Yamaha Robotics
Automation Direct
Connection
Manual for TS-S, TS-S2, TS-SH, TS-X and TS-P
Controllers with Ethernet/IP

Version Control

Version	Date	Author	Change Description
1.0	7/14/2025	B.Shriner	Original release

1 Introduction

This manual is intended to describe how Yamaha TS-S, TS-S2, TS-SH, TS-X, and TS-P, controllers with Ethernet/IP communication cards interface to Automation Direct PLCs that use Productivity Suite software. The following examples were designed in an Automation Direct Productivity2000 (P2-622) CPU using version 4.2.3.2 of Productivity Suite software.

1.1 Supported PLCs

- Productivity2000 PLCs are supported with Productivity Suite Software

1.2 Supported Yamaha Controllers

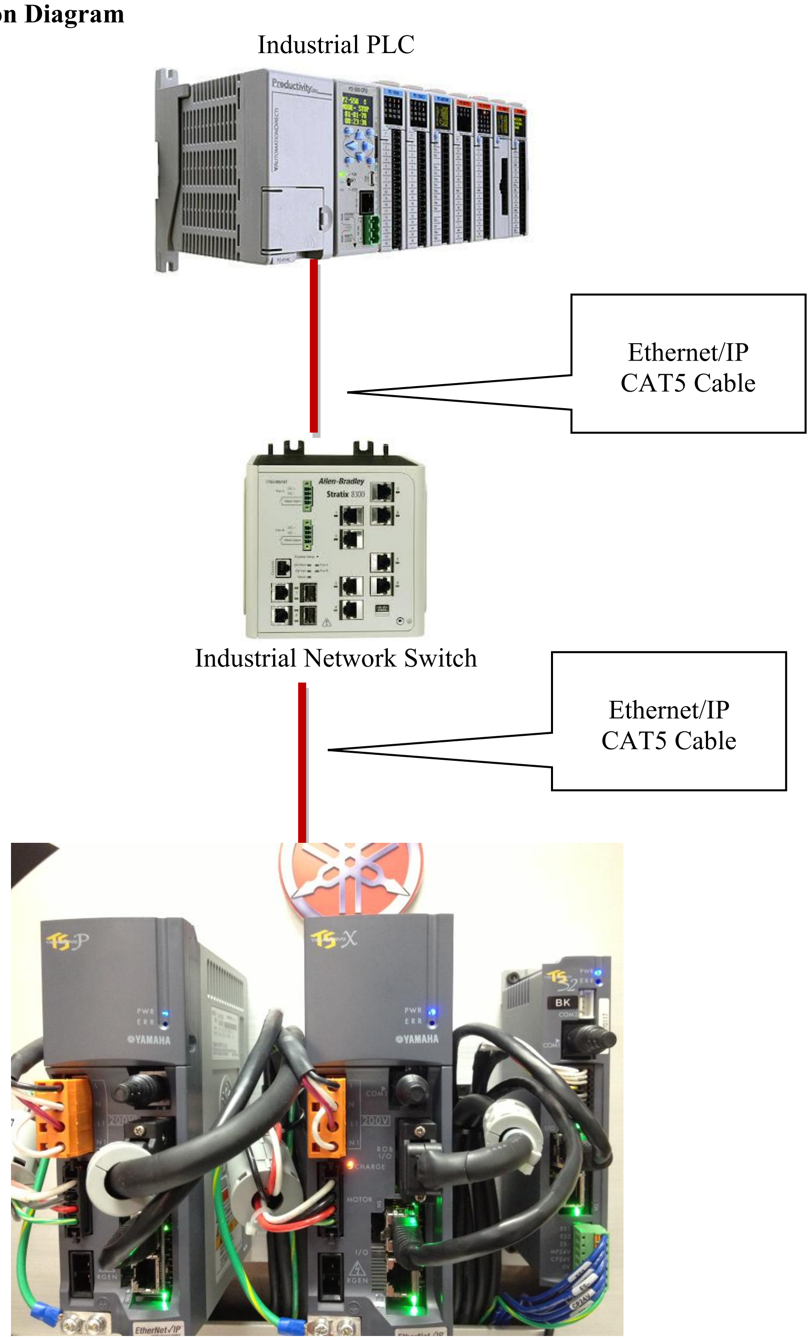
- TS-S, TS-S2, TS-SH, TS-X and TS-P with optional Ethernet/IP Slave card.
- SRCX, DRCX, TRCX, ERCD, SR1-X controllers **ARE NOT SUPPORTED**

2 System Block Diagram

Yamaha TS Series controllers connect to a standard Ethernet/IP industrial network through CAT5 ethernet cables. A generic ethernet profile is added to a Productivty2000 PLC.

Yamaha TS Series support dual CAT5 connections. Which may be either be used for DLR (device level ring) or as an integrated switch.

2.1 Typical Connection Diagram



3 Customize the IP Address Ethernet/IP Slave

Each robot will need a unique Ethernet IP address before the PLC can communicate with the controller. This section describes how to customize the IP address per the specifications of the customer.

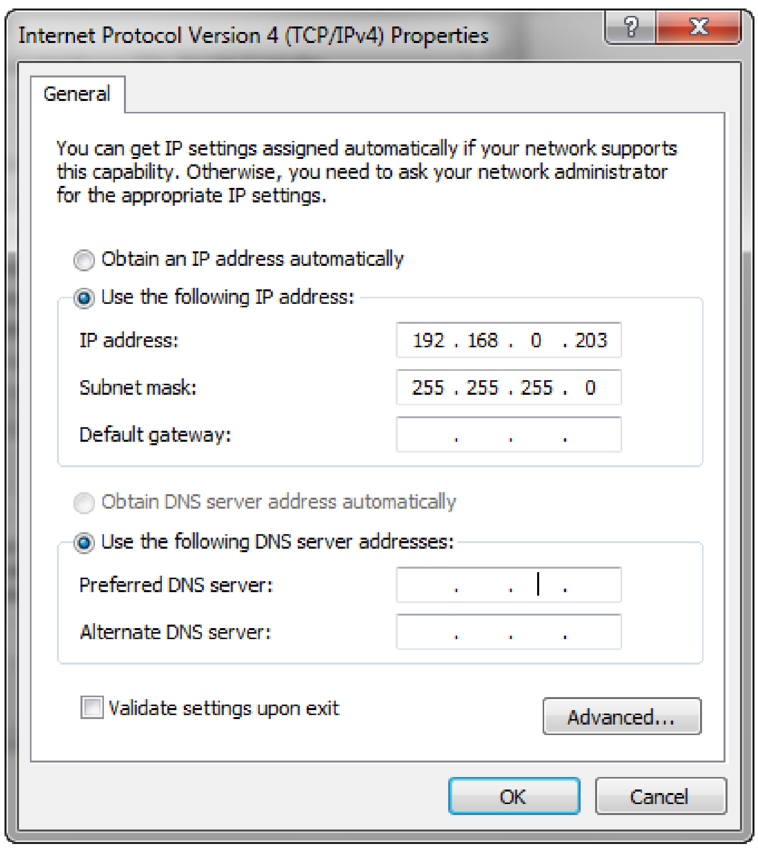
3.1 Web Browser Method

The default factory IP address of all TS controllers will be:

192.168.0.1

Step #1

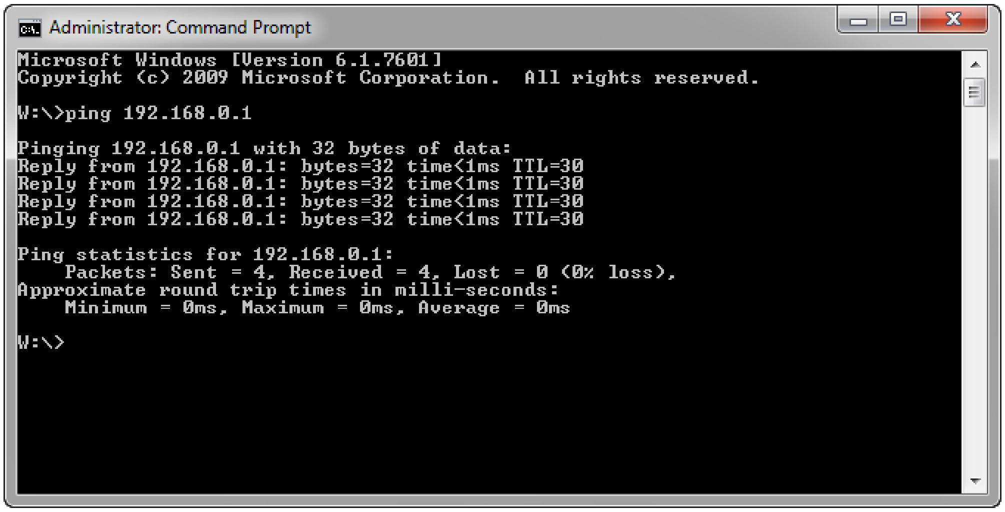
Set your computer IP address to the same subnet as 192.168.0.xxx You can choose any address except .1 which is the same address as the TS controller. Only ONE TS controller at a time can be connected to the configuration computer. A red LED light on the TS controller CAT5 connector will light up if duplicate IP addresses are detected on the same network. To prevent this, only network to a single TS controller until you have set a unique IP address for multiple TS controllers on the same network.



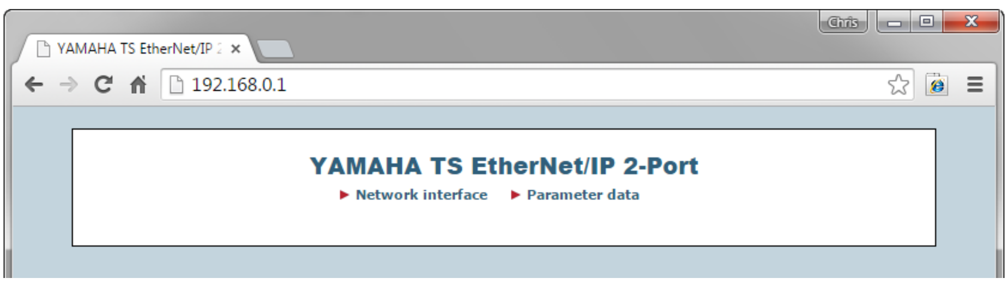
Step #2

Connect a network cable from your PC to the TS Ethernet port. A straight through or cross over cable will work. No network switch or hub is required. The TS Ethernet port will auto sense the cable type and adjust its connection automatically.

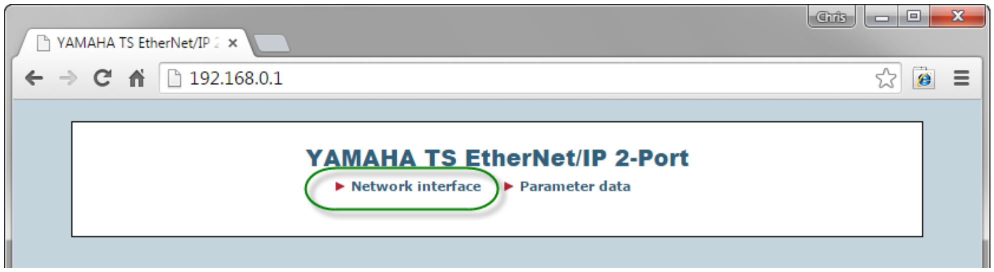
Step #3
Verify factory connection and PING the address 192.168.0.1. The best way to ping is to use a DOS command prompt as shown below. The controller should respond with a "reply" with a time if your computer is communicating with the factory default IP address.

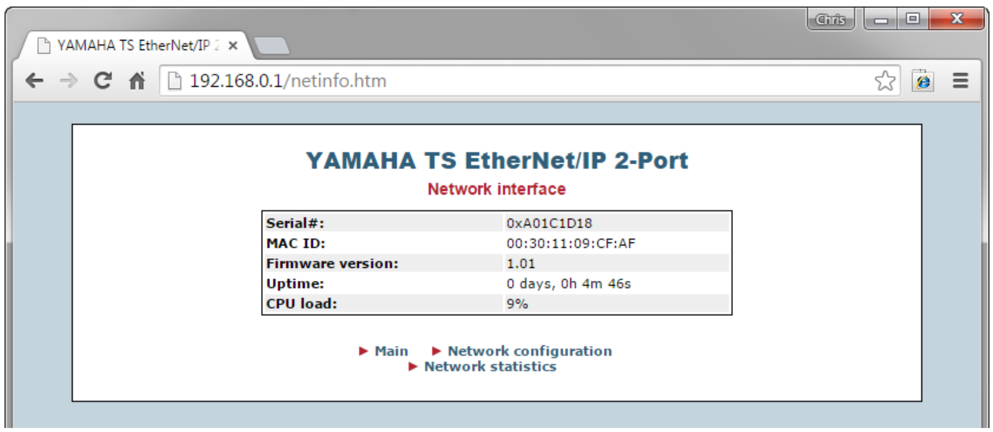


Step #4
Open up your favorite web browser of choice. In this example, we are using Google Chrome. Type the factory IP address into the URL bar of your web browser. You should see the following interface.

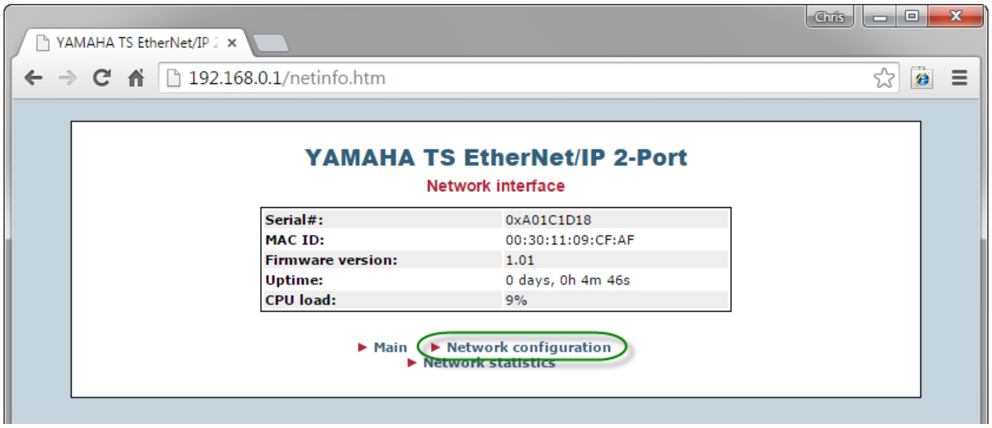


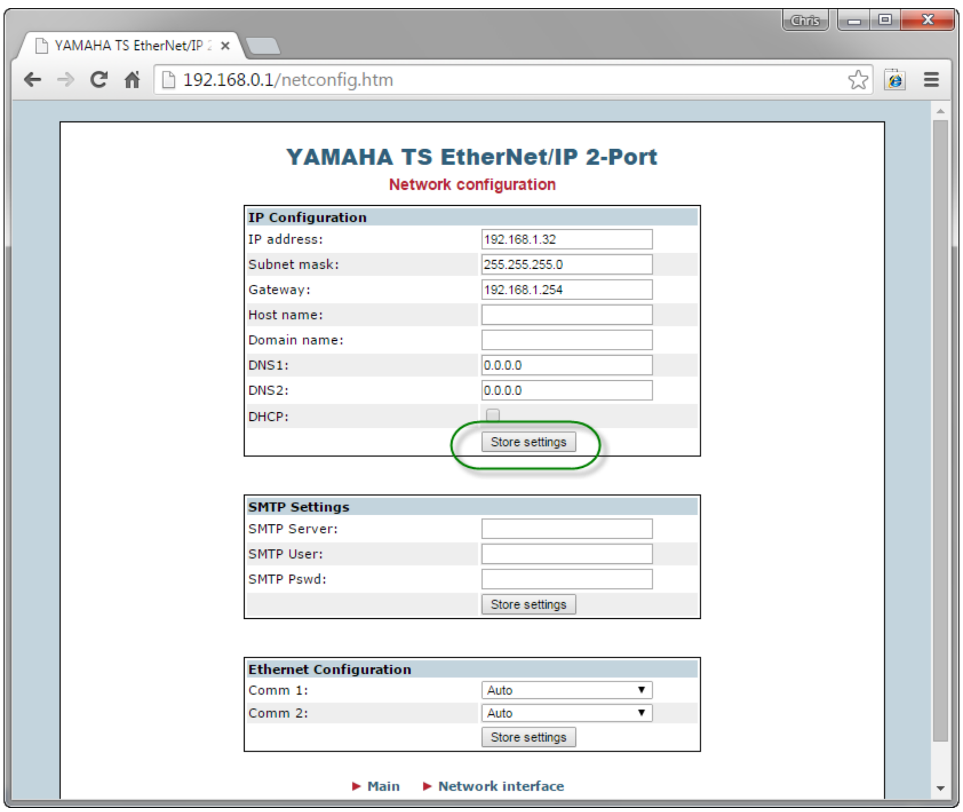
Step #5
To change the IP address to your custom settings, click on the "Network Interface" link on the web page. Next you should see this screen.





Step #6
Click on the “Network Configuration” link, and enter your custom IP address. In this example, we are going to set the TS-S2 controller to IP address 192.168.1.32. Click on “Store Settings” when finished.

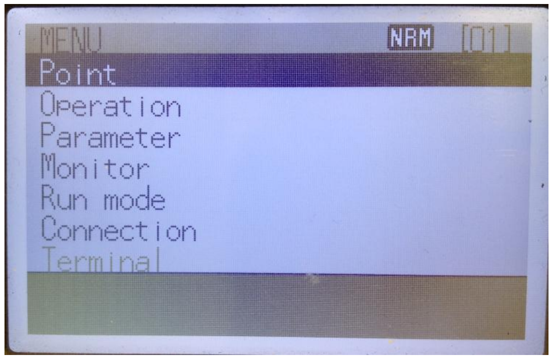




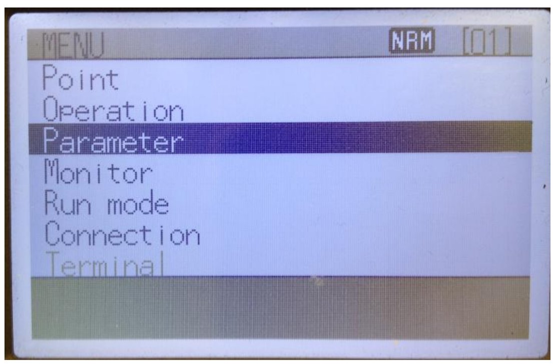
Step #7
REBOOT CONTROLLER
Reboot controller for the new IP address to take effect.
Controller is now ready to communicate to the Allen Bradley master Ethernet/IP card.
Change your computer network interface back to normal.

3.2 Teach Pendant Method

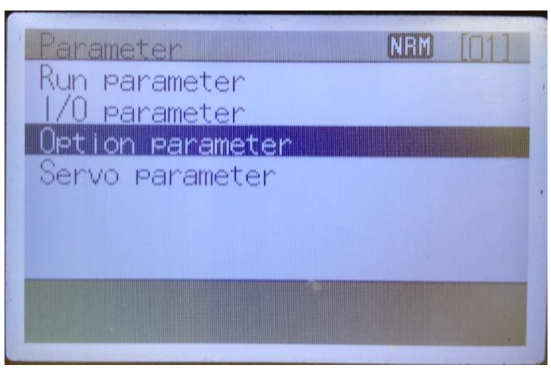
Using the teach pendant. Press the "CLR" key several times until the main menu is viewable. The main menu is displayed when the teach pendant keys say "Point", "Operation", "Parameter", "Monitor", "Run Mode" , "Connection" , "Terminal"



Step #1:
Arrow to PARAMETER
Press the "BLACK SQUARE" to enter the menu

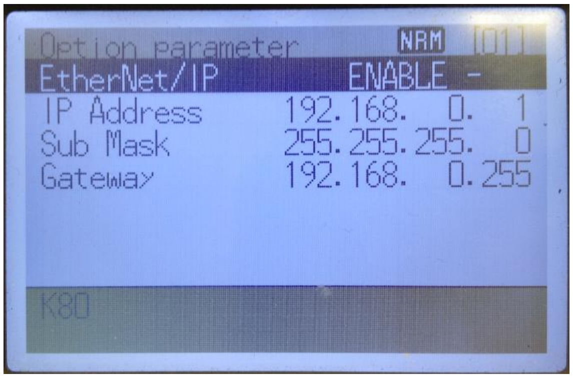


Step #2:
Arrow to OPTION PARAMETER
Press the "BLACK SQUARE" to enter the menu



Step #3:
Edit the IP Address of the TS slave Ethernet/IP to your factory IP address scheme. Also update the subnet mask and gateway settings. Use the arrows to navigate the numbers up and down.

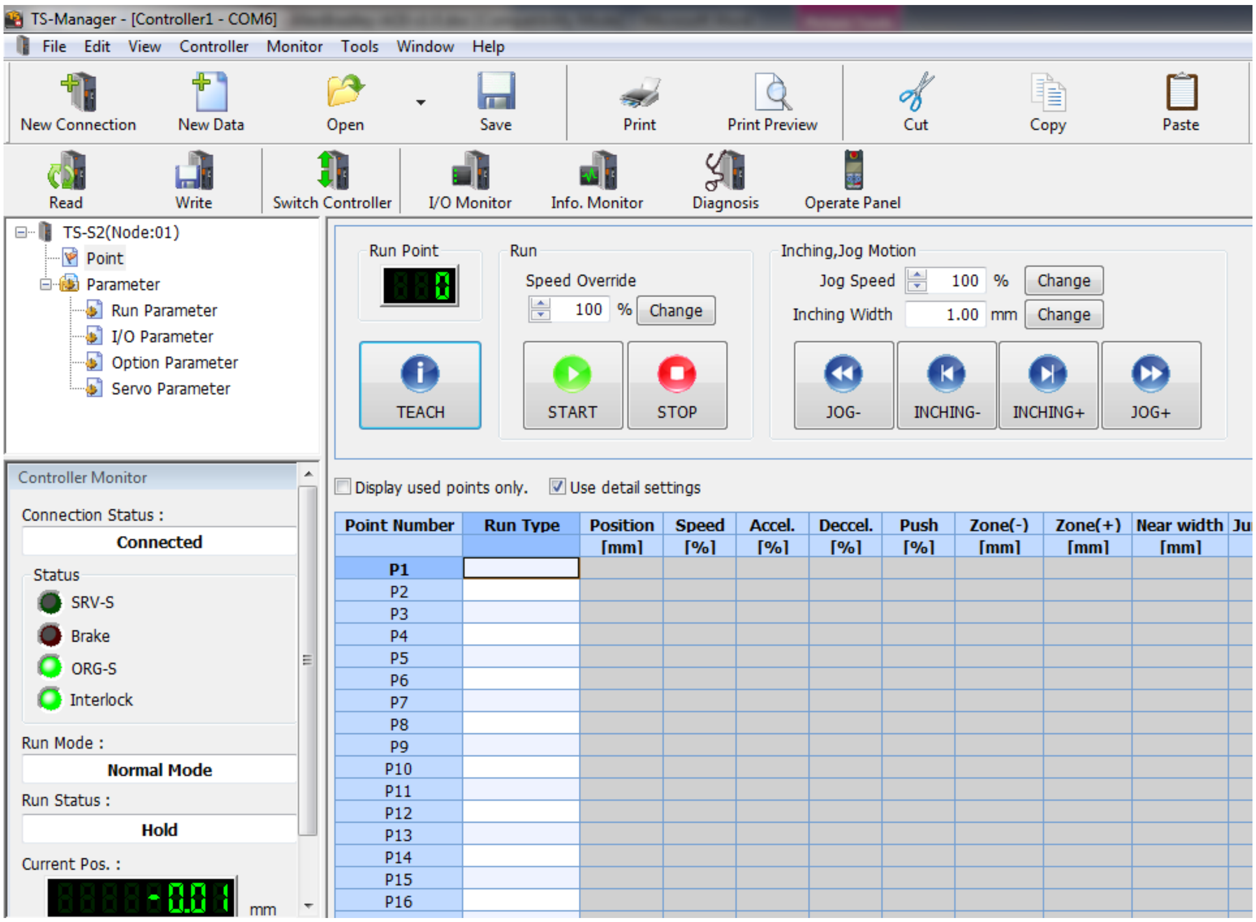
The default IP address is 192.168.0.1. Change this IP address to your desired network settings.



Step #4:
REBOOT CONTROLLER
Reboot controller for the new IP address to take effect
Controller is now ready to communicate to the Allen Bradley master Ethernet/IP card.

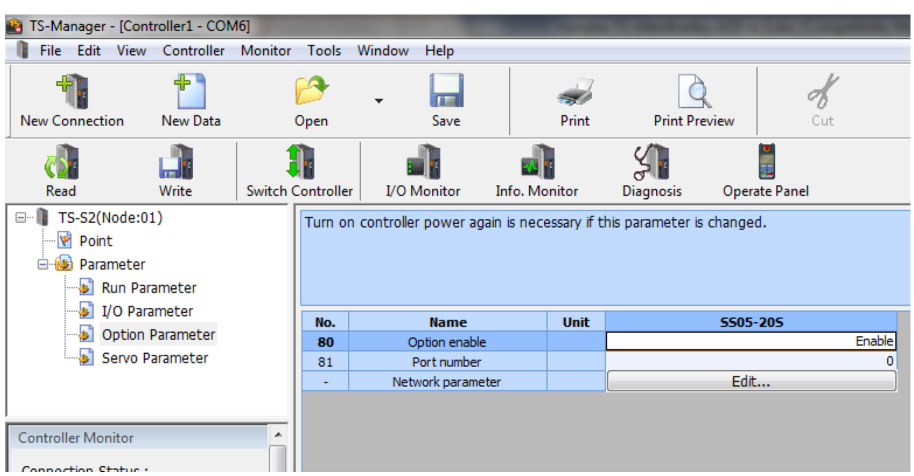
3.3 TS-Manager Software Method

Using the TS-Manager software connect to the controller and view the controller tree online.

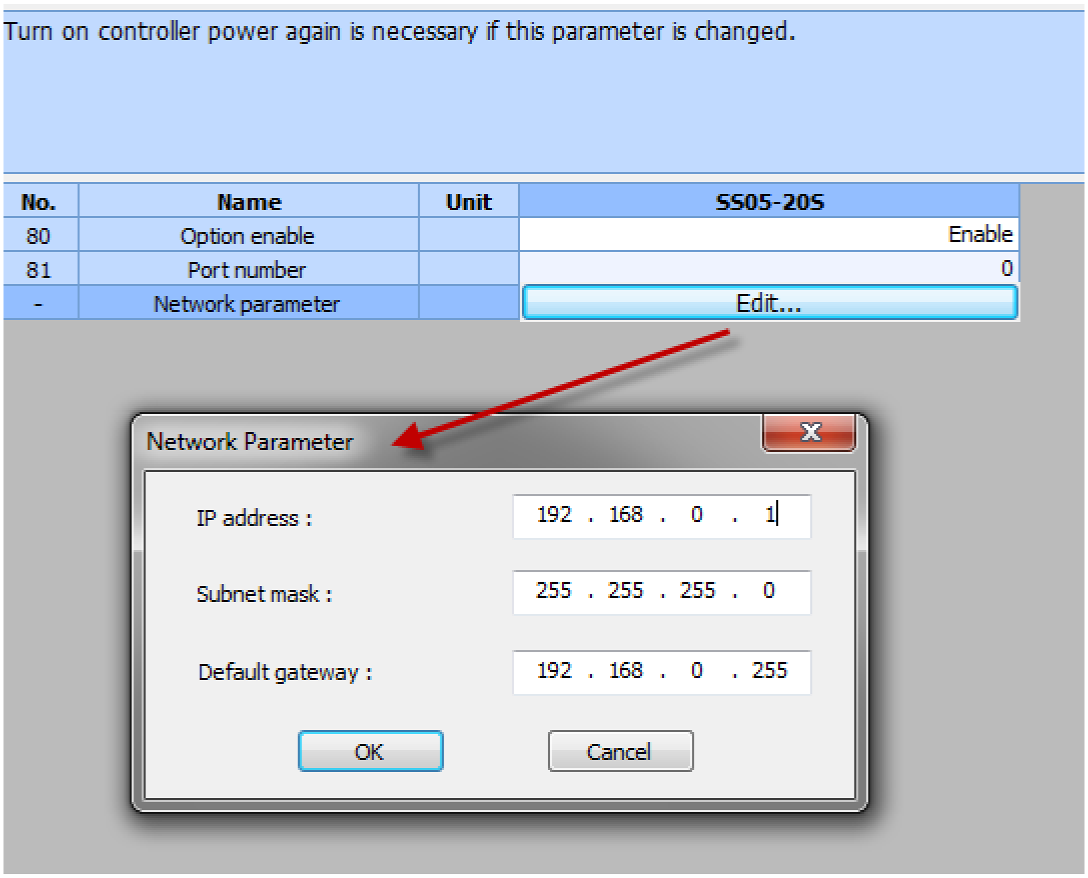


Step #1:

Click on Option Parameter

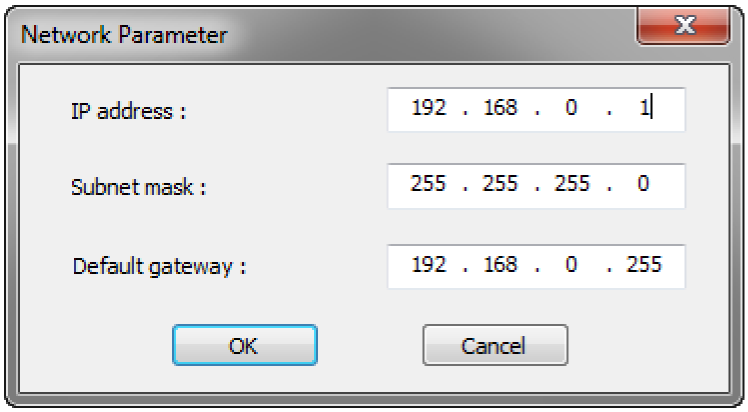


Step #2:
Click on Edit…(Under Network Parameter)



Step #3:
Edit the IP address to your custom network settings.
Also update the subnet mask and gateway settings

Default IP address: (192.168.0.1)

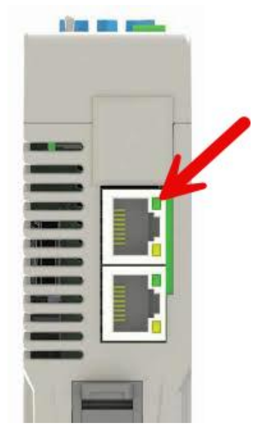


Change IP and click "OK"

Step #4:
REBOOT CONTROLLER
Reboot controller for the new IP address to take effect
Controller is now ready to communicate to the Automation Direct PLC.

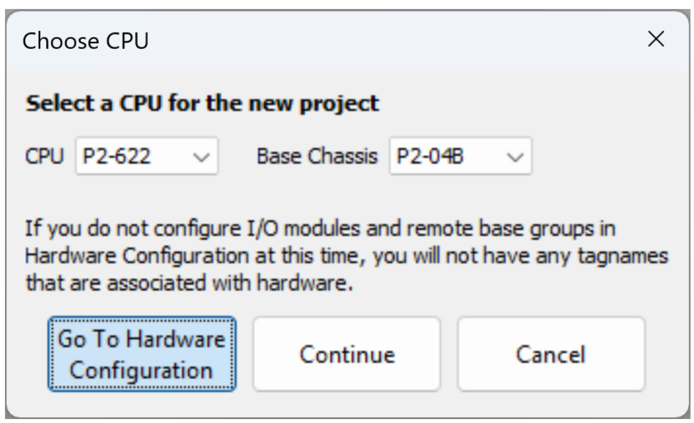
4 Setting up Ethernet/IP Connection

Ensure All Ethernet/IP communication is connected to the forward most RJ45 port on the underside of the PLC CPU



4.1 Start a New Project with Productivity Suite

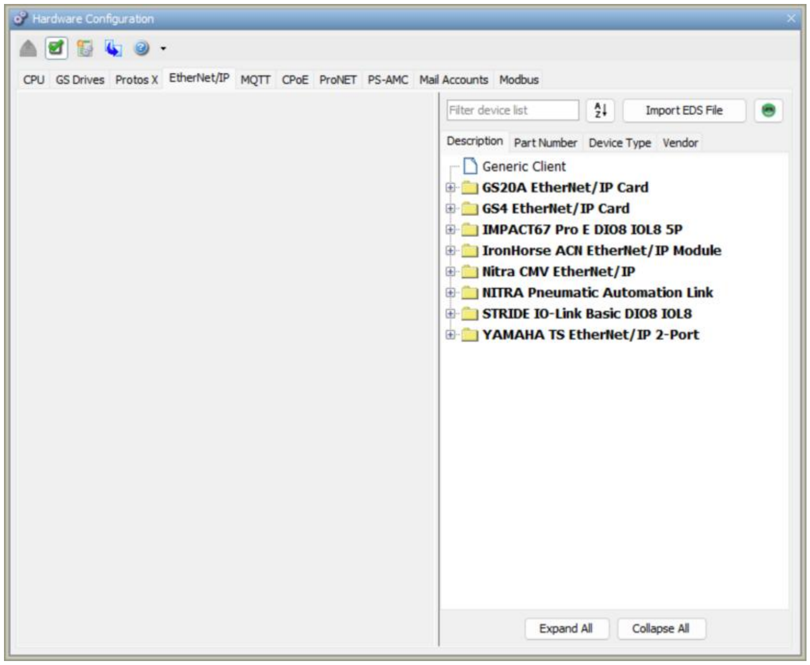
Click File, New Project to start a new PLC project
Choose PLC CPU Type and the chassis it is connected to
Select "Go To Hardware Configuration"



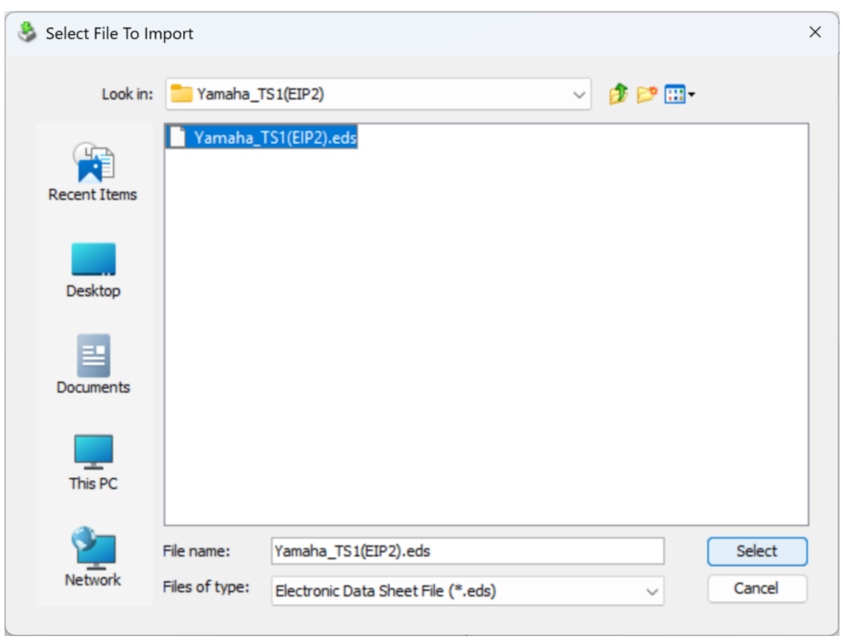
4.2 Create a New Ethernet Connection

Download the Ethernet/IP EDS file from the Yamaha website (https://global.yamaha-motor.com/business/robot/download/fieldbus/)

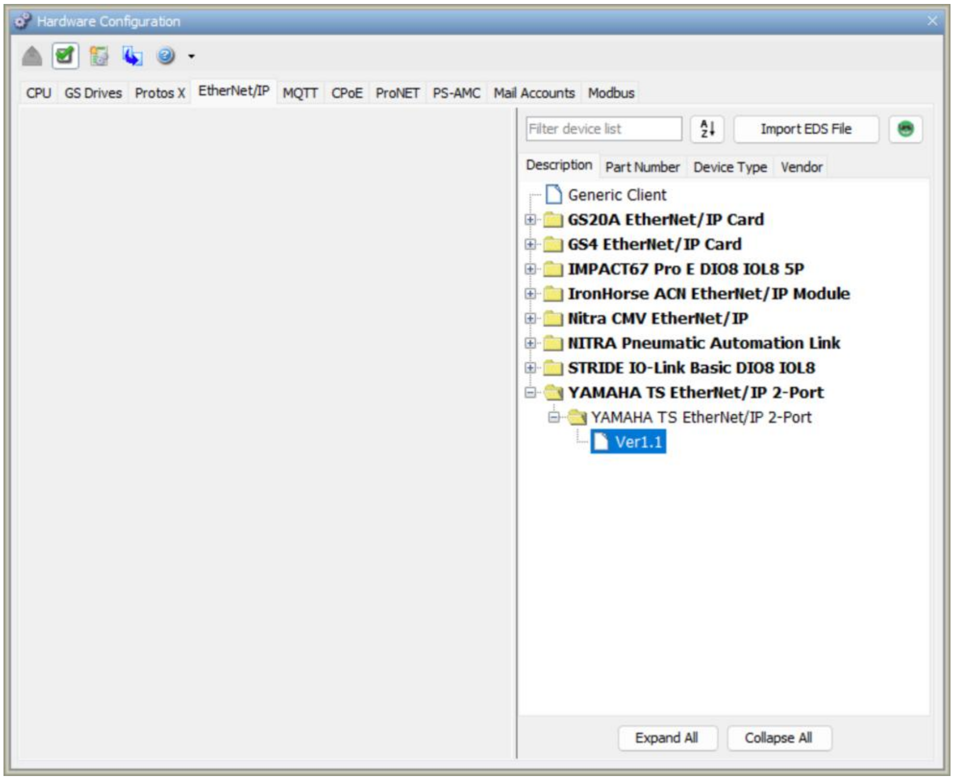
In the Hardware Configuration
Select the "EtherNet/IP" tab



Select "Import EDS File"
Navigate to the file and select it

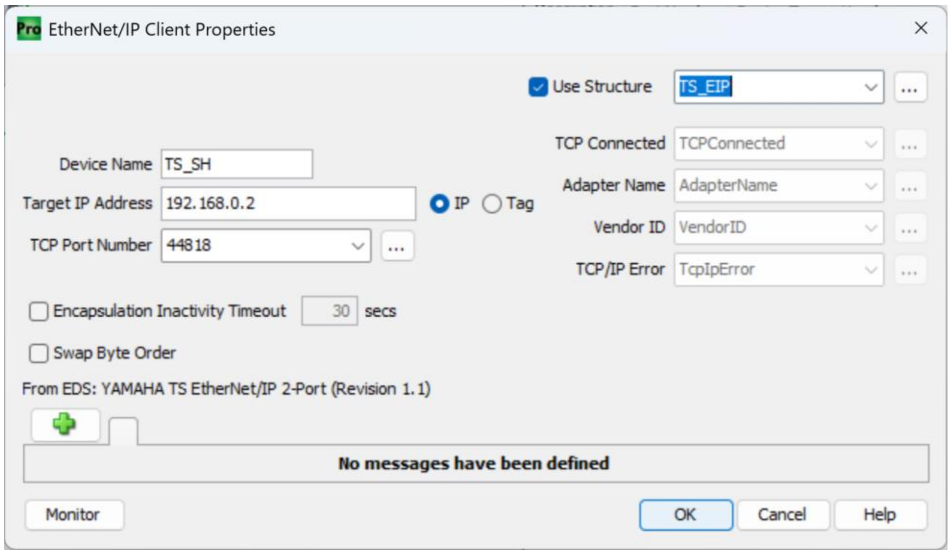


Expand the new Yamaha TS Ethernet/IP folder
Drag and drop the version file to the left side of the window

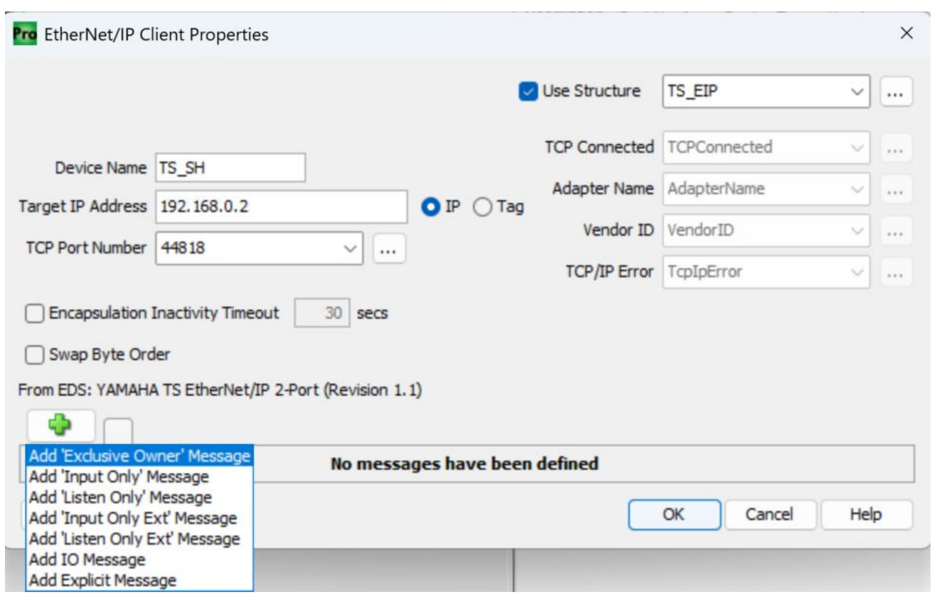


Name the Device Connection:
Example: Robot1, Robot2, etc…TSS,TSX,TSP,etc…Station1Robot,Station2Robot,etc…
(This will be the prefix name of the tags in the controller.)

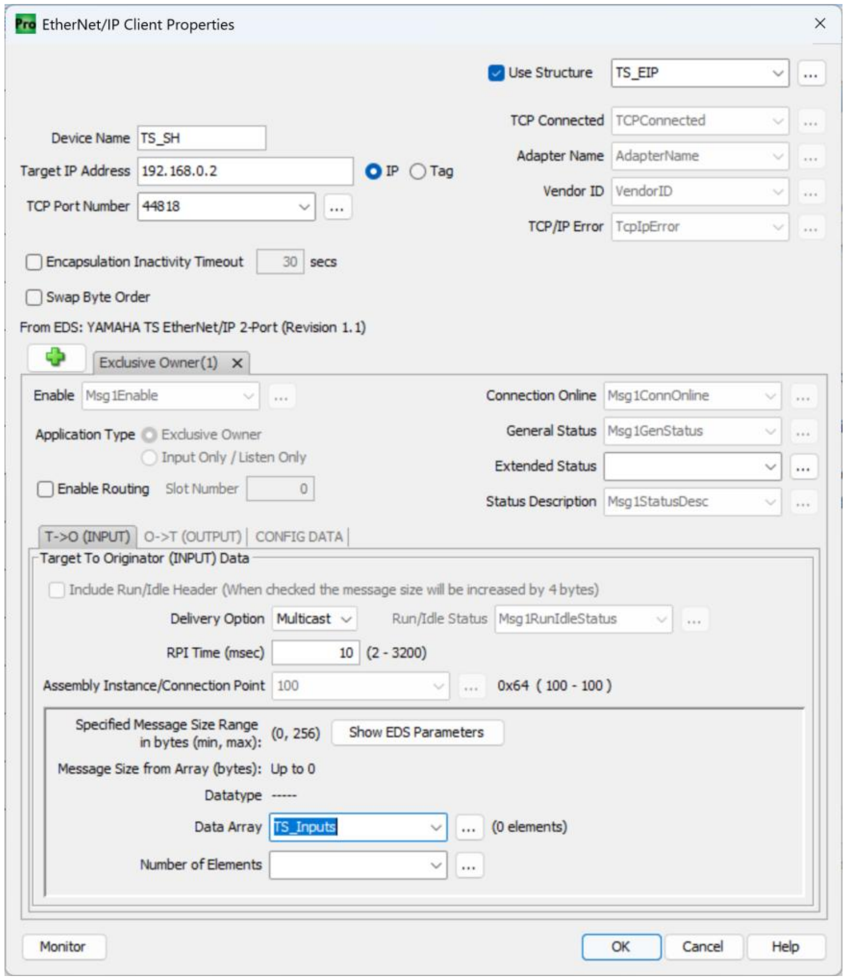
Enter the device name
Enter the IP address of the controller
Select "Use Structure" and enter "TS_EIP"



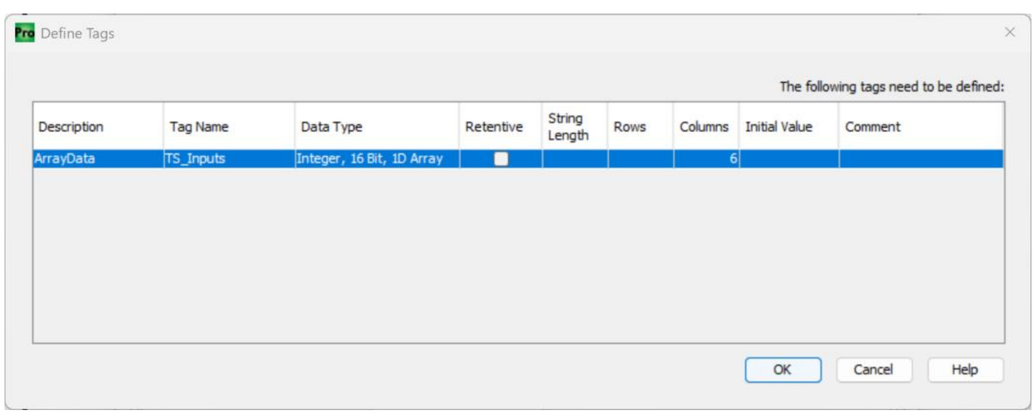
Select the plus sign and select "Add 'Exclusive' owner message"



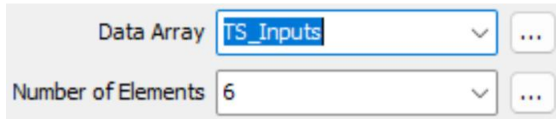
In the “Data Array” box enter “TS_Inputs” and press Enter



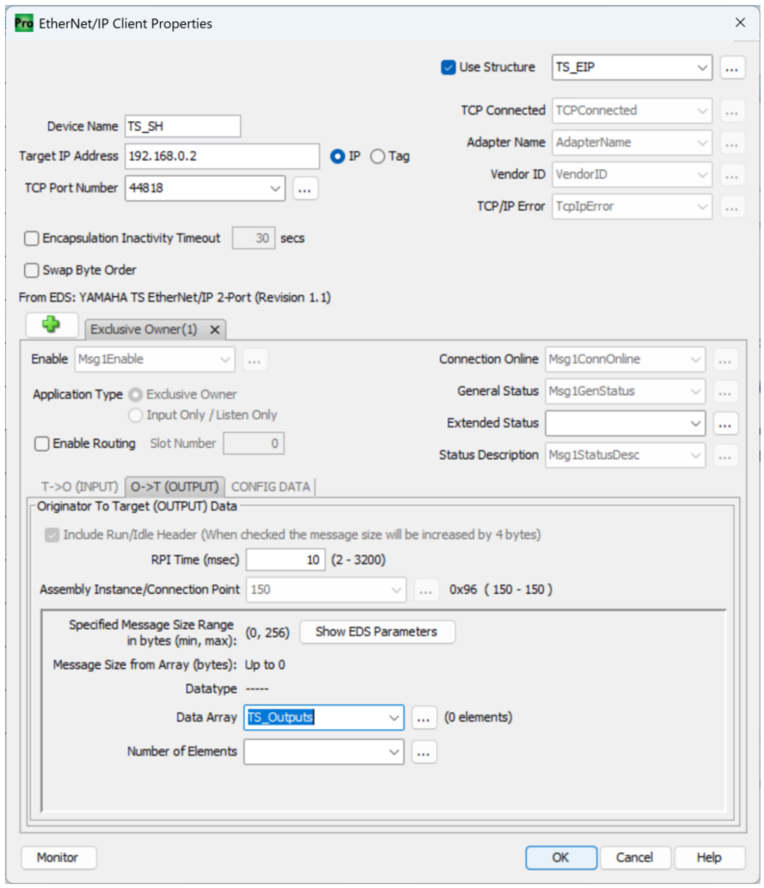
Change the Data Type to “Integer, 16 Bit, 1D Array” and the columns to 6



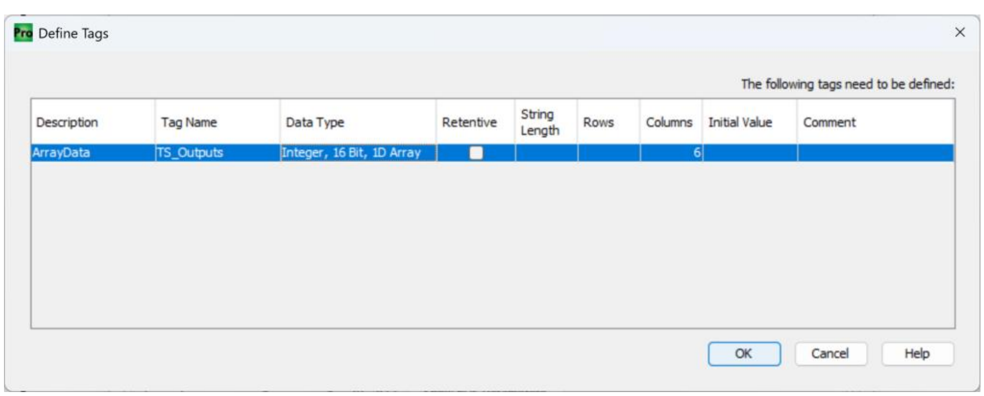
Ensure the number of elemets is set to 6



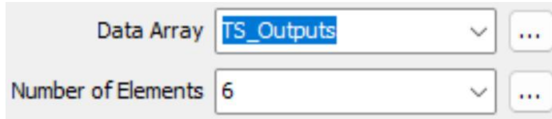
Select the “O -> T (OUTPUT)” tab
In the “Data Array” box enter “TS_Outputs” and press Enter



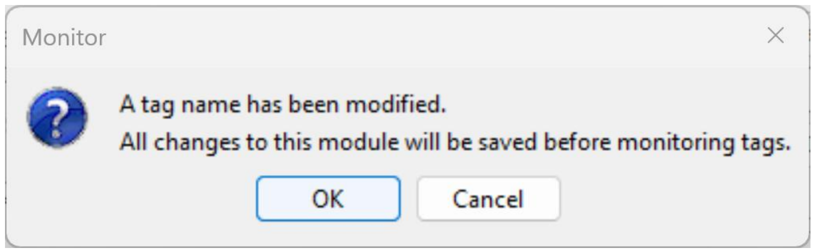
Change the Data Type to “Integer, 16 Bit, 1D Array” and the columns to 6



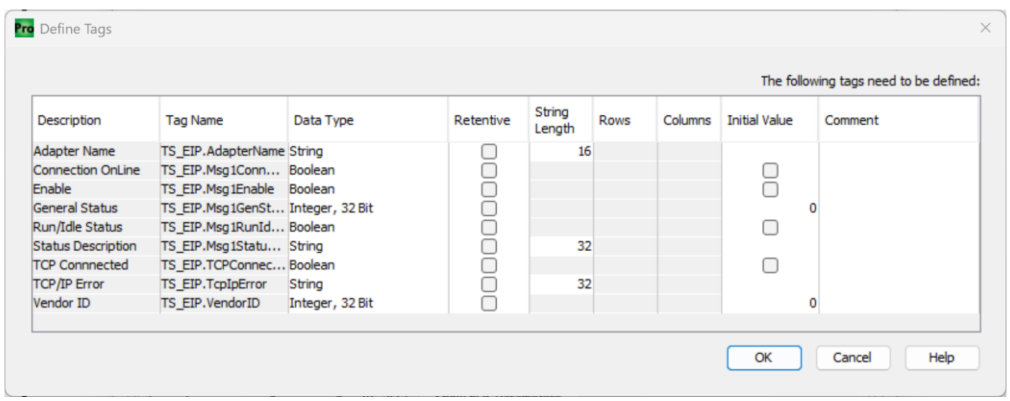
Ensure the number of elemets is set to 6



Select "Monitor" in the bottom left of the window and enter in an appropriate name for the data viewer
Select "OK" to save the changes



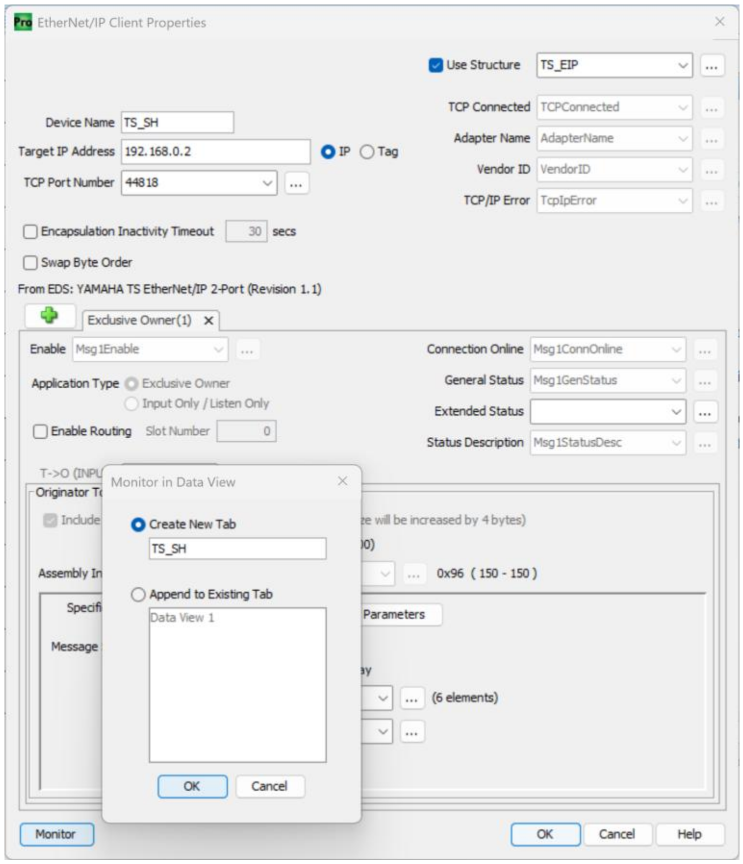
Select "OK" after reviewing the changes anmd ensuring they are correct.



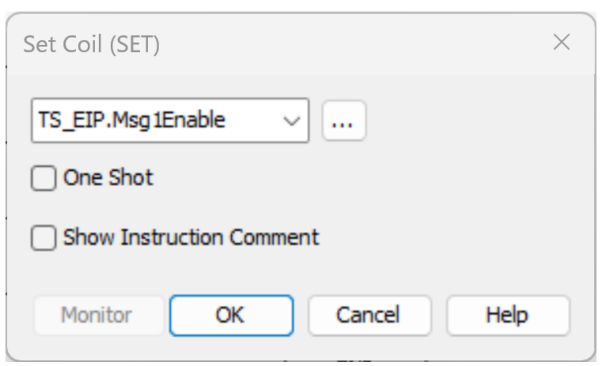
Description	Tag Name	Data Type	Retentive	String Length	Rows	Columns	Initial Value	Comment
Adapter Name	TS_EIP.AdapterName	String	☐	16				
Connection OnLine	TS_EIP.Msg1Conn…	Boolean	☐				☐	
Enable	TS_EIP.Msg1Enable	Boolean	☐				☐	
General Status	TS_EIP.Msg1GenSt…	Integer, 32 Bit	☐				0	
Run/Idle Status	TS_EIP.Msg1RunId…	Boolean	☐				☐	
Status Description	TS_EIP.Msg1Statu…	String	☐	32				
TCP Connnected	TS_EIP.TCPConnec…	Boolean	☐				☐	
TCP/IP Error	TS_EIP.TcpIpError	String	☐	32				
Vendor ID	TS_EIP.VendorID	Integer, 32 Bit	☐				0	

Rename the monitor to an appropriate name, then elect "OK" to create the monitor

Select "OK" to save the controller properties

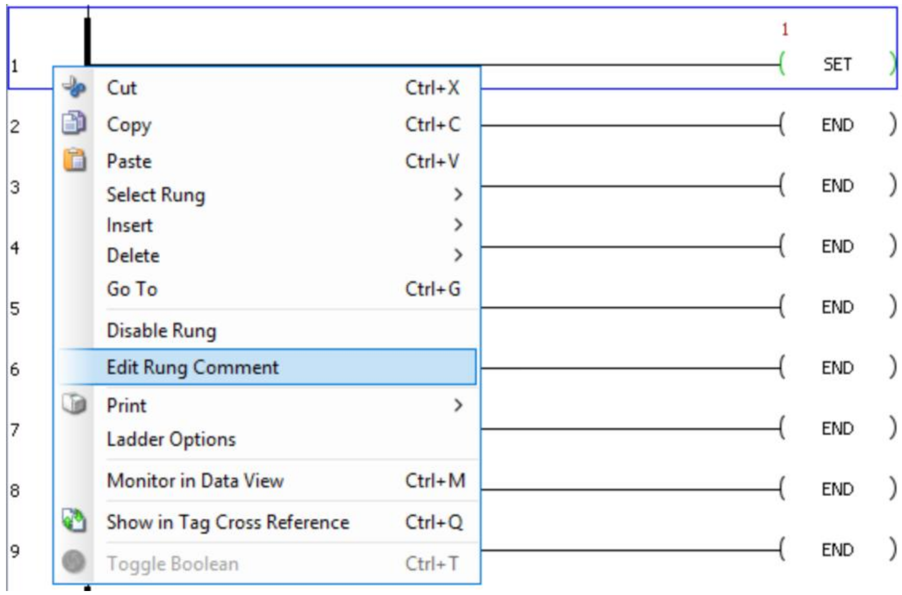


In the ladder logic add a Set Coil to the end of the first rung
Map the coil to the .Msg1Enable tag for your E/IP setup.



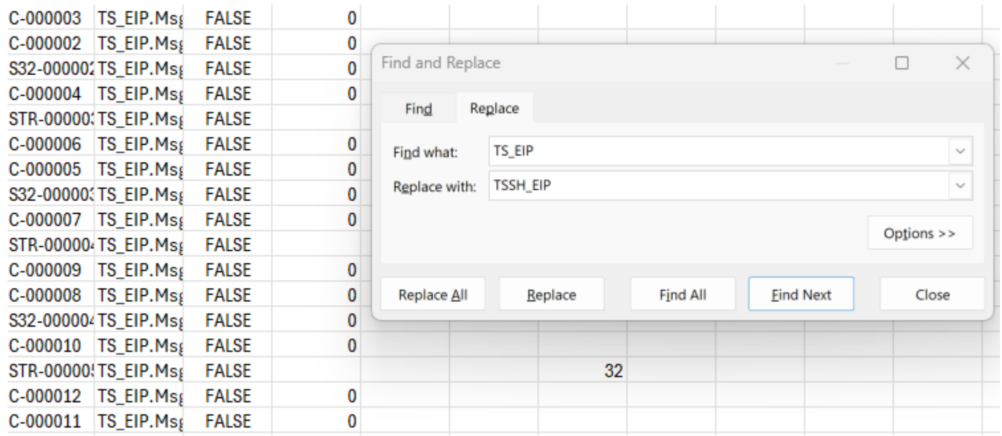
Optional but Recommended

Right click on the rung and select “Edit Rung Comment” add a comment that talks about that this set coil is needed for E/IP communication

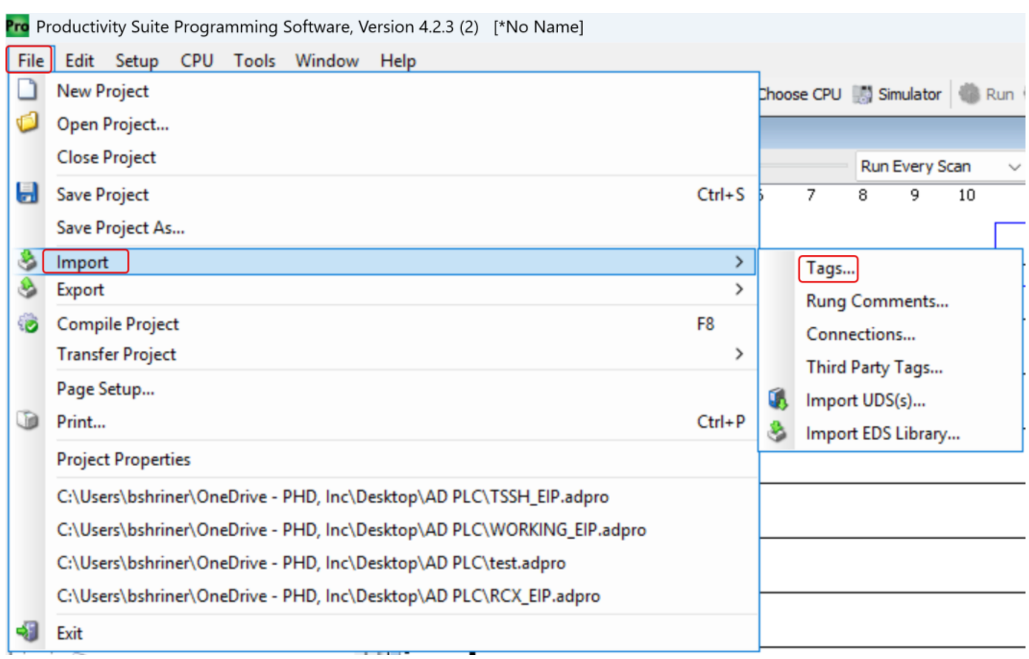


4.3 Importing TS Tag Data Comments

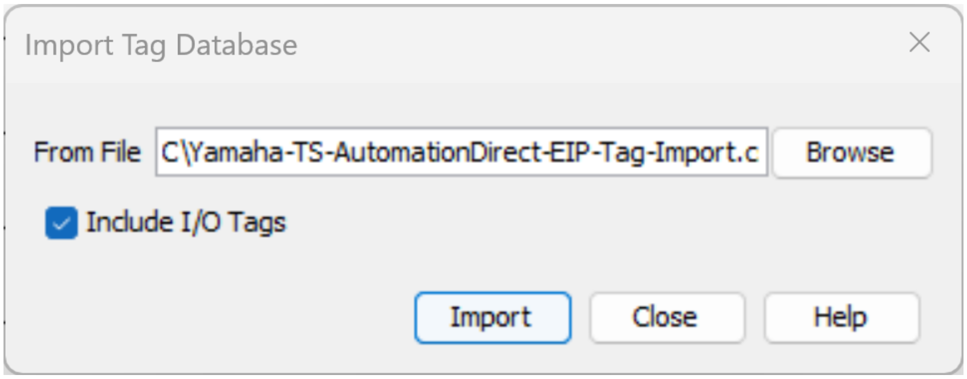
Open supplied Excel.CSV file
(Yamaha-TS-AutomationDirect-EIP-Tag-Import.csv)
If a different structure name was used find and replace the name
Do this for the input and output names too, if needed



Select “File”
Select “Import”
Select “Tags…”

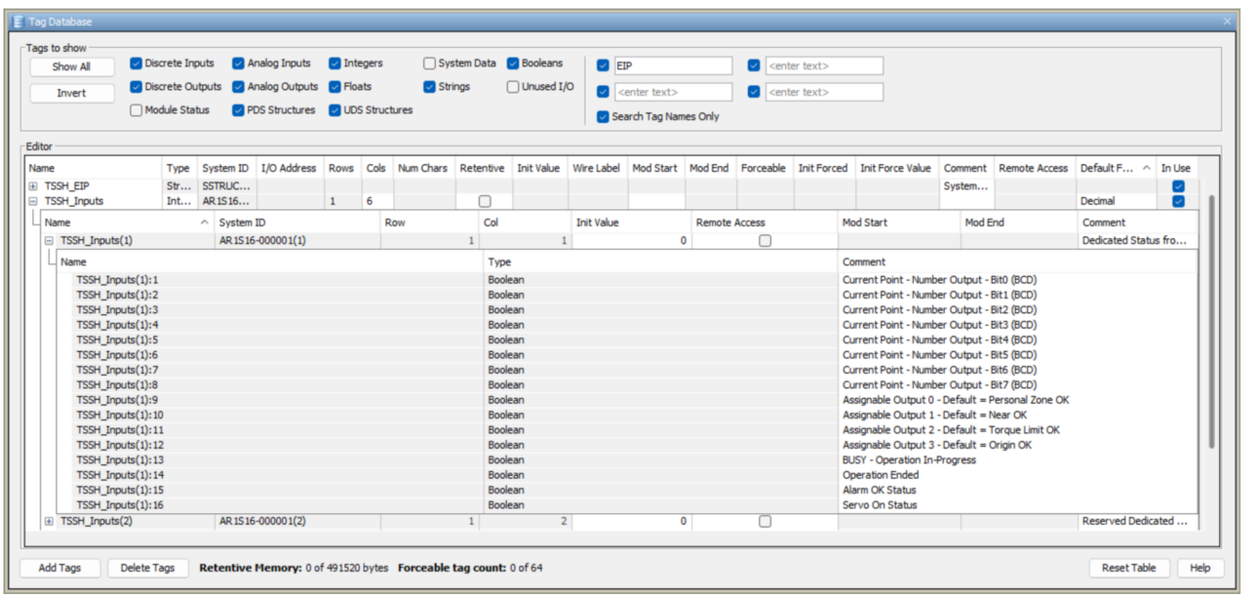


Browse to the CSV file
Select "Include I/O Tags"
Click Import



Verify tags and comments imported successfully
Repeat for multiple robots on the same Ethernet/IP master card

I.E. Find and Replace with your "Robot1, Robot2, etc…" tag names and import



5 Rung examples for dedicated I/O control

5.1 Input Tag Overview

(Please review the TS controller maula for a more in-depth explanation)

List of TS input bits and their purpose in numerical order:

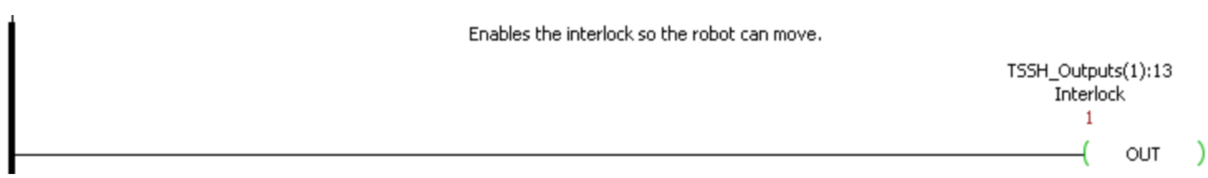
- BCD Bit0
- BCD Bit1
- BCD Bit2
- BCD Bit3
- BCD Bit4
- BCD Bit5
- BCD Bit6
- BCD Bit7
- Personal Zone OK
- Near OK
- Torque Limit OK
- Origin Status
- Operation In-Progress
- Operation Ended
- Alarm Status
- Servo Status

Name	Type	Comment
TSSH_Inputs(1):1	Boolean	Current Point - Number Output - Bit0 (BCD)
TSSH_Inputs(1):2	Boolean	Current Point - Number Output - Bit1 (BCD)
TSSH_Inputs(1):3	Boolean	Current Point - Number Output - Bit2 (BCD)
TSSH_Inputs(1):4	Boolean	Current Point - Number Output - Bit3 (BCD)
TSSH_Inputs(1):5	Boolean	Current Point - Number Output - Bit4 (BCD)
TSSH_Inputs(1):6	Boolean	Current Point - Number Output - Bit5 (BCD)
TSSH_Inputs(1):7	Boolean	Current Point - Number Output - Bit6 (BCD)
TSSH_Inputs(1):8	Boolean	Current Point - Number Output - Bit7 (BCD)
TSSH_Inputs(1):9	Boolean	Assignable Output 0 - Default = Personal Zone OK
TSSH_Inputs(1):10	Boolean	Assignable Output 1 - Default = Near OK
TSSH_Inputs(1):11	Boolean	Assignable Output 2 - Default = Torque Limit OK
TSSH_Inputs(1):12	Boolean	Assignable Output 3 - Default = Origin OK
TSSH_Inputs(1):13	Boolean	BUSY - Operation In-Progress
TSSH_Inputs(1):14	Boolean	Operation Ended
TSSH_Inputs(1):15	Boolean	Alarm OK Status
TSSH_Inputs(1):16	Boolean	Servo On Status

5.2 Software Interlock

Typically used to stop robot and enable robot or a light curtain enabled

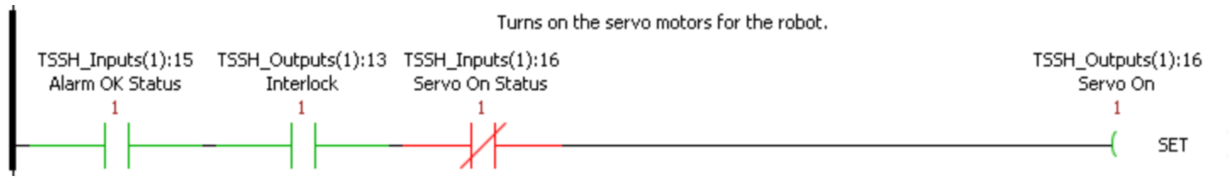
Interlock Bit needs to be a MAINTAINED signal
(See timing chart in TS controller manual)



5.3 Servo On

Dedicated rung to enable robot servo power on. Status of interlock or emergency stop and servo on status are typically used in this rung.

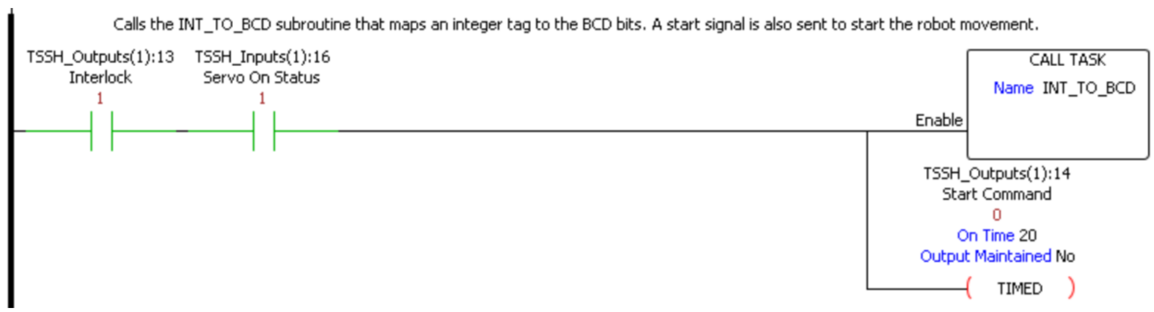
Servo On bit needs to be a MOMENTARY signal.
(See timing chart in TS controller manual)



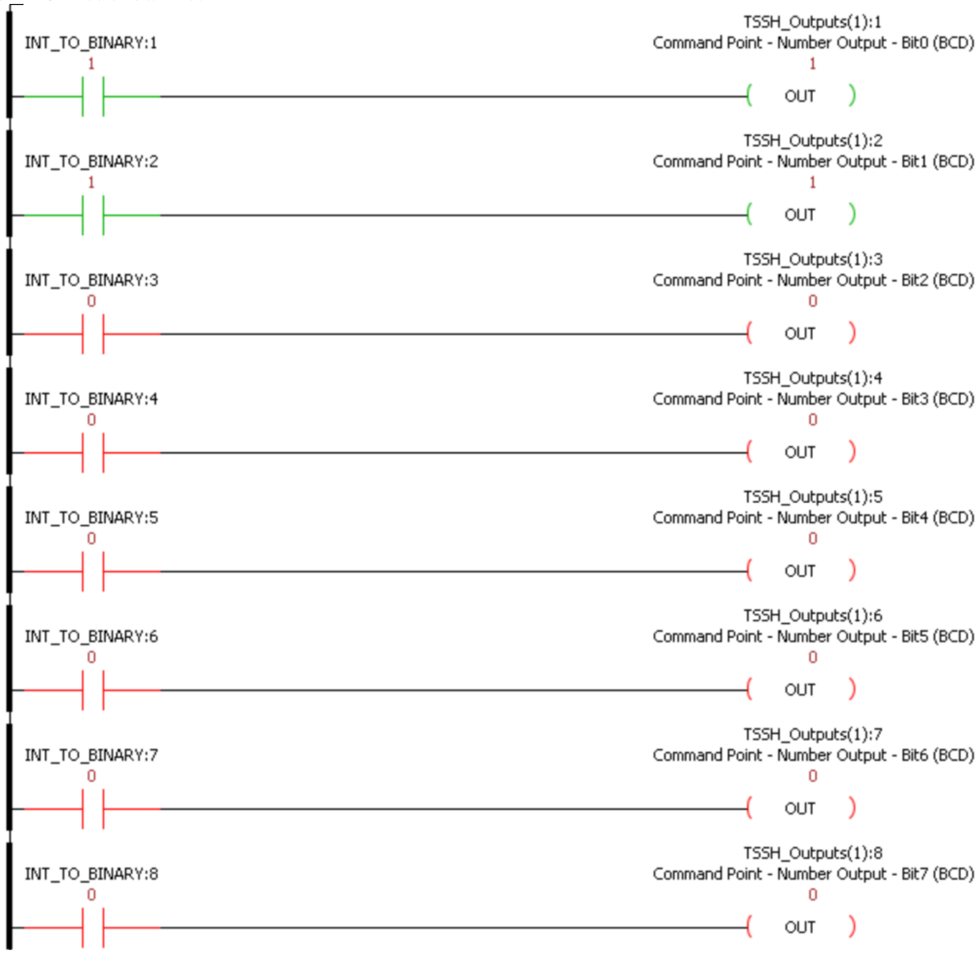
5.4 Jog to Point

A dedicated subroutine was created to convert an integer point value into a BCD value. The Start command must also be sent to jog to robot.

Start bit needs to be a MOMENTARY signal.
(See timing chart in TS controller manual)



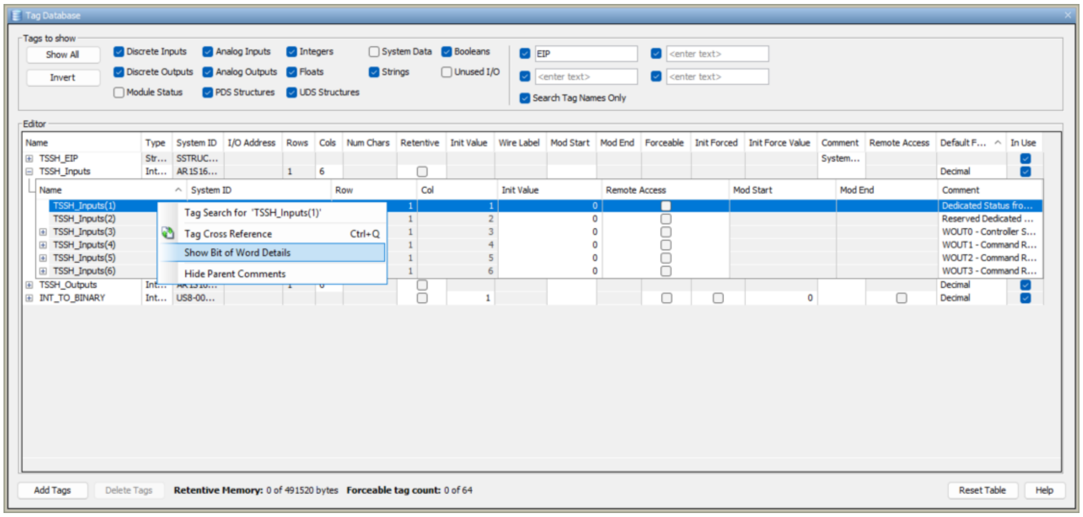
INT_TO_BCD subroutine:



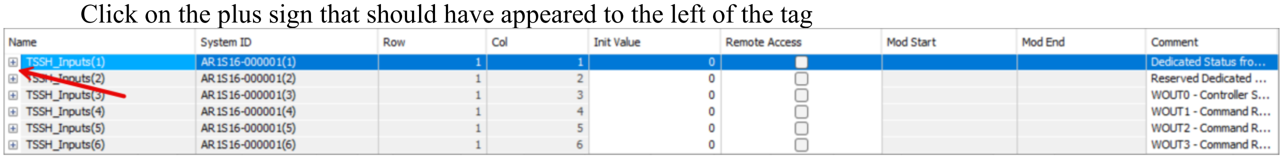
6 Miscellaneous

6.1 Viewing Bit level of a tag

Navigate to the Tag Database within the Application Tools
Find the tag and right click on that specific tag
Select "Show Bit of Work Details"

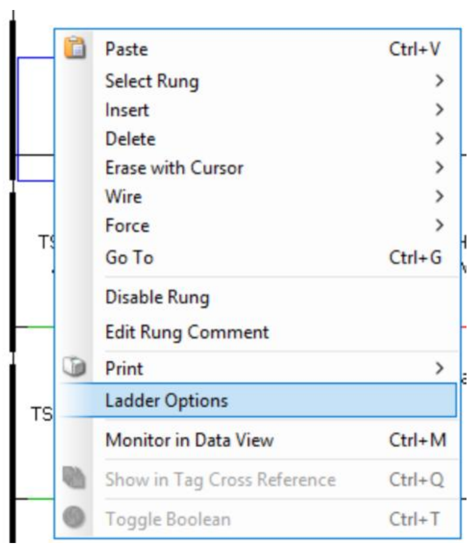


Click on the plus sign that should have appeared to the left of the tag

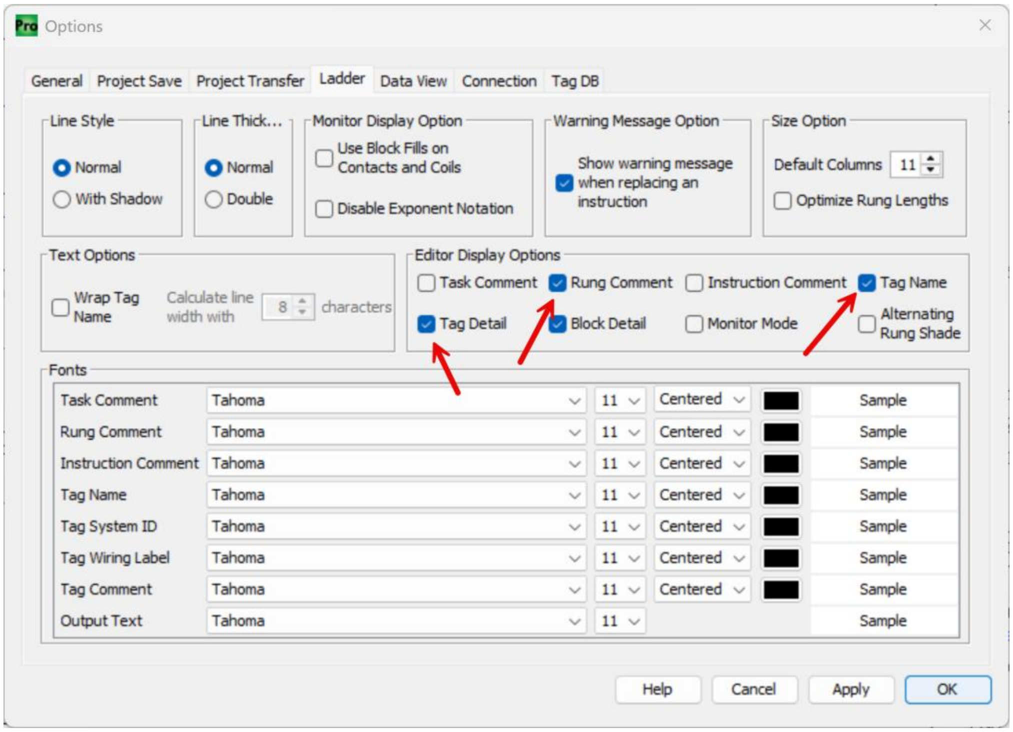


6.2 View tag details on a rung

Go to a task and right click anywhere within the ladder logic window
Select "Ladder Options"



To see the Tag name and comment select the checkbox for "Tag Name" and "Tag Detail"
Its also recommended to check the "Rung Comment" checkbox


Options
General
Project Save
Project Transfer
Ladder
Data View
Connection
Tag DB
Line Style
Normal
With Shadow
Line Thick...
Normal
Double
Monitor Display Option
Use Block Fills on Contacts and Coils
Disable Exponent Notation
Warning Message Option
Show warning message when replacing an instruction
Size Option
Default Columns 11
Optimize Rung Lengths
Text Options
Wrap Tag Name
Calculate line width with 8 characters
Editor Display Options
Task Comment
Rung Comment
Instruction Comment
Tag Name
Tag Detail
Block Detail
Monitor Mode
Alternating Rung Shade
Fonts
Task Comment Tahoma 11 Centered Sample
Rung Comment Tahoma 11 Centered Sample
Instruction Comment Tahoma 11 Centered Sample
Tag Name Tahoma 11 Centered Sample
Tag System ID Tahoma 11 Centered Sample
Tag Wiring Label Tahoma 11 Centered Sample
Tag Comment Tahoma 11 Centered Sample
Output Text Tahoma 11 Sample
Help
Cancel
Apply
OK