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
- Click “Next”



Step 9: Jerk / Ramps

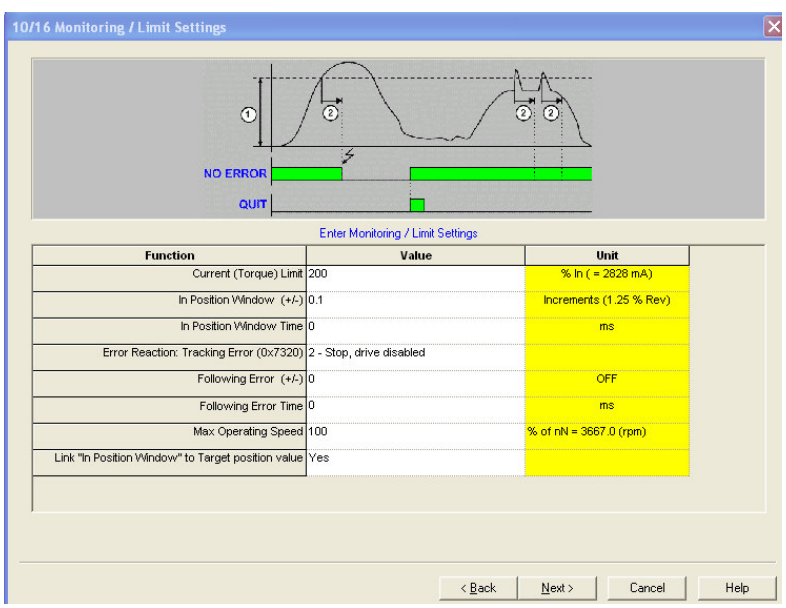
- ➢ No changes required, leave as default
- ➢ ACR controls these values
- ➢ Click “Next”



Function	Value	Unit
Speed for positioning and velocity control	0	mm/s
Acceleration for positioning and velocity control	0	mm/s^2
Decceleration for positioning	0	mm/s^2
Jerk for positioning	0	mm/s^3
Deceleration on STOP	100	mm/s^2
Deceleration on Error / Drive Disable	100	mm/s^2
JOG Acceleration / Deceleration	100	mm/s^2
JOG velocity	10	mm/s
Jerk for STOP, JOG and Reference Move	1000000	mm/s^3

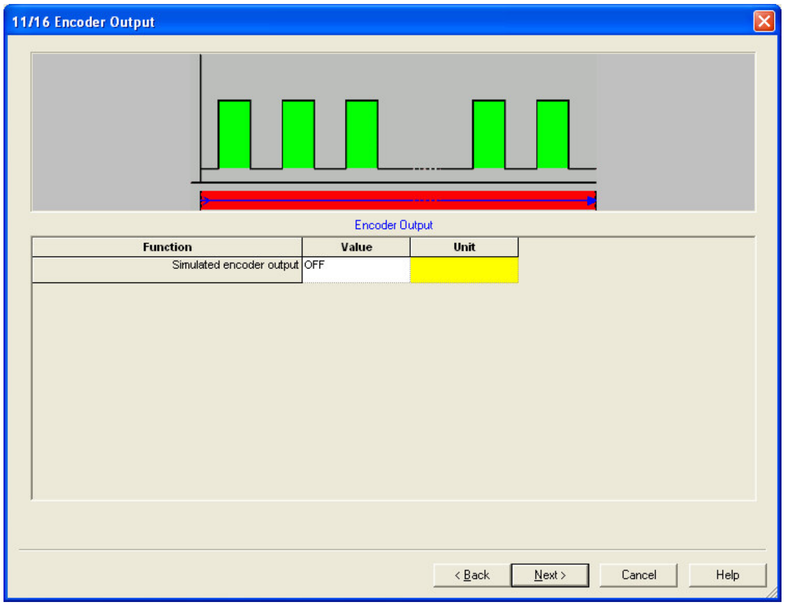
Step 10: Monitoring / Limit Settings

- ➢ Current Limit: Select as a percentage of motor continuous
- ➢ Following Error – Set value to Zero, ACR will monitor following error
- ➢ Other values as default settings
- ➢ Click “Next”



Function	Value	Unit
Current (Torque) Limit	200	% In (= 2828 mA)
In Position Window (+/-)	0.1	Increments (1.25 % Rev)
In Position Window Time	0	ms
Error Reaction: Tracking Error (0x7320)	2 - Stop, drive disabled	
Following Error (+/-)	0	OFF
Following Error Time	0	ms
Max Operating Speed	100	% of nN = 3667.0 (rpm)
Link "In Position Window" to Target position value	Yes	

EPL Setup in ServoManager

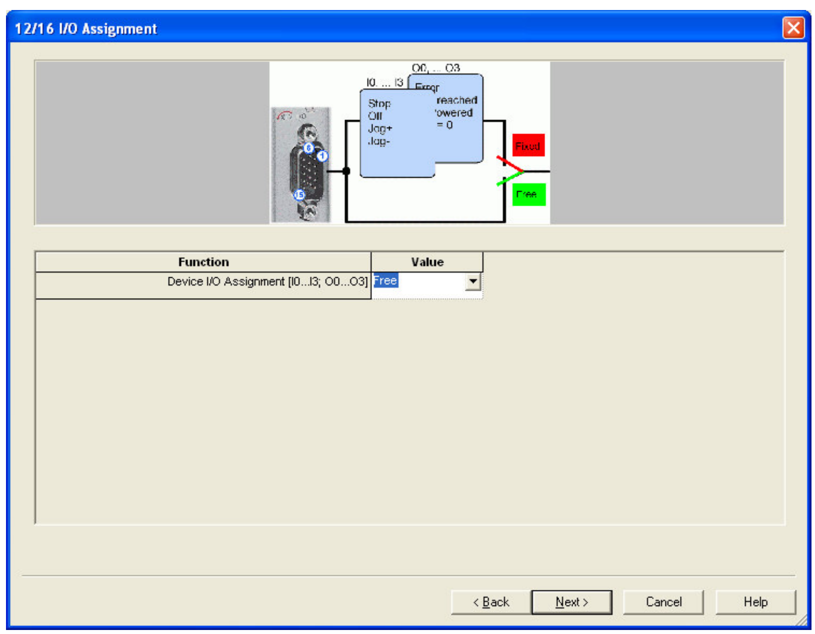


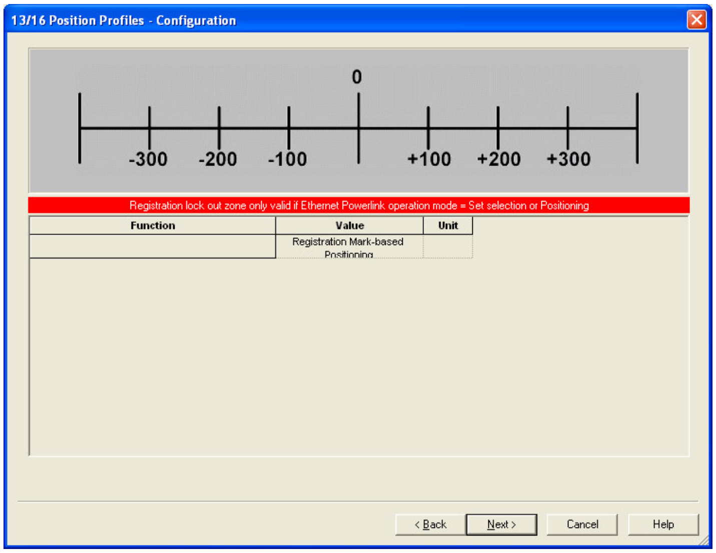
Step 11: Encoder Output

- **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 12: I/O Assignment

- **Make sure the I/O assignment is select “Free”**
  - ✓ This gives the ACR9040 power over all I/O
- **Click “Next”**



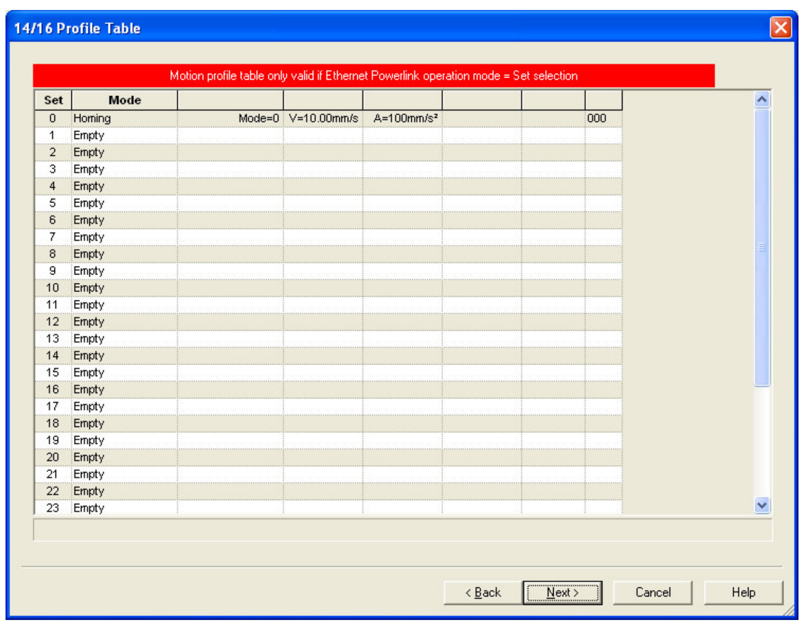


Step 13: Position Profiles - Configuration

- There is nothing to be done here
- Click "Next"

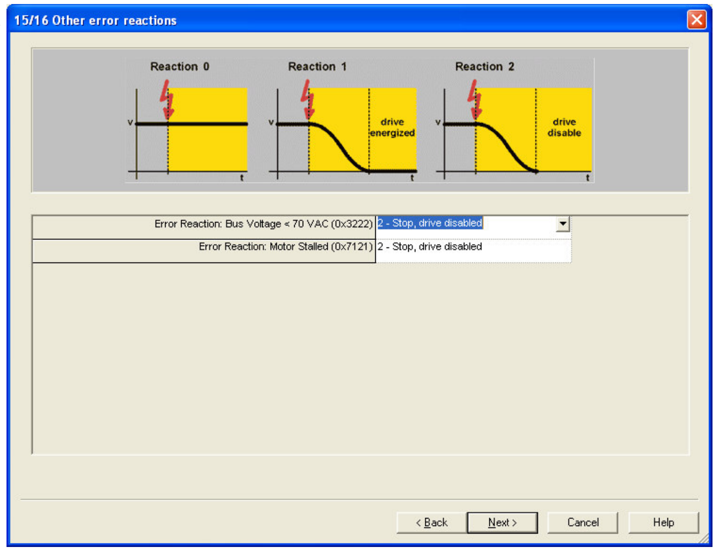
Step 14: Profile Table

- 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"



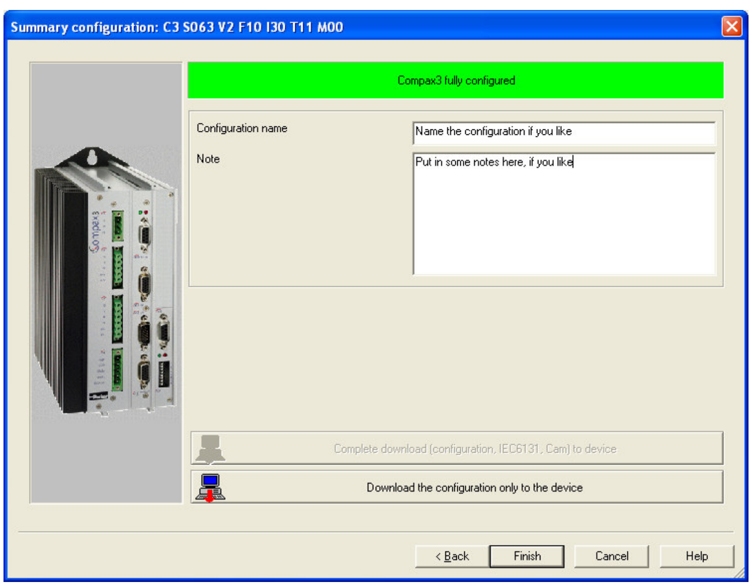
Step 15: Other Error Reactions

- Defaults settings are shown and recommend for most applications
- Highlight the field to reveal a pull-down to change the error reactions if needed
- 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



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.

- Click “Finish”

EPL Setup in ServoManager

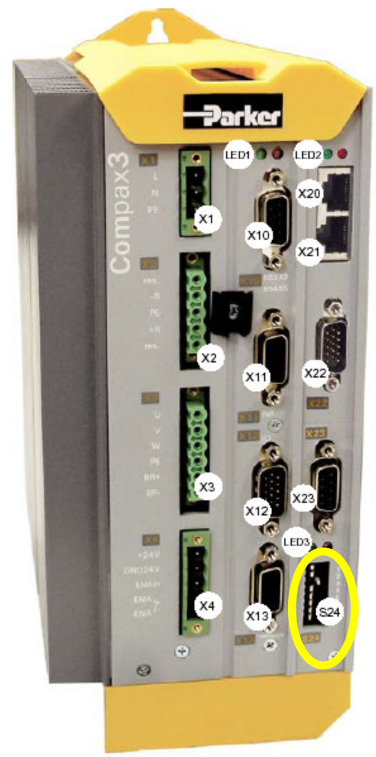
Ethernet Powerlink Setup

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**

S24 Connector Bus Address Values

- **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

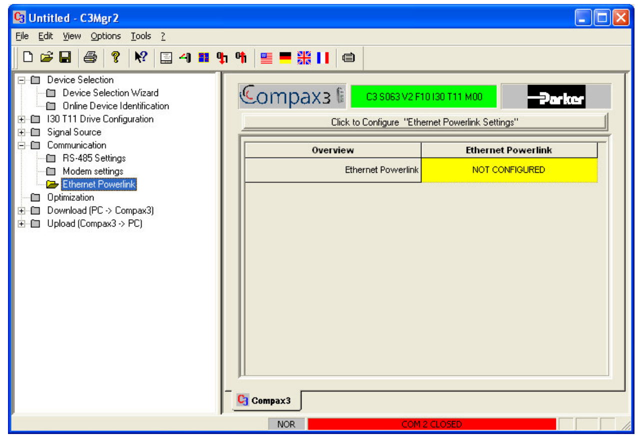


- **When using multiple EPL drives, each drives MUST have a unique address.**
  - ✓ Recommend using Address 1 for 1st axis, 2 for 2nd Axis, etc.

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

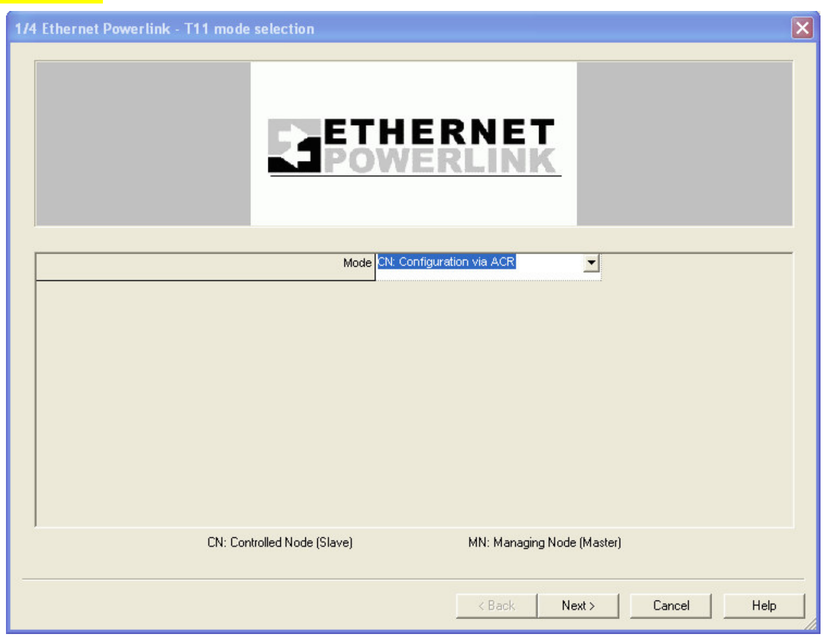
Communications: Ethernet Powerlink

- ➢ 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: Configuration via MN
  - ✓ CN: Configuration via ACR
- ➢ Select "CN: Configuration via ACR"
- ➢ Click "Next"



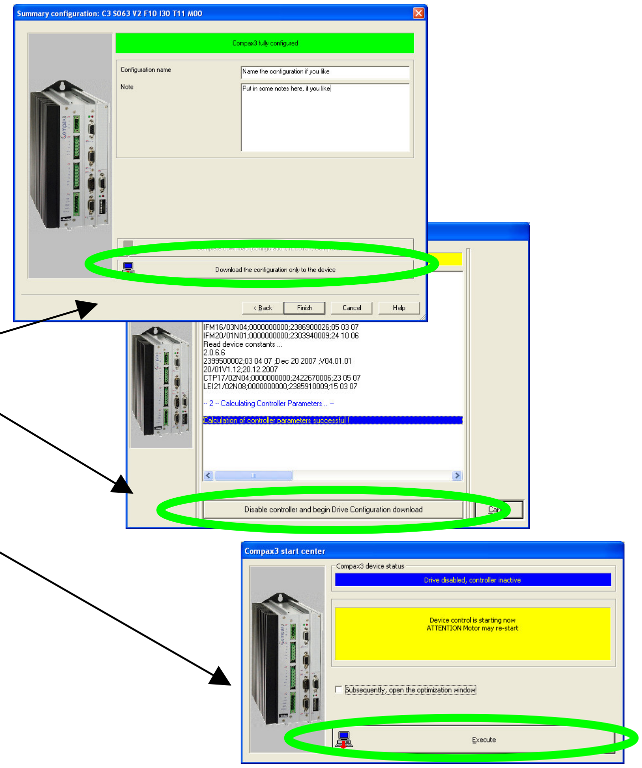
Compax3 Family

EPL Setup in ServoManager

Step 2: Summary, Download Configuration

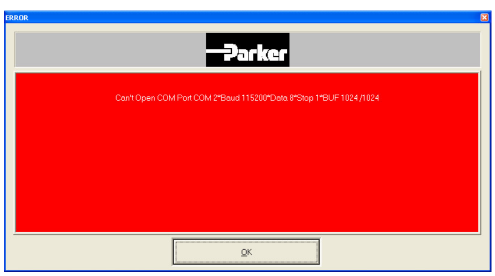
- This is where you can now download the entire configuration you went through
  - ✓ Device Selection
  - ✓ Drive Configuration
  - ✓ Ethernet Powerlink Settings

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

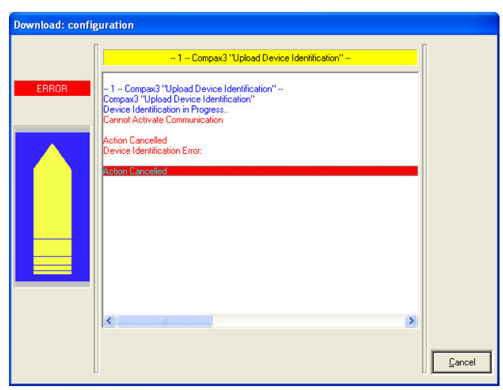


Possible Errors

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



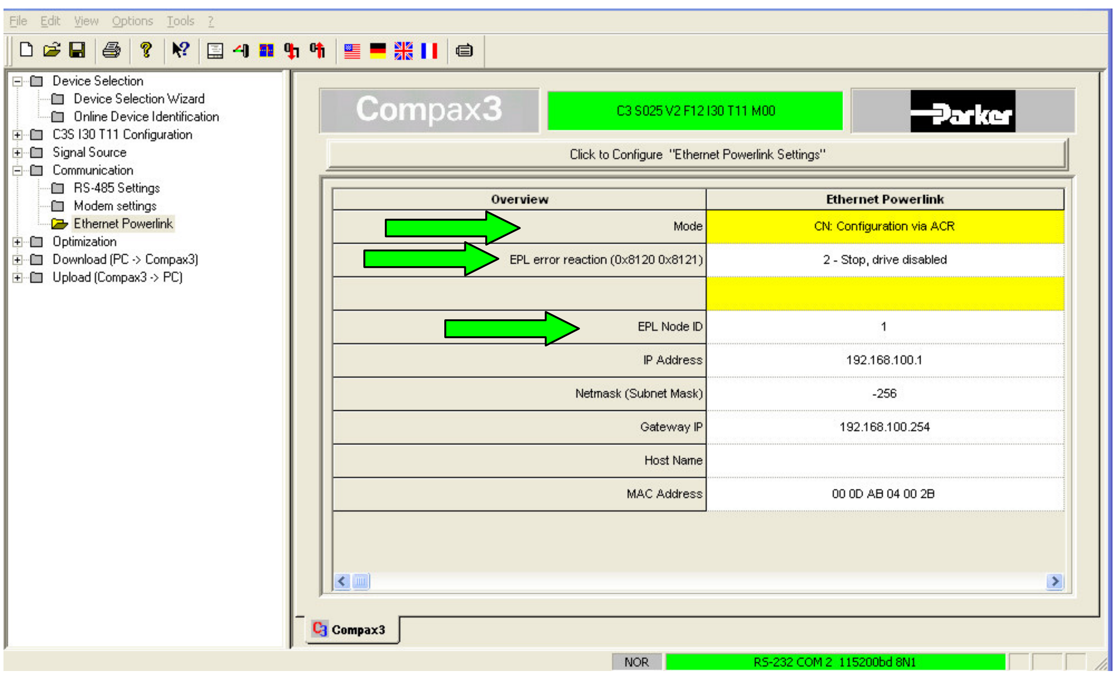
- Problem 2:
  - ✓ Can't Initiate Download: check to make sure power is on, correct cable is being used, USB-Serial cable is the recommended version (*Bafo BF-800 or BF-810* (http://www.bafo.com).



- 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.

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 : CN: Configuration via ACR
  - ✓ EPL Error Reaction (For application safety)
  - ✓ EPL Node ID: this is the value set by the Bus Address, make note of this number for use within 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 ACR-View 5.5.5

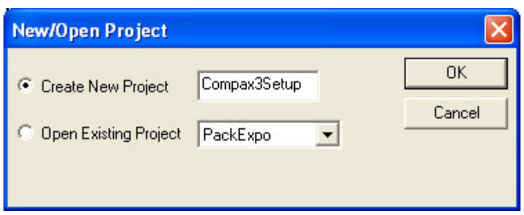
The section will go over how you can set up a Compax3 EPL axis in ACR-View.

Launch ACR-View

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

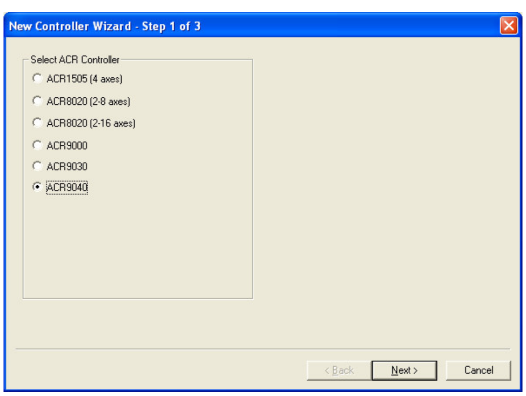
Step 1: Create/Name Project

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



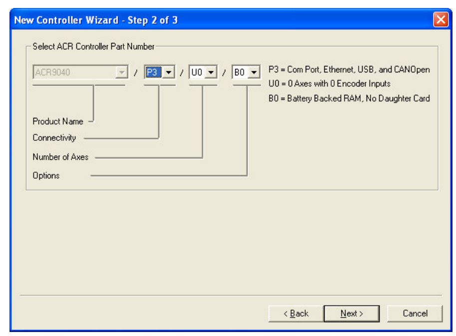
Step 2: Select Controller

- **Select ACR9040 (or 9030)**



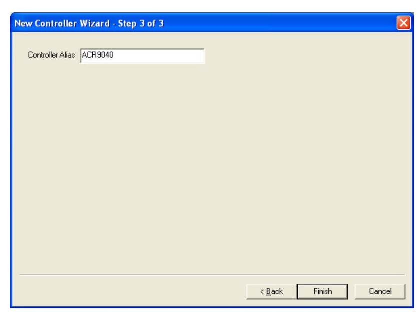
Step 3: Model Number

- **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)**

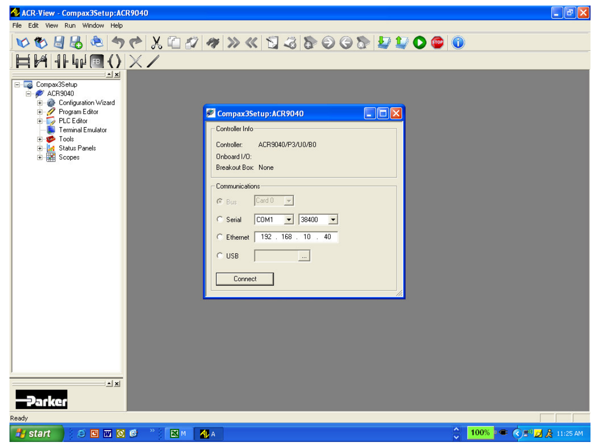


Compax3 Family

EPL Setup in ServoManager

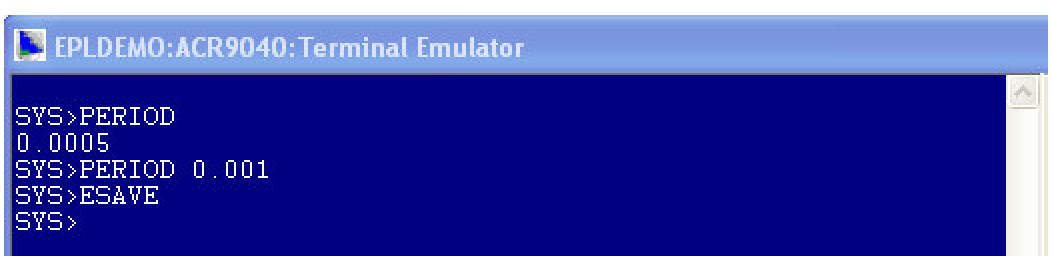
Step 1: Communications

- Select how you will communicate to the ACR9040 –Ethernet selected in this example with the default ACR IP address shown
- Click “Connect” and wait for communications to occur



Step 1a: Set the EPL Period

- Open the Terminal Emulator
- The default servo/EPL period in the controller is 0.0005 sec. The Compax3 drives require a minimum of 0.001 sec
- In the terminal emulator, enter PERIOD 0.001
- Enter the command ESAVE



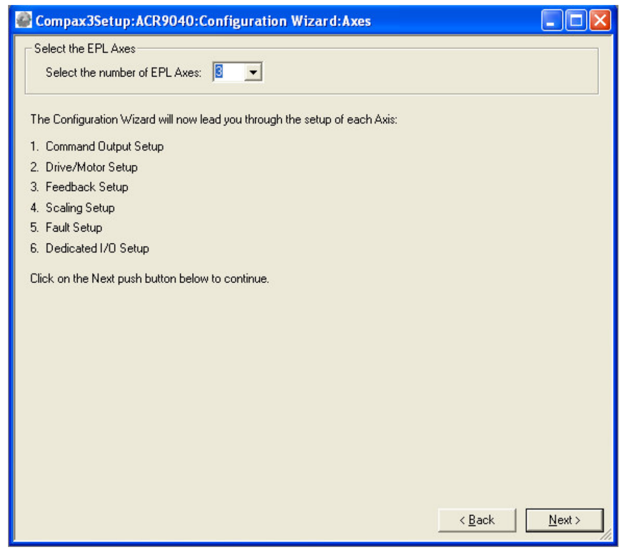
EPL Setup in ServoManager

Configuration Wizard

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

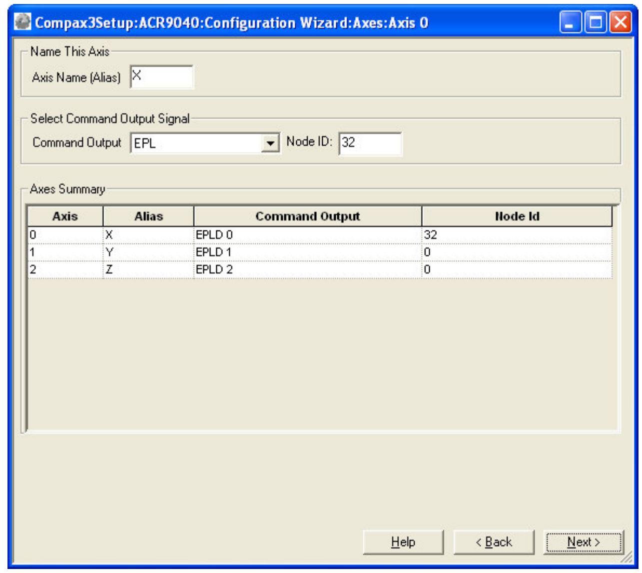
Step 2: Axes

- 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).
- This example shows configuration of 3 axes



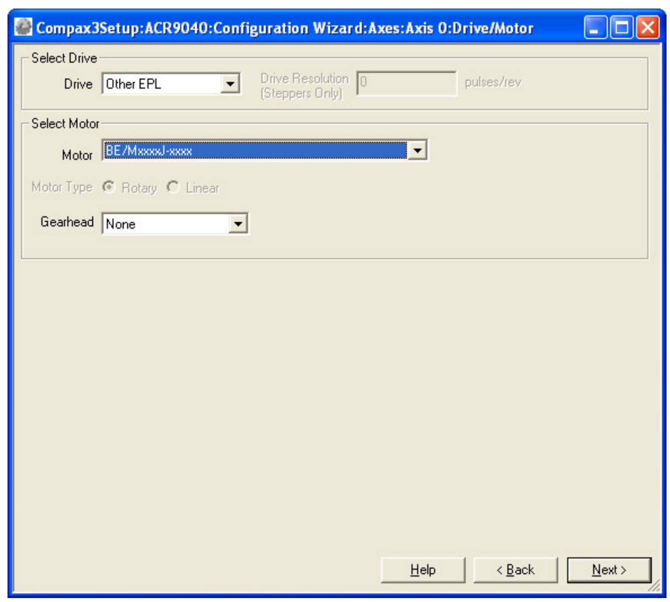
Step 3: Axis 0 Setup

- Input the name of the axis
  - ✓ Example: "X"
- Input the address of this drive
  - ✓ Input the EPL Node ID from the Compax3: "1"
- Choose "EPL" for Command Output
- Once you click next, "1" will be displayed on the Axis Summary Table in this window

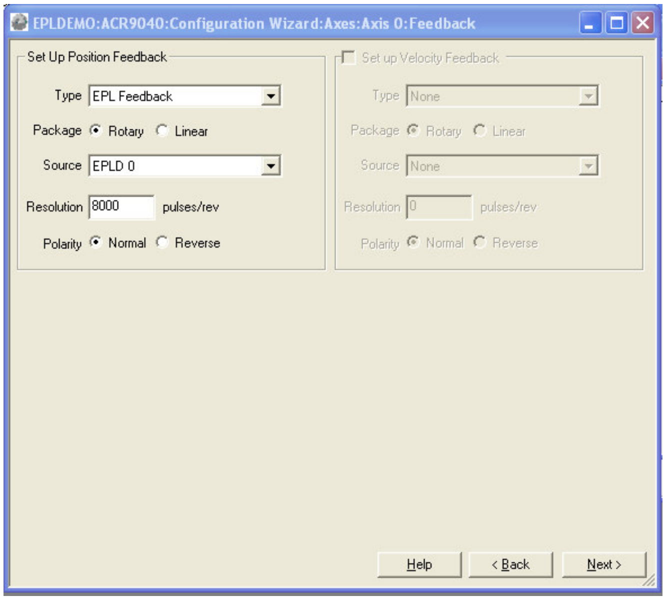


Step 4: Drive/Motor

- 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

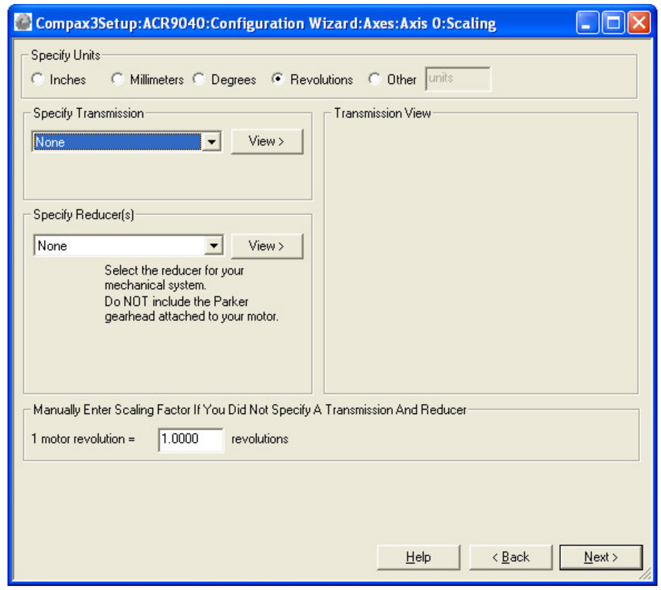


Step 5: Axis 0 Feedback

- **Type:**
  - ✓ **Select "EPL Feedback"**
- **Package**
  - ✓ **Rotary or Linear**
- **Choose "EPL" for Command Output**
- **Resolution: Use Motor's post-quadrature Encoder/Resolver resolution. If a Parker motor is selected in the previous screen, the correct resolution will be populated here.**

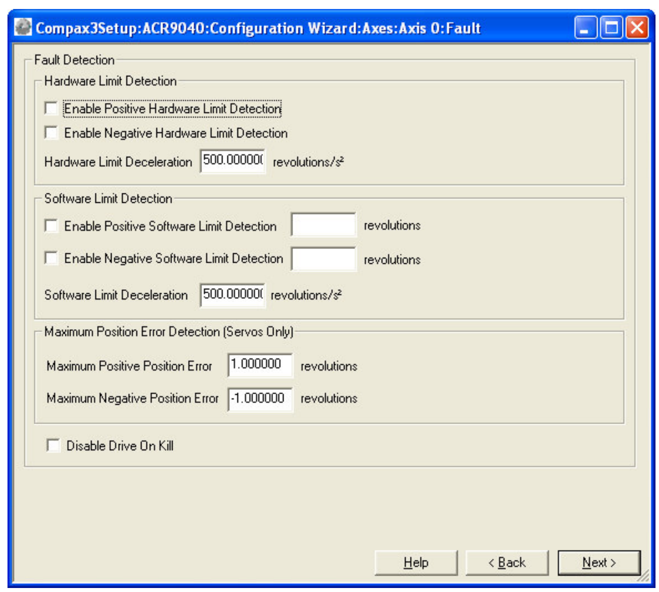
Step 6: Axis 0 Scaling

- 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

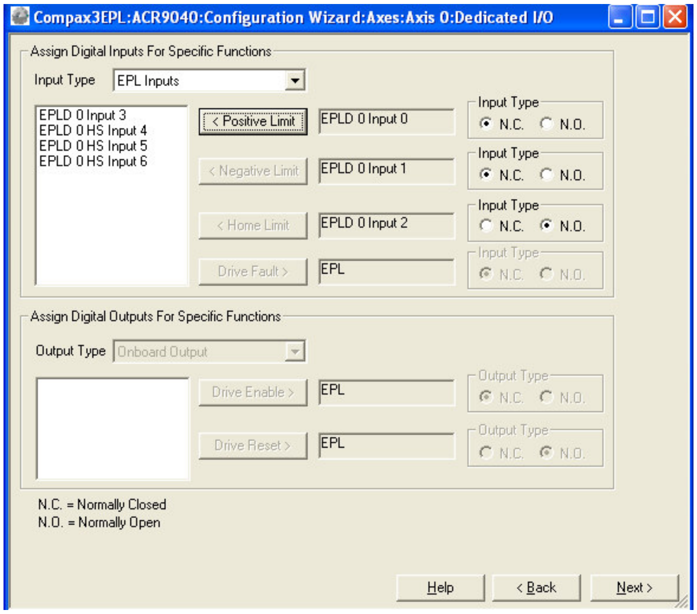


Step 7: Axis 0 Faults

- 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 smaller than the one in ServoManager (Page 8 Step 10)**



EPL Setup in ServoManager

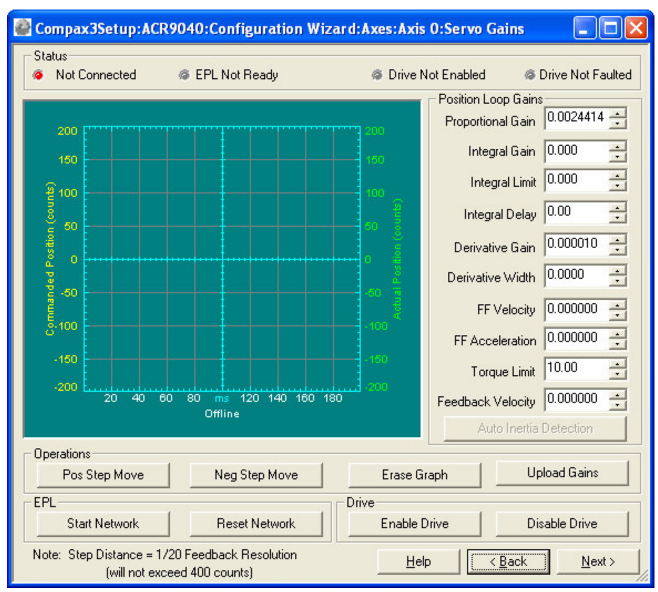


Step 8: Axis 0 Dedicated I/O

- **Input Type:**
  - ✓ Select "EPL Inputs"
  - ✓ Highlight the Input to be used for Positive Limit.
  - ✓ Click Positive Limit
  - ✓ The next 2 consecutive inputs will be configured as Negative Limit and Home.
  - ✓ Example shows Input 0 selected as Positive limit

Step 9: Servo Gains

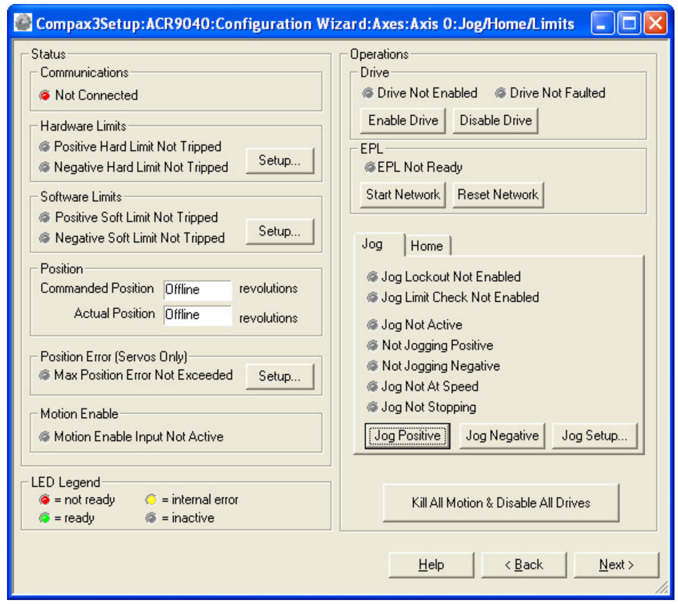
- **Completely Ignore this screen for the Compax3**
- **Use ServoManager Optimization Tool for tuning the motor**



EPL Setup in ServoManager

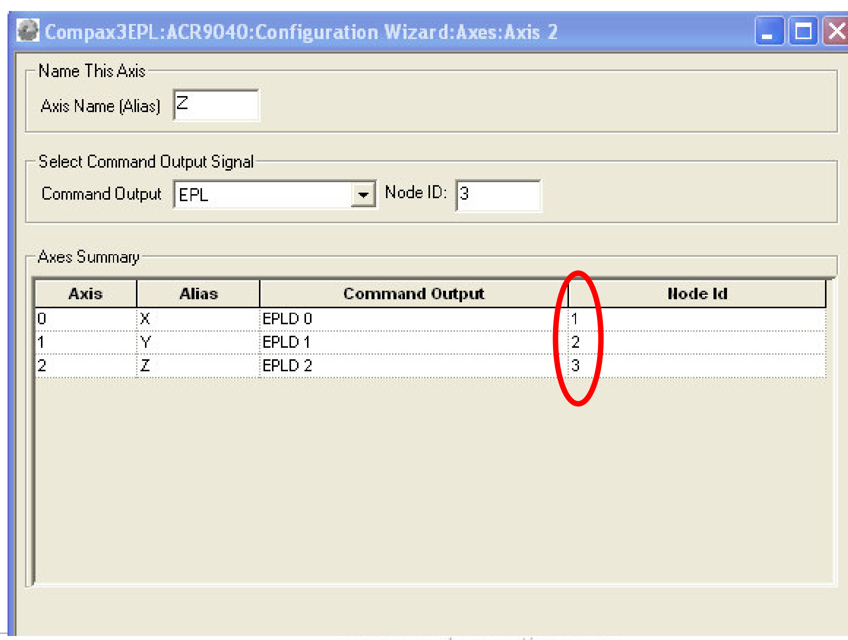
Step 10: Axis 0 Jog/Home/Limits

- **Test Operation of Drive/Motor**
  - ✓ Start EPL Network
  - ✓ Enable Drive
  - ✓ Jog the motor
  - ✓ Home the motor
- **Be sure everything is wired correctly and that you are ready for motion.**



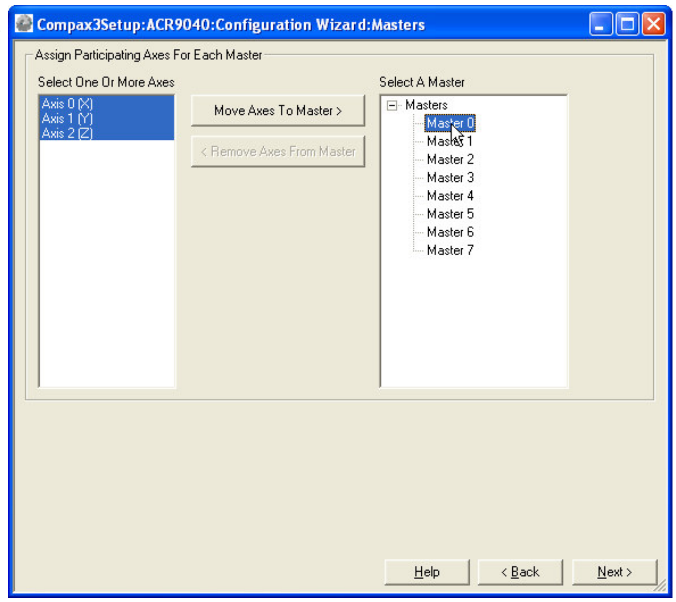
The first Compax3 EPL Axis is configured. Go through these steps again for the remaining drives.

Make sure each drive has a unique EPL Node ID in Step2.



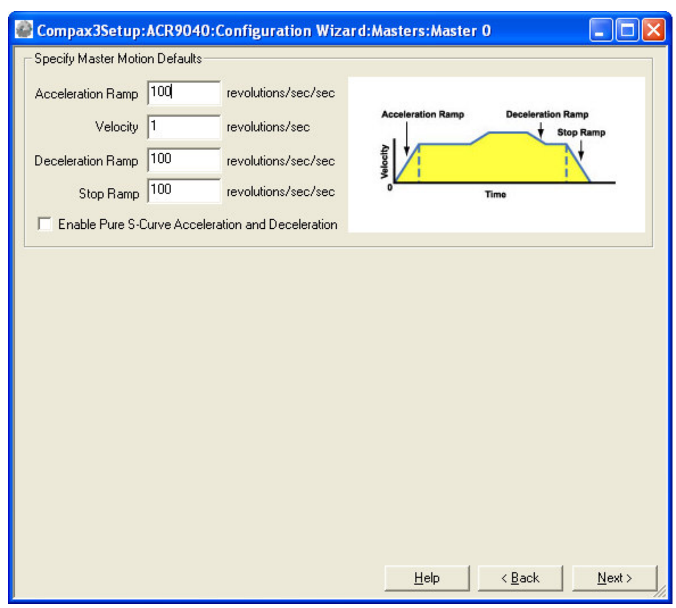
Step 11: Masters

- 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”

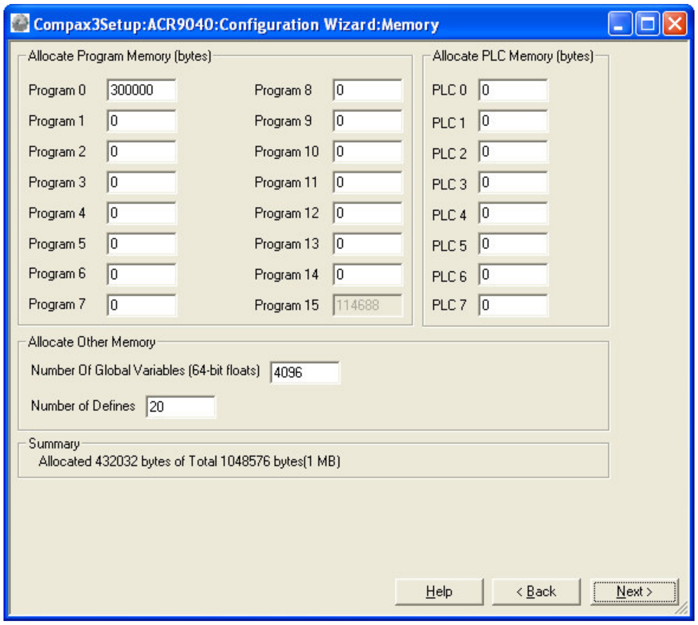


Step 11a: Master 0

- 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

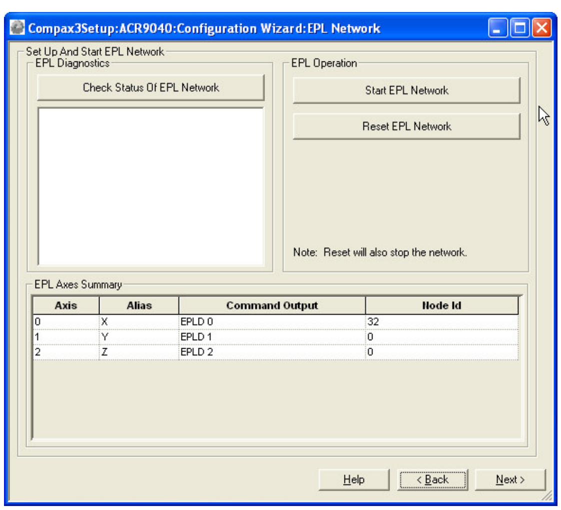


Step 12: Memory

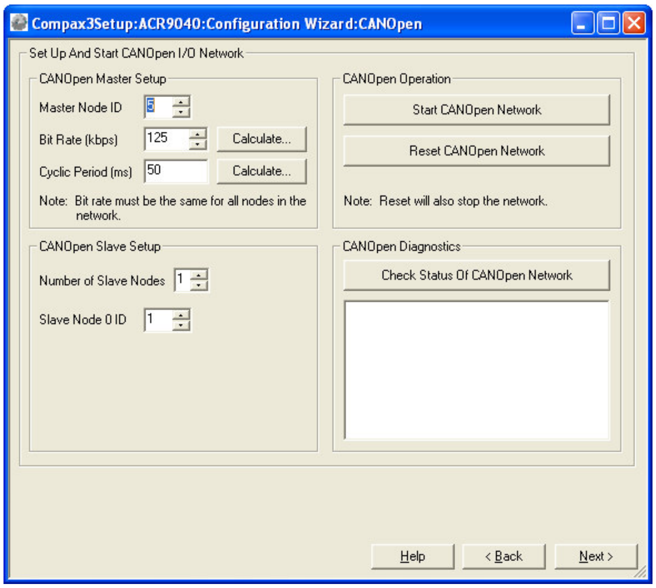
- Input the amount of memory for each program (aka “task”) that is being used
  - ✓ Default for Program 0 is 300000k
  - ✓ Enter in other values for other programs if needed.
  - ✓ You can also change the number of global variables in this screen

Step 13: Check EPL Network

- Skip this step.
- ACR-View will calculate a PERIOD value based on the number of axes in the system, however, it does not consider that Compax3 drives require a minimum PERIOD of 0.001.



3

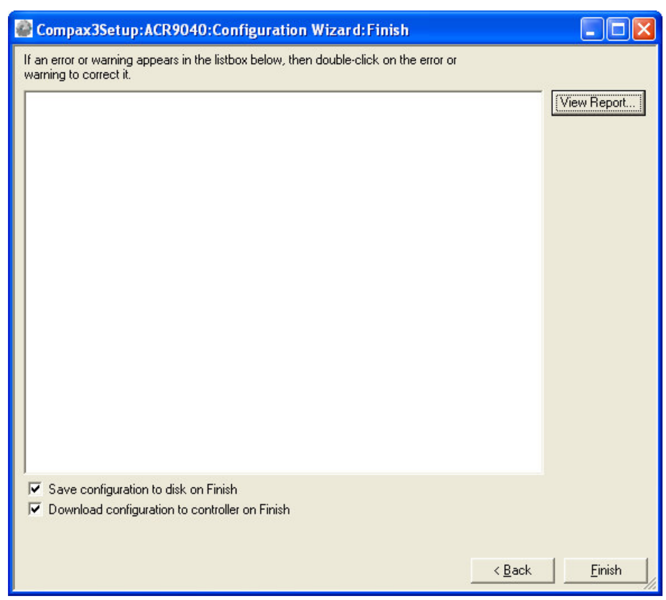


Step 14: CANOpen

- **This screen allows you to setup the CANOpen port**
  - ✓ **Talk to CAN Open Expanded I/O**
  - ✓ **Skip this step if the system does not include Expanded I/O**

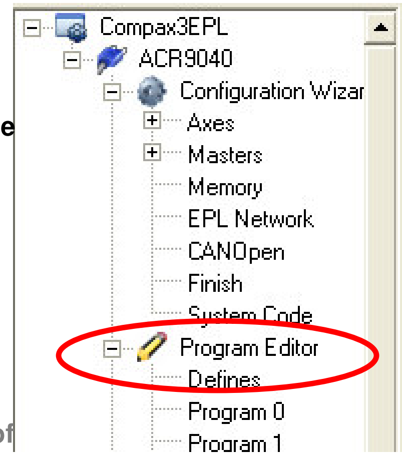
Step 15: Finish

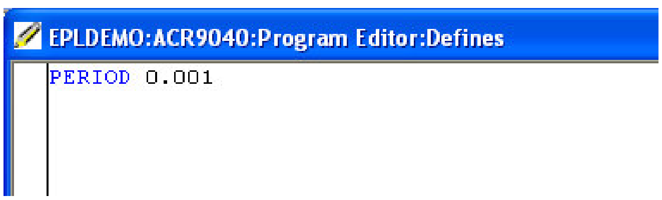
- **If any errors occur in the configuration, they will be listed here**
- **Before clicking "Finish" proceed to step 16……..**



Step 16: Period

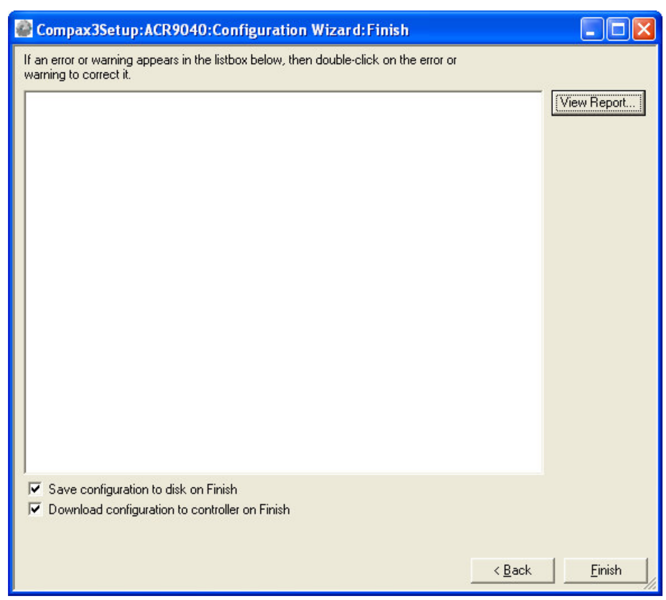
- In the project tree, open the Defines editor
- The DEFINES editor will download code for immediate execution by the controller. This space is generally used for Tag/Alias information but can be utilized for any System configuration data that is not included in the Configuration Wizard.
- In the editor, enter the corrected value for the PERIOD, calculated as follows:
  - ✓ 1-7 EPL axes, at least 1 Compax3: PERIOD=0.001
  - ✓ 8-15 EPL axes: PERIOD = 0.000125 x Total # of EPL axes

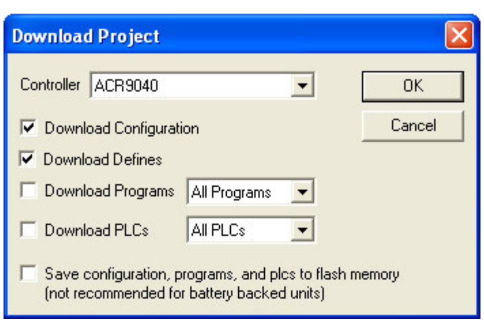




Step 16: Period

- Click FINISH
- In the download Project dialog, make sure that Configuration and Defines are checked
- Click OK





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

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