# Yamaha Robotics Automation Direct Connection Manual for RCX 3 Series controllers with Ethernet/IP

RCX340


RCX320

## Version Control

| Version | Date | Author | Change Description |
|---|---|---|---|
| 1.0 | 8/29/25 | B.Shriner | Original release |

# 1 Introduction

This manual is intended to describe how Yamaha RCX3 series, controllers with Ethernet/IP communication cards interface to Allen Bradley Micro850 that use Connected Components Workbench. The following examples were designed in an Allen Bradley Micro850 2080-L50E-24QBB using the Developer Edition of Connected Components Workbench software.

## 1.1 Supported PLCs

- Allen Bradley Micro 850 PLCs are supported with Connected Components Workbench

## 1.2 Supported Yamaha Controllers

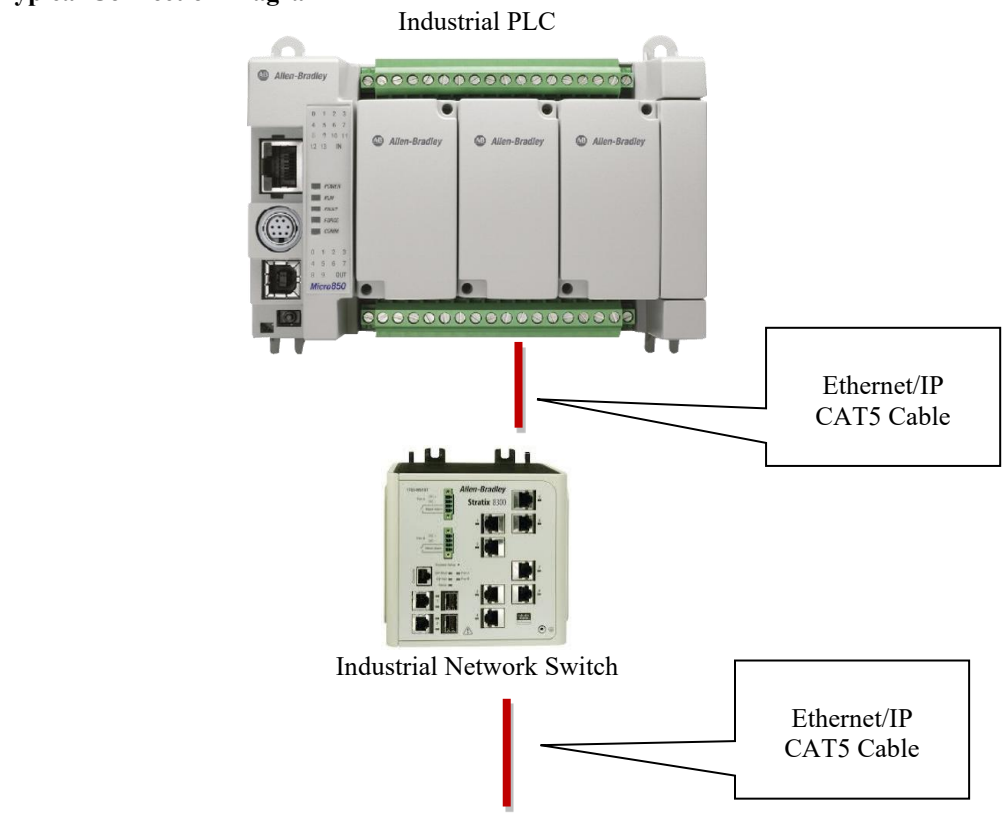
- RCX340 with an optional Ethernet/IP slave card, RCX320 with an optional Ethernet/IP slave card.
- RCX144, RCX143, RCX142, RCX141, RCX40, RCX222, RCX221, RCX240, RCX240S **ARE NOT SUPPORTED**

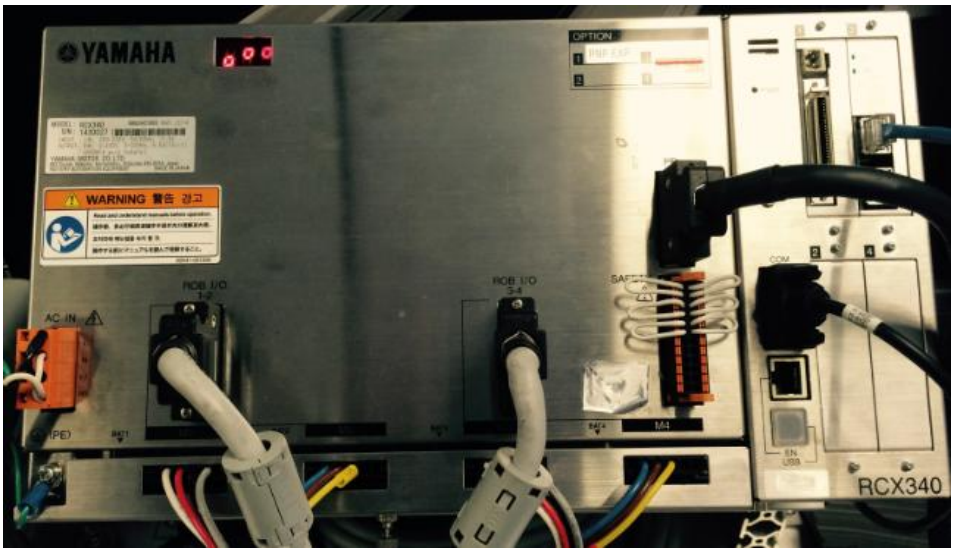
# 2 System Block Diagram

Yamaha TS Series controllers connect to a standard Ethernet/IP industrial network through CAT5 ethernet cables. A generic ethernet profile is added to an Allen Bradley Micro 850.

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

## 2.1 Typical Connection Diagram



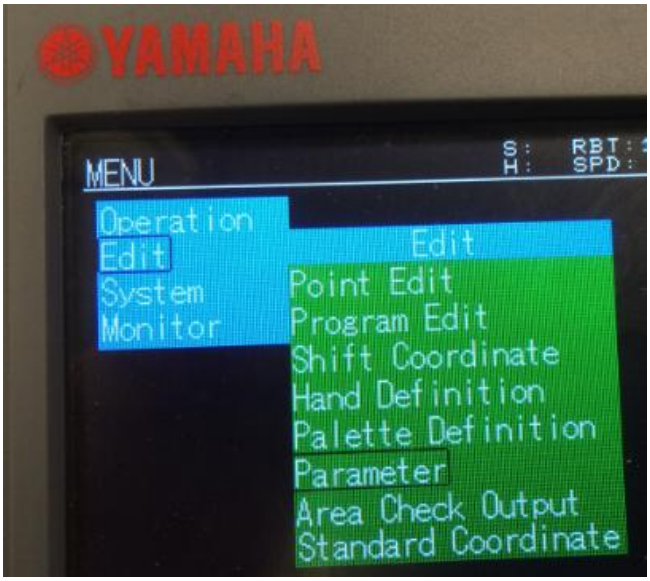
# 3 Customize the IP Address Ethernet/IP Slave

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.

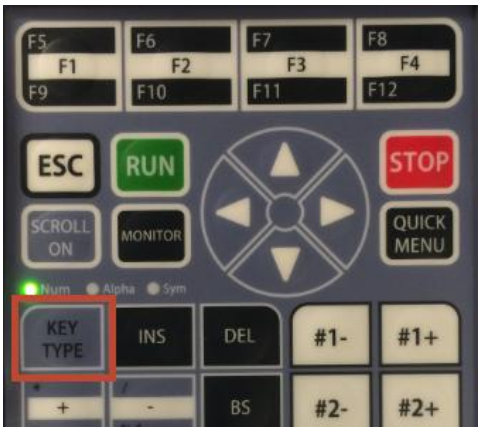
## 3.1 Teach Pendant Method

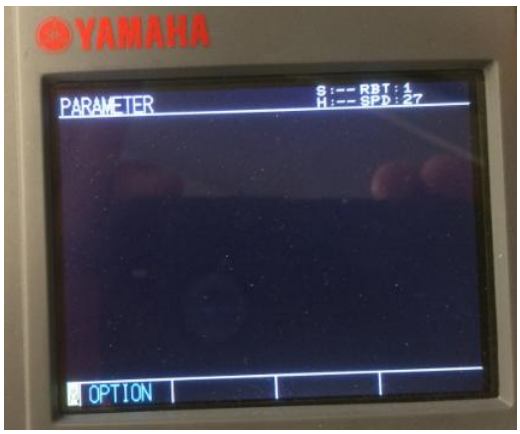
Using the teach pendant. At the Initial Screen, Select (EDIT), press (ENTER), then select (PARAMETER), press (ENTER), Press (Key Type), Press F1 (OPTION), Press (EDIT), Select the option slot that your EIP card is located in and make it a (1).

**Step #1:**
At the Initial Screen, Select (EDIT), press (ENTER), then select (PARAMETER) Press (ENTER).

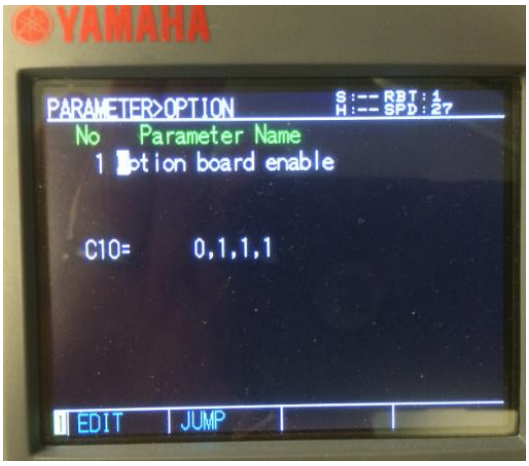


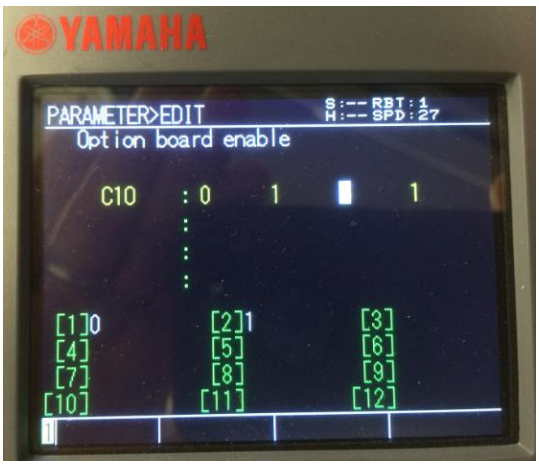

**Step #2:**
Press the “Key Type” to give you the (OPTION) selection. Press F1 (OPTION).



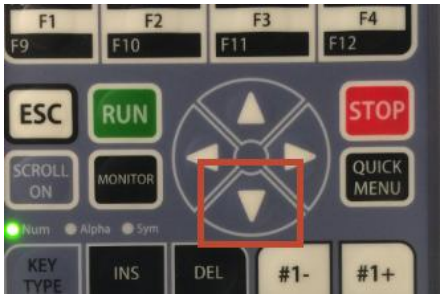



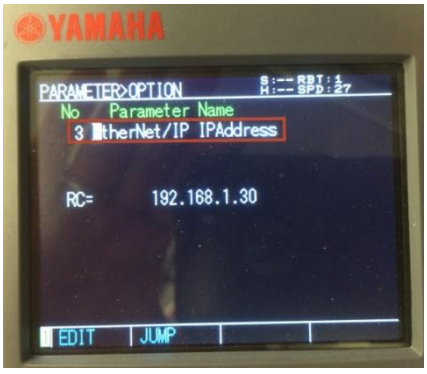
**Step #3:**
Press F1 (EDIT) to edit the parameters in parameter # 1. Select the option slot that your EIP card is located in (This Controller has an EIP Card located in the third slot) and make it a (1). This Enables your EIP card. Next you will need to change your IP Address.

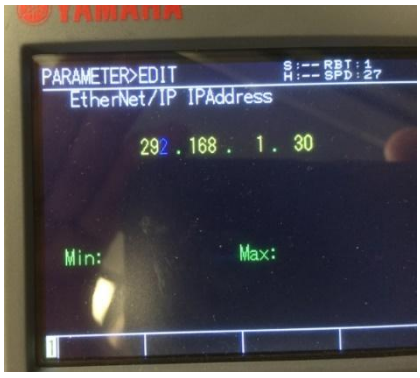



**Step #4:**
Now go back to the Parameter>OPTION screen and Arrow down to select Parameter # 3. Press F1 (EDIT) and change the IP Address of the Robot controller to your desired address.

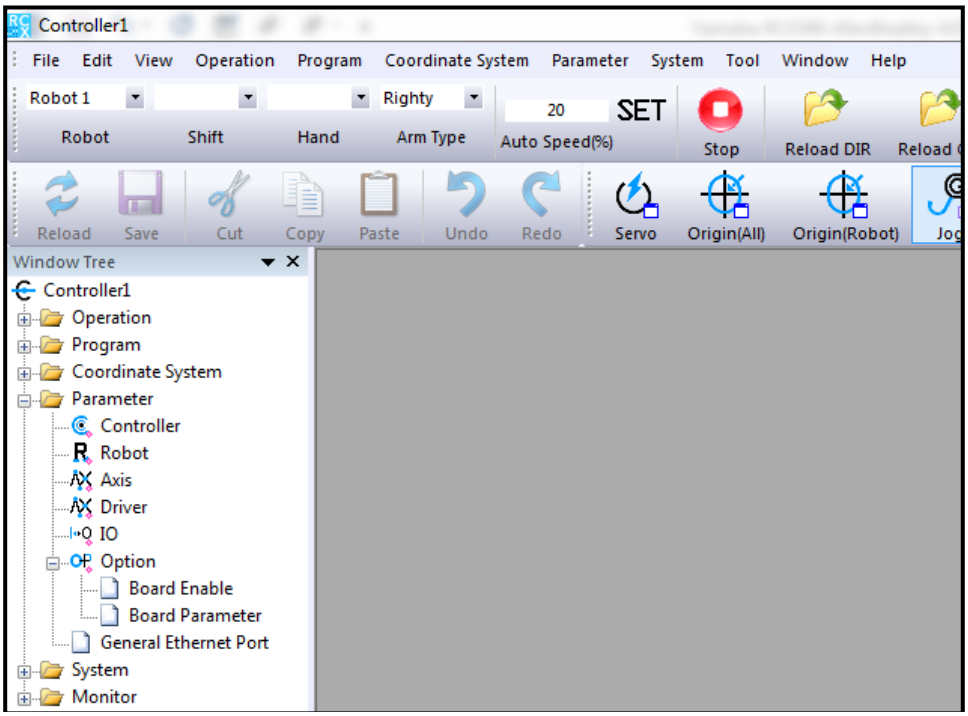




**Step #5:**
## REBOOT CONTROLLER
Reboot controller for the new IP address to take effect
Controller is now ready to communicate to the Allen Bradley master Ethernet/IP card

### 3.2 RCX-Studio Software Method (RCX-Studio 1.1.0 and RCX 3 Series firmware 1.14 or greater)

Using the RCX-Studio software connect to the controller and view the controller tree online.

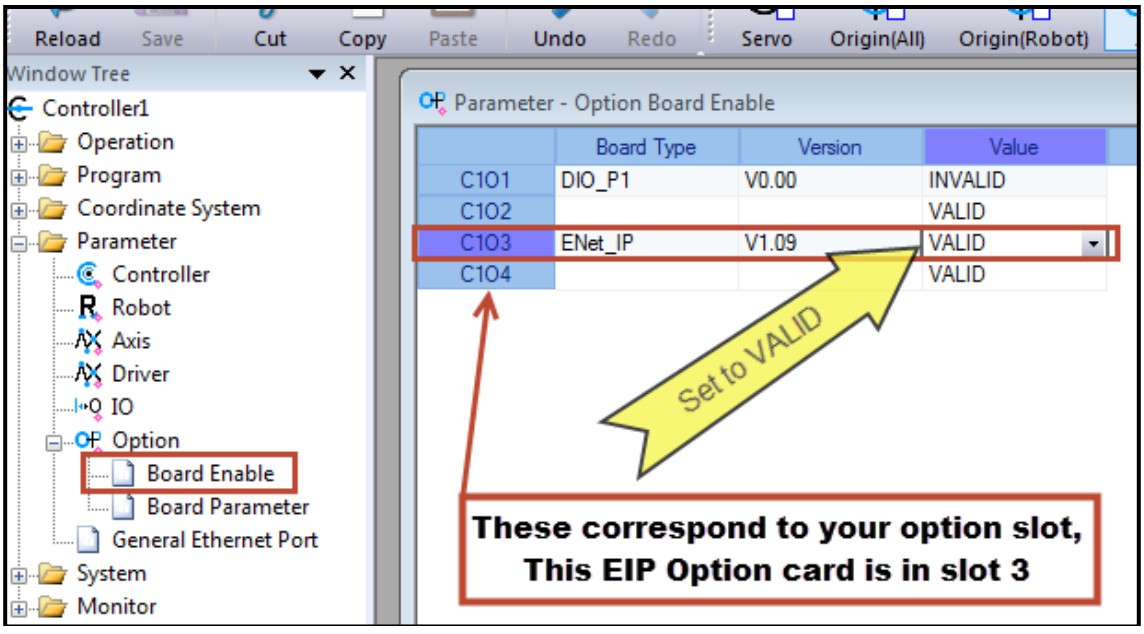



**Step #1:**

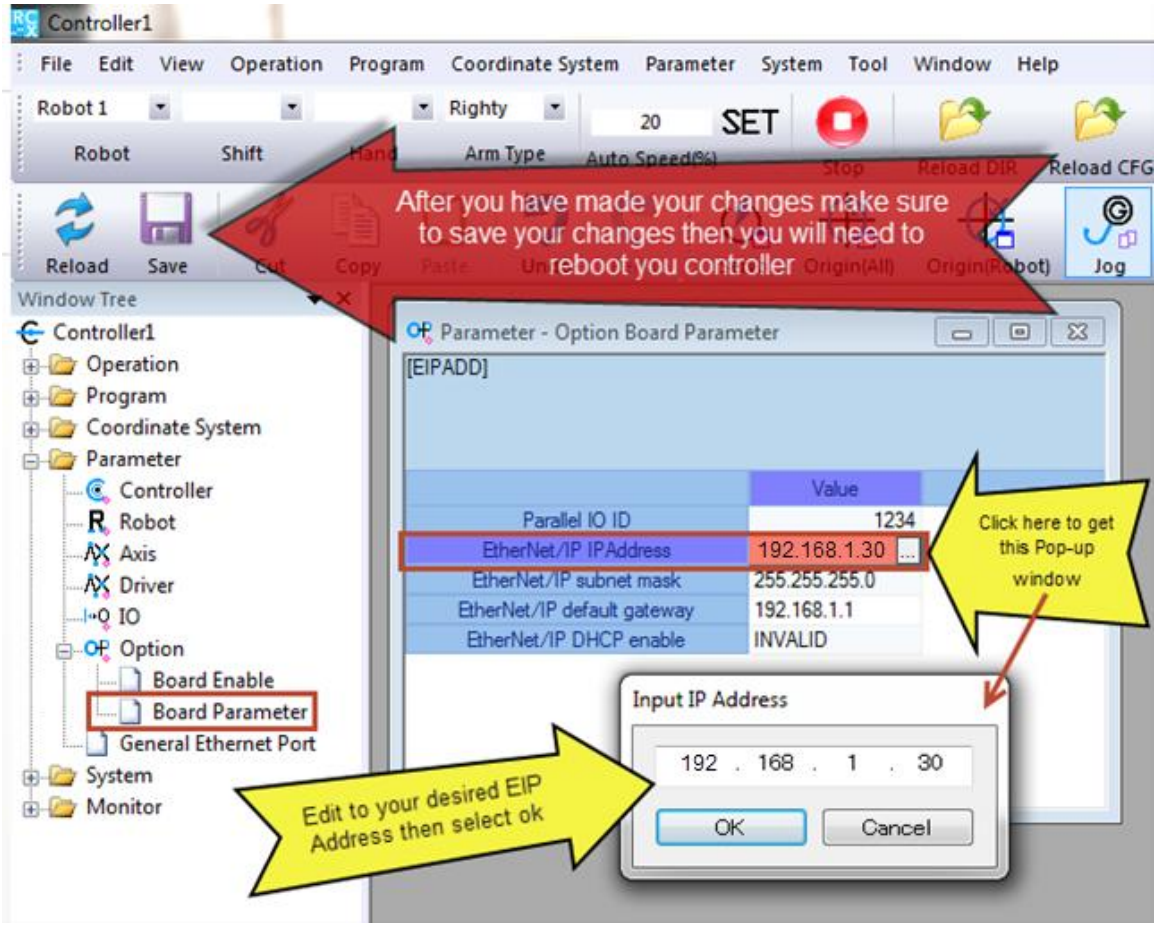
Click on Parameters to expand the tree

Click on “Board Enable” you will get a pop-up window

Click on the value column of your EIP option slot to make “VALID”. This will Enable your EIP card, next you will need to change your IP Address.



**Step #2:**
Click on Parameters to expand the tree
Click on "Board Parameter" you will get a pop-up window
Click on the Ethernet/IP Address then click on the "browse" tab to get another pop-up window.
Now you can change your IP address. Make sure that this address is specific to this robot and not used anywhere else on this network. Default IP Address is 192.168.0.2
Click on OK when you are done.



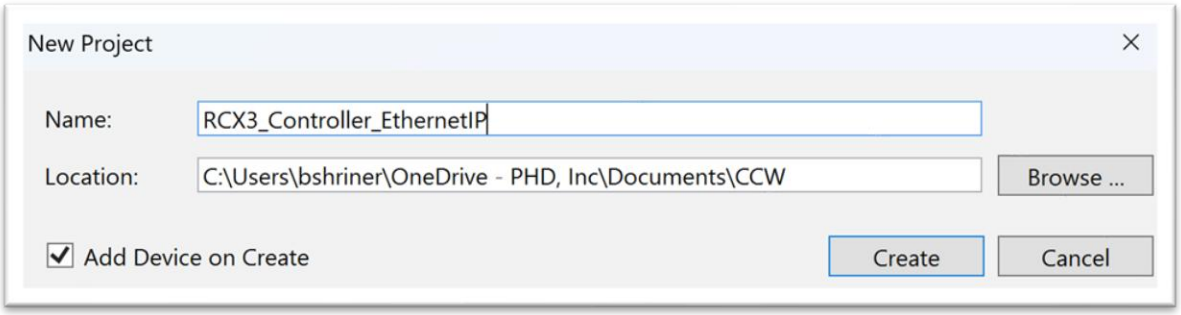

**Step #4:**
## REBOOT CONTROLLER
After all your changes be sure to save your changes.
Then reboot the robot controller for your changes to take effect.
Controller is now ready to communicate to the Allen Bradley master Ethernet/IP card

# 4 Setting up Ethernet/IP Communication

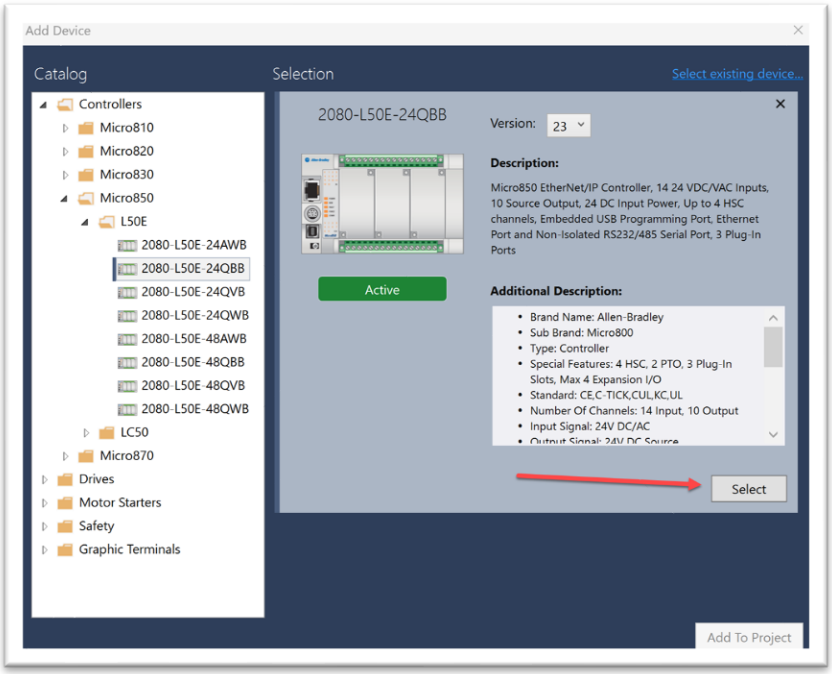
All Ethernet/IP communication must be connected to the forward-most RJ45 port located on the underside of the Productivity Series PLC CPU. This port serves as the primary interface for Ethernet/IP communication with external devices such as the Yamaha RCX3 controller.

## 4.1 Start a New Project with Connect Components Workbench

Select File then New to start a new project
Enter a name for the project and pick the proper save location
Ensure that the “Add Device on Create” box is checked
Click “Create” to create the project

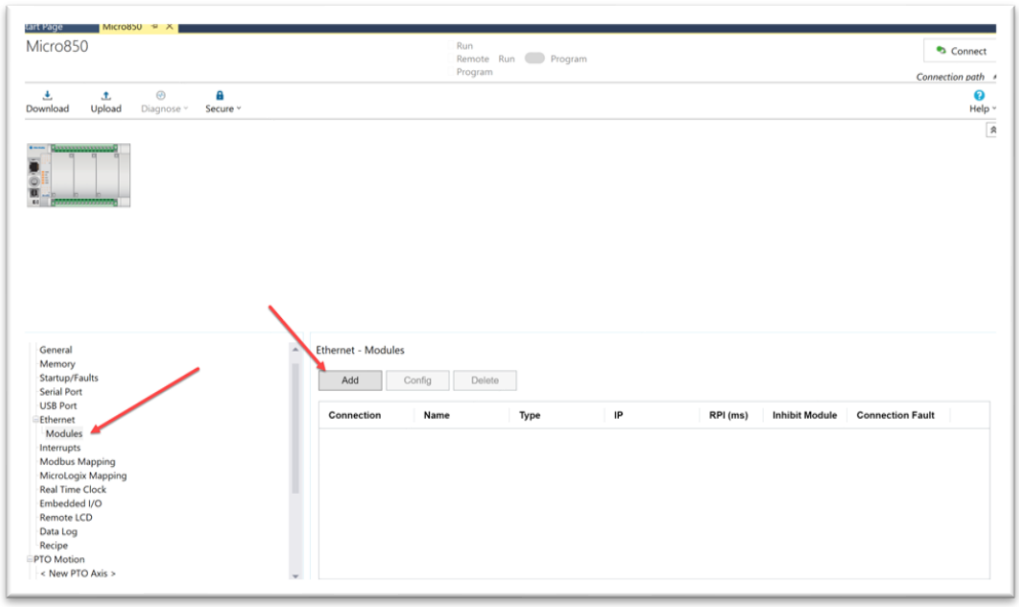



Under “Controllers” find the type of Micro 850 controller that is being used
Once found select the correct PLC and enter the proper firmware version
Click the “Select” button
Select the “Add to Project” button to finish the creation of the project

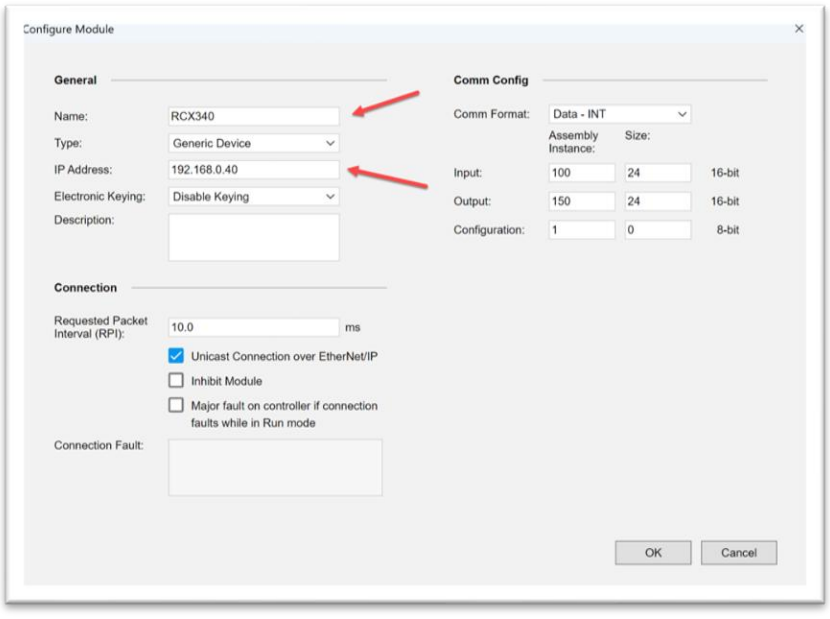


## 4.2 Create a New Ethernet Connection

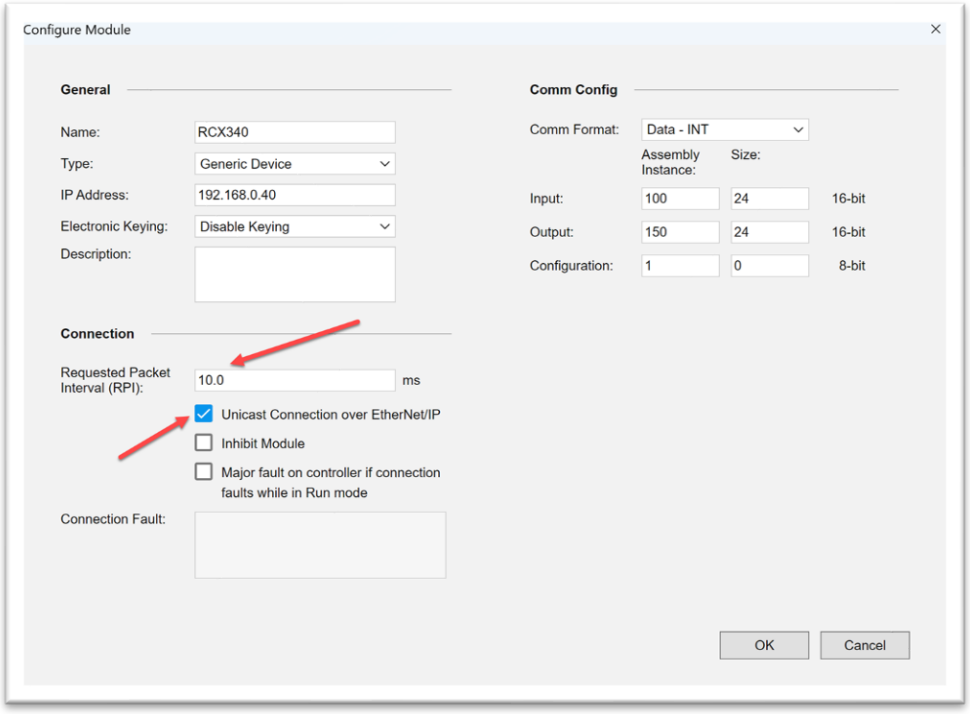
On the main page of the project find “Ethernet” select “Modules” then select “Add”



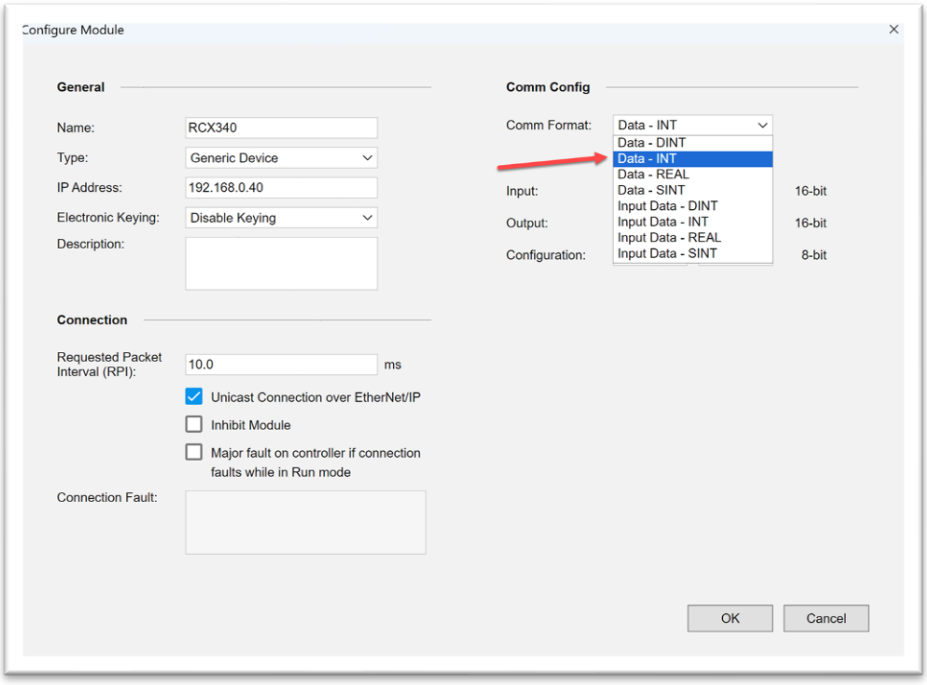

Under the “General” section enter the name of the controller, and the IP address



Under the “Connection” section change the Requested Packet Interval (RPI) to 10.0
Also ensure that the Unicast Connection over EtherNet/IP box is checked




Under the “Comm Config” section change the data type to “Data – INT”



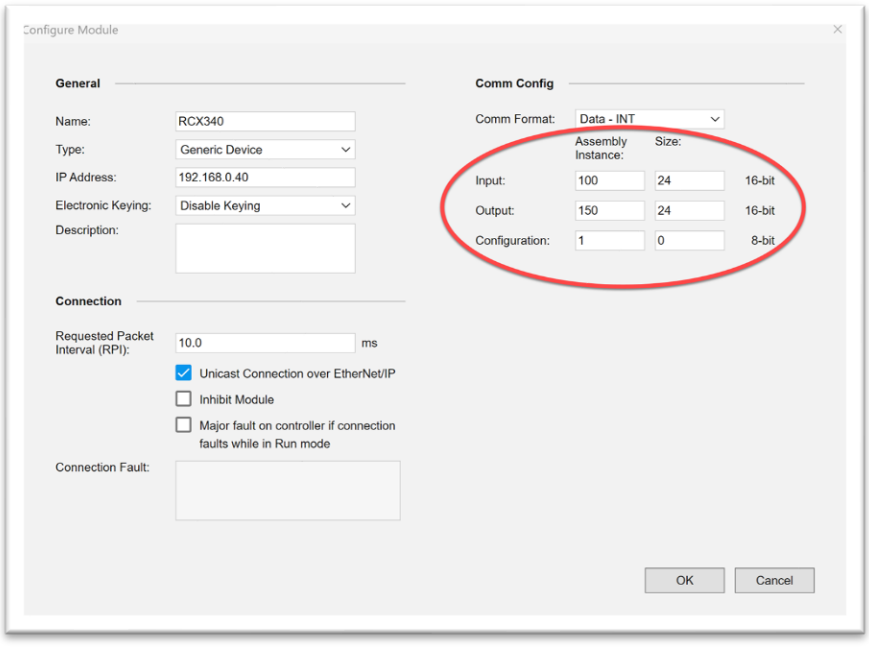
# Real-Time Outputs (RTOs) over Ethernet/IP

Real-Time Outputs (RTOs) are optional status signals sent from the Yamaha RCX340 robot controller to the Allen Bradley PLC over Ethernet/IP. These outputs reflect the robot's live operating state and can be used by the PLC to make real-time control decisions. While RTOs are not strictly required for basic operation or simple sequencing, they are highly beneficial in applications that demand precise coordination, reduced cycle time, or immediate fault handling. In systems where timing is less critical or where the robot operates independently from other equipment, RTOs may be unnecessary. However, in tightly integrated environments, they significantly improve responsiveness, safety, and overall system efficiency.

## RTOs Disabled:

Change the Input, Output, and Configuration assembly instance and size to match the following

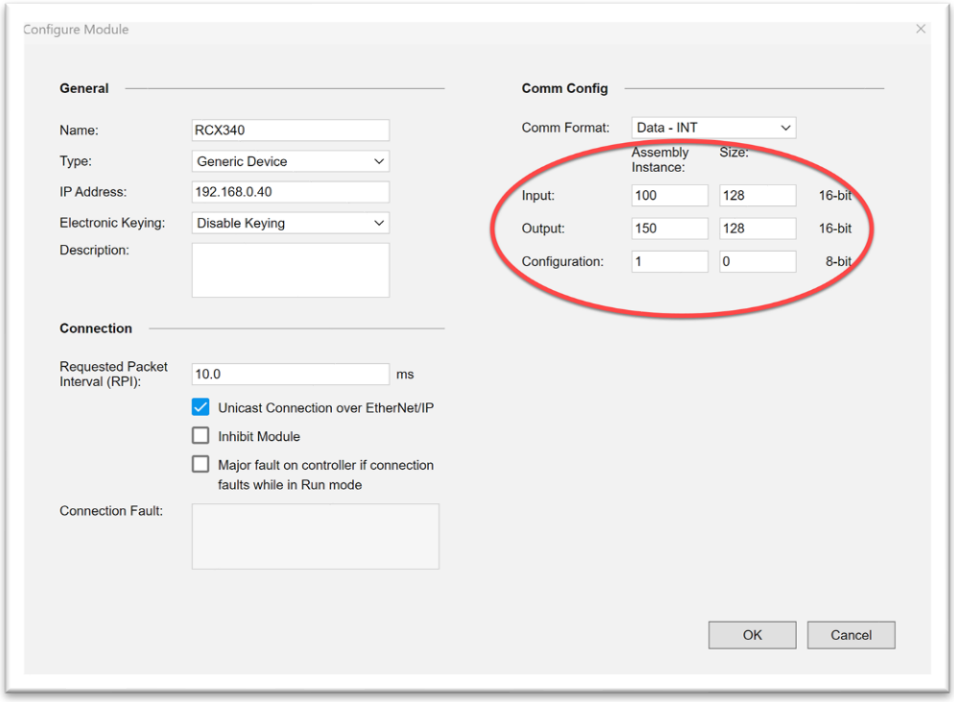
| | Assembly Instance: | Size: |
|---|---|---|
| Input: | 100 | 24 |
| Output: | 150 | 24 |
| Configuration: | 1 | 0 |



## RTOs Enabled:

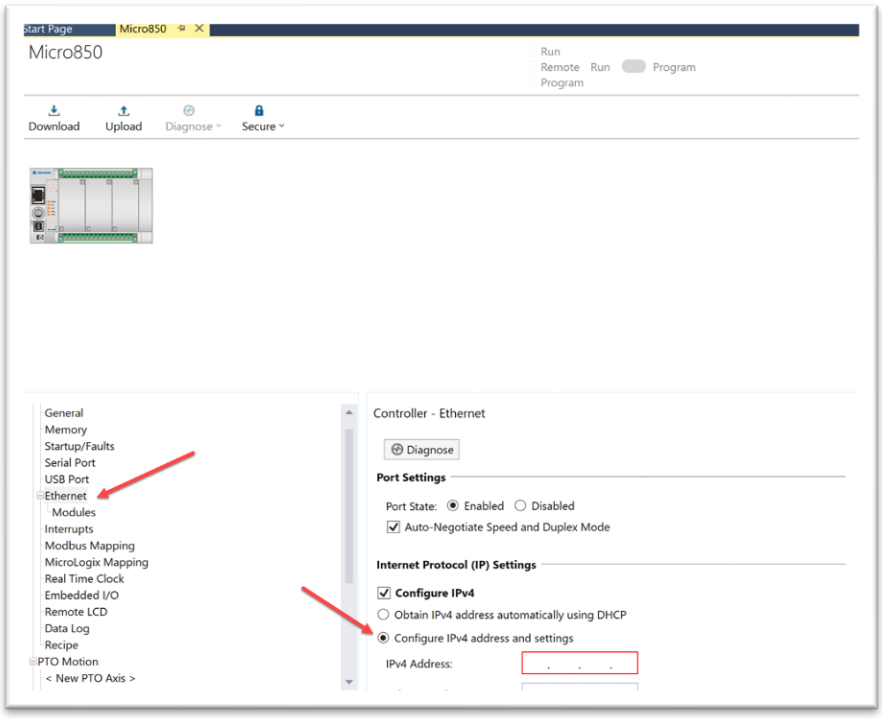
Change the Input, Output, and Configuration assembly instance and size to match the following

| | Assembly Instance: | Size: |
|---|---|---|
| Input: | 100 | 128 |
| Output: | 150 | 128 |
| Configuration: | 1 | 0 |



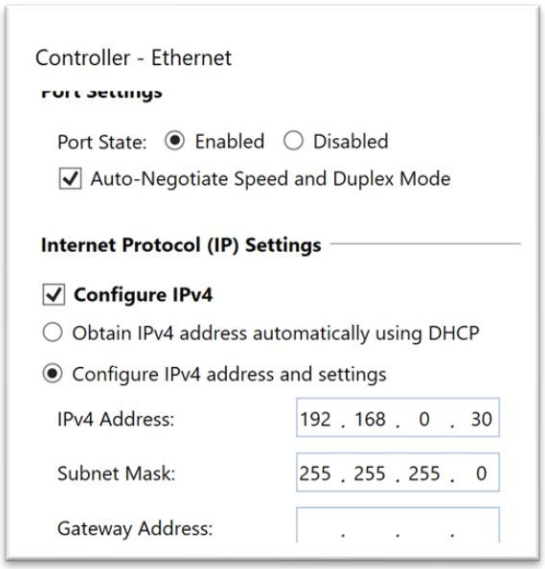
### 4.3 Ensure Ethernet address is set properly

On the main page of the project click on “Ethernet”
Select the “Configure IPv4 address and settings” button



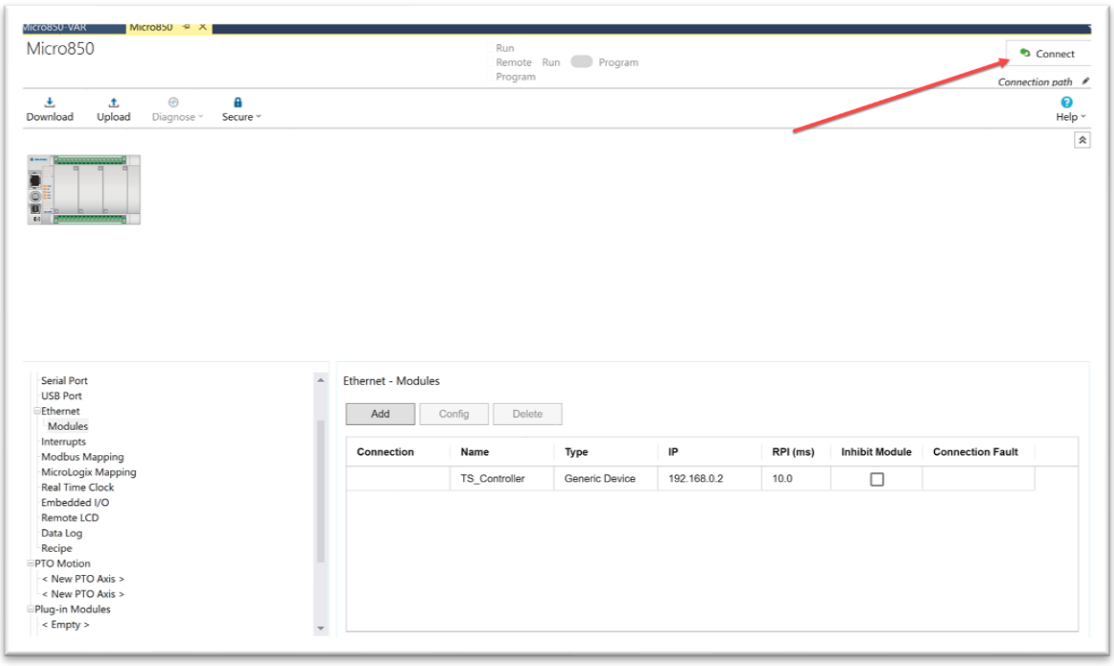

Enter the IP Address for the PLC and the Subnet Mask.

**<u>*** If this is not done the IP of the PLC will get reset to the default **</u>**

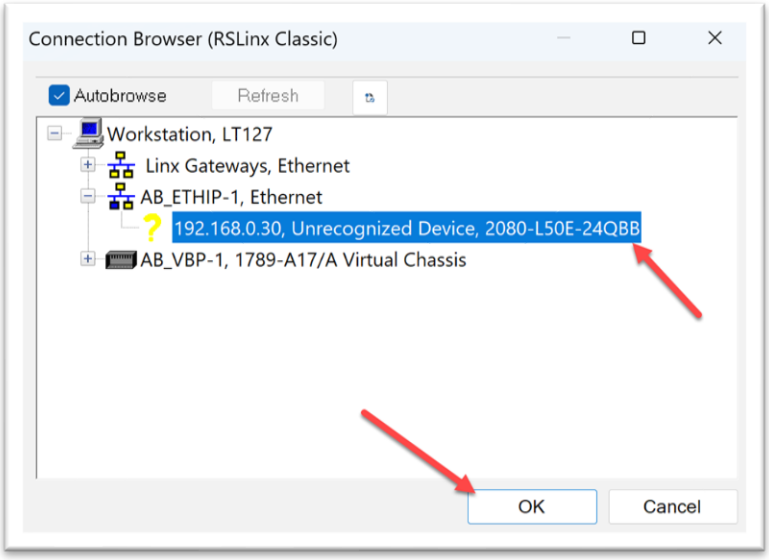


## 4.4 Uploading Project to Controller and Checking Tags are Configured

On the main screen of the project click “Connect” in the top right corner

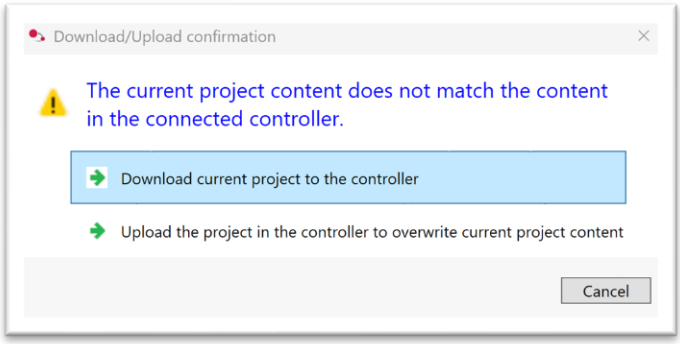



Find the Allen Bradley PLC that is going to be used and select it
Click “OK” to continue

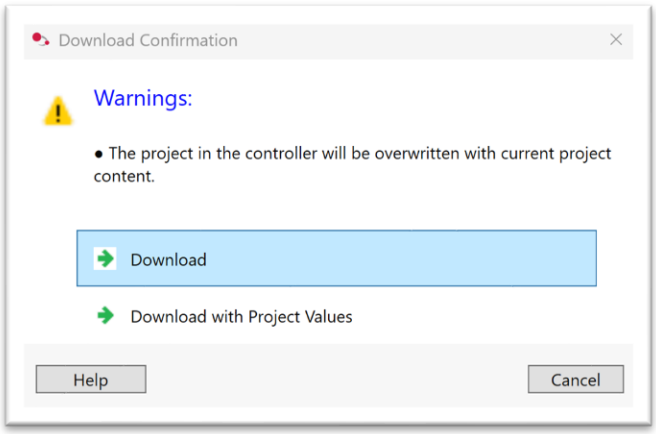


*****Ensure that anything important currently saved on the PLC is backed up and stored properly*****

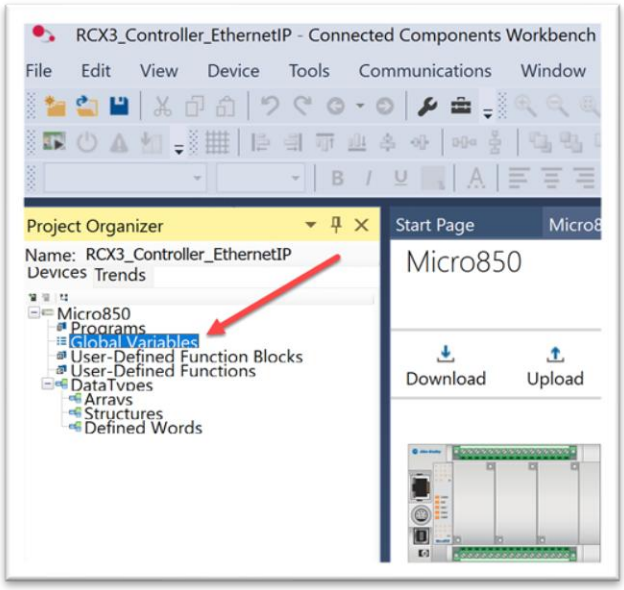
In the new window select “Download current project to the controller”



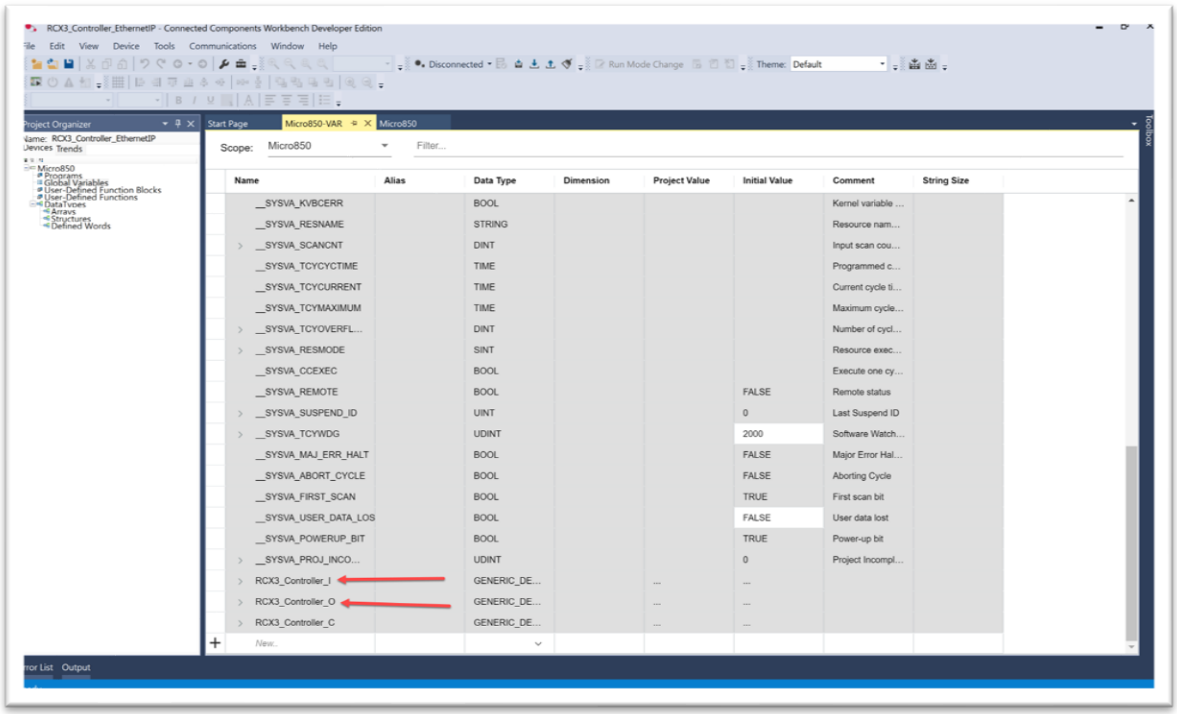

In the new window select “Download”
This will download the program to the controller with all the variables set as the **Initial Values**




To view the tags, select “Global Variables” in the “Project Organizer”



Scroll all the way to the bottom of the list and the tags should be shown
The array ending with “I” are the PLC inputs and the array ending with “O” are the PLC outputs
The array ending with “C” are the configuration tags




### 4.5 Identifying Tags

Unfortunately in Connected Components Workbench since these tags were automatically generated by the software it does not allow for a description or alias to be assigned to any of the tags. A list of the tag descriptions has been created and bundled with this manual.

## 5 Rung examples for dedicated I/O control

### 5.1 Input Tag Overview

(Please review the RCX 3 Series controller manual for a more in-depth explanation)

Please refer to the RCX_Controller_IOs document for a full list of I/Os.

### 5.2 Emergency Stop

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

**Emergency Stop bit needs to be a MAINTAINED signal**
(See timing chart in RCX3 controller manual)

### 5.3 Alarm Reset

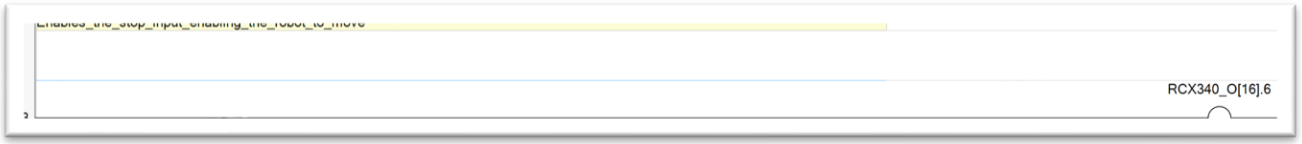
Dedicated rung to reset alarms on the controller.

**Alarm Reset bit needs to be a MOMENTARY signal.**
(See timing chart in RCX3 controller manual)


### 5.4 Stop Input

Dedicated rung to enable the stop bit, thus allowing the robot to move.

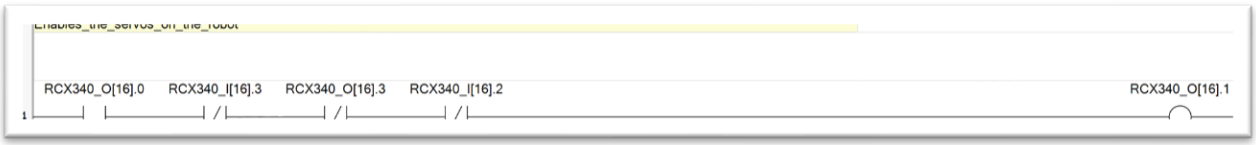
**Stop Input bit needs to be a MAINTAINED signal.**
(See timing chart in RCX3 controller manual)




### 5.5 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.

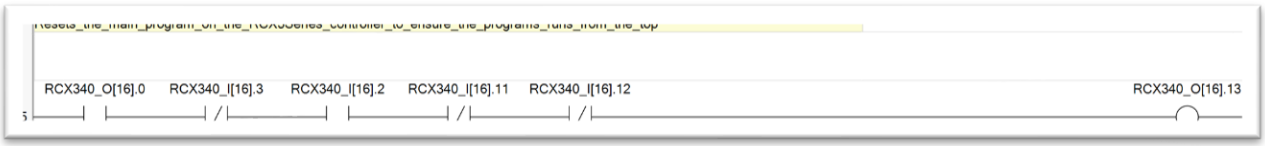
**Servo On bit needs to be a MOMENTARY signal.**
(See timing chart in RCX340 controller manual)




### 5.6 Reset Program

Dedicated rung to reset the main program before running.

**Reset Program needs to be a MOMENTARY signal.**
(See timing chart in RCX340 controller manual)



## 5.7 Start Program

Dedicated rung to start the main program within the controller.

**Start Program bit needs to be a MOMENTARY signal**
(See timing chart in RCX340 controller manual)