Tolomatic
EXCELLENCE IN MOTION

Technical Note

ACS Controller and Omron CJ2M PLC EtherNet/IP Configuration Steps

Contents

1. Introduction

This information contains primary steps required to commission the PLC and network configuration for operation of the ACS Drive with the Omron PLC. Drive-side information will be provided by Tolomatic.

Common PLC set-up will be identified, but not fully detailed herein.

2. Overall Layout / Hardware

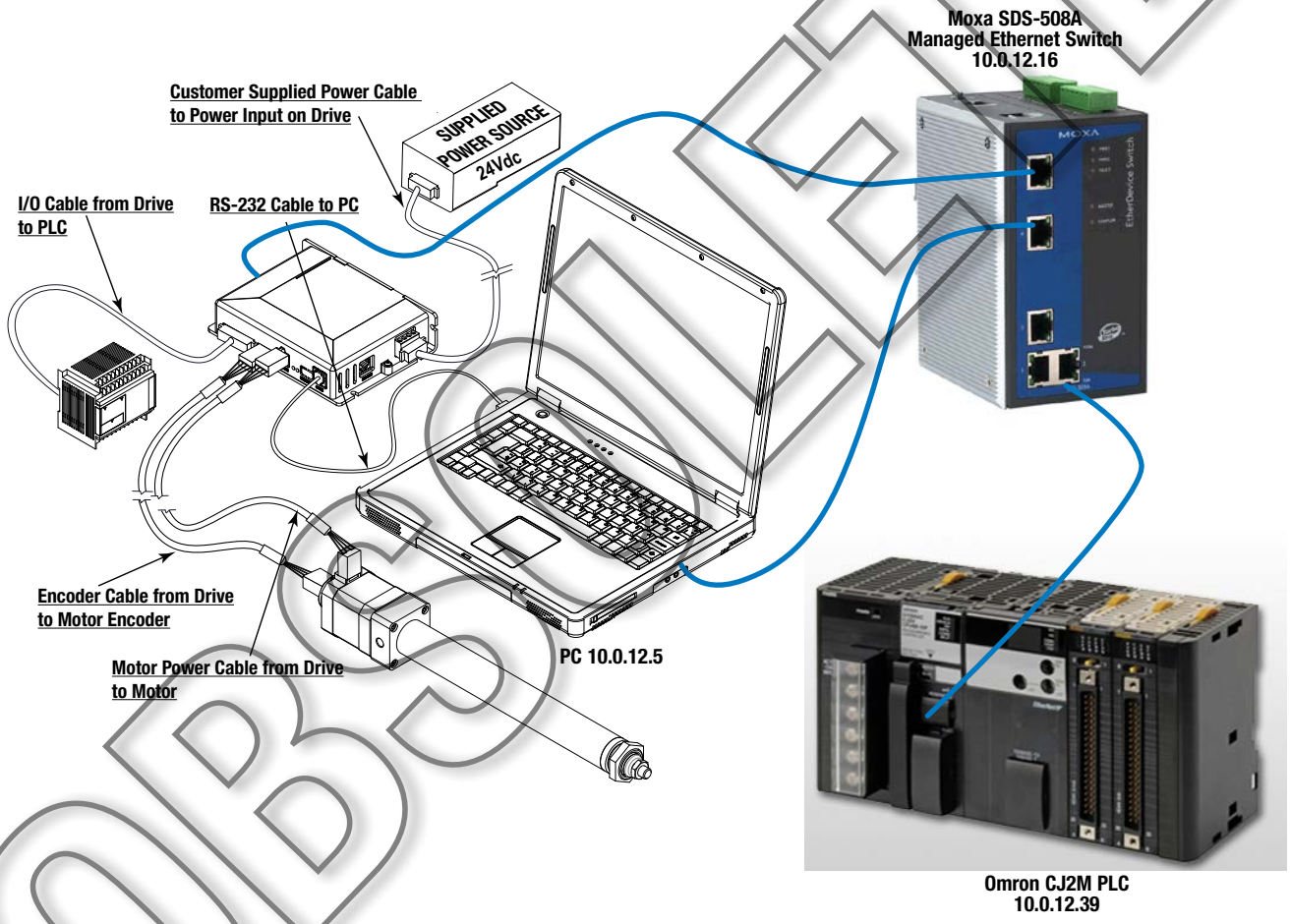


Figure 2.1; Overall Layout/Hardware

3. Tolomatic ACS / TMI Setup

Using Tolomatic Motion Interface connect to the drive and configure the actuator and motor tabs.

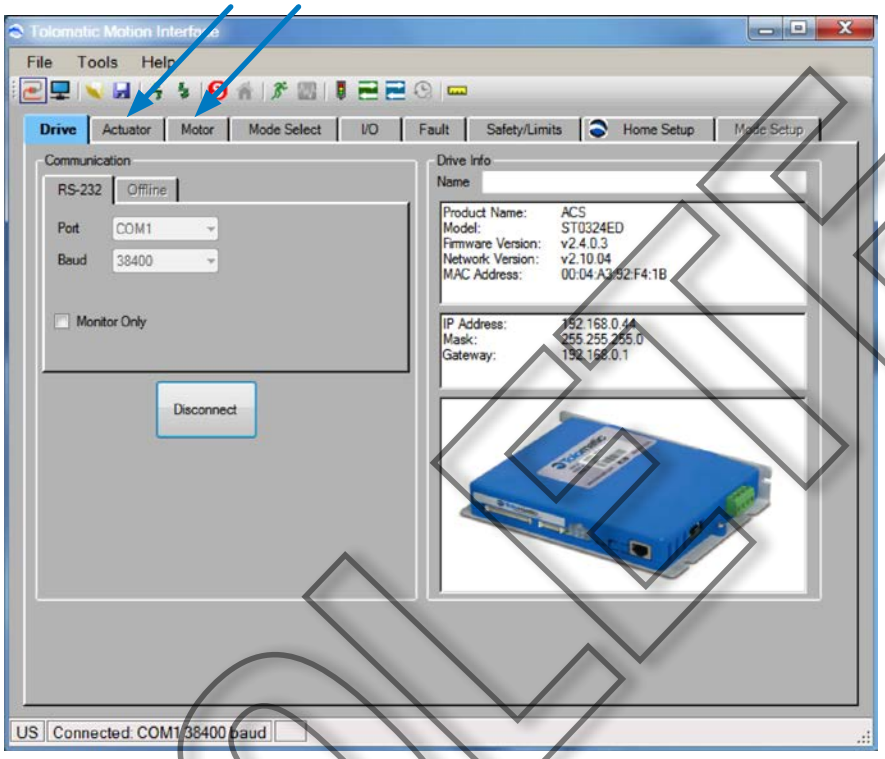


Figure 3.1; TMI Setup

Within the 'Mode Select' tab, select EtherNet/IP.

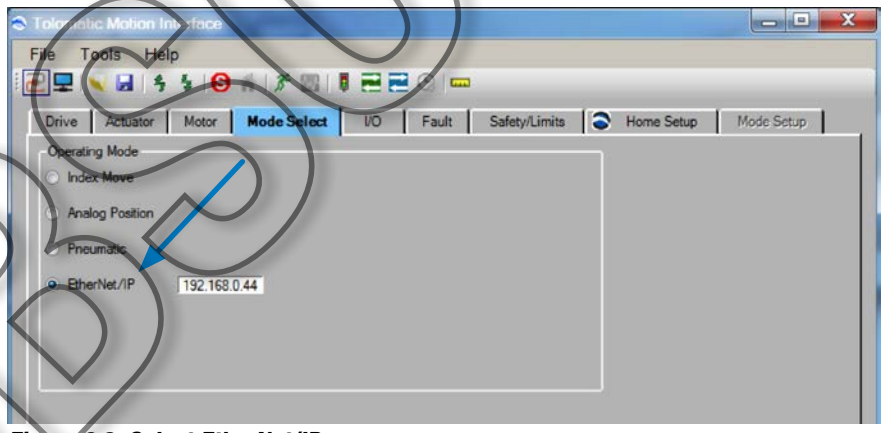


Figure 3.2; Select EtherNet/IP

Open the 'ACS Ethernet Properties' by selecting Tools> Ethernet Setup. Then set the IP Address, Subnet Mask and Gateway to the desired values. Click OK and write the settings to the drives flash.

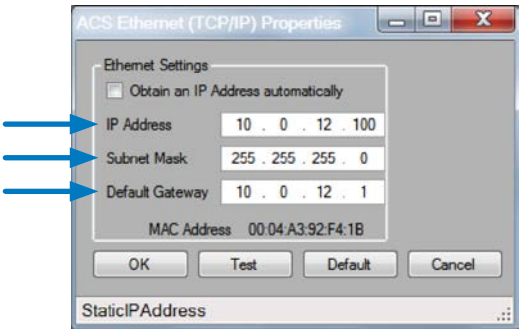


Figure 3.3; ACS Ethernet Properties

4. Commission PLC

A. Set PLC rotary switches as required Ethernet Modules Unit # and Node #

B. Start project and connect via USB com.

C. Register I/O table, set IP address, and Routing Table (if applicable, – if using more than one SIOU card)

D. Download, discon., change comm. to Ethernet

4A. Set PLC Rotary Switches

Setting Rotary Switches

Unit Number: 0-F, set to position 1

(Each communications module on the Rack ass'y must have a unique number up to 16 on a system. More than 1 will require a routing table be set via CX-Integrator.)

Node Number:

Set "16X1" Sw to 2, and 16X0 Sw to 7.

(These are "hex-based" settings which must match the last octet of software set IP address, this is done later via I/O table configuration.)

In this case 27 hex = 39 decimal, our IP is 10.0.12.39 in this example.

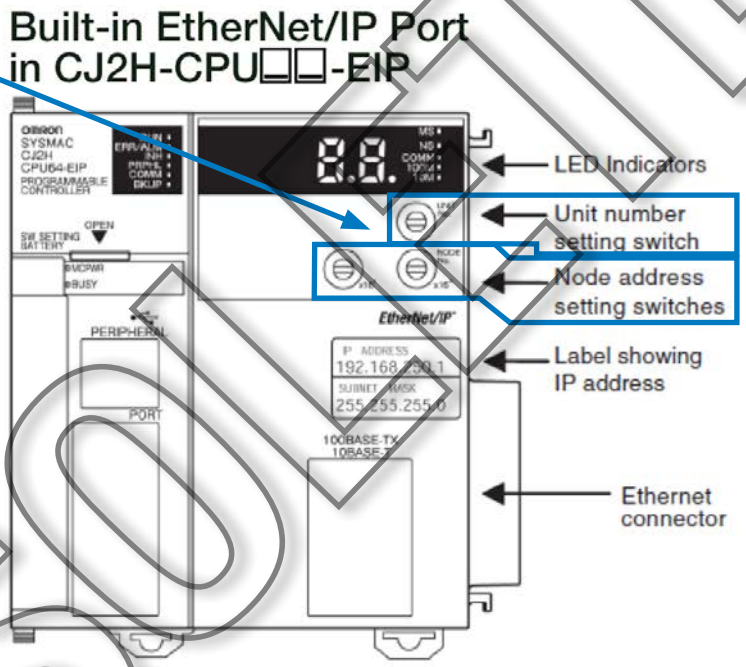


Figure 4A.1; Set PLC Rotary Switches (CJ2H)

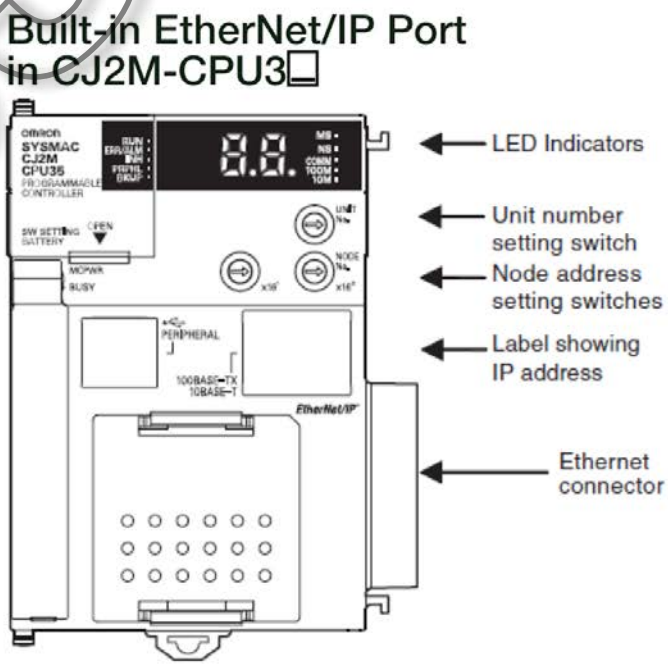


Figure 4A.2; Set PLC Rotary Switches (CJ2M)

4B Starting the PLC Project

1. Start new CX-Programmer project.
2. Choose PLC Model
3. Set CPU Version
4. Use USB
5. Choose OK.

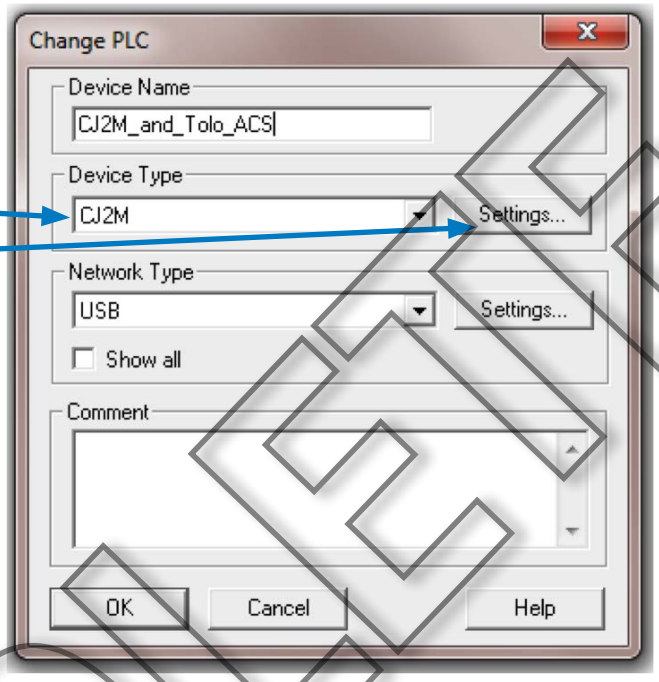


Figure 4B.1; Starting the PLC Projec

4C1 Register I/O Table

1. Get On-Line.
2. Change or set CPU to Stop/ Program mode.
3. Go into I/O Table
4. From Options pull-down choose "Create".

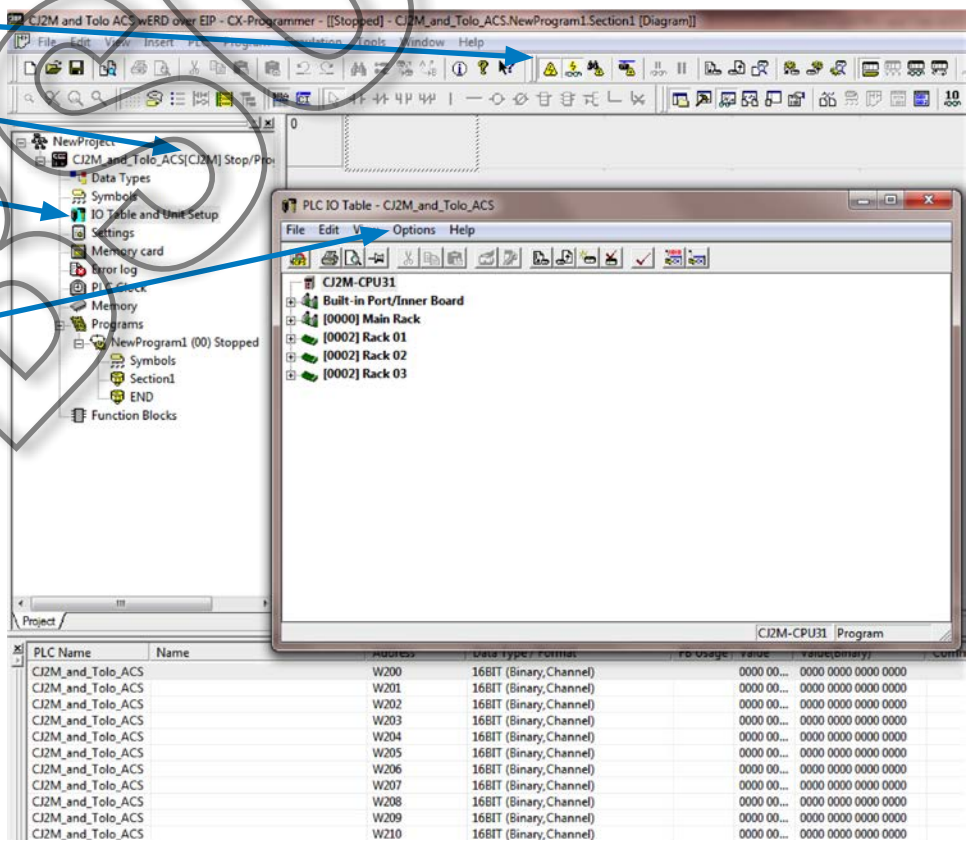


Figure 4C1.1; Configuring the I/O Table

4C2 Editing the I/O Table

1. Result: cards on system are now registered to CPU
2. (Built-in 'EIP)
3. (Other Cards on "rack")

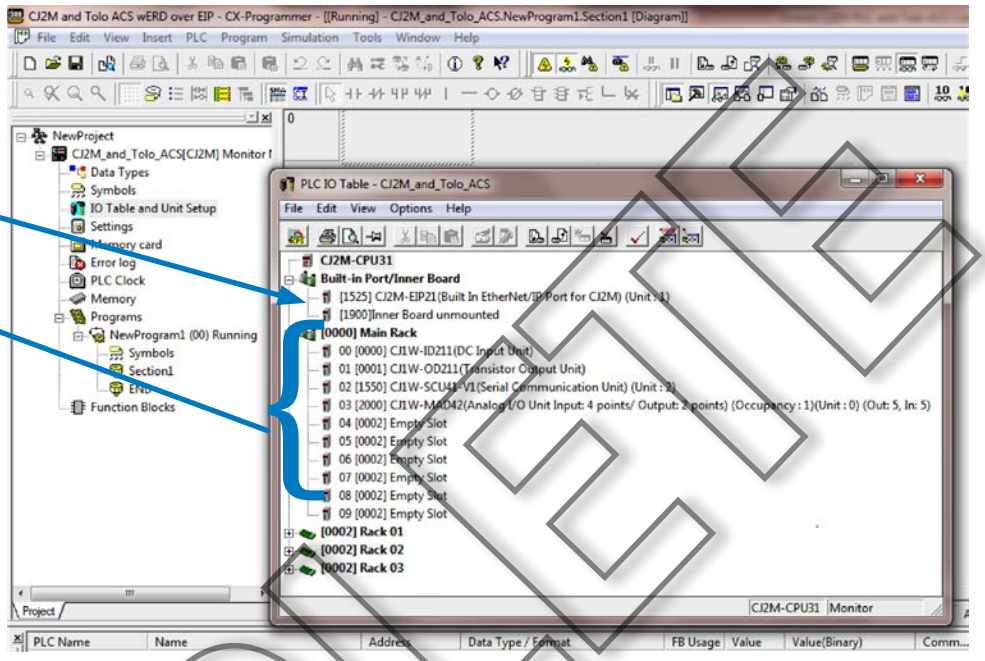


Figure 4C2.1; Editing the I/O Table

4C3 Ethernet/IP Address Settings

1. Open 'EIP card
2. Set IP and sub-net.
3. Transfer (PC to Unit)
4. (Acknowledge following prompts accordingly.)

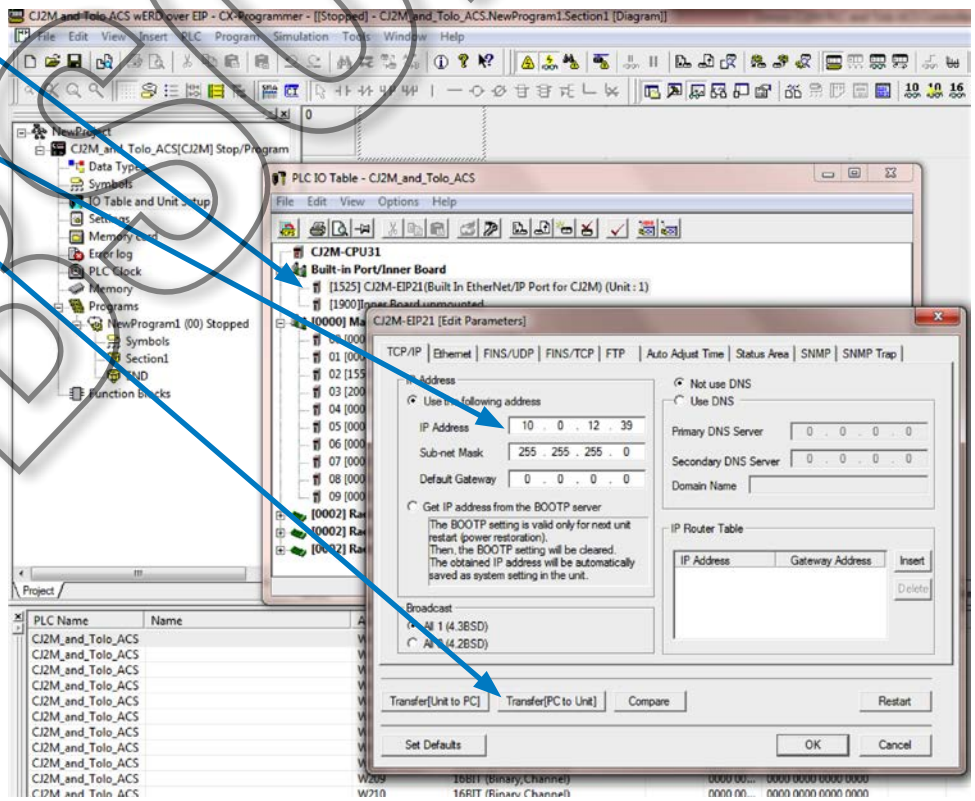


Figure 4C3; Set IP Address

4C4 Changing Project Communications

1. Close I/O Table
2. Go Off-Line
3. Change comm. Settings
4. Set IP to match settings made in I/O settings.

   (10.0.12.39)
5. Choose OK

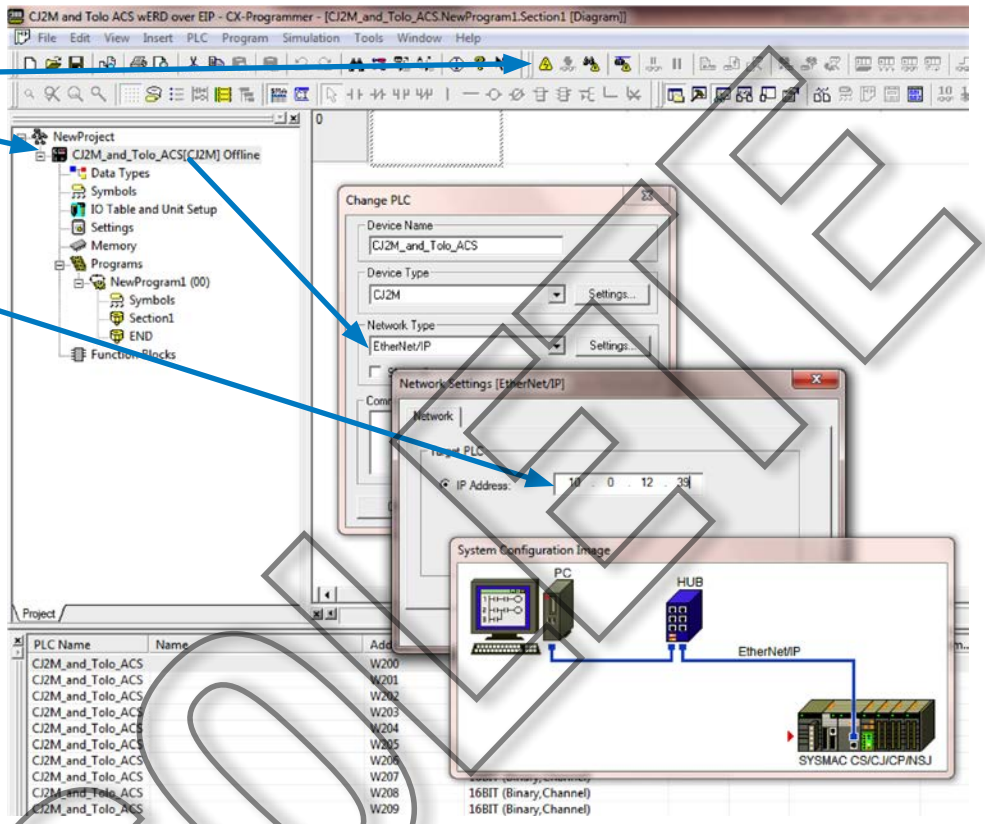


Figure 4C4.1; Changing Project Communications

4C5 Setting PC to PLC comm.'s

1. Change your PC's network card to an IP on the same subnet.
2. "Ping test" your conn. w/PLC.
3. Start, Run…

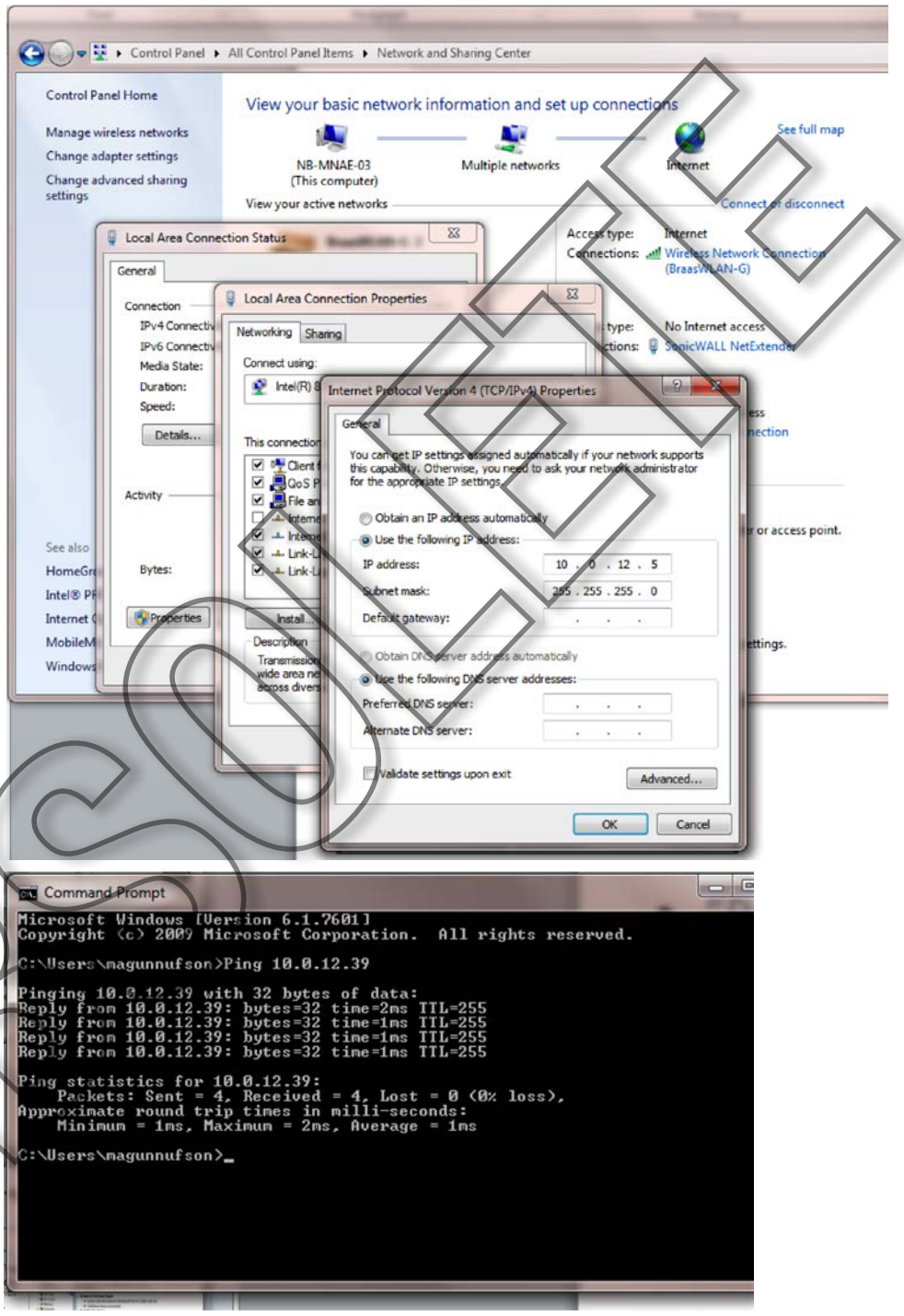


Figure 4C5.1; Setting PC to PLC comm.'s

4D1 Launching "Network Configurator"

1. Go back On-Line
2. Open I/O Table
3. Expand view
4. Right click on 'EIP, then choose "Start Special Application", "…with Setting Inherited".
5. Acknowledging prompts will start the Omron "Network Configurator" software tool.

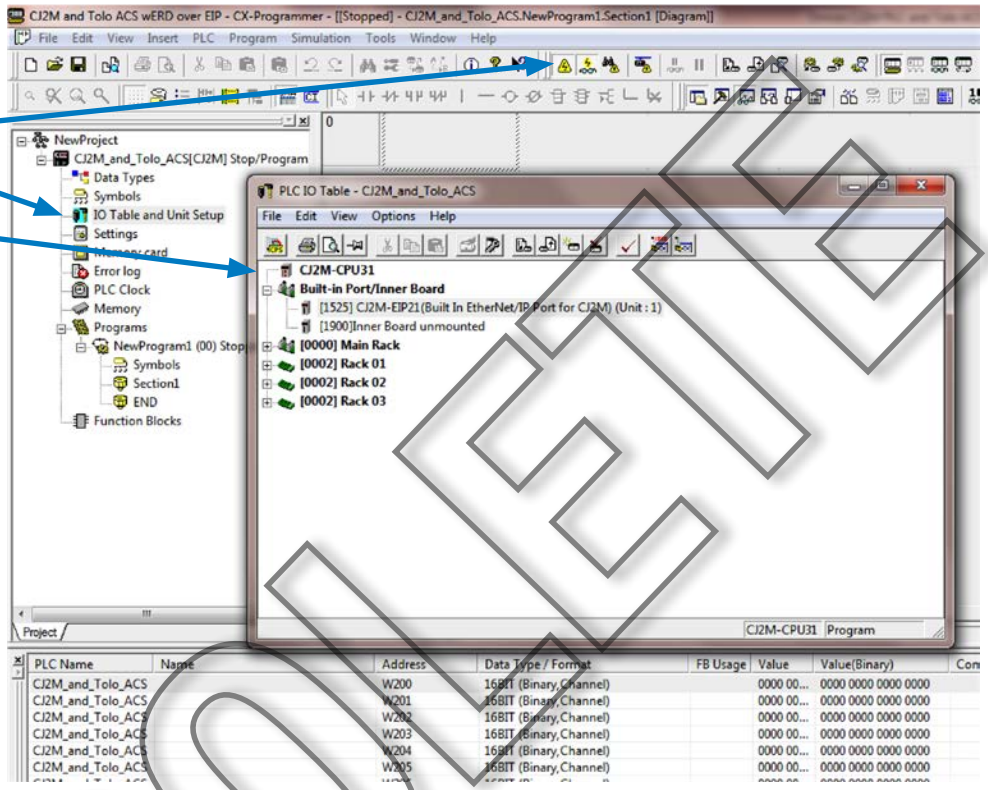


Figure 4D1.1; Launching "Network Configurator"

4D2 Network Configurator

Result

This will be used in the following slides to commission the Ethernet/IP "Tag Data links"

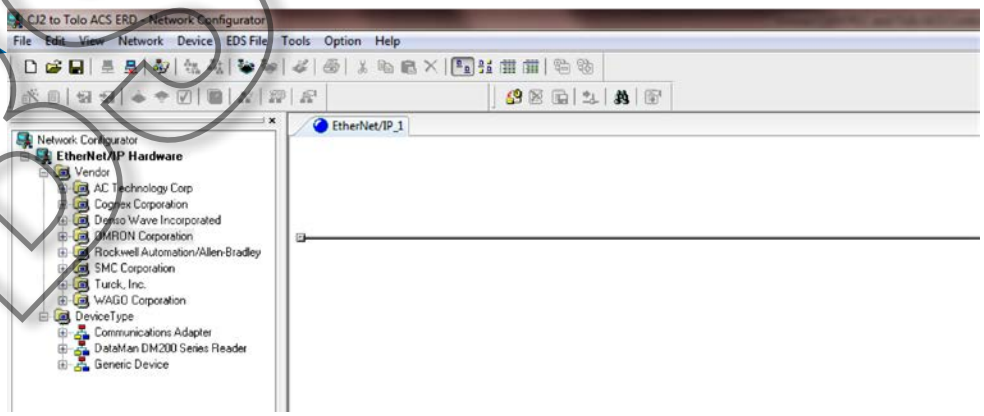


Figure 4D2.1; Network Configurator

4D3 Creating the Network Diagram

1. Obtain and install the ACS's EDS file, use the "EDS File" pull-down.
2. Expand the device tree
3. Click and drag the CP2M out to the network diagram
4. Click and drag the ACS drive controller out to the network diagram

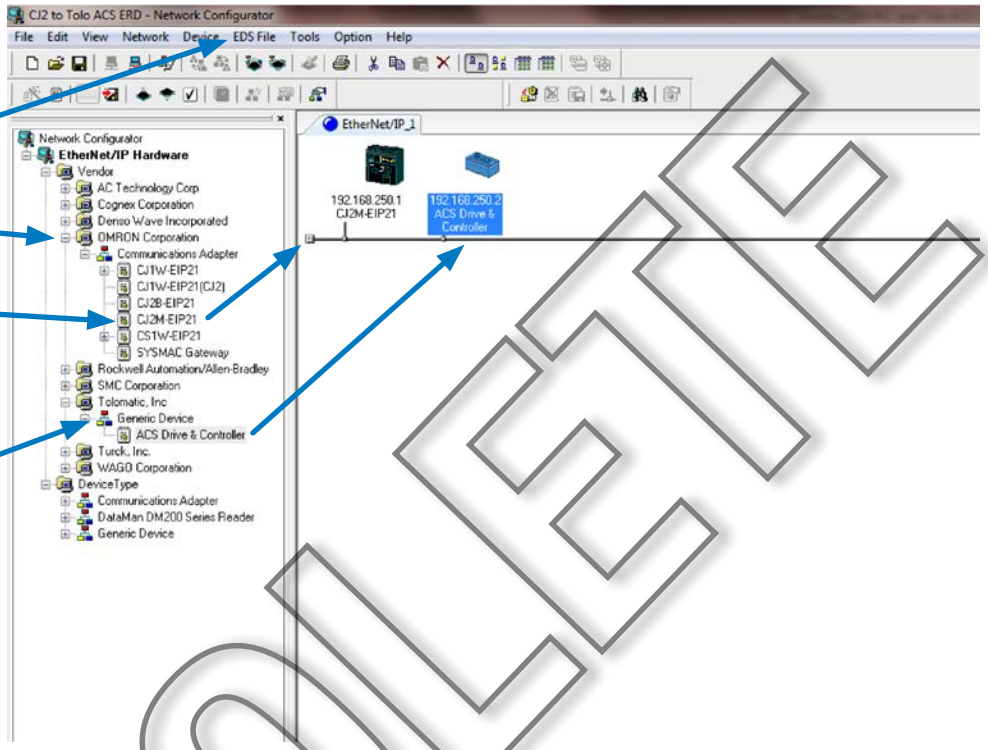


Figure 4D3.1; Creating the Network Diagram

4D4 Setting IP Addresses

1. Right Click on PLC icon and choose "Change Node Address"
2. Set to 10.0.12.39
3. Choose OK

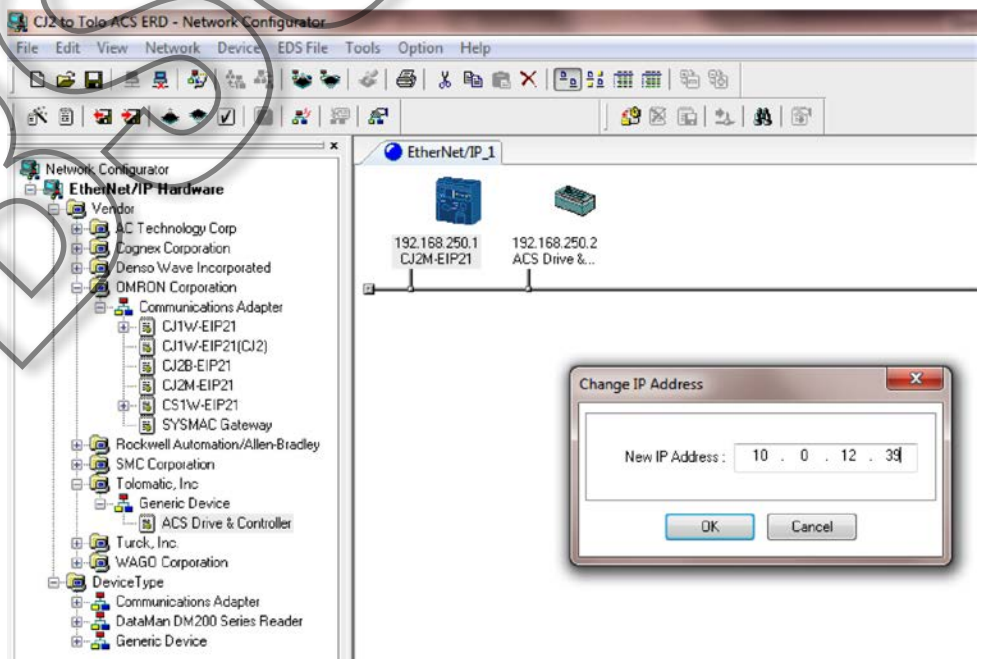


Figure 4D4.1; Setting IP Addresses

4D5 Setting IP Addresses

1. Do the same for the ACS.

   (Our example will use 10.0.12.100)
2. Choose OK

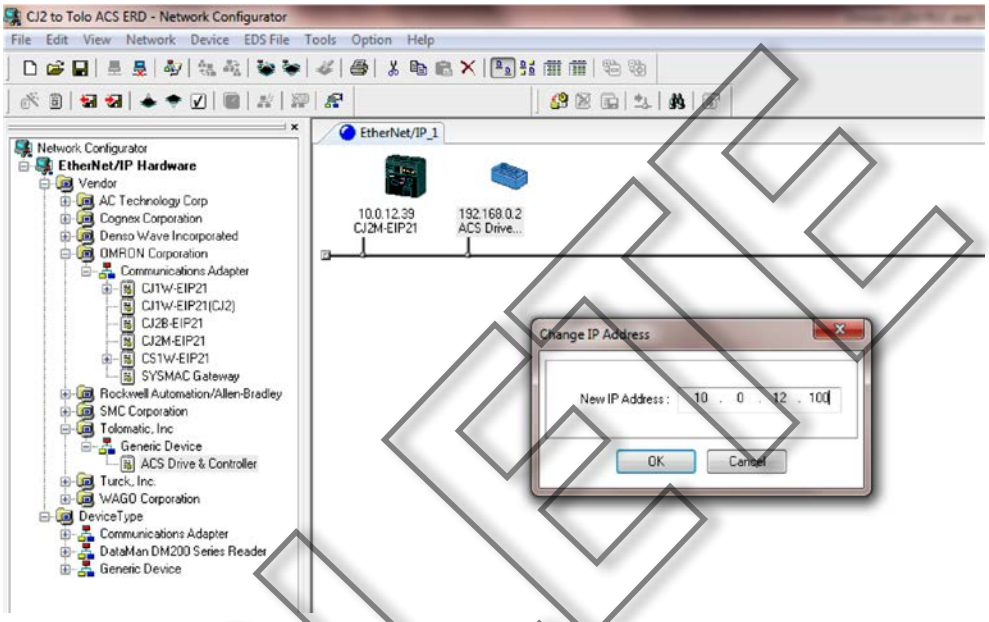


Figure 4D5.1; Setting IP Addresses

4D6 Creating "Tag Sets" (input)

1. Double-click PLC icon
2. Choose “Tag Sets” tab
3. Choose “Edit Tags”
4. Choose “New”
5. Enter an address in “Name” field.

   (Note, this is actually the address location you want the ACS’s 28 bytes to be seen in the PLC’s memory.)
6. Choose “Register”.

   (Since this completes the Input tag sets we need here click “Close”, and then “OK”)

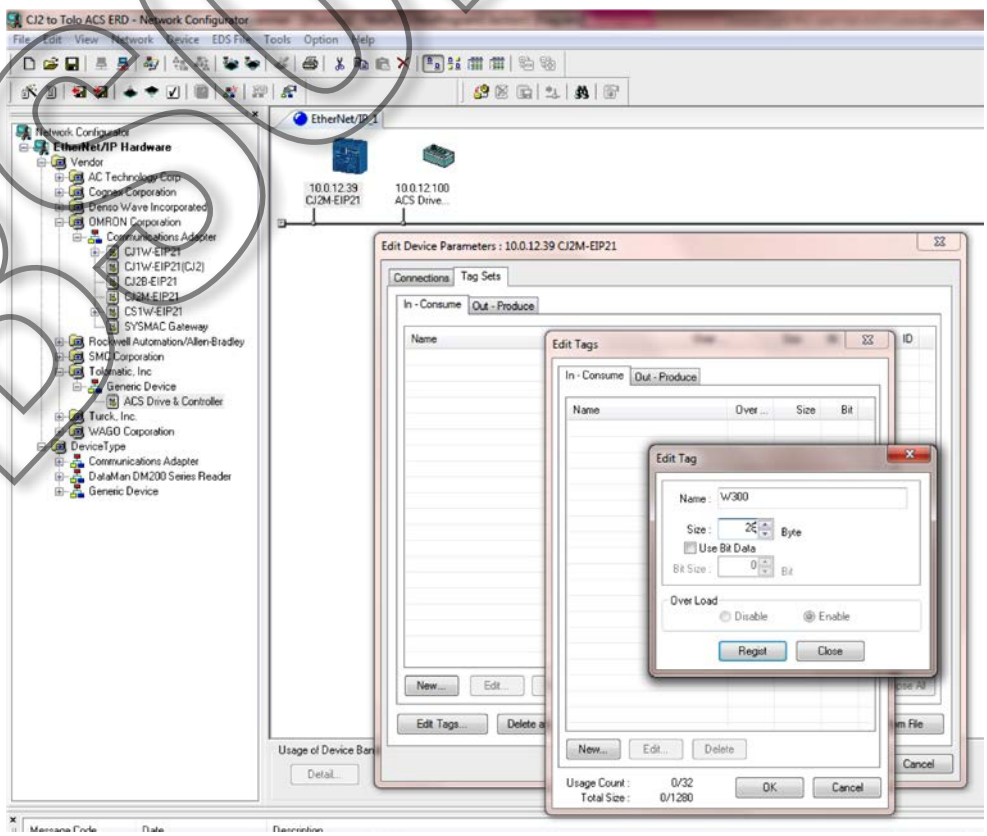


Figure 4D6.1; Creating "Tag Sets" (input)

4D7 Creating "Tag Sets" (output)

1. Click the “Out-Produce” tab.
2. Click “Edit Tags”
3. Enter an address in the “Name” field.

   (As before, this is actually the address location you wish to designate in the PLC for use in controlling the ACS)
4. Choose “Register”.

   (Since this completes the Output tag sets we need here click “Close” and then “OK”)

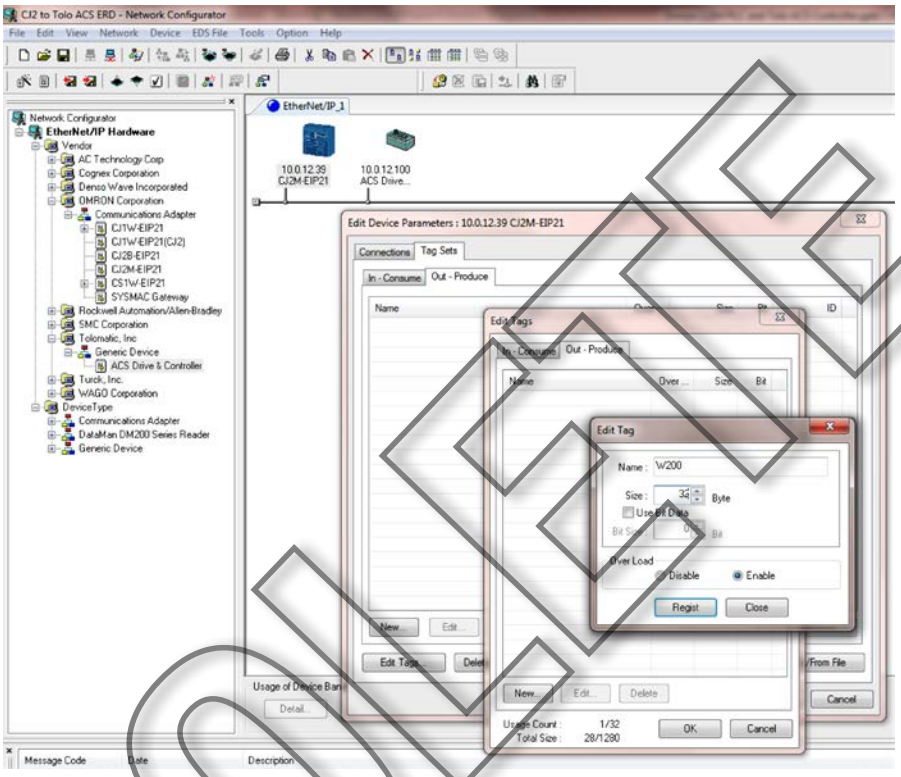


Figure 4D7.1; Creating "Tag Sets" (output)

4D8 Editing, adding a Connection

1. Go to connections tab
2. Click here

   (To bring PLC down to “Register Device List)
3. Result
4. Double-click to edit (as seen next)

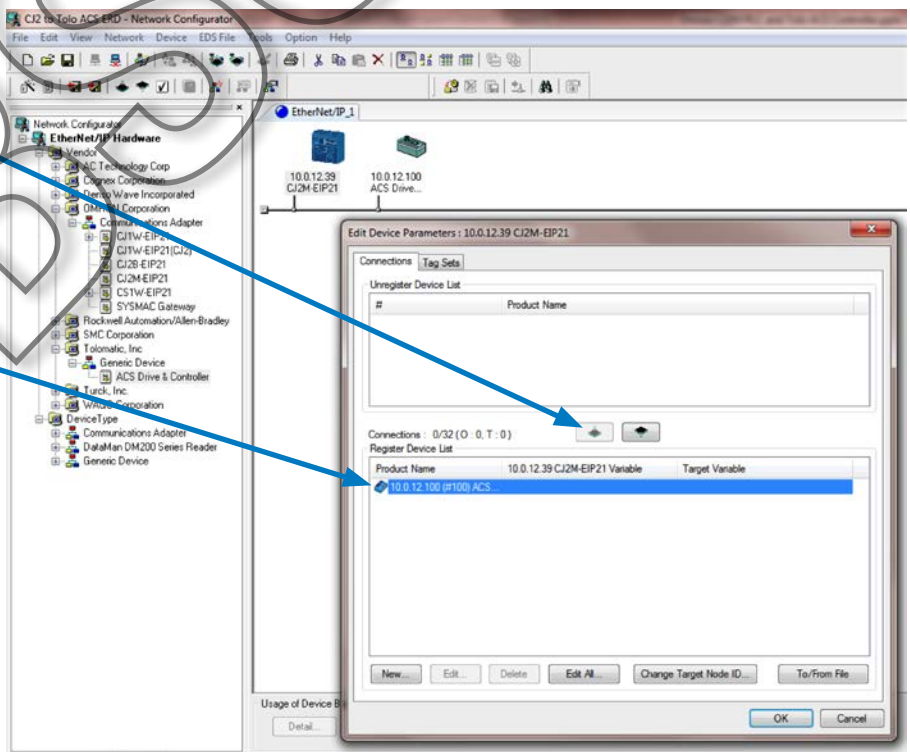


Figure 4D8.1; Editing, adding a Connection

4D9 Connection Details

1. Change pull-down choices to following selections to create appropriate connections with the PLC!
2. Click “Register

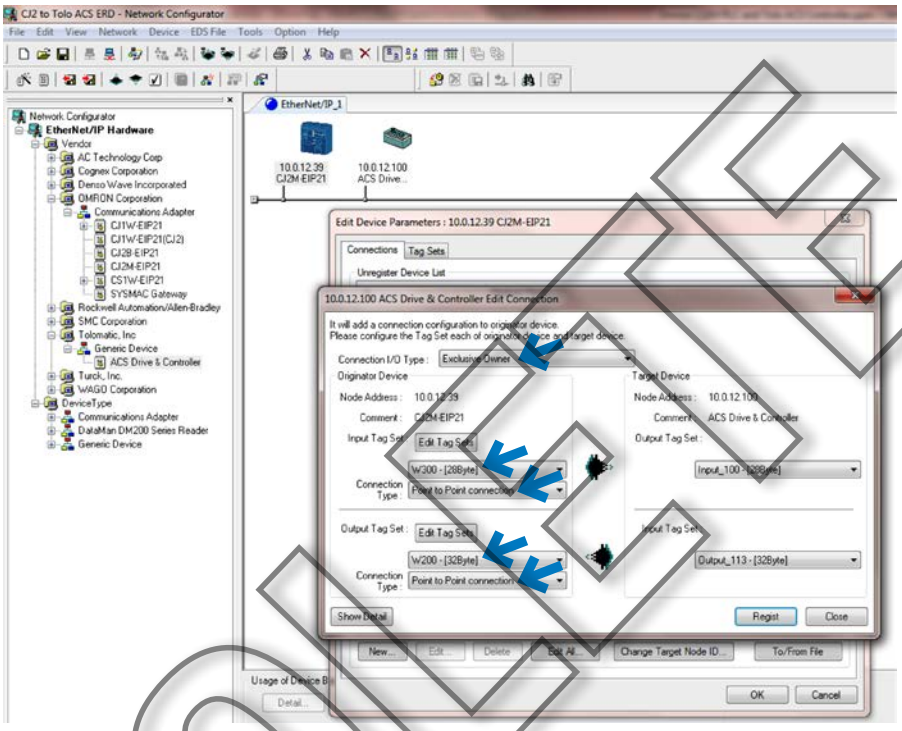


Figure 4D9.1; Connection Details

4D10 Download Configuration!

Result!

1. Choose OK.
2. Click on PLC icon in network diagram.
3. From the menu bar choose “Device”, then “Parameter”, then “download.

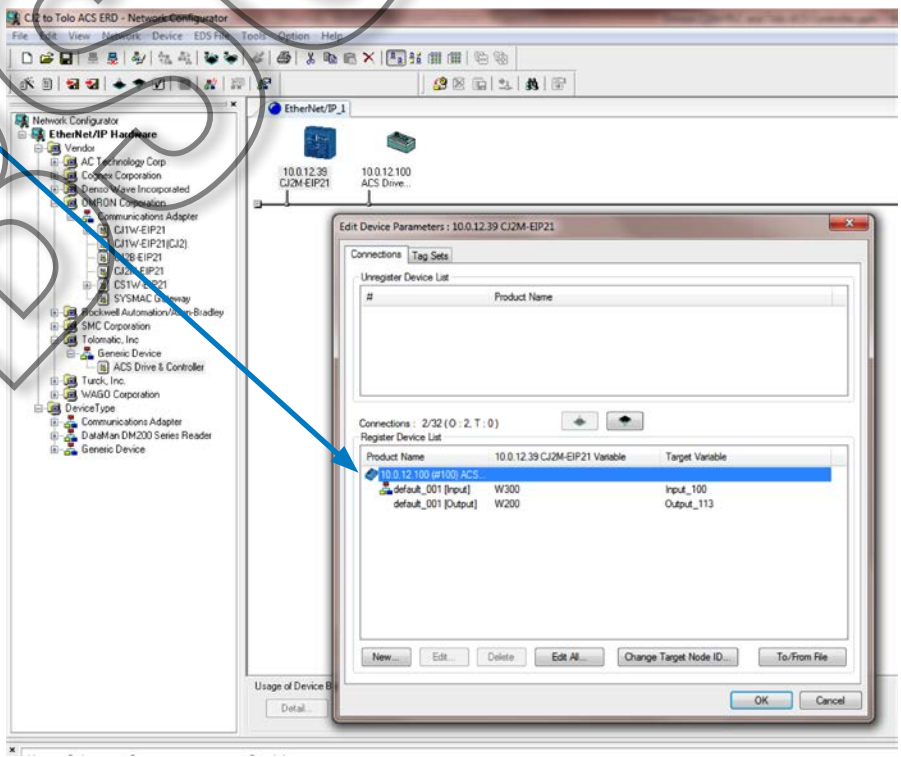
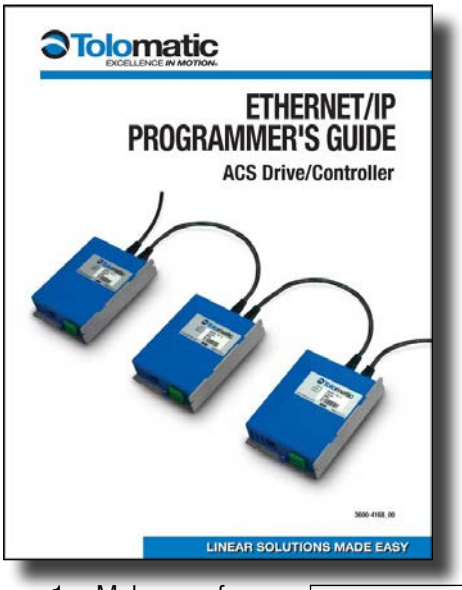


Figure 4D10.1; Download Configuration!

5A ACS "Output Process Image"



1. Make up of "Output Ass'y" mapped for control from the PLC over the drive/actuator.

   PLC memory area W200-W215

(32 Bytes = 16 Words)

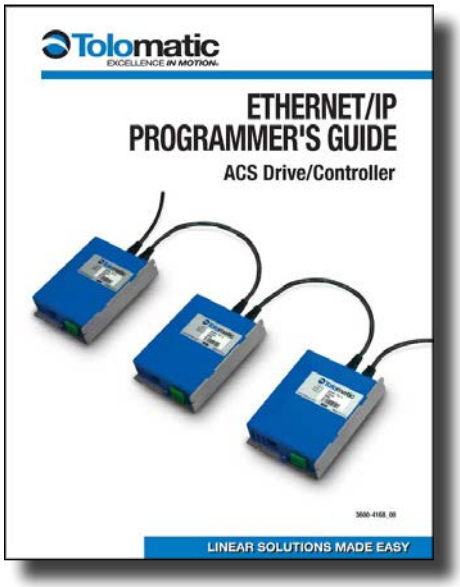
4: ETHERNET/IP & I/O CONNECTIONS

INSTANCE	ATTRIBUTE ID	BYTES	TYPE	VALUE
Output (O->T) Instance 113	3	0	USINT	Network Outputs Bit 0: Enable Bit 1: Start Motion Bit 2: Home Bit 3: E-Stop Bit 4-7: Reserved
		1	USINT	Move Select (0-16)
		2-3	*NA*	*Reserved*
		4-7	REAL	Target 0 Position
		8-11	REAL	Target 0 Velocity
		12-15	REAL	Target 0 Acceleration
		16-19	REAL	Target 0 Deceleration
		20-23	REAL	Target 0 Force
		24-27	DWORD	Target 0 Motion Type (absoute or incremental)
		28-31	DWORD	Digital Output (4 bits used out of 32)

Table 4-6: ACS EtherNet/IP Full Output Assembly

Figure 5A.1; ACS "Output Process Image"

5B ACS "Input Process Image"



1. Make-up of "Input Assembly" mapped for "feedback" to PLC

   PLC memory area W300-W313

(28 Bytes = 14 Words)

4.2 Input Assembly

INSTANCE	ATTRIBUTE ID	BYTES	TYPE	VALUE
Input (T->O) Instance 100	1	0-3	REAL	Current Position
		4-7	DWORD	Drive Status (32 bitmap statuses)
		8-11	DWORD	Drive Faults (32 bitmap faults)
		12-15	DWORD	Digital Input (8 bits used out of 32)
		16-19	DWORD	Digital Output (4 bits used out of 32)
		20-23	REAL	Analog Input
		24-27	REAL	Analog Output

Table 4-2: ACS EtherNet/IP Input Assembly

ACS DRIVE STATUS	
BIT	DESCRIPTION
0	Drive Enable: 0 = Not Enable; 1 = Enable
1	Drive Homed: 0 = Not Homed; 1 = Homed
2	Drive In Motion: 0 = Motion Complete; 1 = In Motion
3	EStop: 0 = off; 1 = on
4	(internal use)
5	(internal use)
6	(internal use)
7	(internal use)
8	(internal use)
9	(internal use)
10-30	open
31	Drive Control: 0 = off (I/O, CTROFF), 1 = on (Host, CTRON)

Table 4-3: ACS Drive Status

Ethernet/IP Programmer's Guide: ACS Drive/Controller
• 4-2 •

Figure 5B.1; ACS "Input Process Image"

6 PLC Data Exchange

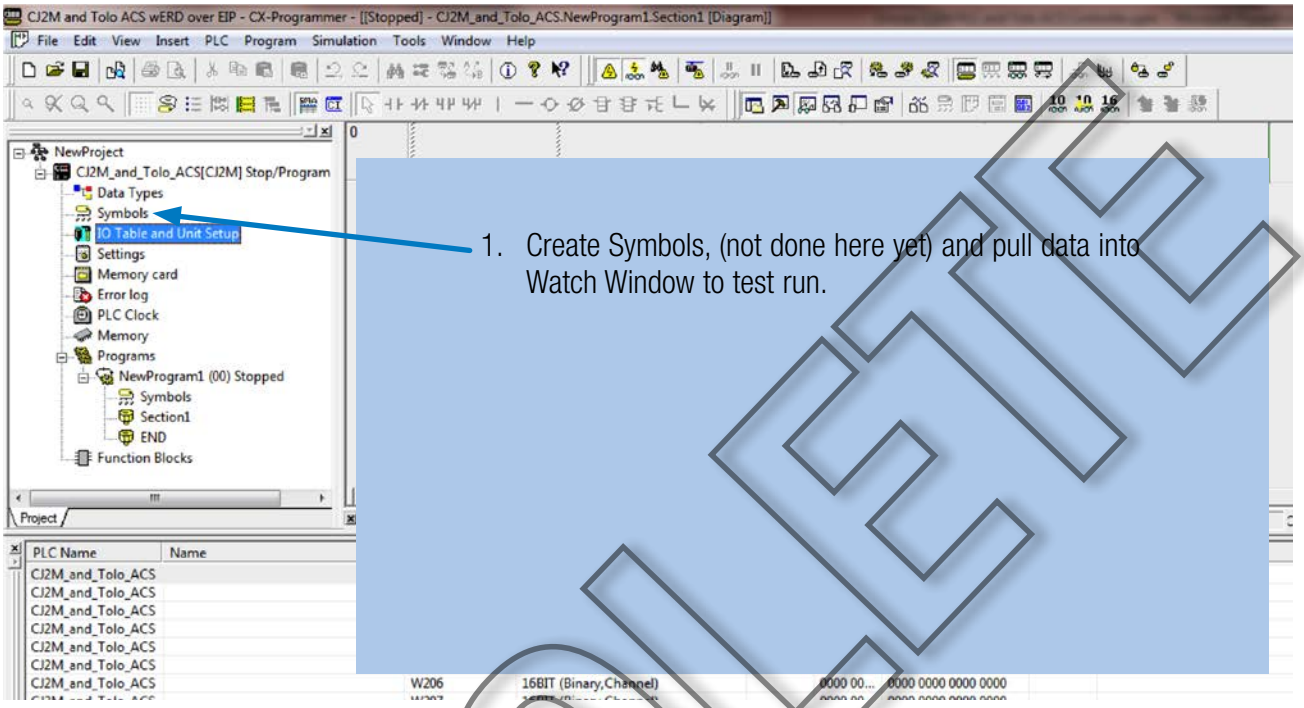


Figure 6.1; PLC Data Exchange

7 Project References

- Omron CX-Programmer - Ref manuals, Installed with Suite
- Omron Network Config. Tool for "E/IP – Ref manuals"
- CJ2M Manuals – available at Omron247.com
- Tolomatic Motion Interface, EDS files and manuals at Tolomatic.com

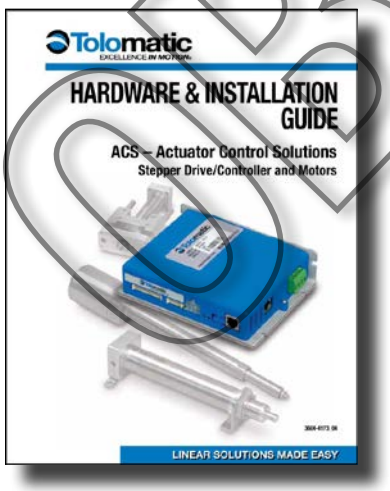


Figure 7.1 Tolomatic #3604-4173

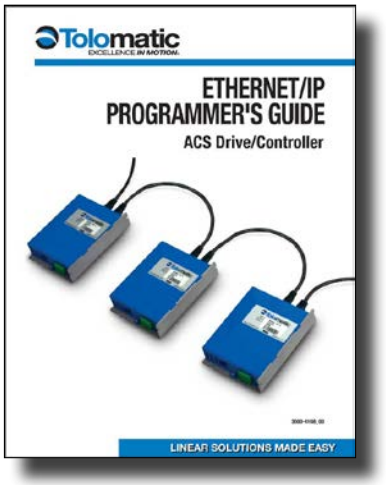


Figure 7.2 Tolomatic #3600-4167

8 Tag Set Up

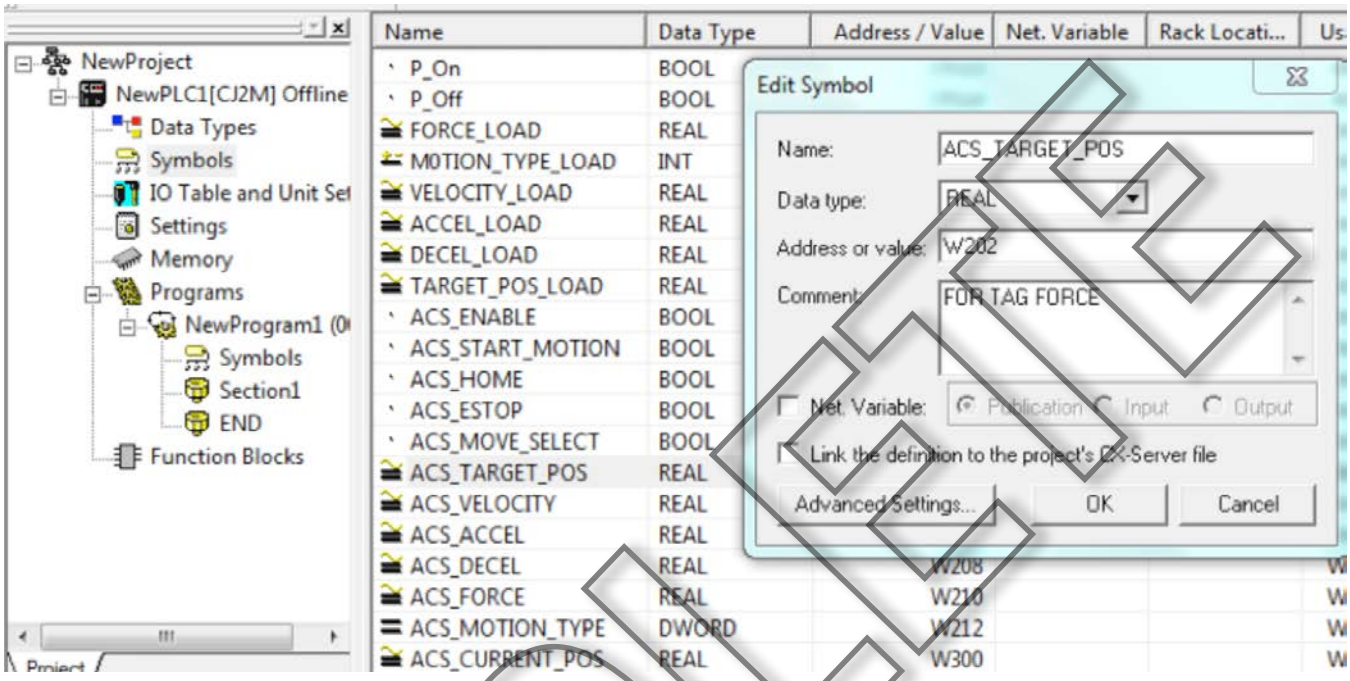


Figure 8.1; Double click on symbols, edit the data tag. A list of tags/addresses needs to be made for each ACS parameter.

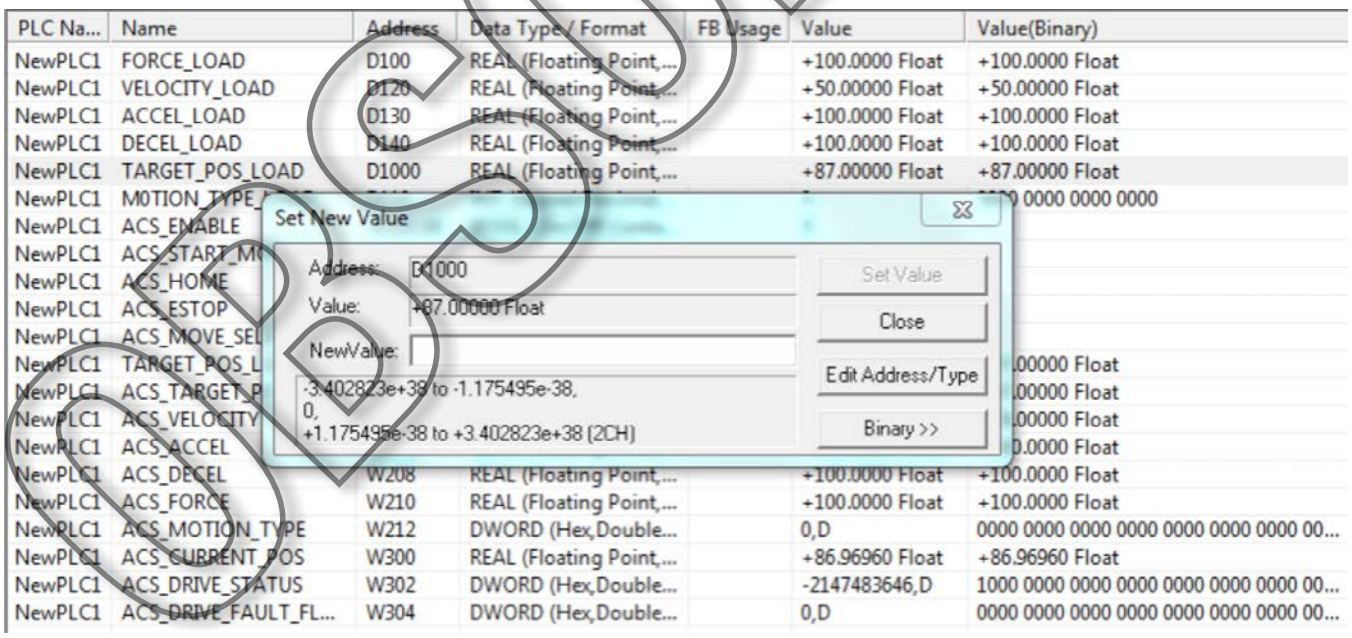


Figure 8.2; Data tag values can be loaded by double clicking the tag.

9 Tag Set Up Tables

Figure 9.2; Example of Omron tags used in ladder logic program