Motors

Automation

Energy

Transmission and Distribution

Coatings

CFW900 - AOI

Configuration

Driving efficiency and sustainability

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WEG CFW900 AOI Configuration

SUMMARY OF REVISIONS

The information below describes the revisions made to this manual.

Version	Description
1.0	Initial release of the document.
2.0	Updated to include additional information for setup and troubleshooting.
-	-
-	-

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To ensure safe operation, observe all instructions in this manual, and the warning information in the other applicable documents for the variable frequency drive technology that is used.
Work on and with variable frequency drives, must only be carried out by qualified personnel.

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About This Manual

This manual supplies the necessary information to operate the CFW900 drive using the Ethernet IP interface to communicate with a Rockwell PLC with an AOI. It must be used together with the CFW900 user's manual and programming manual.

This document is intended for qualified personnel experienced in the operation of the specified equipment and the installation of EtherNet IP networks. Proficiency in automation and programmable logic controllers, particularly with Rockwell Automation software, is required.

REFERENCED DOCUMENTS

This manual was developed based on the following documents and tools:

Document/Tool	Version	Source
CFW900 User's Manual	10008985516 / 07	WEG
CFW900 Programming Manual	10008985492 / 09	WEG
Studio 5000 PLC programming software	37	Rockwell Automation

These documents and tools can be referred to for additional information.

Terms and Definitions

AOI: Add On Instruction. Add On Instructions are used to encapsulate and reuse logic in Rockwell PLCs.

BOOl: Boolean is a data type that has one of two possible values, which is intended to represent the two truth values of logic and Boolean algebra.

CFG: Configuration

CIP: Common Industrial Protocol. CIP connections are automatically established over a TCP connection and transfer data from one device on the EtherNet/IP network to another.

DINT: Double integer equates to 32 bits of data. Creating a DINT structure on the PLC will result in a structure that will have 32 BOOLs.

EDS: Electronic Data Sheets. EDS files are simple text files used by software to help you identify products and quickly commission them on a network.

INT: Integer. The structure within the PLC can be broken down into 16 distinct booleans, which correlates to the fact that an integer is 16 bits.

IP: Internet Protocol. A set of rules governing the format of data sent over the internet or other networks.

PLC: Programmable Logic Controller

RPI: Requested Packet Interval, generally expressed in milliseconds, is the interval of periodic data exchange between the scanner and the adapter. A connection request from the scanner establishes the repetition interval, or RPI, in both directions.

VFD: Variable Frequency Drive

WEG CFW900 AOI Configuration

Prerequisites

Exclusions

This document does not go into detail of setting up a controller in RSLOGIX/STUDIO 5000.

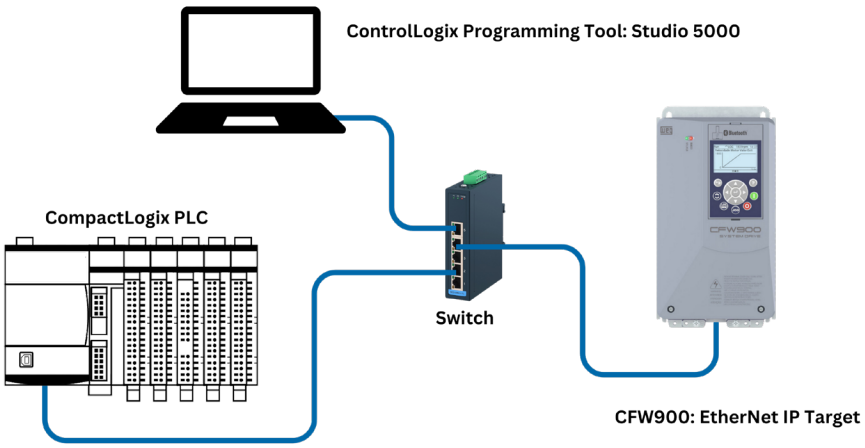
The connection and configuration of the IP network is beyond the scope of this document.

All non-communication specific parameters on the CFW900 are excluded from the configuration requirements of this document.

System Components

This document assumes that the following components are available and configured:

- A CFW900 running version 1.09.01 (or higher) firmware.
- A 10/100 or Faster Ethernet network with IP connectivity and IP addresses for both the PLC and VFD.
- The Fast Ethernet 100BASE-TX standard is recommended.
- Programming tools for the PLC (RS Logix or Studio 5000 Logix Designer).
- We recommend using certified components for all passive network components (cables and Ethernet switches) in industrial applications. Please refer to the CFW900 EtherNet/IP Communication Manual for information about the proper network installation.



WEG CFW900 AOI Configuration

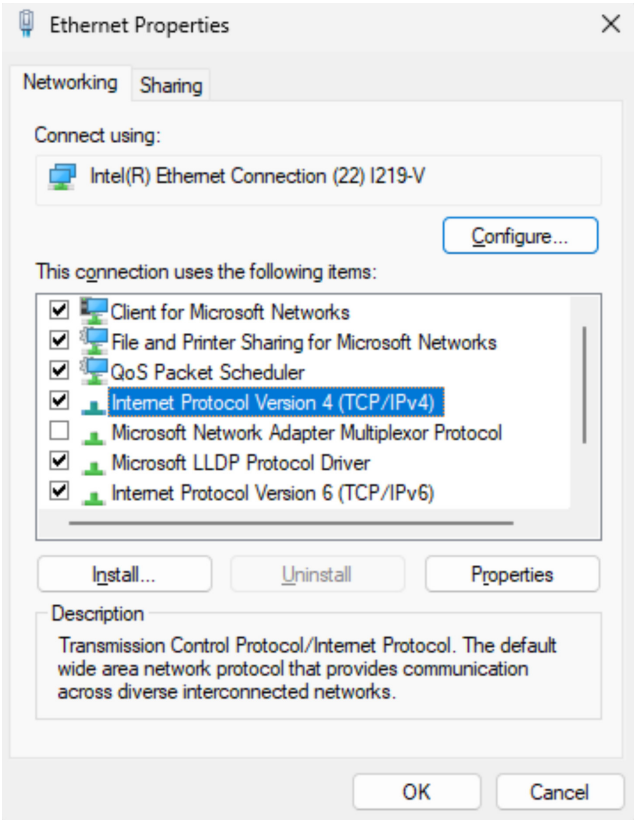
IP Address and Network Configuration

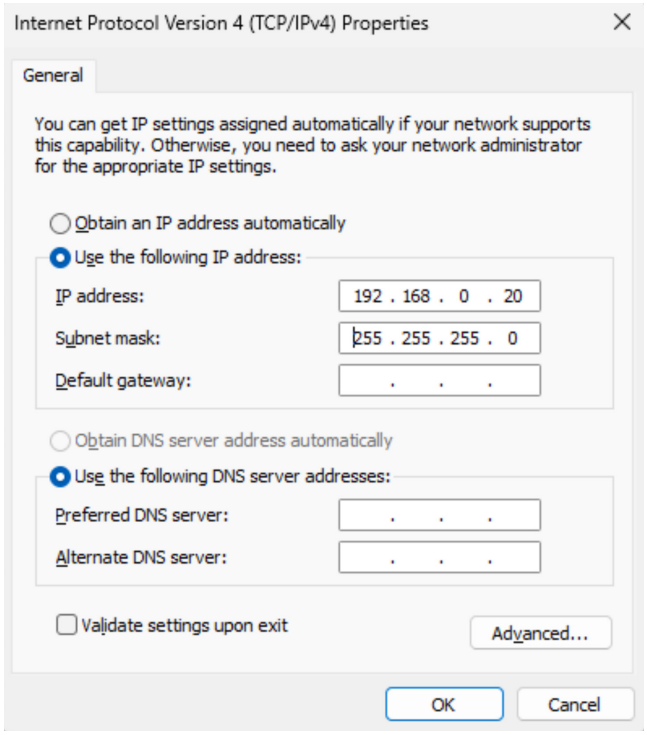
To allow communication among the devices, they need to have an compatible IP address configuration. It means the IP address must be at the same range, according to network mask. For this example, we will use the following IP addresses in this document:

- Subnet mask: 255.255.255.0
- IP addresses: each device must have a different IP address.
  PC: 192.168.0.20
  ControlLogix: 192.168.0.71
  CFW900: 192.168.0.126

PC IP Address Configuration

To configure these options at Windows platform, go to “Network Connections” and open “Properties” of the desired

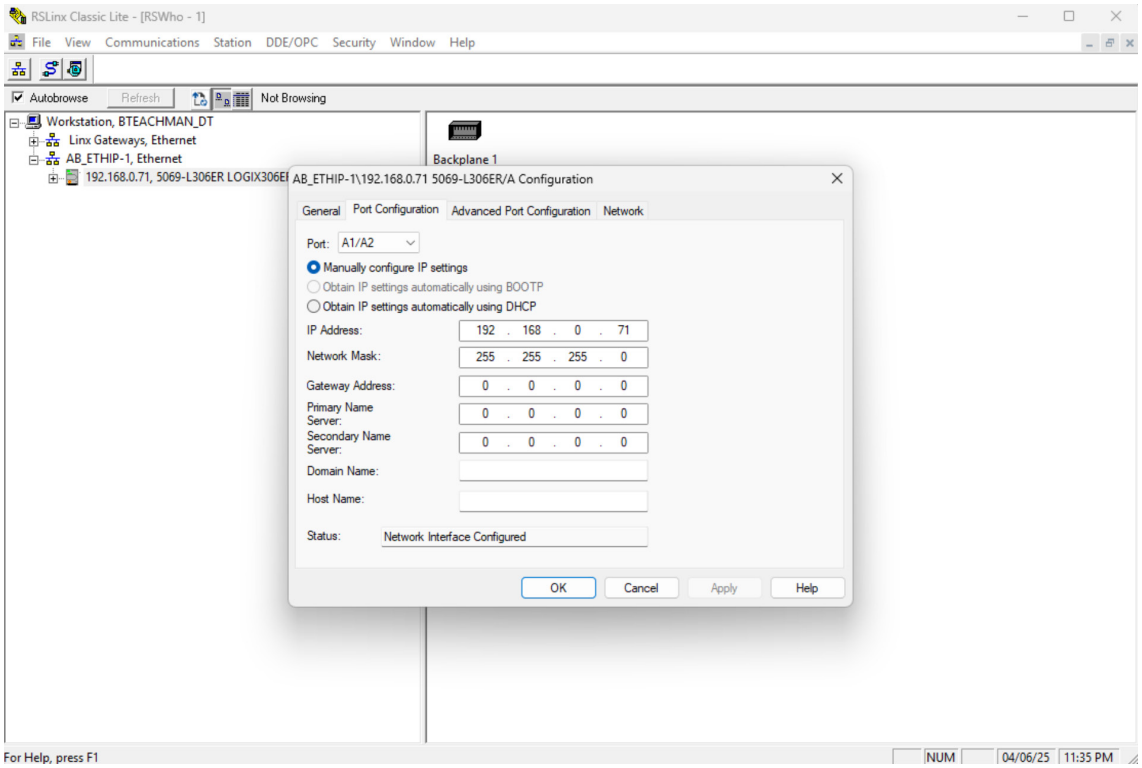




WEG CFW900 AOI Configuration

PLC IP Address Configuration

User can set IP Address for the Rockwell PLC using Rockwell configuration tools. Check PLC documentation to obtain information about how to perform this configuration.



CFW900 Ethernet Interface

For this application, the following configurations have been done via keypad to allow Ethernet communication to PLC:

- C9.4.1 IP Address Setting: 0 (Parameters).
- C9.4.2 IP Address: 192.168.0.126
- C9.2.4.3 CIDR: 24
- C9.2.4.4 Gateway: 0.0.0.0

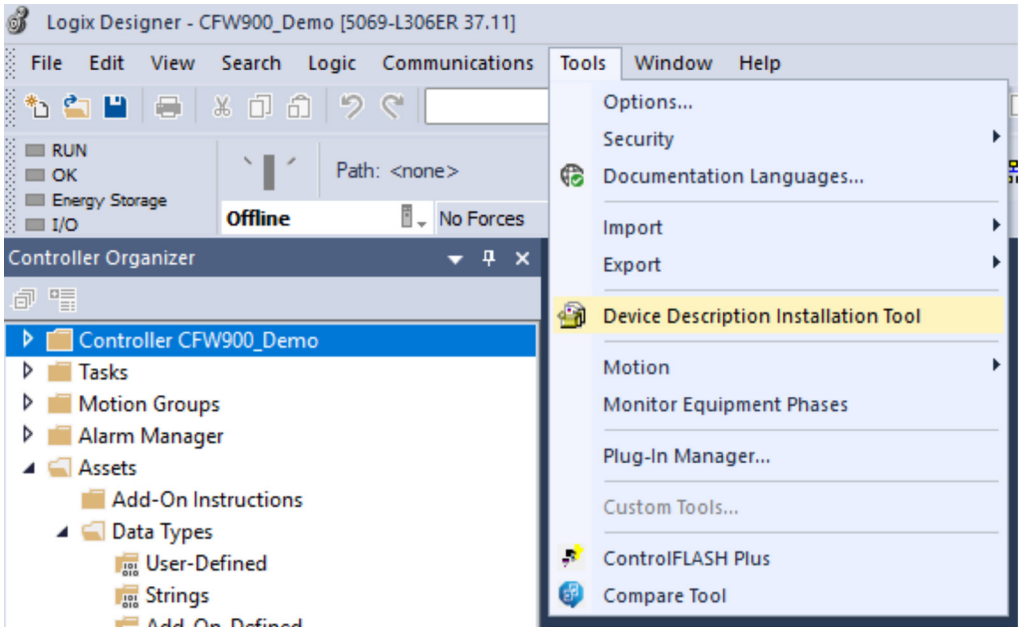
✓ **NOTE!**

After changing these configurations, for the modification to be effective, the equipment must be turned off and then turned on again.

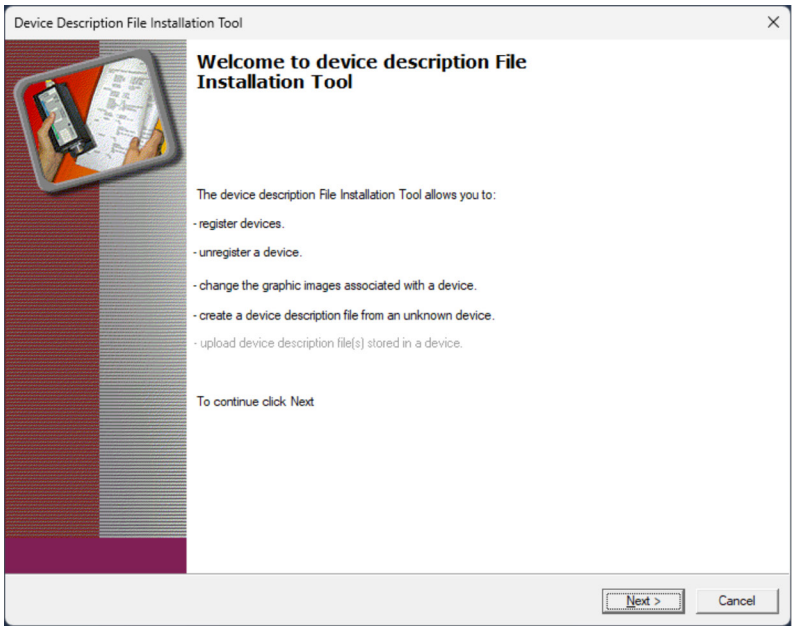
WEG CFW900 AOI Configuration

EDS Installation

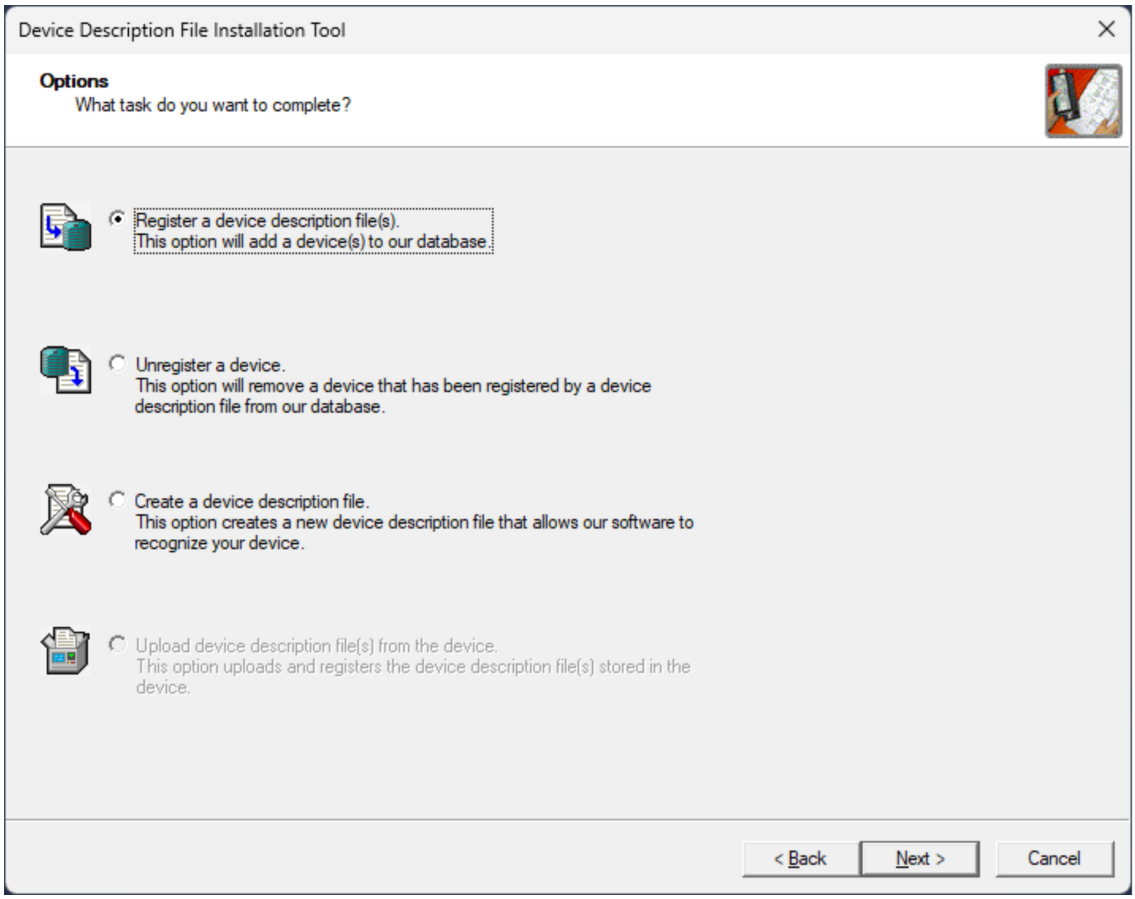
Begin by adding the EDS file for the CFW900 if it not already in the project.



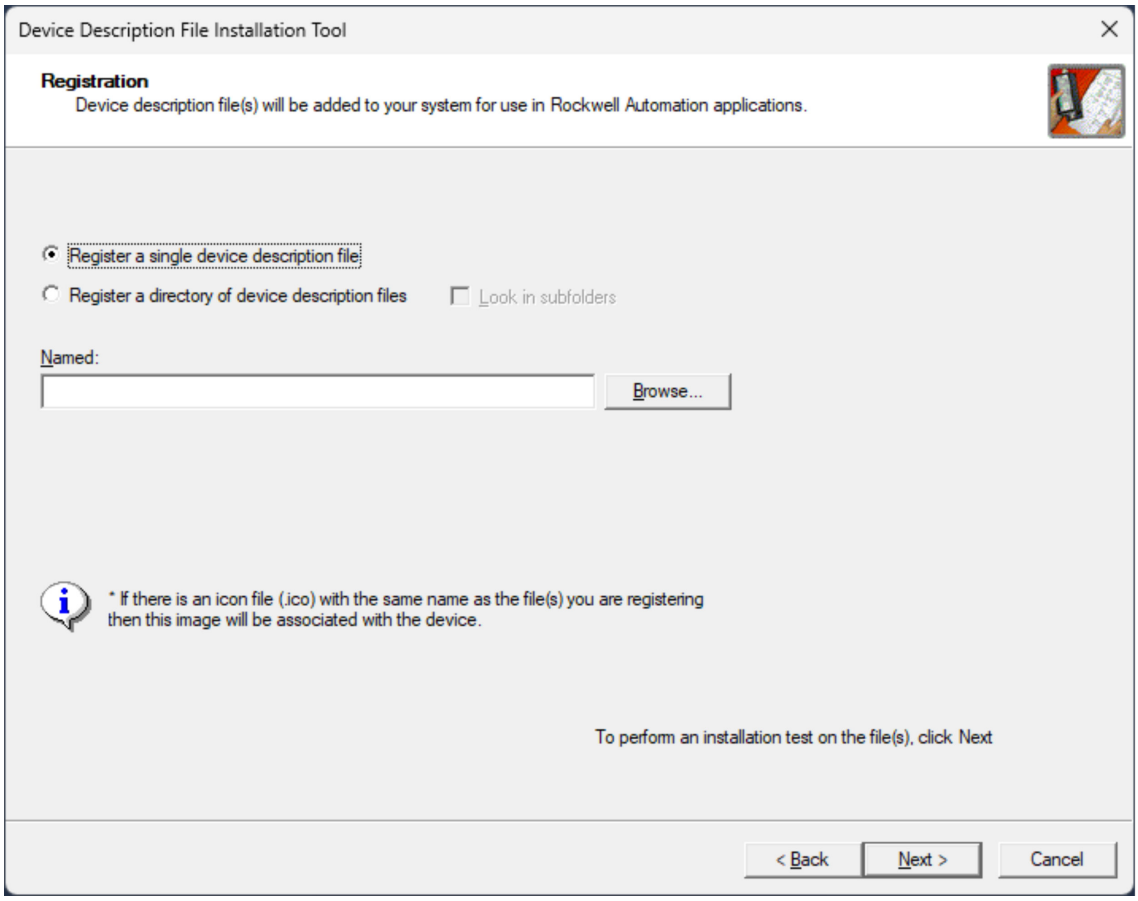
From inside Logix Designer, go to Tools -> Device Description Installation Tool



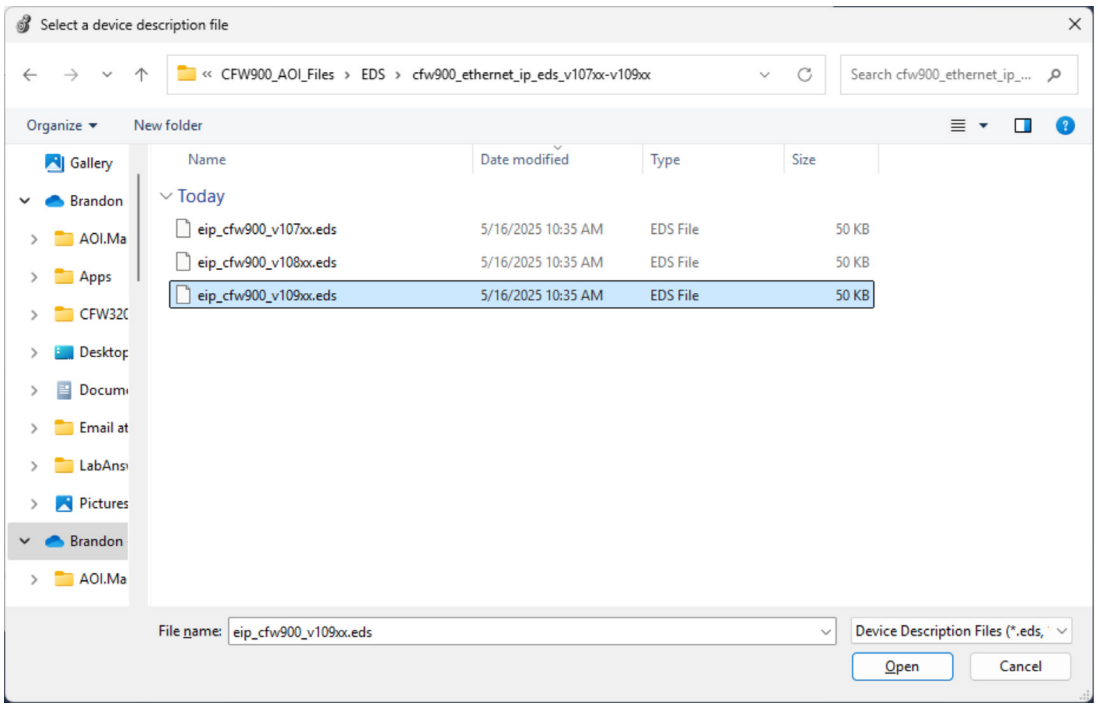
Click Next >


Device Description File Installation Tool
Options
What task do you want to complete?
Register a device description file(s).
This option will add a device(s) to our database.
Unregister a device.
This option will remove a device that has been registered by a device description file from our database.
Create a device description file.
This option creates a new device description file that allows our software to recognize your device.
Upload device description file(s) from the device.
This option uploads and registers the device description file(s) stored in the device.
< Back
Next >
Cancel

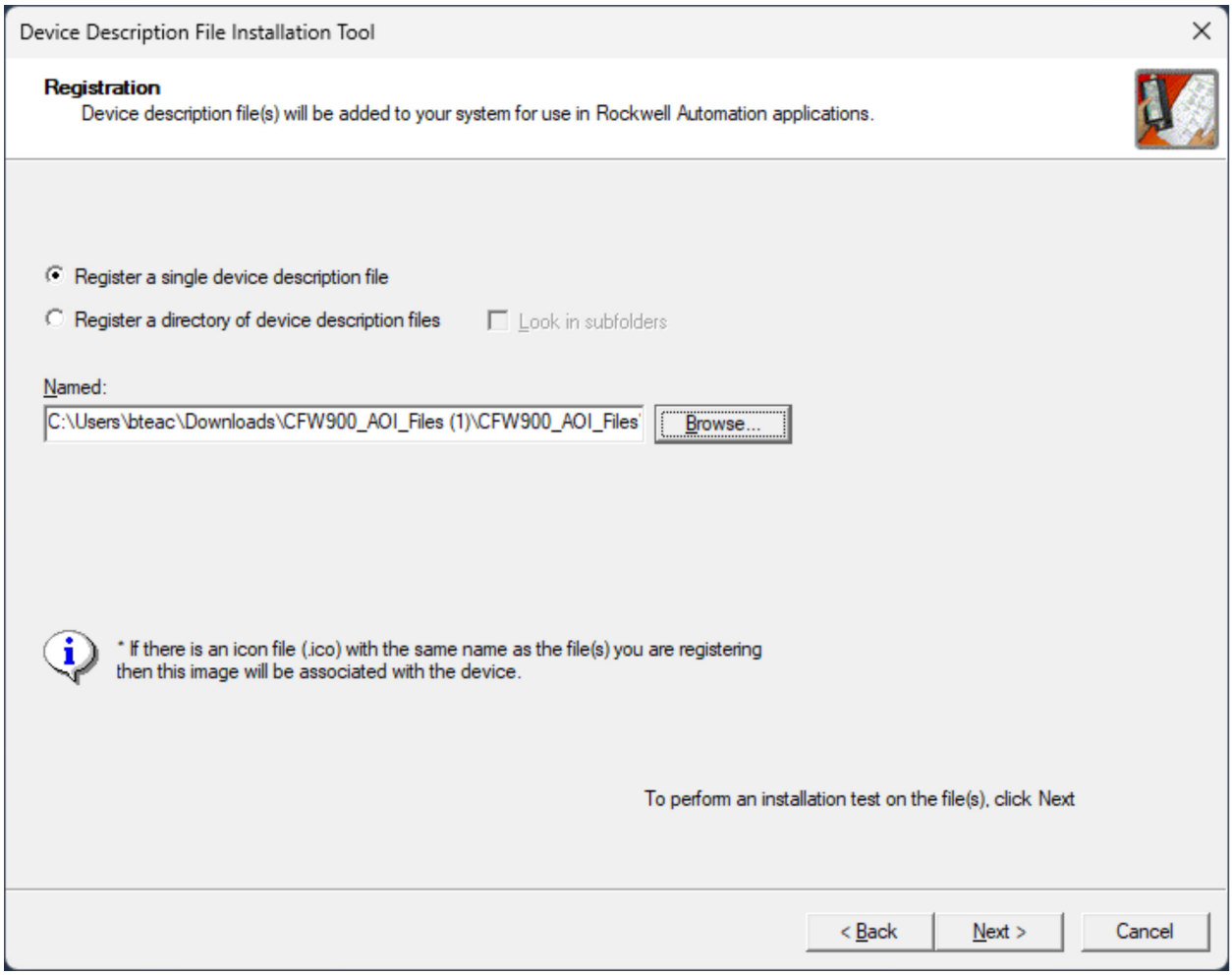
Click Next >



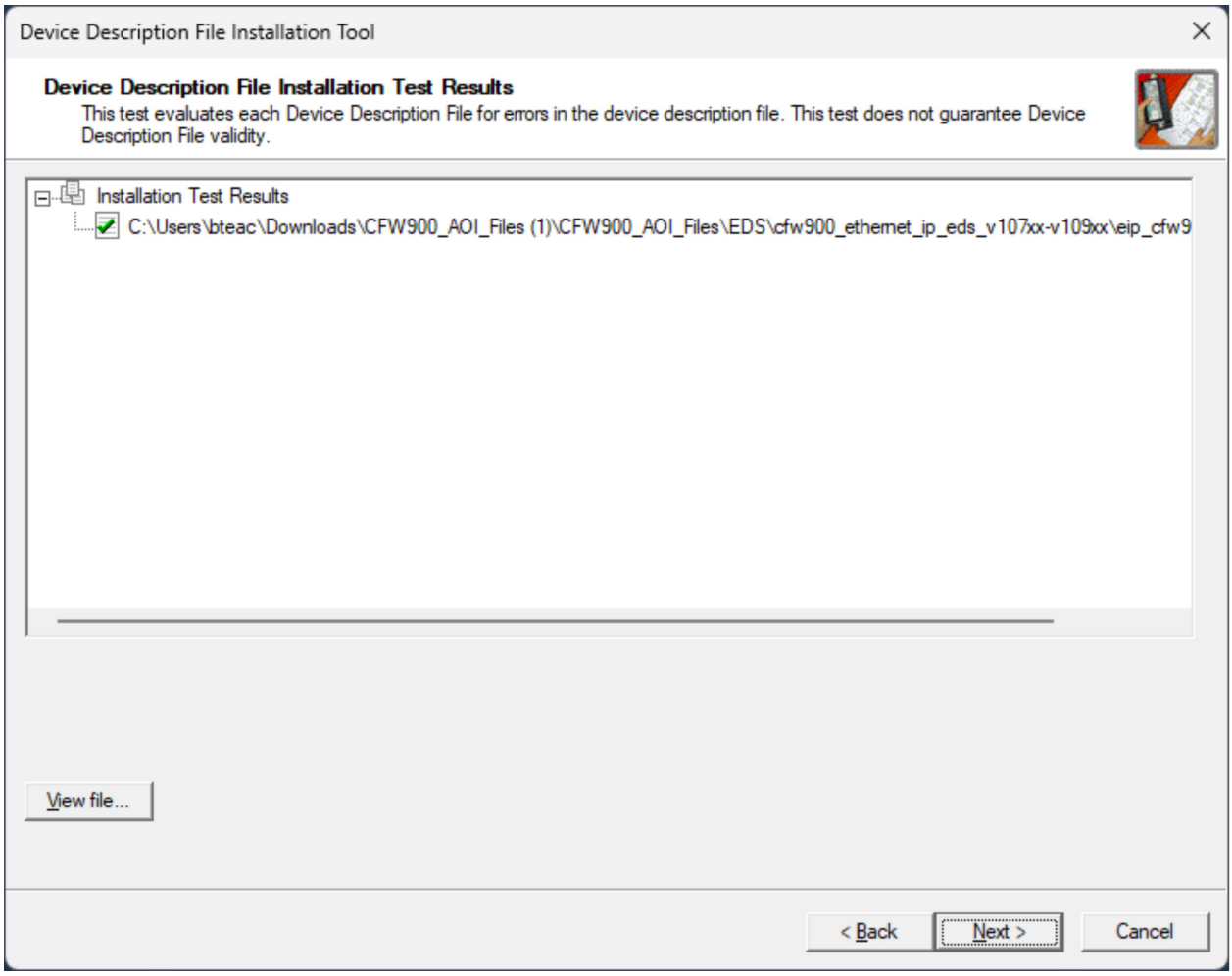
Click Browse ...



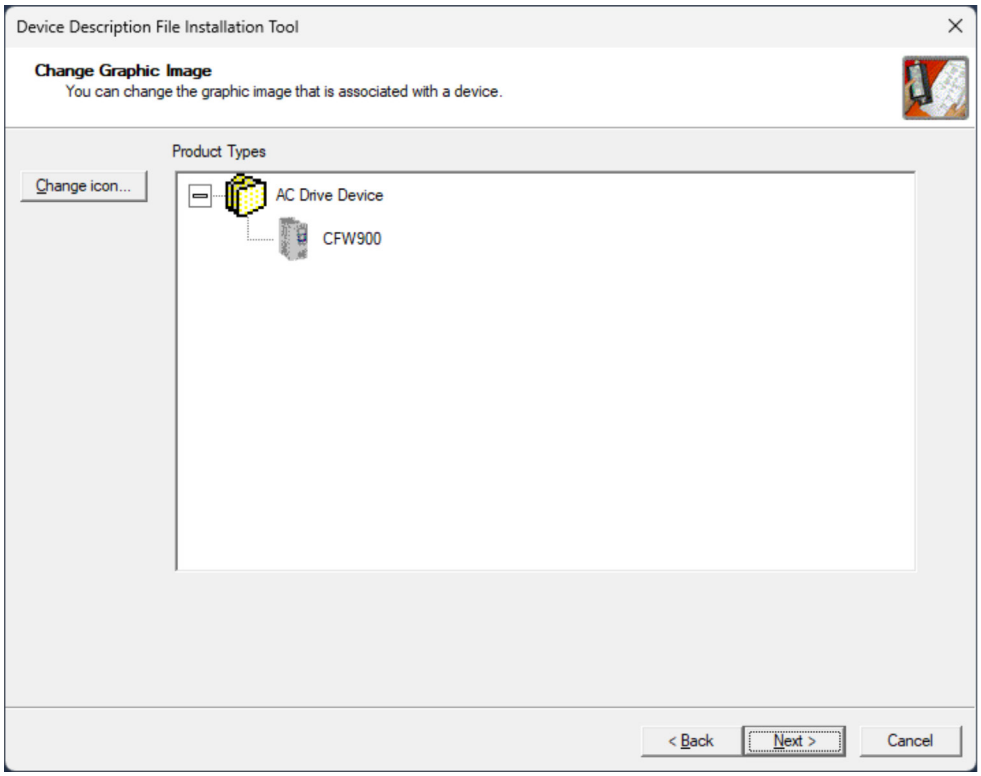
Browse to where the downloaded eds file is located and click Open


Device Description File Installation Tool
Registration
Device description file(s) will be added to your system for use in Rockwell Automation applications.
Register a single device description file
Register a directory of device description files
Look in subfolders
Named:
C:\Users\bteac\Downloads\CFW900_AOI_Files (1)\CFW900_AOI_Files
Browse...
* If there is an icon file (.ico) with the same name as the file(s) you are registering then this image will be associated with the device.
To perform an installation test on the file(s), click Next
< Back
Next >
Cancel

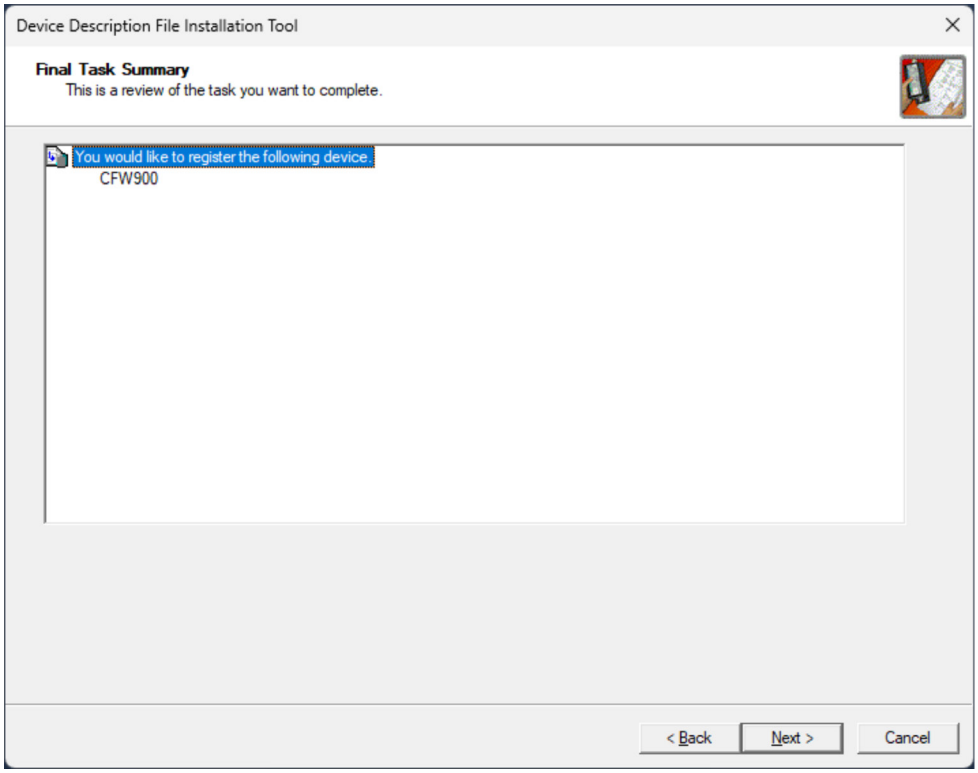
Click Next >



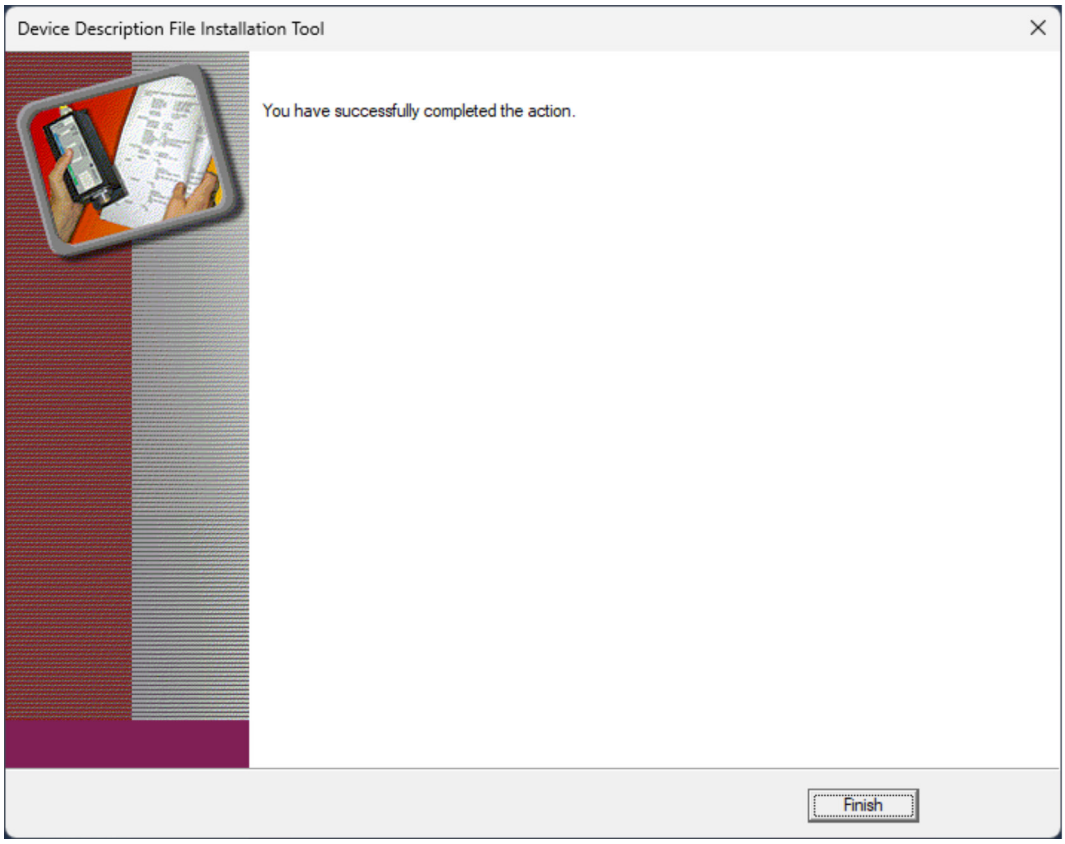
There should be a green checkmark. Click Next >



Click Next >



Click Next >



Click Finish

The EDS file is now installed and the CFW900 can be added as an Ethernet/IP device in the device tree.

Selecting the Correct AOI for Your Application

WEG offers six (6) different Add-On Instructions (AOIs) for the CFW900. Each AOI is specifically used for a single connection instance type. The system designer should select the best AOI based on the project's requirements. If you are starting a program from scratch, it is generally recommended that you use the CFW900_101151 if you need torque control and the CFW900_100150 if you do not need torque control. Below is an overview of the AOI options:

1. **CFW900_2070 (CIP Basic Speed)**: This AOI is used when the 20/70 CIP Basic Speed control mode is desired. This AOI uses the least data required for communication, reducing network traffic, but it gives you the least amount of data back.

2. **CFW900_120170 (CIP Basic Speed + IO)**: This AOI is used when the 120/170 CIP Basic Speed control mode + IO is desired. This behaves similarly to the 20/70 CIP Basic Speed, but adds the following parameters:
    a. Output: Output Current, Output Voltage, Output Frequency, & Last Fault Code
    b. Inputs: Acceleration Ramp 1& Deceleration Ramp 1

3. **CFW900_2171 (Extended Speed Control)**: This AOI is used when the 21/71 CIP Extended Speed control mode is desired.

4. **CFW900_121171 (Extended Speed Control + IO)**: This AOI is used when the 121/171 CIP Extended Speed control mode + IO is desired This behaves similarly to the 21/71 CIP Extended Speed, but adds the following parameters:
    a. Outputs: Output Current, Output Voltage, Output Frequency, & Last Fault Code
    b. Inputs: Acceleration Ramp 1, & Deceleration Ramp 1

5. **CFW900_100150 (Manufacture Speed + IO)**: This AOI is used when the 100/150 Manufacture Speed + IO is desired. This uses the WEG status word and is controlled slightly differently from the CIP style controls. Additionally, the AOI handles the following additional parameters:
    a. Outputs: Output Current, Output Voltage, Output Frequency, & Last Fault Code
    b. Inputs: Acceleration Ramp 1 & Deceleration Ramp 1

6. **CFW900_101151 (Manufacture Speed + IO + Torque)**: This AOI is used when the 101/151 Manufacture Speed + IO is desired. This uses the WEG status word and is controlled slightly differently from the CIP style controls. This mode is suited for torque control. Additionally, the AOI handles the following additional parameters:
    a. Outputs: Torque Reference, Output Current, Output Voltage, Output Frequency, & Last Fault Code
    b. Inputs: Acceleration Ramp 1, Deceleration Ramp 1, Torque IncRamp, & Torque DecRamp

CFW900_2070 AOI (CIP Basic Speed)

This AOI is used when the 20/70 CIP Basic Speed control mode is desired and handles the following additional parameters:

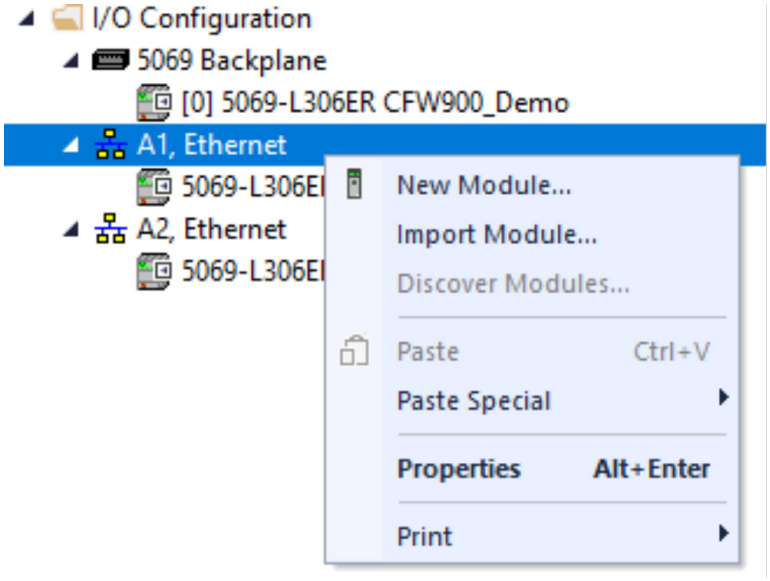
Outputs

- Real Speed

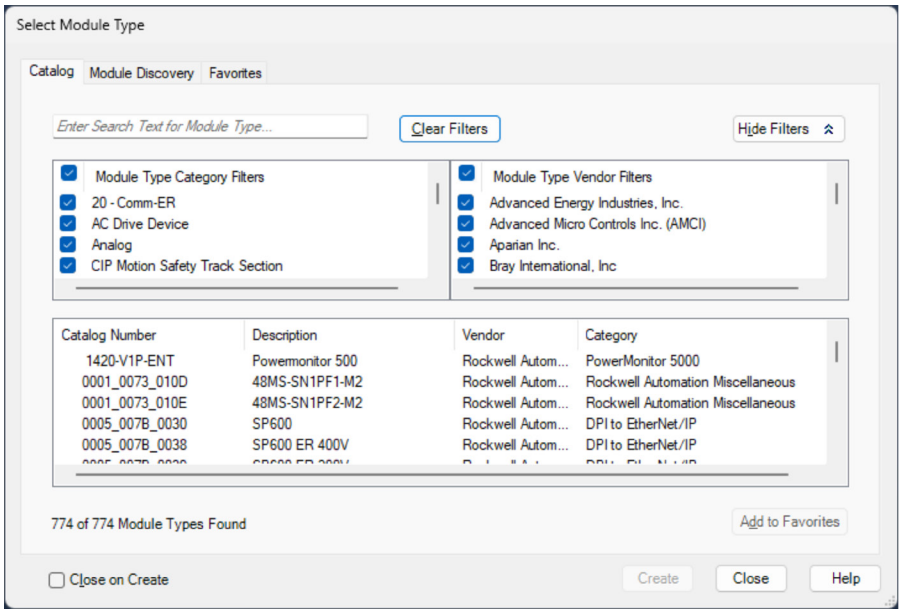
Inputs

- Speed Refrence

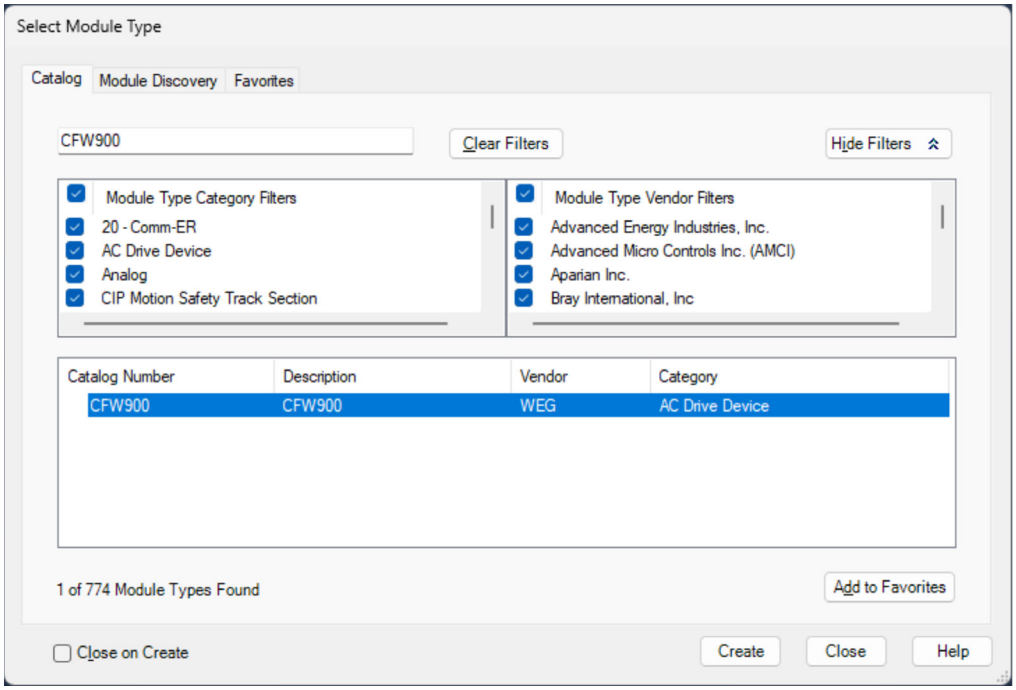
Create the EtherNet/IP Device



In the device tree, right click on the Ethernet bus that will contain the CFW900 and click New Module...

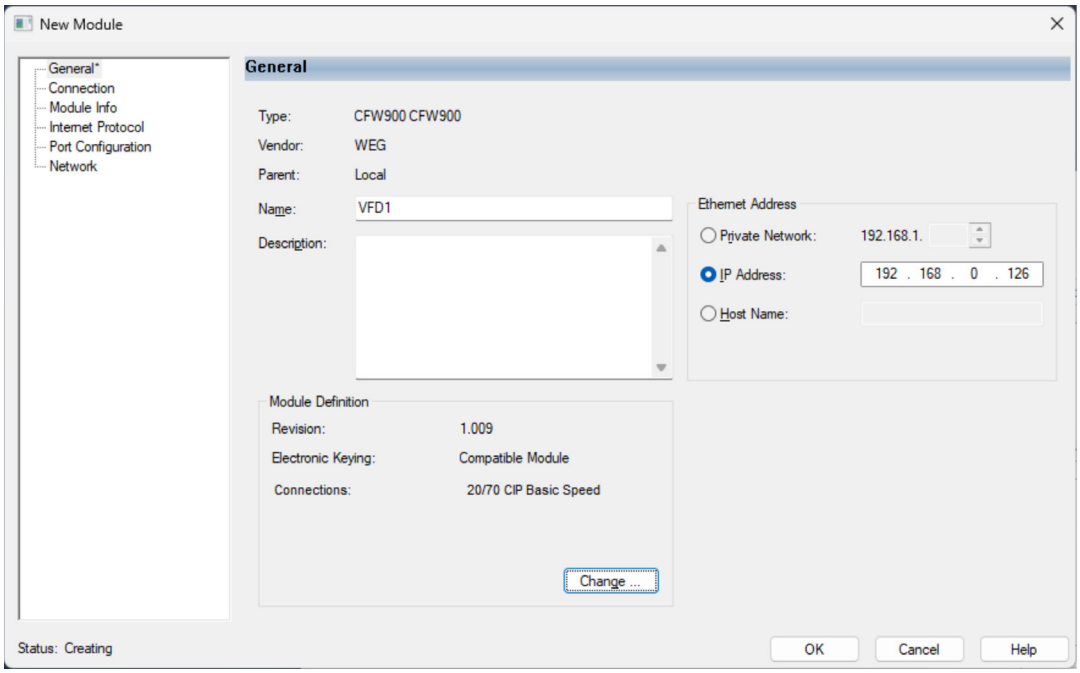


In the Select Module Type dialog box, enter “CFW900” in the search field



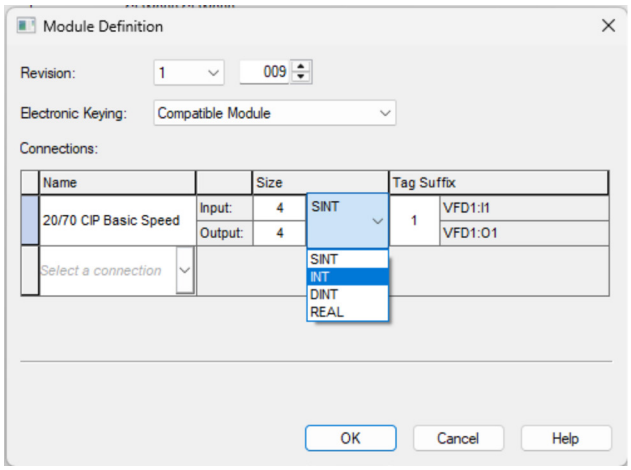
There should be an entry matching the above screenshot.

Highlight the CFW900 and click Create

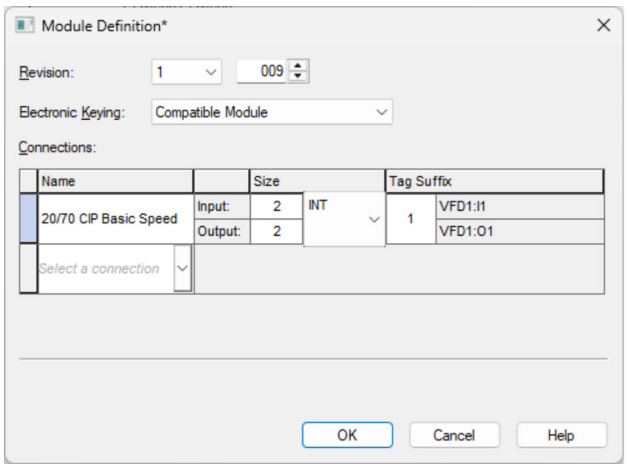


Give the CFW900 a name and enter the IP address of the drive.

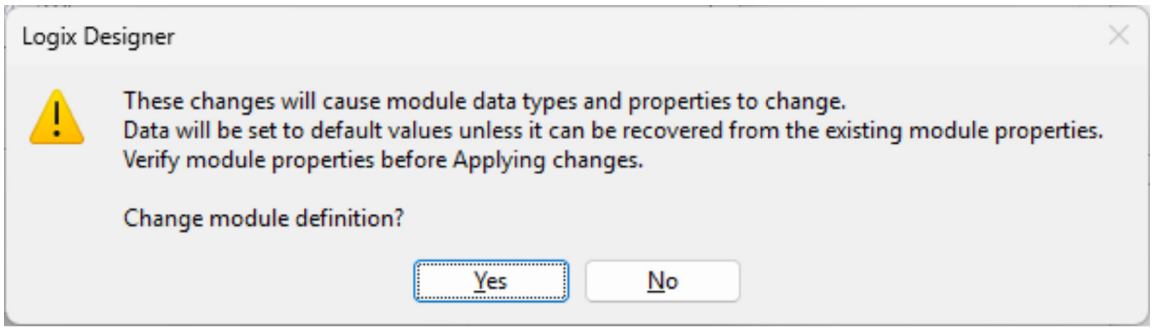
Before clicking on OK, click on the Change ... button in the module definition.



Change the type to INT

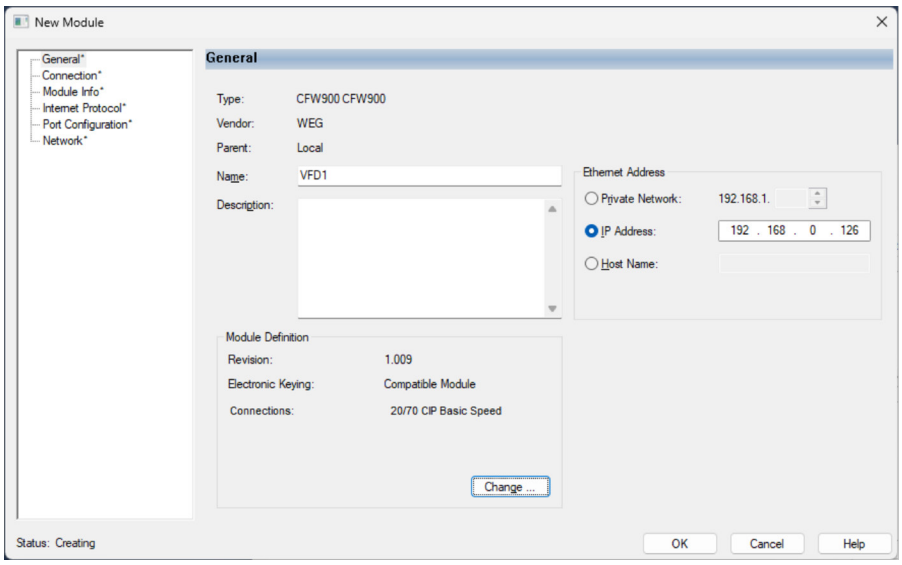


The Input and output size should be set to 2 and 2 respectively. Click OK



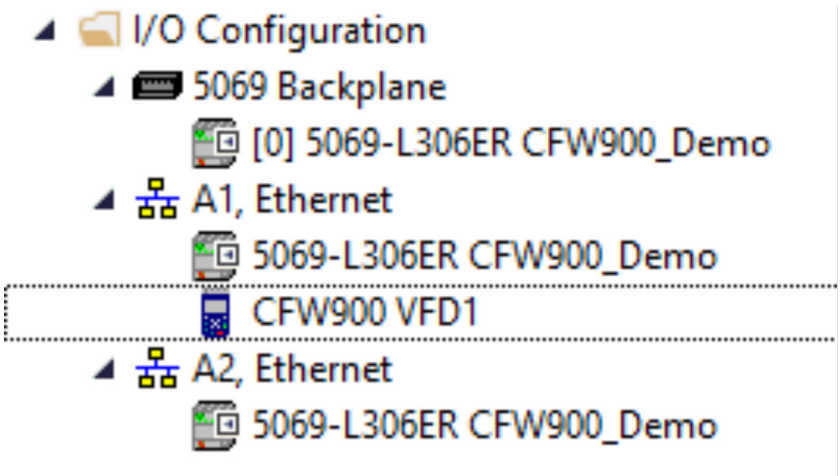
Click Yes

At this point, no other changes are required. However, changing the RPI can be done if the need arises.



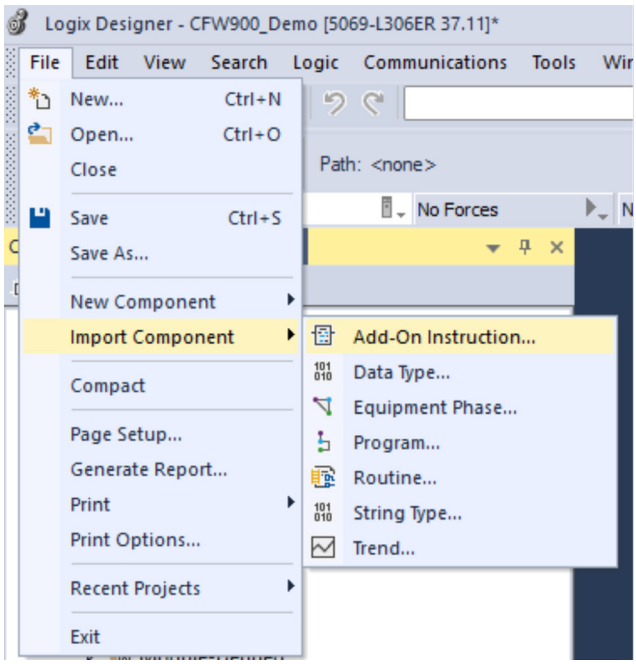
See the Trouble Shooting section to learn more about changing the RPI.

Once satisfied with the settings, Click OK

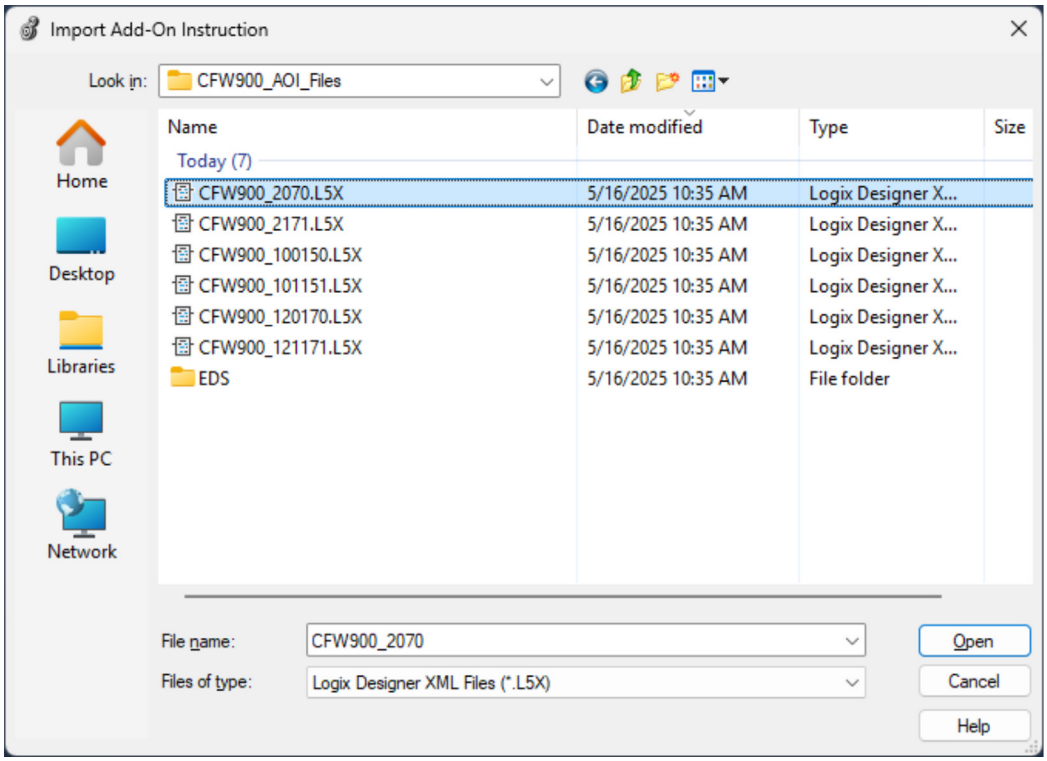


There should now be an instance of the CFW900 in the device tree

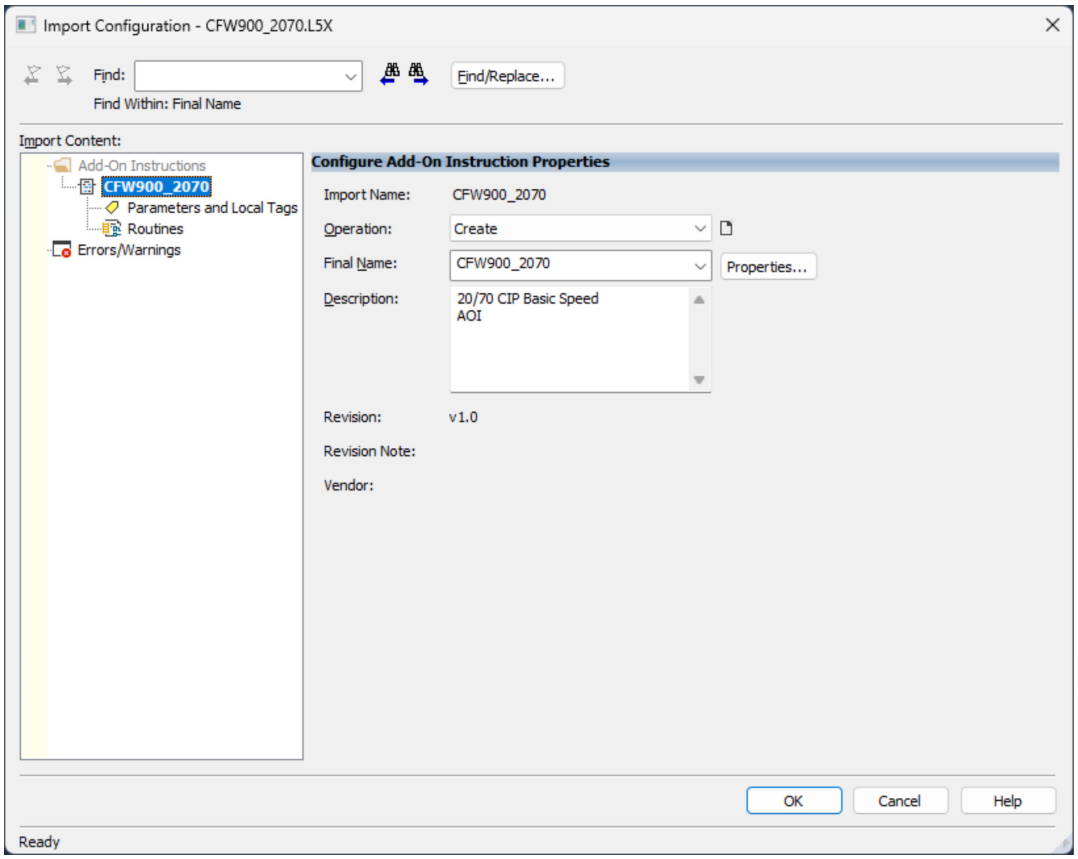
CFW900_2070 AOI Import



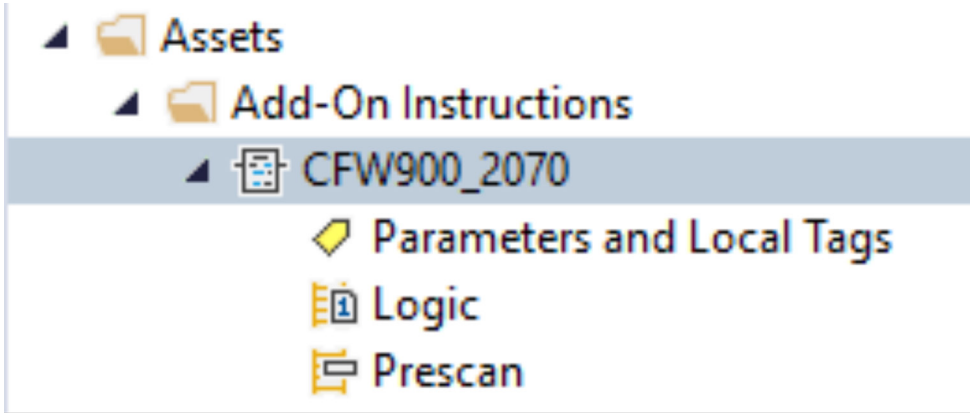
From the menu bar go to File, Import Component, Add-On Instruction...



Select the appropriate add-on instruction (CFW900_2070.L5X) and click Import....



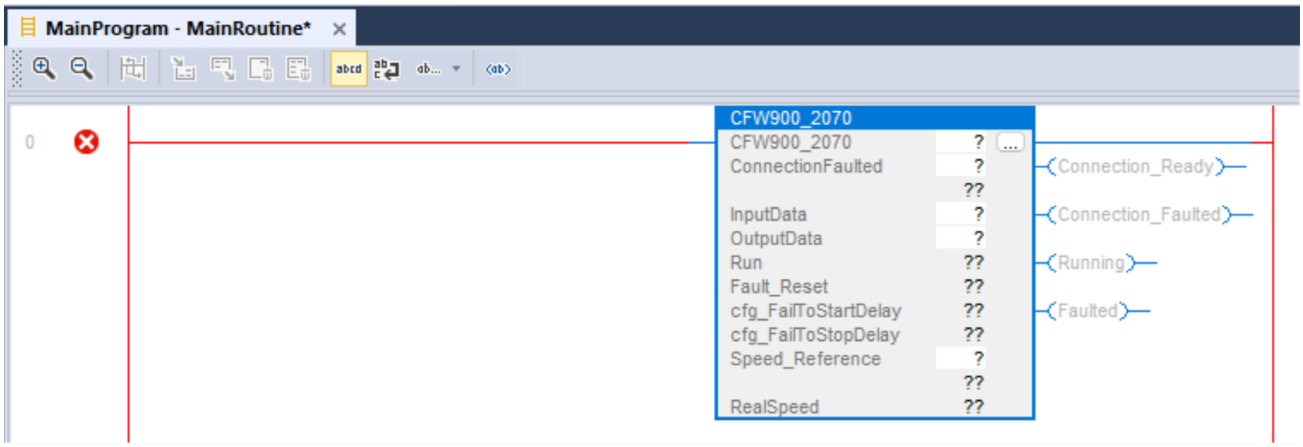
Review the proposed changes and click OK



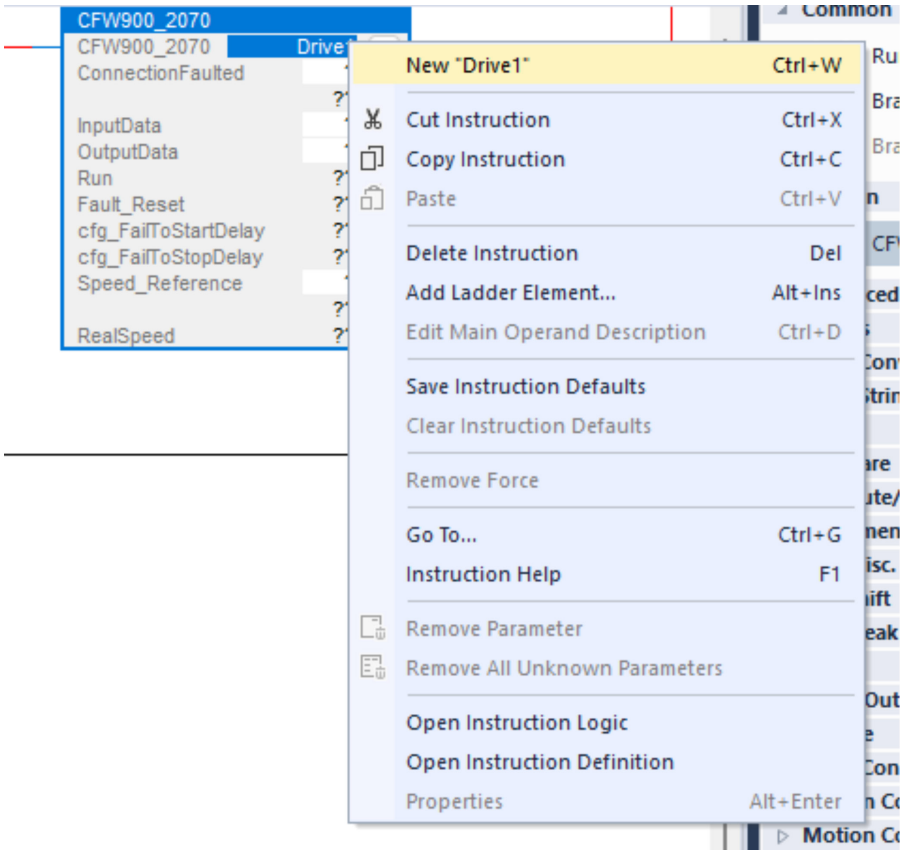
There should now be this add-on instruction in the project.

CFW900_2070 AOI Usage

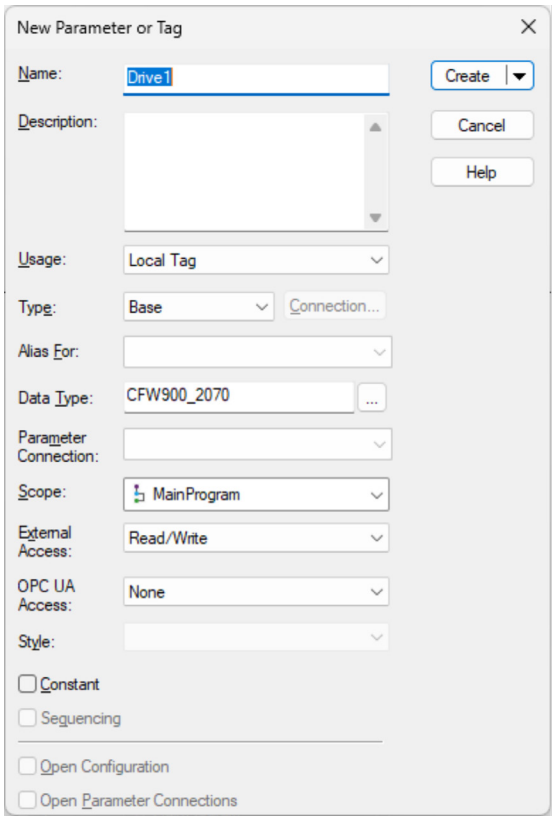
On an empty rung of ladder, add an instance of the newly imported add-on instruction by clicking on the Toolbox bar and clicking the CFW900_2070 symbol under Add-On



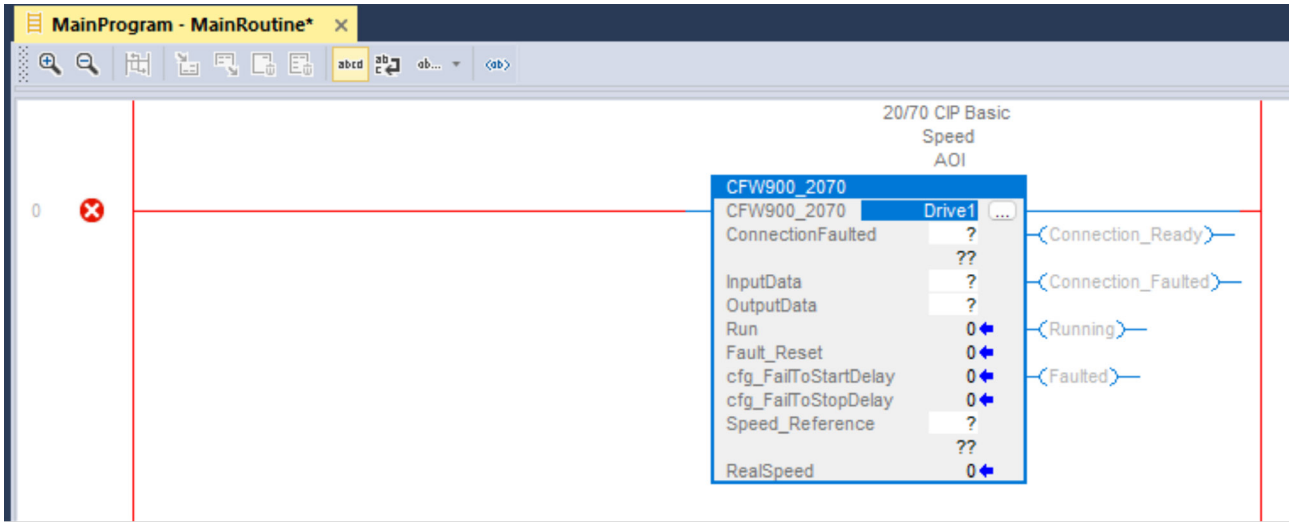
Your ladder logic should look like this after you add the add-on instruction



The Add-On requires a tag to be created. Create this tag by typing a name in the CFW900_2070 field and right-clicking and selecting New “Tag”



Give any appropriate description and scope (the tag can be either program or controller scoped and then click Create

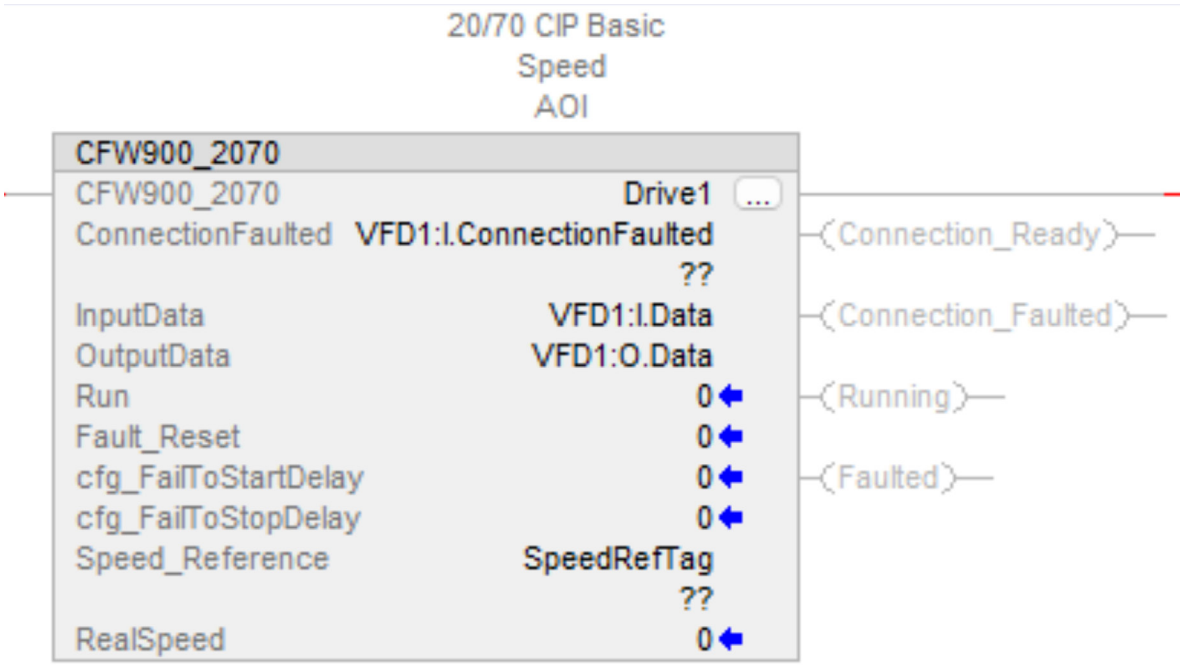


The majority of your parameters for the add-on instruction should now show values

Next the Connection Faulted, Inputs, Outputs, and Speed_Reference need to be populated as follows:

- ConnectionFaulted = VFD1:I.ConnectionFaulted
- Inputs = VFD1:I.Data
- Outputs = VFD1:O.Data
- Speed_Refrence = SpeedRefTag

You will need to create the SpeedRef tag with a data type of INT.



CFW900_2070 (CIP Basic Speed) – AOI Parameter Descrpition

InOut Parameters

Parameter	Type	Description
Inputs	INT[2]	Input Assembly from CFW900
Outputs	INT[2]	Output Assembly to CFW900

Input Parameters

Parameter	Type	Description
Cfg_FailToStartDelay	DINT	Time in seconds before faulting on fail to start if VFD does not start when commanded Set to 0 to disable
Cfg_FailToStopDelay	DINT	Time in seconds before faulting on fail to stop if VFD does not stop when commanded Set to 0 to disable
ConnectionFaulted	BOOL	From CFW900 Ethernet Module. 1 = Connection is faulted 0 = Connection is OK
Fault_Reset	BOOL	1 = Send Reset Fault Signal to VFD 0 = No action
Run	BOOL	1 = Run 0 = Stop
Speed_Reference	INT	Speed Setpoint (RPM) Negative Speed will reverse direction of motor

Output Parameters

Parameter	Type	Description
Connection_Faulted	BOOL	Goes high when connections interrupted. If “Run” signal is set, it must be reset before this will clear 1 = Connection has been faulted from VFD to PLC
Connection_Ready	BOOL	0 = Connection OK 1 = Connection from VFD to PLC is established 0 = Connection not established
Faulted	BOOL	1 = VFD Fault, connection fault, or failedToStart/Stop Fault 0 = No faults
RealSpeed	INT	Current Speed (RPM)
Running	BOOL	1 = VFD running 0 = VFD Stopped

CFW900 Parameter Requirements

The following paramaters must be set in the CFW900:

Parameter	Setting
C9.5.1 EtherNet/IP I/O Instances	0 = 20/70 CIP Basic Speed; these instances represent the simplest operation interface of a device according to the AC/DC Drive Profile.
C4.1.1 Command mode	2 = Remote 2 Fixed in Remote 2 command mode
C4.2.2.1 General Enable	7 = Ethernet
C4.2.2.2 Run/Stop	6 = Ethernet
C4.2.2.3 Direction of Rotation	7 = Ethernet
C4.2.2.4 JOG	7 = Ethernet
C4.3.1.2.2 Remote 2 Mode	6 = Ethernet

CFW900_120170 AOI (CIP Basic Speed + IO)

This AOI is used when the 120/170 CIP Basic Speed control mode + IO is desired.

This behaves similarly to the 20/70 CIP Basic Speed, but adds the following parameters:

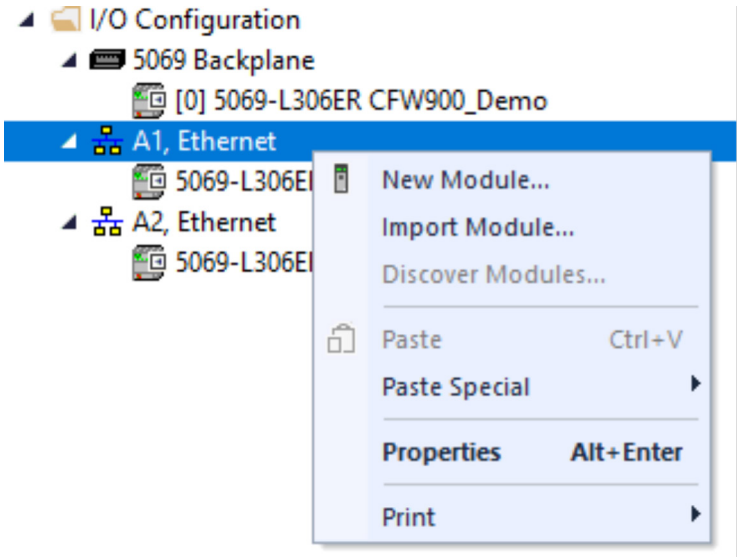
Outputs

- Output Current
- Output Voltage
- Output Frequency
- Last Fault Code

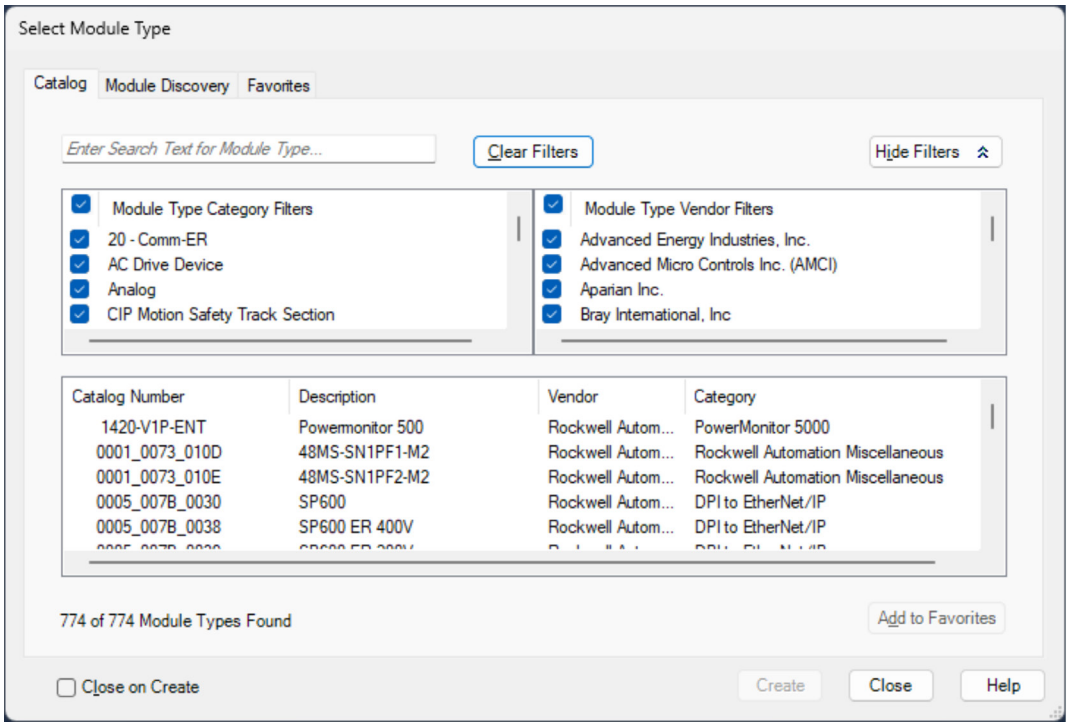
Inputs

- Acceleration Ramp 1
- Deceleration Ramp 1

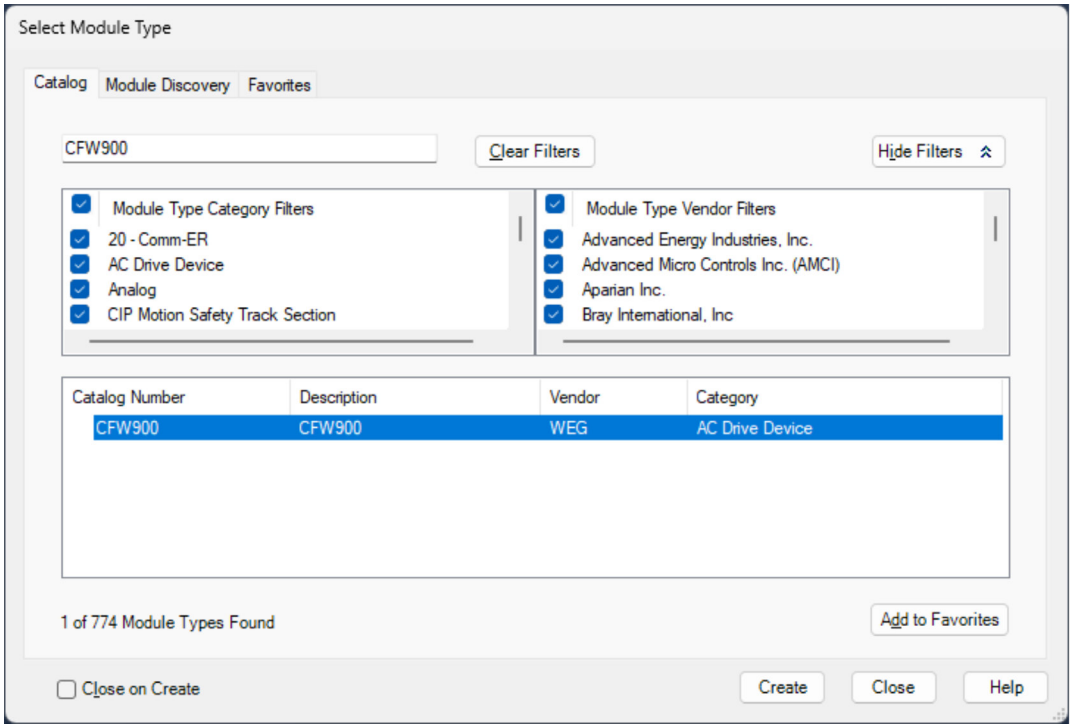
Create the EtherNet/IP Device



In the device tree, right click on the Ethernet bus that will contain the CFW900 and click New Module...

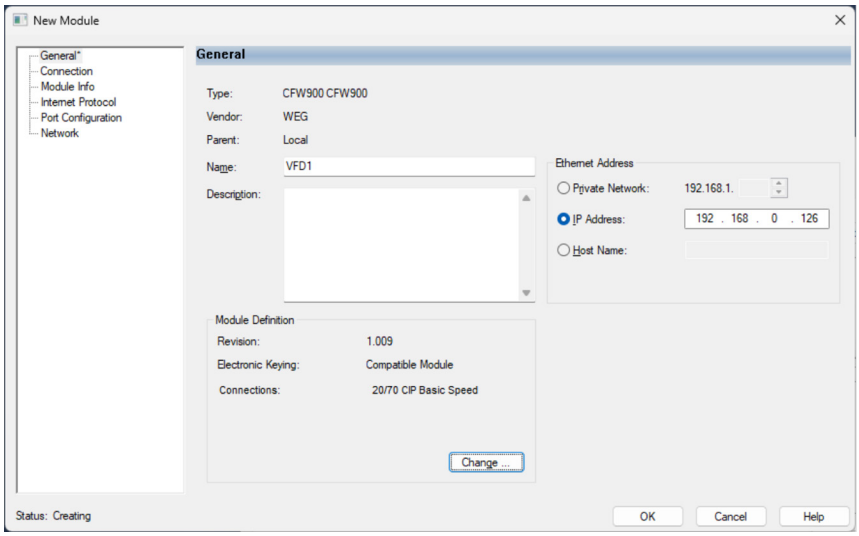


In the Select Module Type dialog box, enter “CFW900” in the search field



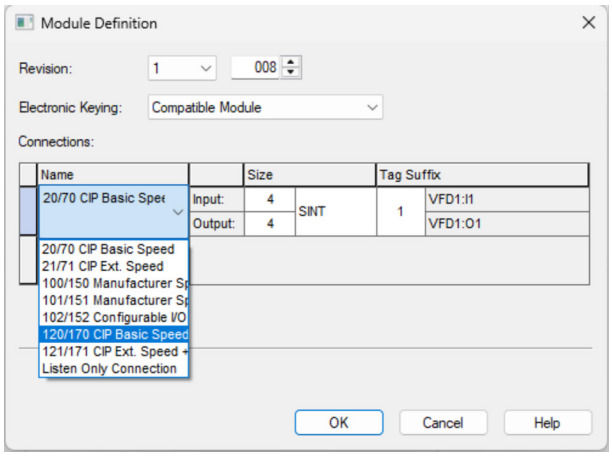
There should be an entry matching the above screenshot.

Highlight the CFW900 and click Create

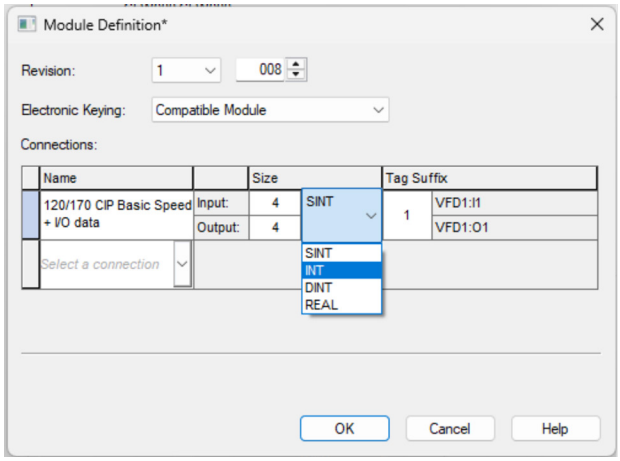


Give the CFW900 a name and enter the IP address of the drive.

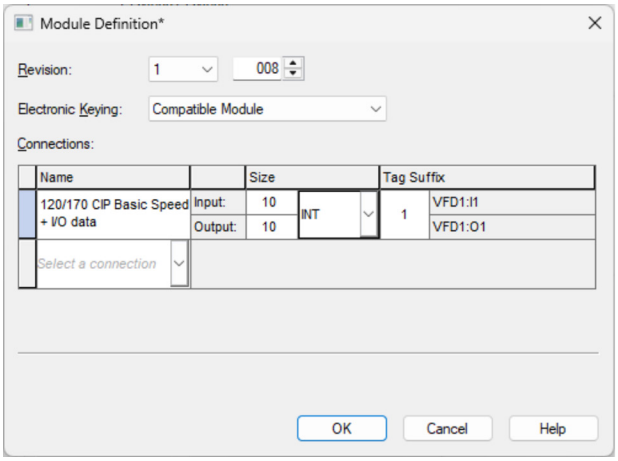
Before clicking on OK, click on the Change … button in the module definition.



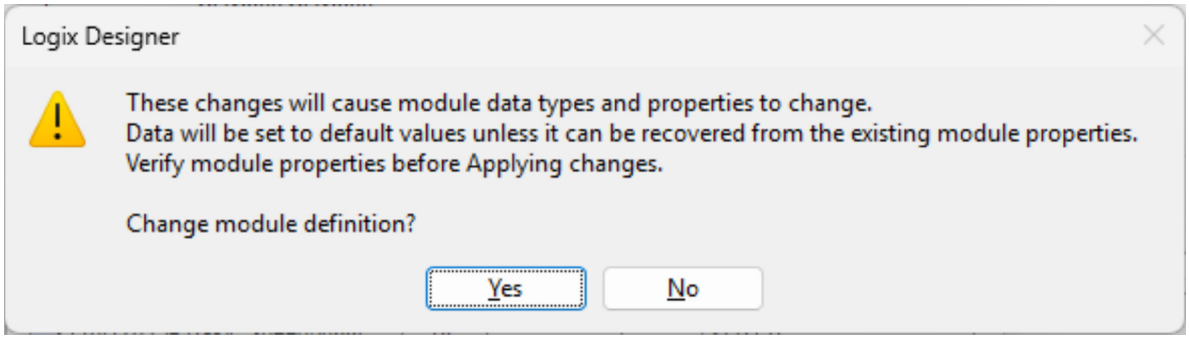
Change the type to INT and the connection name to 120/170 CIP Basic Speed + I/O data



Change the type to INT

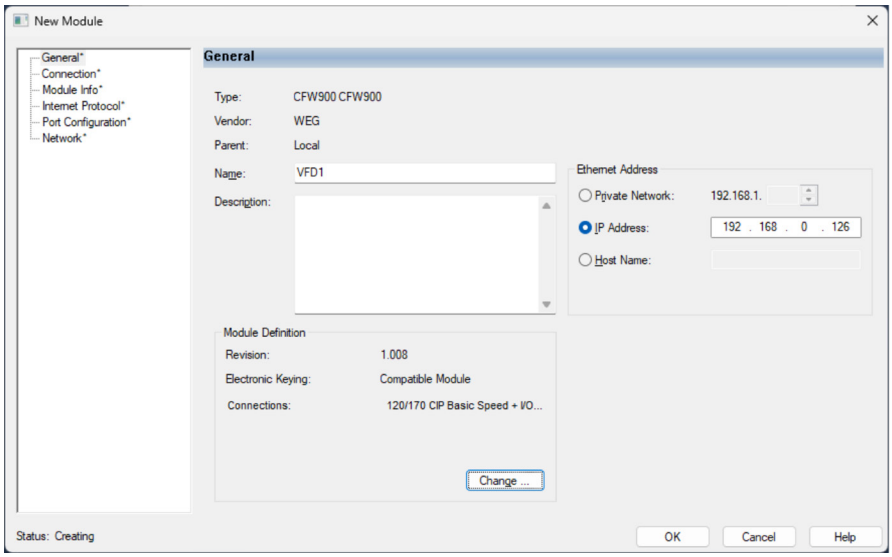


The Input and output size should be set to 10 and 10 respectively. Click OK



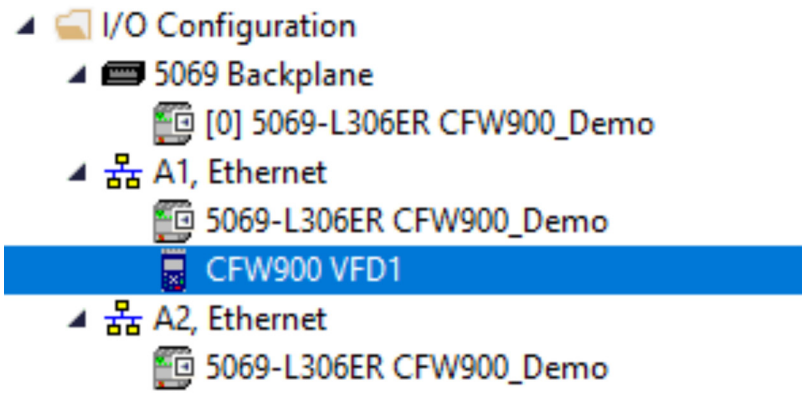
Click Yes

At this point, no other changes are required. However, changing the RPI can be done if the need arises.



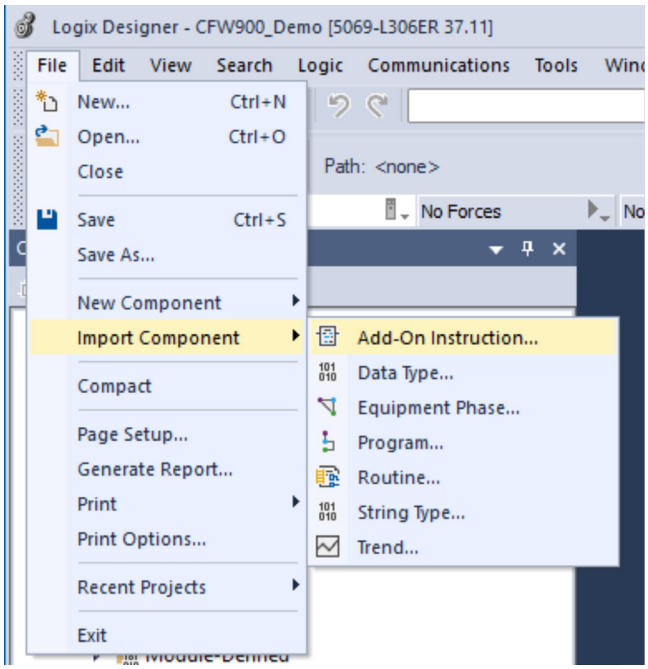
See the Trouble Shooting section to learn more about changing the RPI.

Once satisfied with the settings, Click OK

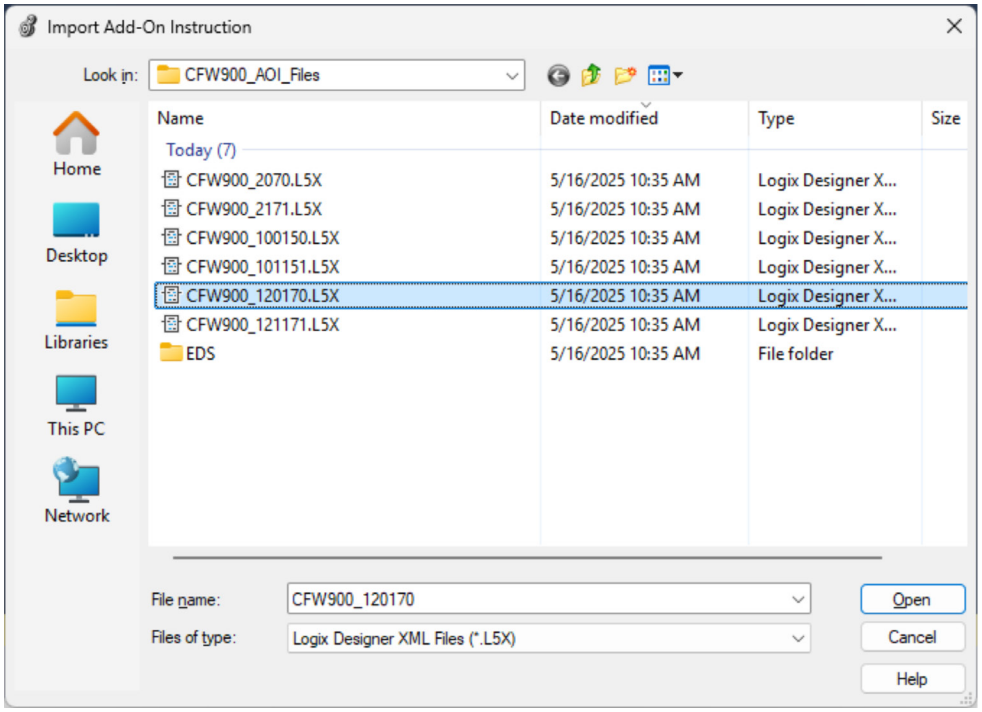


There should now be an instance of the CFW900 in the device tree

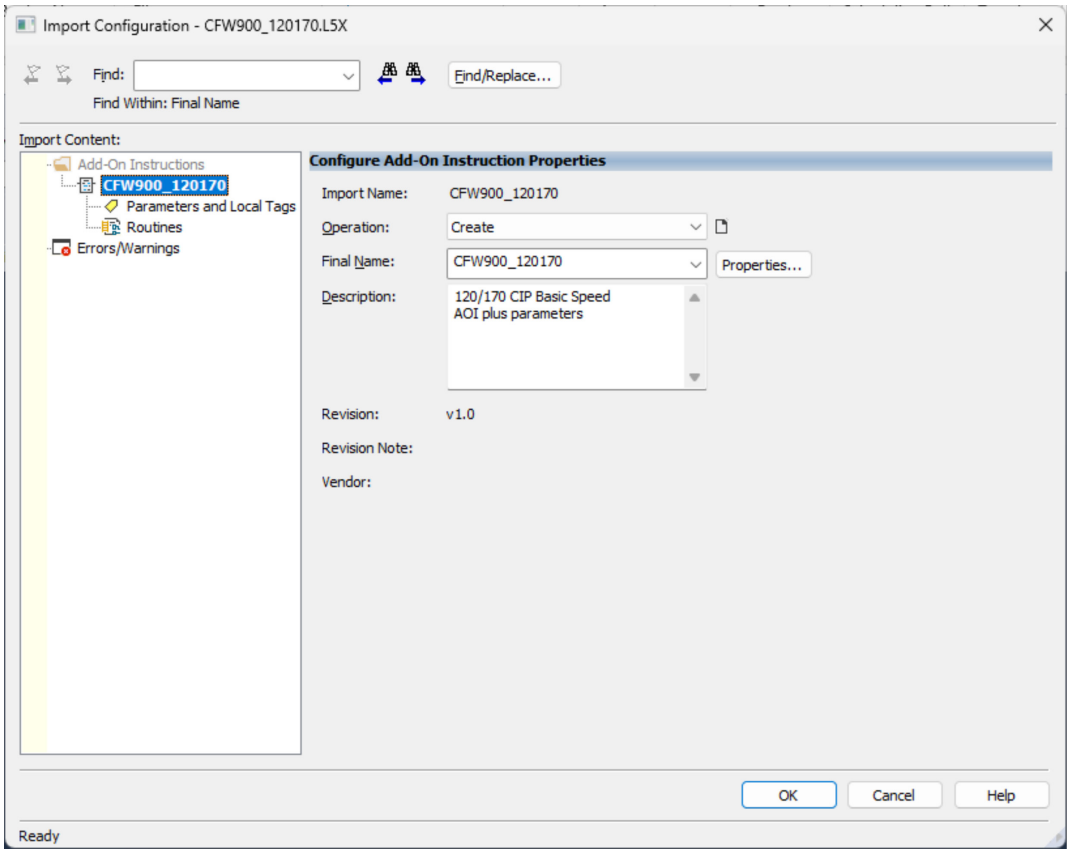
CFW900_120170 AOI Import



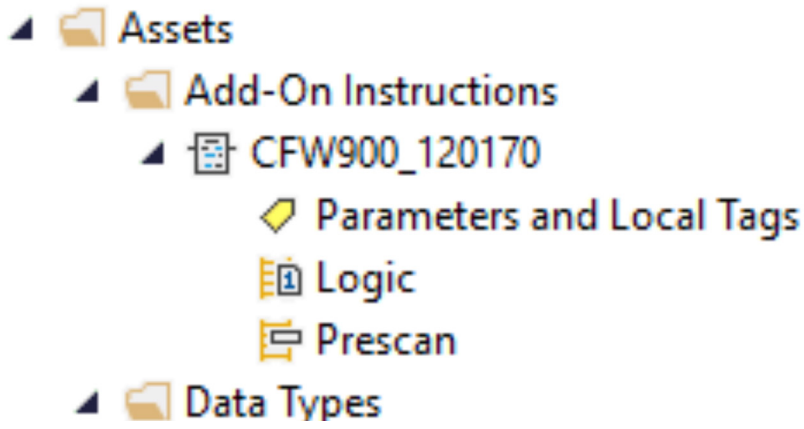
From the menu bar go to File, Import Component, Add-On Instruction...



Select the appropriate add-on instruction (CFW900_120170.L5X) and click Import...

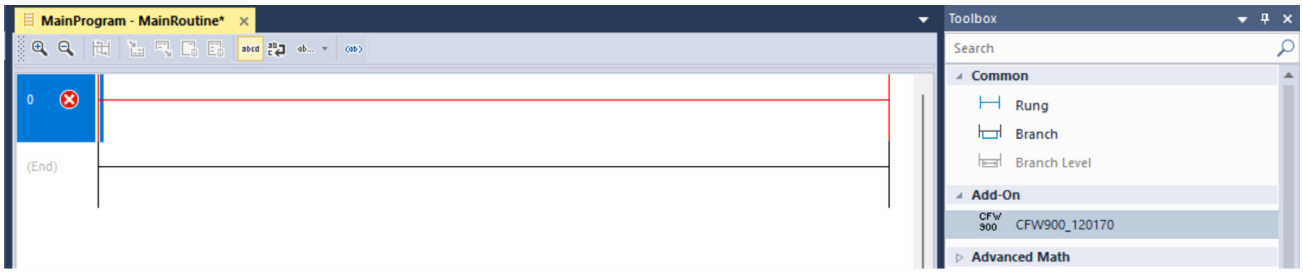


Review the proposed changes and click OK

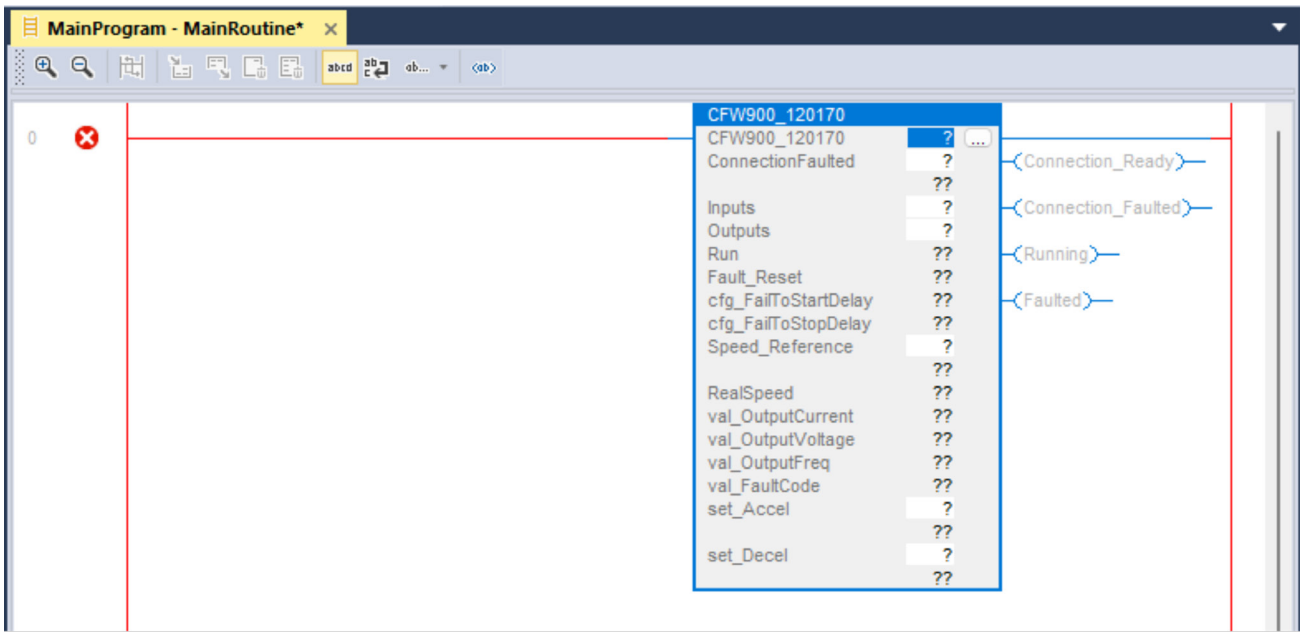


There should now be this add-on instruction in the project.

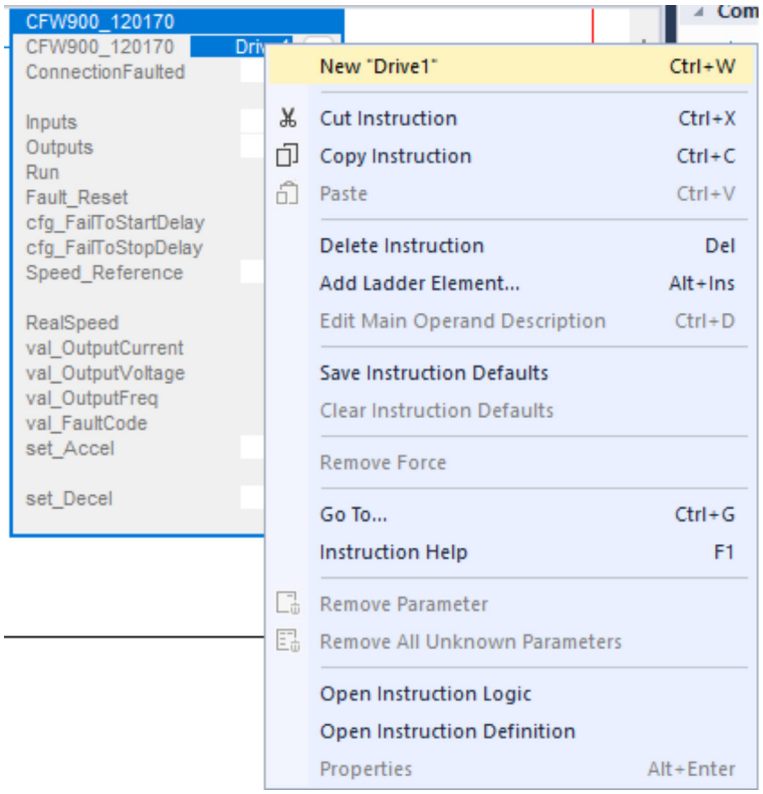
AOI Usage



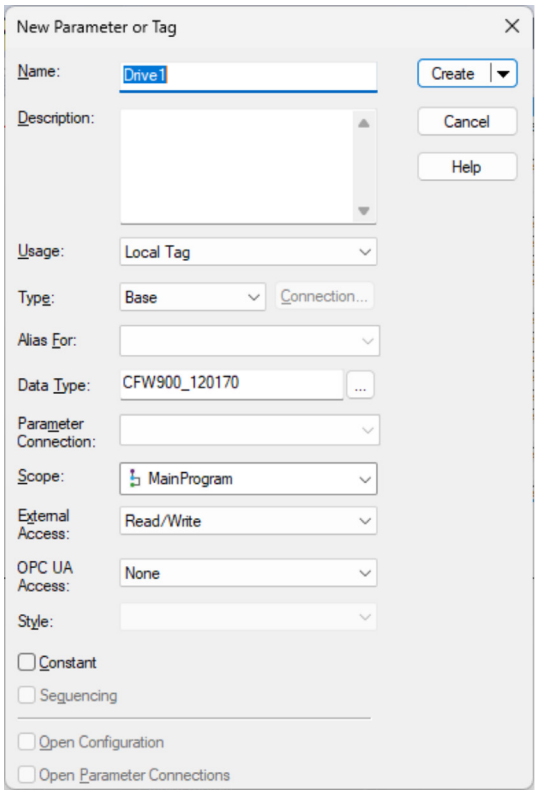
On an empty rung of ladder, add an instance of the newly imported add-on instruction by clicking on the Toolbox bar and clicking the CFW900_120170 symbol under Add-On



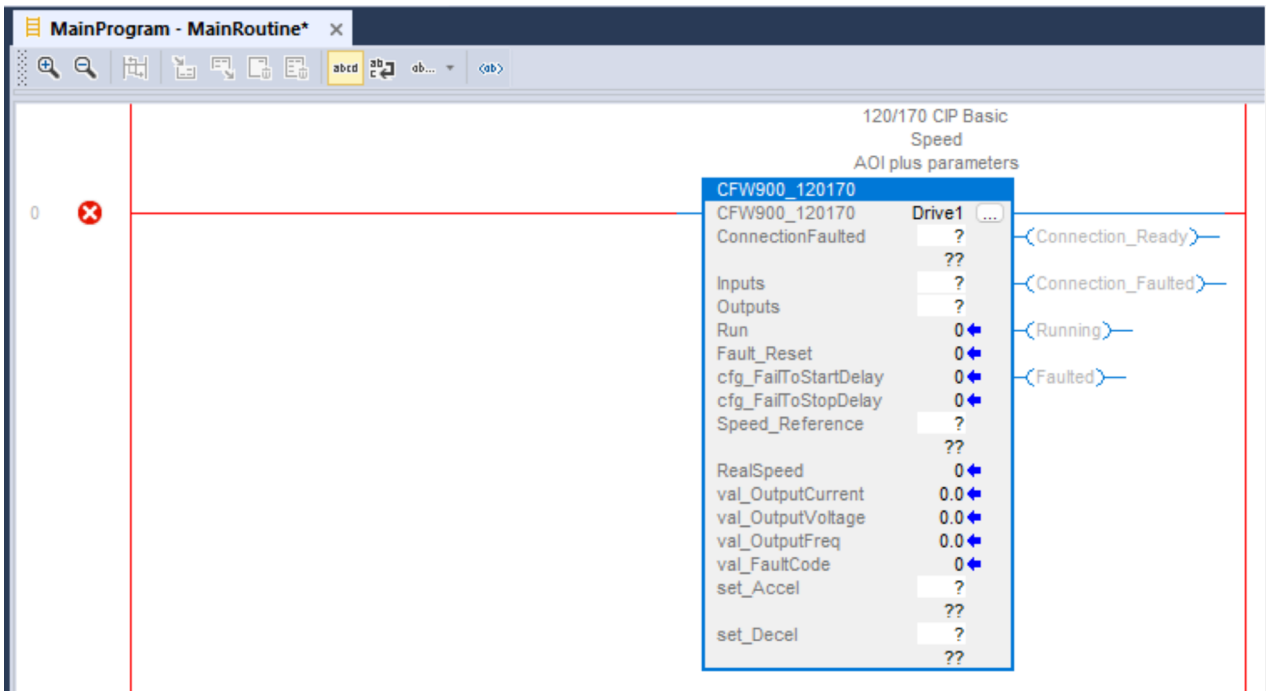
Your ladder logic should look like this after you add the add-on instruction



The Add-On requires a tag to be created. Create this tag by typing a name in the CFW900 field and right clicking and selecting New Tag



Give any appropriate description and scope (the tag can be either program or controller scoped and then click Create

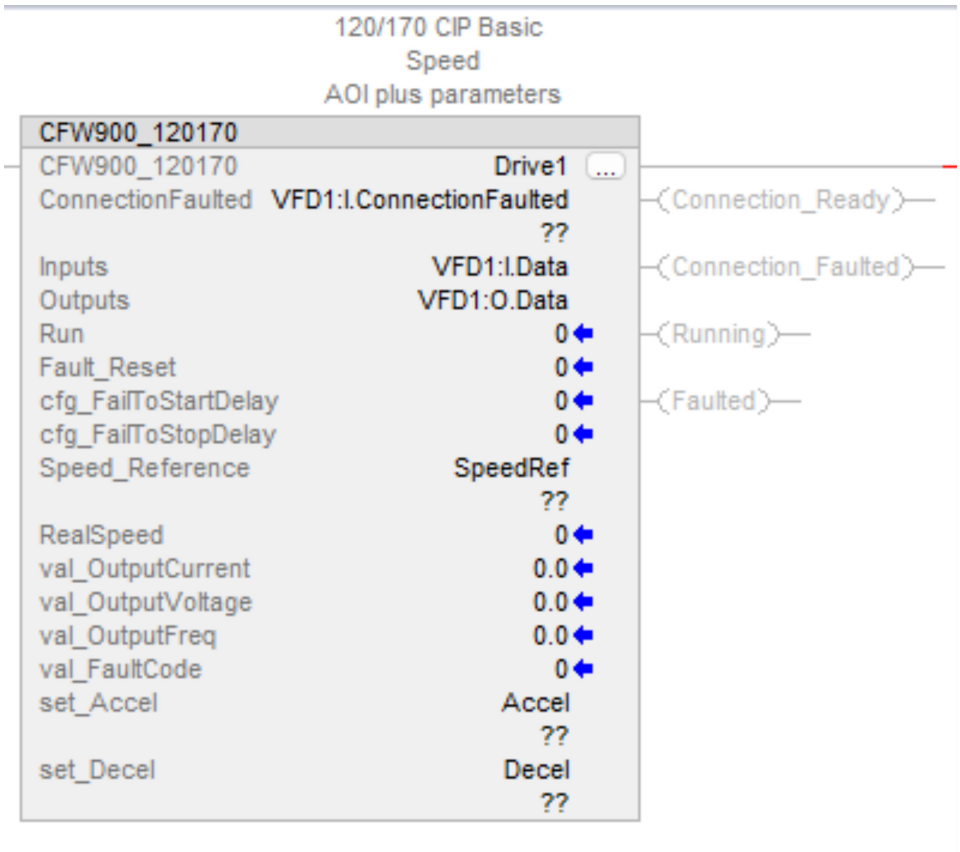


The majority of your parameters for the add-on instruction should now show values

Next the Connection Faulted, Inputs, Outputs, and Speed_Reference need to be populated as follows:

- ConnectionFaulted = VFD1:I.ConnectionFaulted
- Inputs = VFD1:I.Data
- Outputs = VFD1:O.Data
- Speed_Reference = SpeedRef
- set_Accel = Accel
- set_Decel = Decel

The Speed_Ref is an INT that is a tag to be created.
Accel and Decel are REAL tags that are to be created



CFW900_120170 (CIP Basic Speed + IO) – AOI Parameter Descrpition

InOut Parameters

Parameter	Type	Description
Inputs	INT[10]	Input Assembly from CFW900
Outputs	INT[10]	Output Assembly to CFW900

Input Parameters

Parameter	Type	Description
Cfg_FailToStartDelay	DINT	Time in seconds before faulting on fail to start if VFD does not start when commanded Set to 0 to disable
Cfg_FailToStopDelay	DINT	Time in seconds before faulting on fail to stop if VFD does not stop when commanded Set to 0 to disable
ConnectionFaulted	BOOL	From CFW900 Ethernet Module. 1 = Connection is faulted 0 = Connection is OK
Fault_Reset	BOOL	1 = Send Reset Fault Signal to VFD 0 = No action
Run	BOOL	1 = Run 0 = Stop
Speed_Reference	INT	Speed Setpoint (RPM) Negative Speed will reverse direction of motor
Set_Accel	REAL	Acceleration Ramp Setpoint (0.1-999.9) in Seconds
Set_Decel	REAL	Deceleration Ramp Setpoint (0.1-999.9) in Seconds

Output Parameters

Parameter	Type	Description
Connection_Faulted	BOOL	Goes high when connections interrupted. If “Run” signal is set, it must be reset before this will clear 1 = Connection has been faulted from VFD to PLC
Connection_Ready	BOOL	0 = Connection OK 1 = Connection from VFD to PLC is established 0 = Connection not established
Faulted	BOOL	1 = VFD Fault, connection fault, or failedToStart/Stop Fault 0 = No faults
RealSpeed	INT	Current Speed (RPM)
Running	BOOL	1 = VFD running 0 = VFD Stopped
val_FaultCode	DINT	Last fault code reported from the VFD
val_OutputCurrent	REAL	Output Current in Amps reported from the VFD
val_OutputFreq	REAL	Output Frequency in Hertz reported from the VFD
val_OutputVoltage	REAL	Output Voltage in Volts reported from the VFD

CFW900 Parameter Requirements

The following paramaters must be set in the CFW900:

Parameter	Setting
C9.5.1 EtherNet/IP I/O Instances	4 = 120/170 CIP + I/O data They have the same data format as the 20/70 CIP Basic Speed Control instances. In addition, it is possible to program up to 48 parameters of the equipment itself for reading and/or 48 for writing via network.
C9.5.2 Readings 1st Word	1 – (Range: 0-100: STOPPED) It sets the index of the first programmable reading word for data exchange with the network (input to the network master), configured in C9.5.2
C9.5.3 Readings Quantity	8 – (Range: 0-50: STOPPED) It sets the number of programmable reading words for data exchange with the network (input to the network master), from the first word set in C9.5.3.
C9.5.4 Writings 1st Word	1 - (Range: 0-100: STOPPED) It sets the index of the first programmable writing word for data exchange with the network (output to the network master), configured in C9.5.4.
C9.5.5 Writings Quantity	8 - (Range: 0-50: STOPPED) It sets the number of programmable writing words for data exchange with the network (output to the network master), from the first word set in C9.5.5.
C4.1.1 Command mode	2 = Remote 2 Fixed in Remote 2 command mode
C4.2.2.1 General Enable	7 = Ethernet
C4.2.2.2 Run/Stop	6 = Ethernet
C4.2.2.3 Direction of Rotation	7 = Ethernet
C4.2.2.4 JOG	7 = Ethernet
C4.3.1.2.2 Remote 2 Mode	6 = Ethernet
C9.2.1.1 Word #1	3
C9.2.1.2 Word #2	7
C9.2.1.3 Word #3	5
C9.2.1.4 Word #4	60
C9.2.1.5 Word #5	USER DEFINED
C9.2.1.6 Word #6	USER DEFINED
C9.2.1.7 Word #7	USER DEFINED
C9.2.1.8 Word #8	USER DEFINED
C9.2.2.2 Word #1	100
C9.2.2.3 Word #2	101
C9.2.2.4 Word #3	USER DEFINED
C9.2.2.5 Word #4	USER DEFINED
C9.2.2.6 Word #5	USER DEFINED
C9.2.2.7 Word #6	USER DEFINED
C9.2.2.8 Word #7	USER DEFINED
C9.2.2.9 Word #8	USER DEFINED

CFW900_2171 AOI (Extended Speed Control)

This AOI is used when the 21/71 CIP Extended Speed control mode is desired.

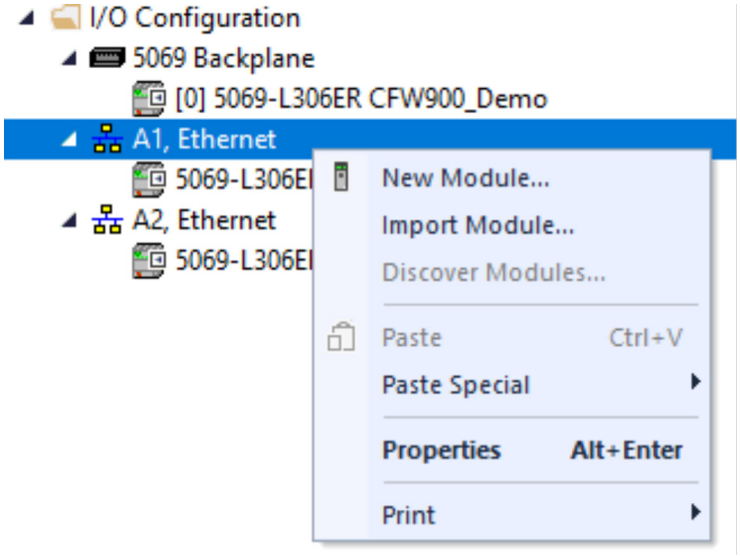
Outputs

- Output Current
- Output Torque
- Output Voltage
- Output Frequency
- Last Fault Code

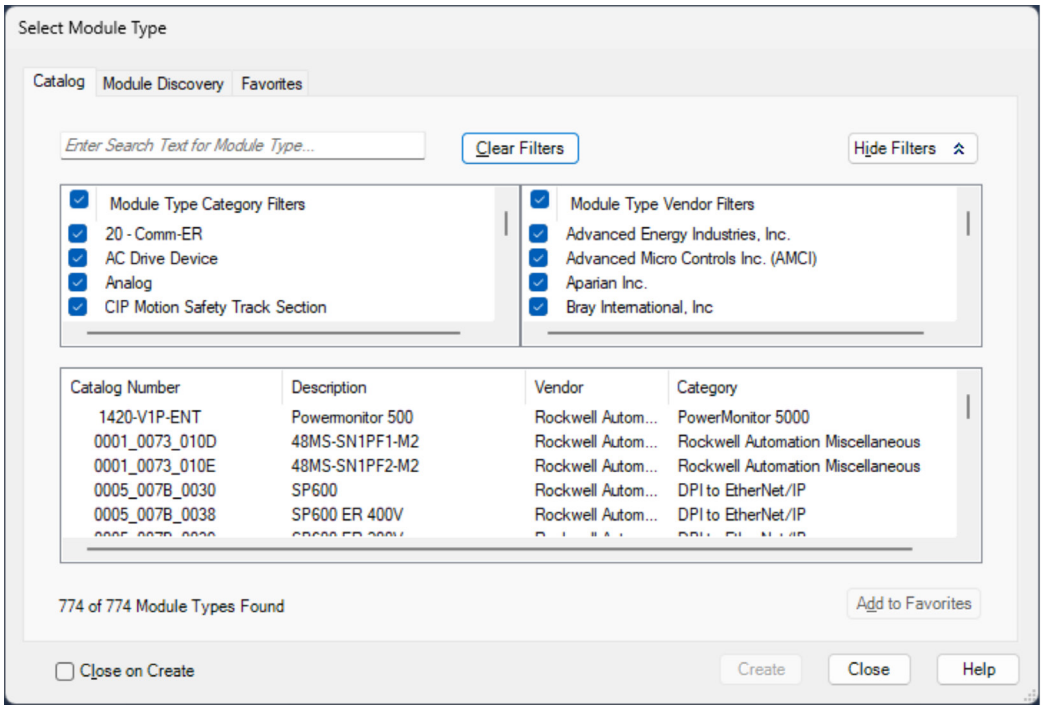
Inputs

- Acceleration Ramp 1
- Deceleration Ramp 1
- Torque Reference Clockwise
- Torque Reference CounterClockwise

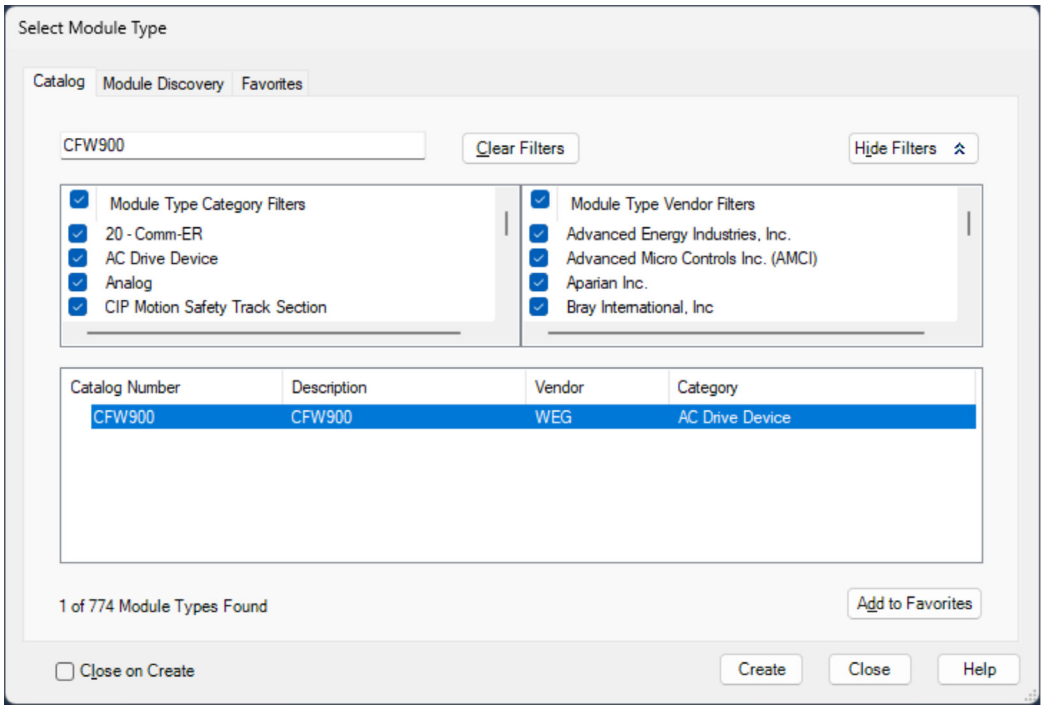
Create the EtherNet/IP Device



In the device tree, right click on the Ethernet bus that will contain the CFW900 and click New Module...

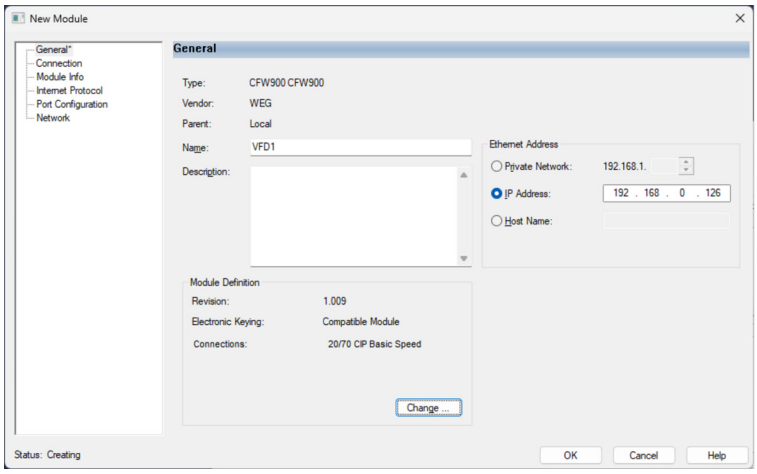


In the Select Module Type dialog box, enter “CFW900” in the search field



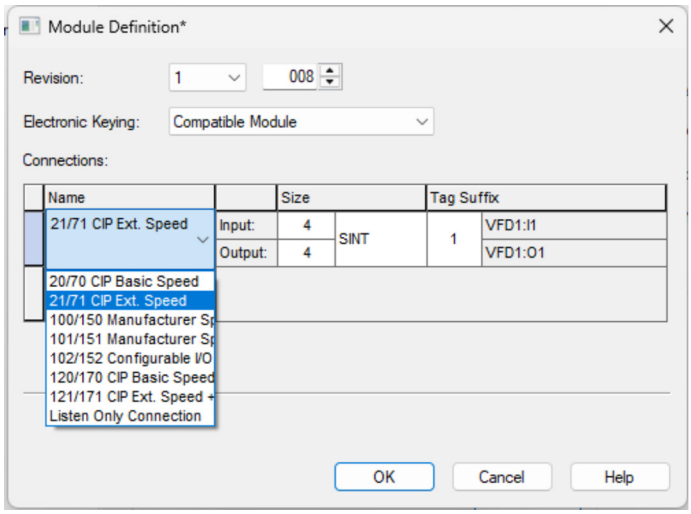
There should be an entry matching the above screenshot.

Highlight the CFW900 and click Create

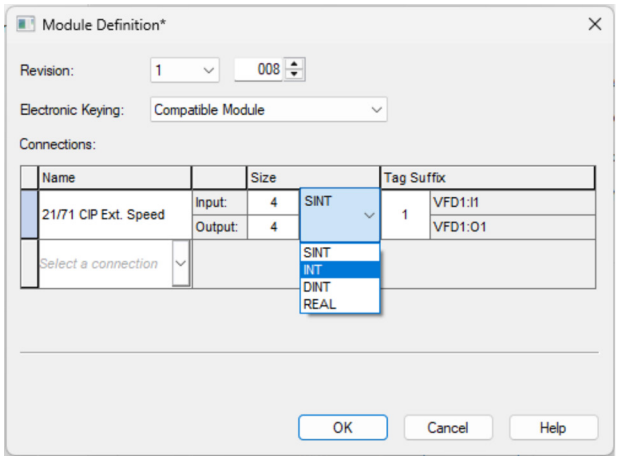


Give the CFW900 a name and enter the IP address of the drive.

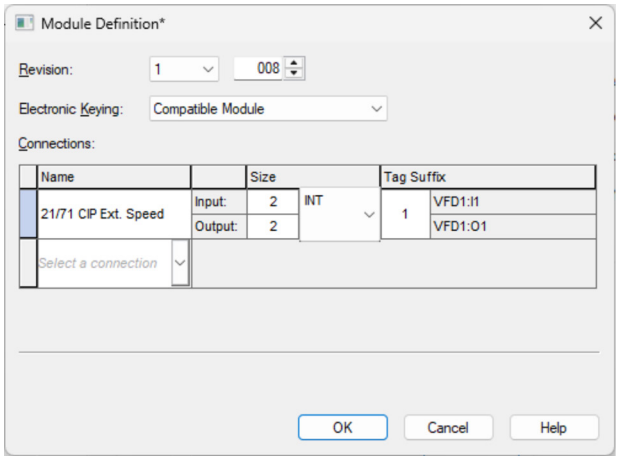
Before clicking on OK, click on the Change … button in the module definition.



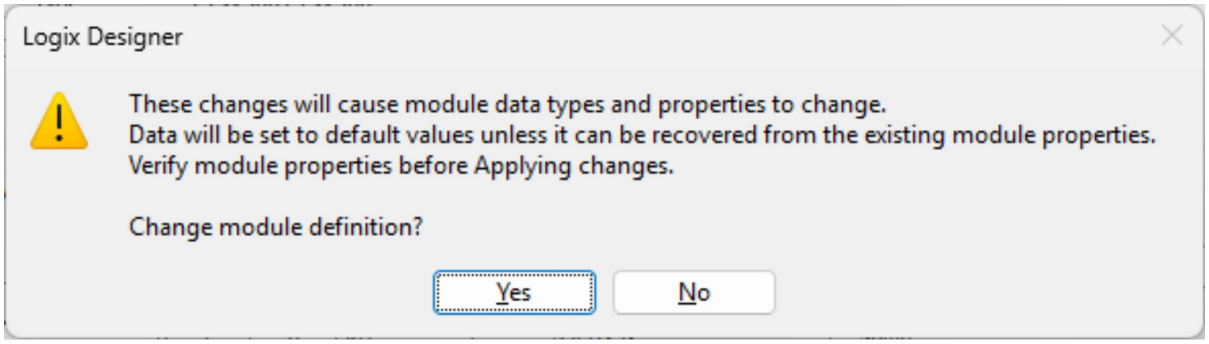
Select the name of 21/71 CIP Ext. Speed



Change the type to INT

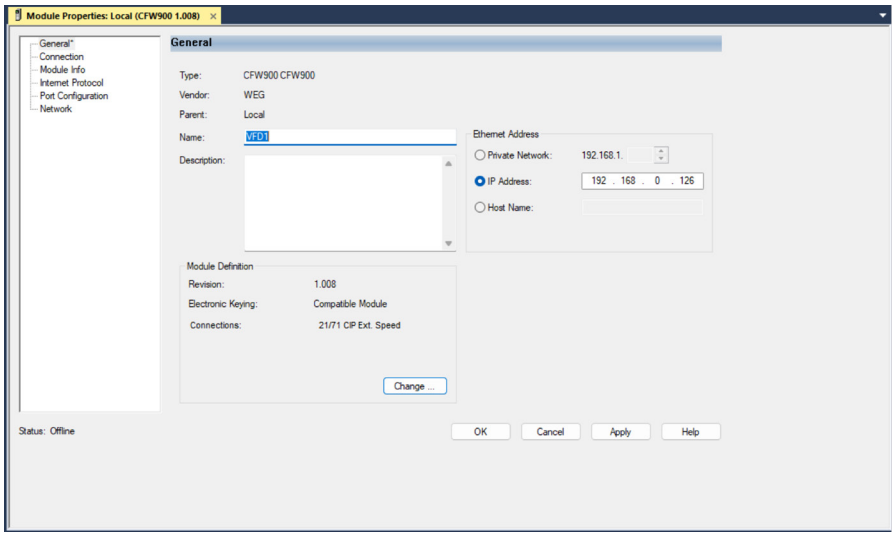


The Input and output size should be set to 2 and 2 respectively. Click OK



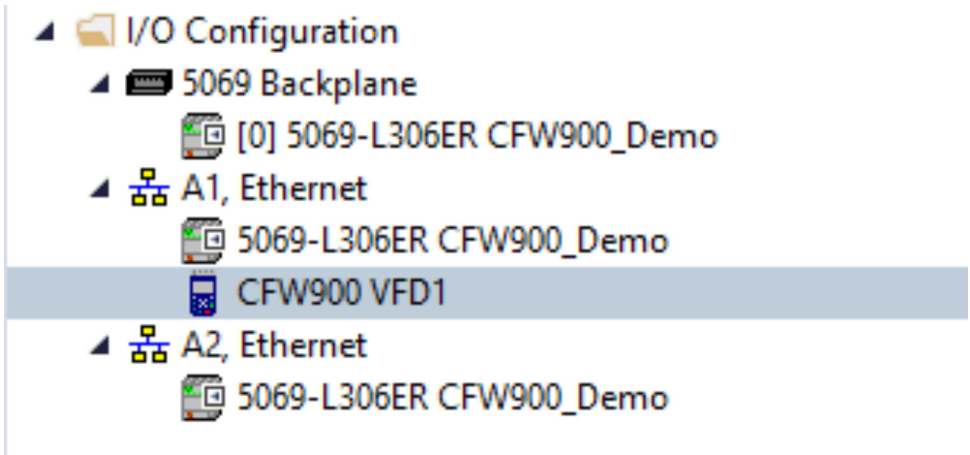
Click Yes

At this point, no other changes are required. However, changing the RPI can be done if the need arises.



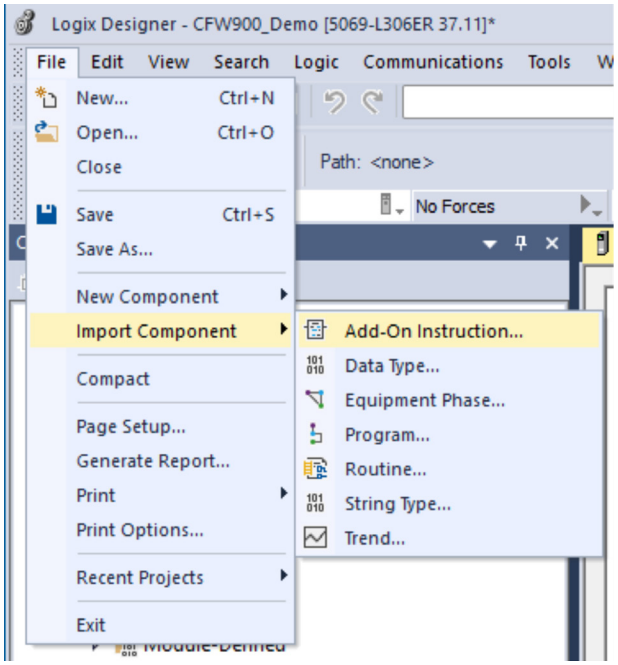
See the Trouble Shooting section to learn more about changing the RPI.

Once satisfied with the settings, Click OK

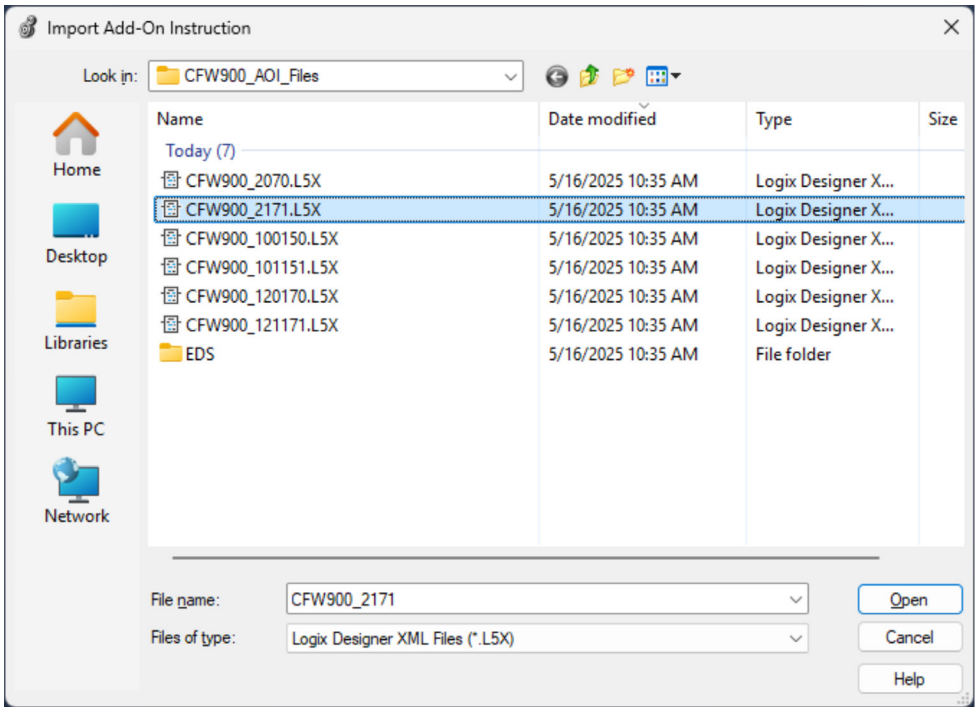


There should now be an instance of the CFW900 in the device tree

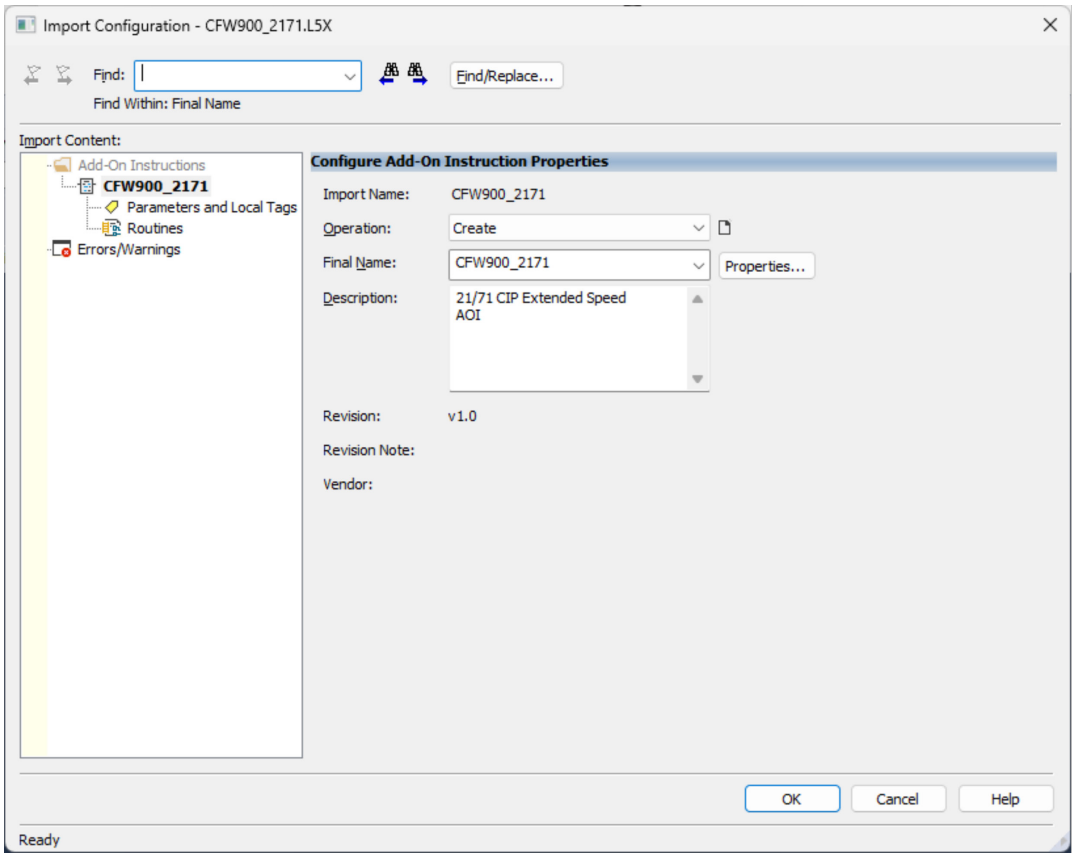
AOI Import



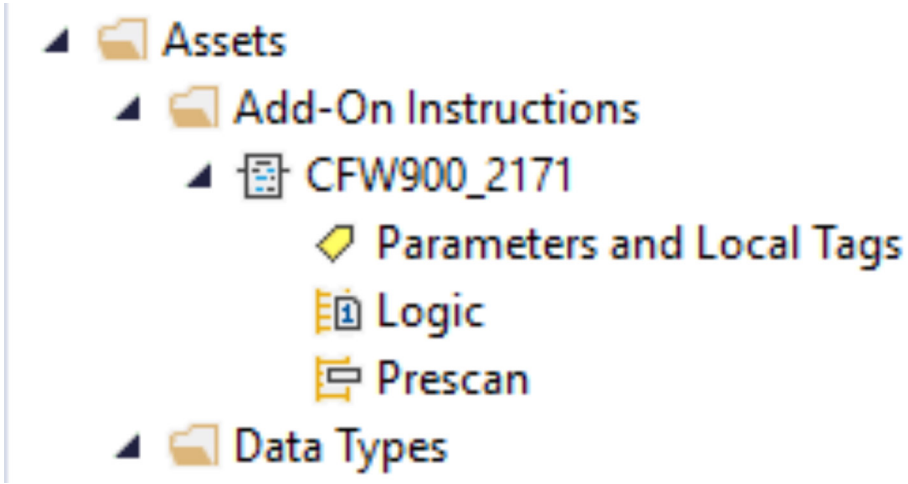
From the menu bar go to File, Import Component, Add-On Instruction...



Select the appropriate add-on instruction (CFW900_2171.L5X) and click Import...



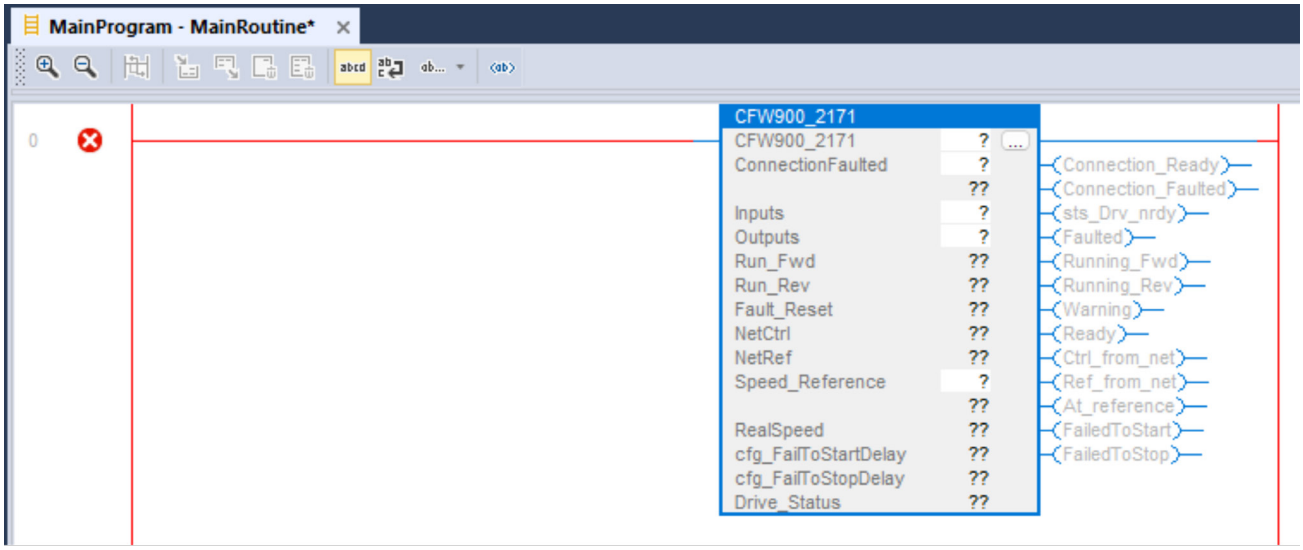
Review the proposed changes and click OK



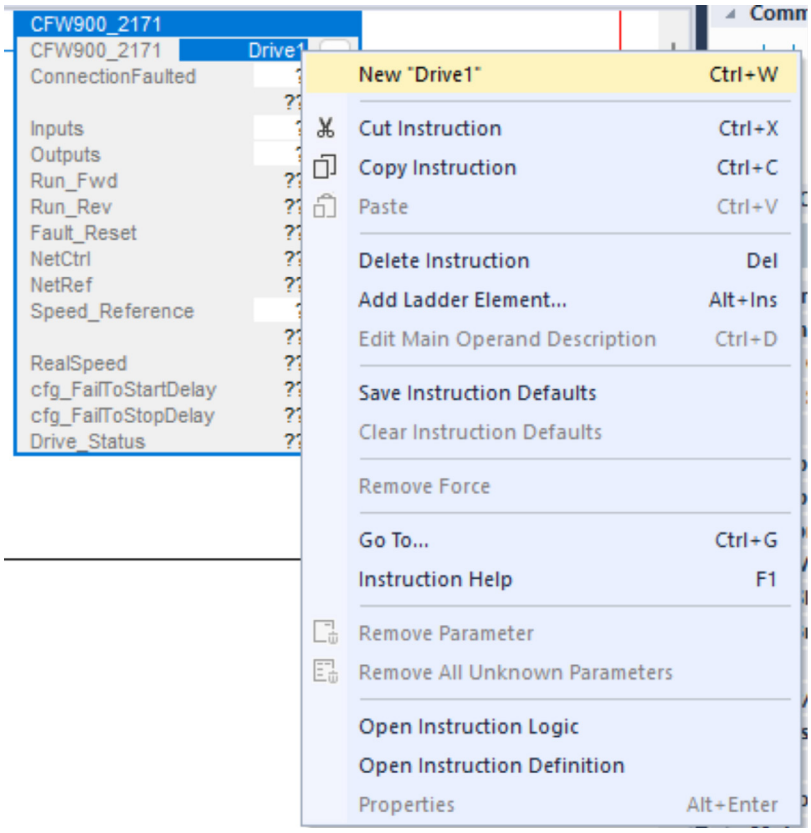
There should now be this add-on instruction in the project.

AOI Usage

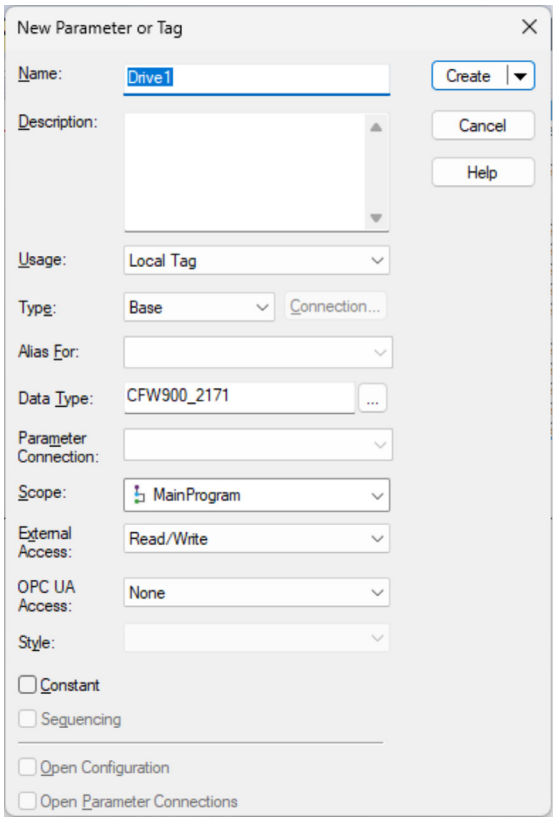
On an empty rung of ladder, add an instance of the newly imported add-on instruction by clicking on the Toolbox bar and clicking the CFW900_2171 symbol under Add-On



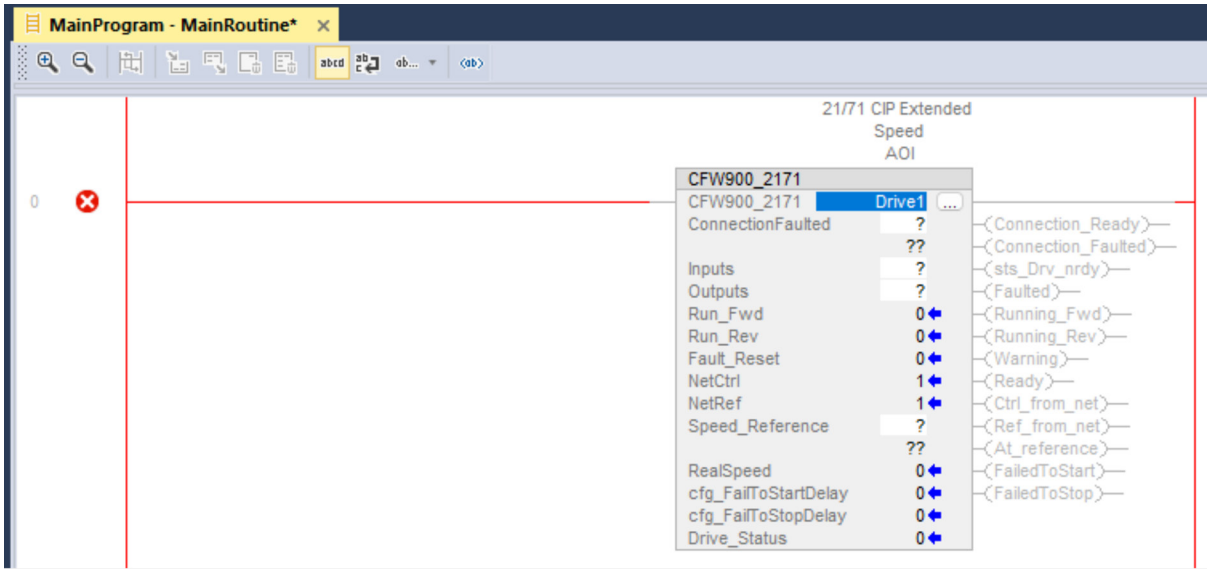
Your ladder logic should look like this after you add the add-on instruction



The Add-On requires a tag to be created. Create this tag by typing a name in the CFW900 field and right clicking and selecting New Tag



Give any appropriate description and scope (the tag can be either program or controller scoped and then click Create

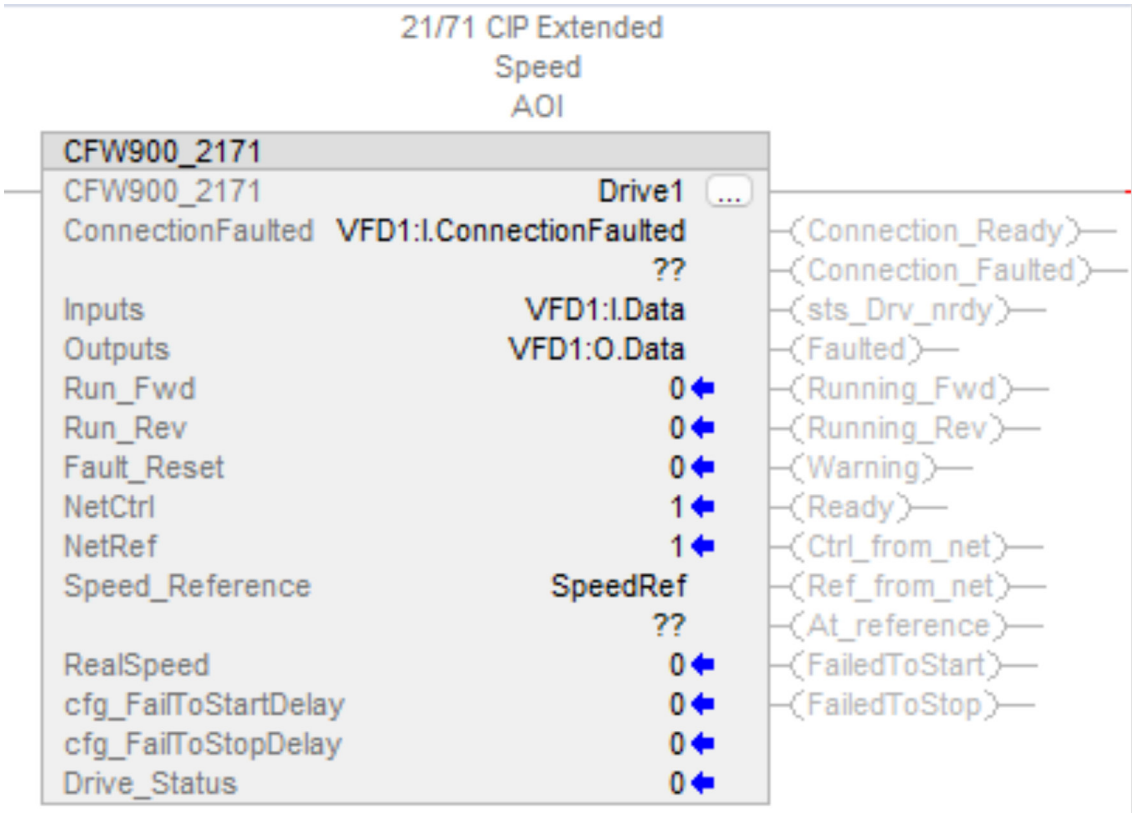


The majority of your parameters for the add-on instruction should now show values

Next, the Connection Faulted, Inputs, Outputs, and set_Speed_Reference need to be populated as follows:

- ConnectionFaulted = VFD1:I.ConnectionFaulted
- Inputs = VFD1:I.Data
- Outputs = VFD1:O.Data
- set_Speed_Reference = SpeedRef

You will need to create the SpeedRef tag with a data type of REAL.



CFW900_2171 AOI (Extended Speed Control) – AOI Parameter Descrpition

InOut Parameters

Parameter	Type	Description
Inputs	INT[2]	Input Assembly from CFW900
Outputs	INT[2]	Output Assembly to CFW900

Input Parameters

Parameter	Type	Description
Cfg_FailToStartDelay	DINT	Time in seconds before faulting on fail to start if VFD does not start when commanded Set to 0 to disable
Cfg_FailToStopDelay	DINT	Time in seconds before faulting on fail to stop if VFD does not stop when commanded Set to 0 to disable
ConnectionFaulted	BOOL	From CFW900 Ethernet Module. 1 = Connection is faulted 0 = Connection is OK
Fault_Reset	BOOL	1 = Send Reset Fault Signal to VFD 0 = No action
Run_Fwd	BOOL	1 = Run Forward 0 = Stop
Run_Rev	BOOL	1 = Run Reverse 0 = Stop
Speed_Reference	INT	Speed Setpoint (RPM) Negative Speed will reverse direction of motor
NetCtrl	BOOL	1 = R2 Control (Ethernet) 0 = R1 Control (other)
NetRef	BOOL	1 = R2 Reference (Ethernet) 0 = R1 Reference (other)

Output Parameters

Parameter	Type	Description
Connection_Faulted	BOOL	Goes high when connections interrupted. If "Run" signal is set, it must be reset before this will clear 1 = Connection has been faulted from VFD to PLC 0 = Connection OK
Connection_Ready	BOOL	1 = Connection from VFD to PLC is established 0 = Connection not established
Faulted	BOOL	1 = VFD Fault, connection fault, or failedToStart/Stop Fault 0 = No faults
RealSpeed	INT	Current Speed (RPM)
Running_Fwd	BOOL	1 = VFD running forward 0 = VFD not running forward
Running_Rev	BOOL	1 = VFD running in reverse 0 = VFD not running in reverse
At_reference	BOOL	1 = VFD has reached programmed speed
Ctrl_from_net	BOOL	1 = VFD Controlled remotely (PLC) 0 = VFD Controlled Locally
Drive_Status	INT	0 = Non-existent 1 = Startup 2 = Not Ready 3 = Ready 4 = Enabled 5 = Stopping 6 = Fault Stop 7 = Faulted
FailedToStart	BOOL	1 = VFD failed to start in time allotted 0 = Normal
FailedToStop	BOOL	1 = VFD failed to stop in time allotted 0 = Normal
Ref_from_net	BOOL	1 = using speed reference from remote source 0 = using speed reference from local source
Sts_Drv_nrdy	BOOL	1 = indicates AOI detected a not ready state and run_fwd/run_rev must be set to 0 to clear 0 = Normal
Warning	BOOL	1 = VFD is in alarm condition 0 = VFD is not in alarm condition

CFW900 Parameter Requirements

The following paramaters must be set in the CFW900:

Parameter	Setting
C9.5.1 EtherNet/IP I/O Instances	1 = 21/71 CIP Extended Speed; these instances represent a slightly improved interface for operating the device that follows the AC/DC Device Profile.
C4.1.1 Command mode	8 = Ethernet
C4.2.2.1 General Enable	7 = Ethernet
C4.2.2.2 Run/Stop	6 = Ethernet
C4.2.2.3 Direction of Rotation	7 = Ethernet
C4.2.2.4 JOG	7 = Ethernet
C4.3.1.2.2 Remote 2 Mode	6 = Ethernet

CFW900_121171 AOI (Extended Speed Control + IO)

This AOI is used when the 121/171 CIP Extended Speed control mode + IO is desired.

This behaves similarly to the 21/71 CIP Extended Speed, but adds the following parameters:

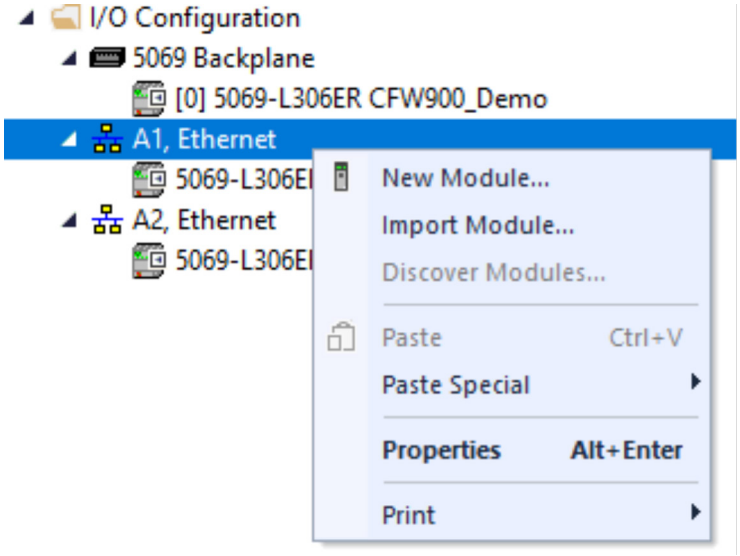
Outputs

- Output Current
- Output Voltage
- Output Frequency
- Last Fault Code

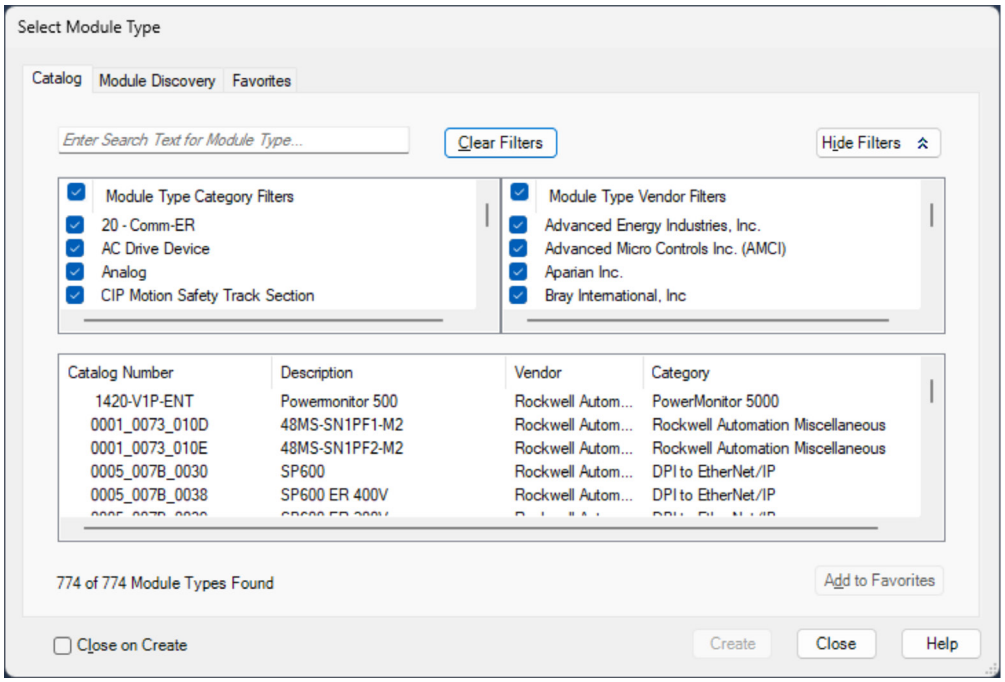
Inputs

- Acceleration Ramp 1
- Deceleration Ramp 1

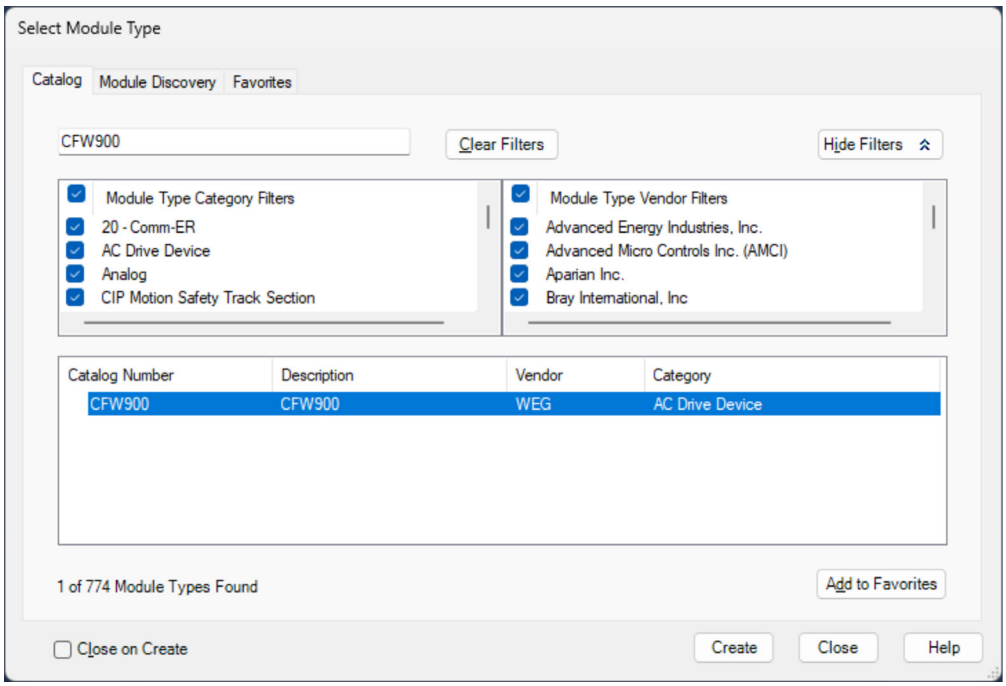
Create the EtherNet/IP Device



In the device tree, right click on the Ethernet bus that will contain the CFW900 and click New Module...

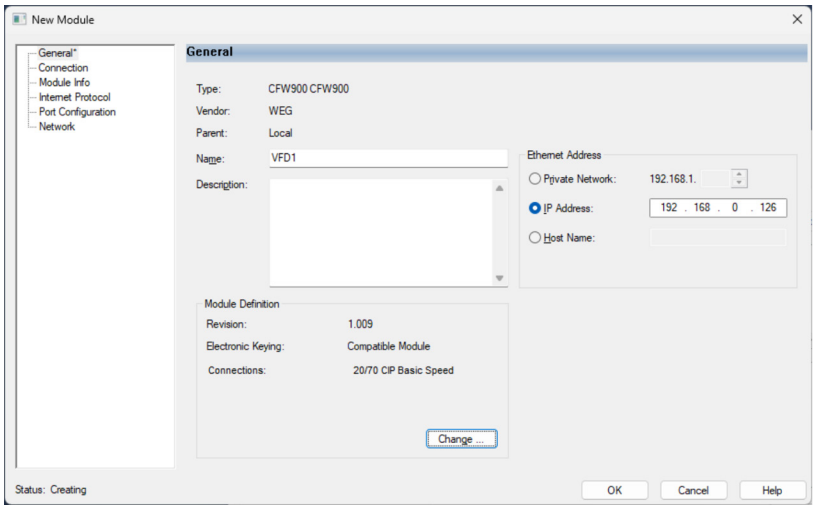


In the Select Module Type dialog box, enter “CFW900” in the search field



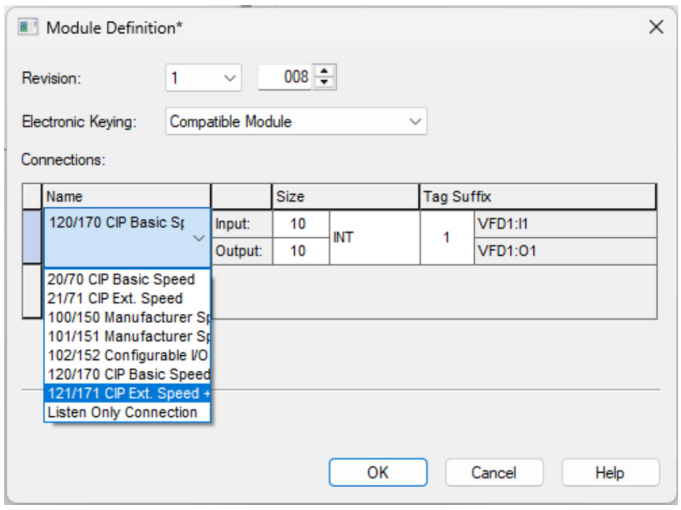
There should be an entry matching the above screenshot.

Highlight the CFW900 and click Create

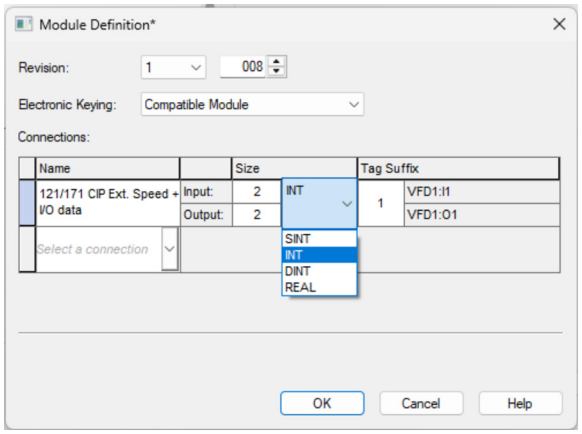


Give the CFW900 a name and enter the IP address of the drive.

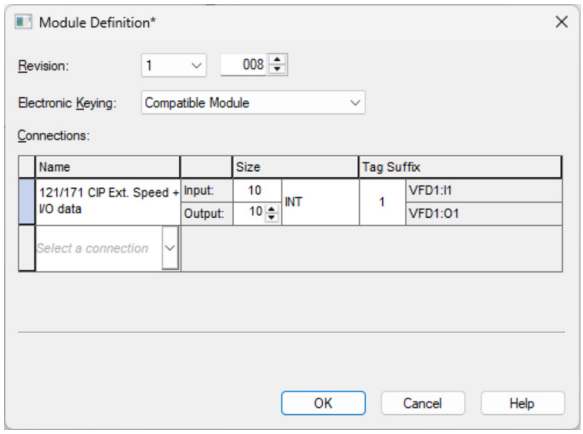
Before clicking on OK, click on the Change ... button in the module definition.



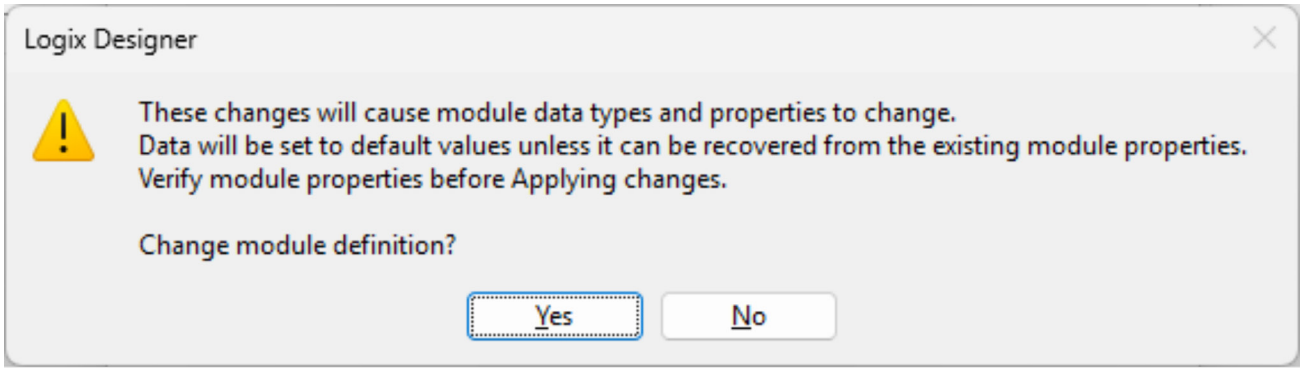
Select the name of 121/171 CIP Ext. Speed + I/O Data



Change the type to INT

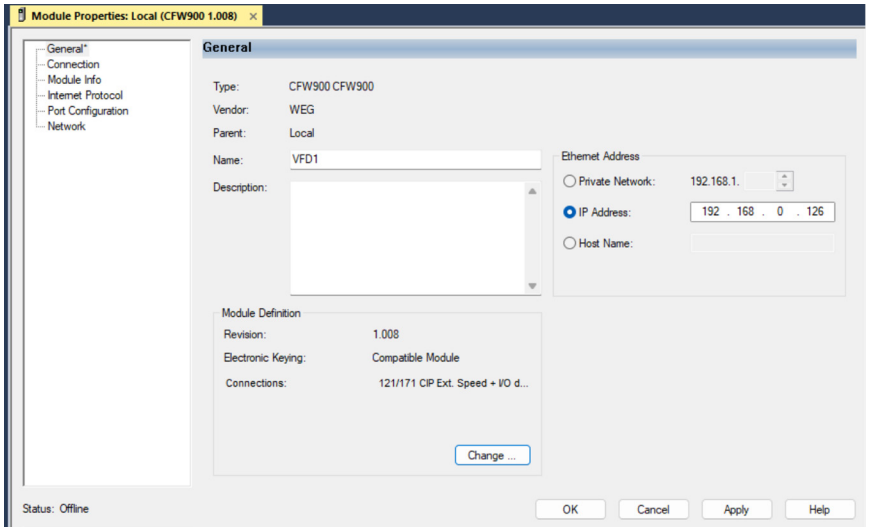


The Input and output size should be set to 10 and 10 respectively. Click OK



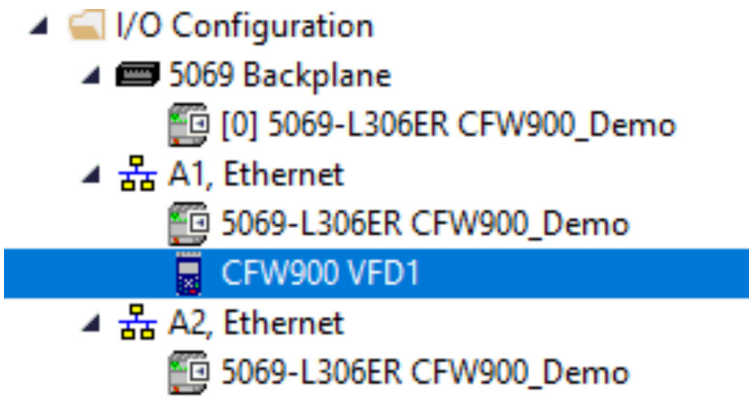
Click Yes

At this point, no other changes are required. However, changing the RPI can be done if the need arises.



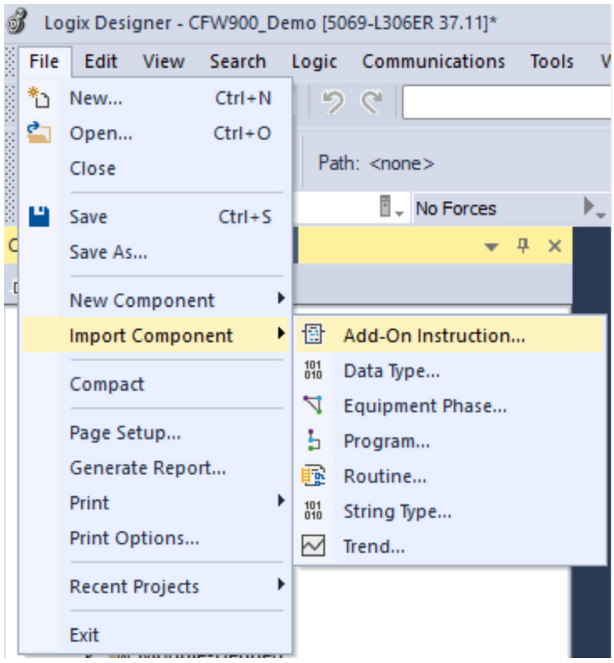
See the Trouble Shooting section to learn more about changing the RPI.

Once satisfied with the settings, Click OK

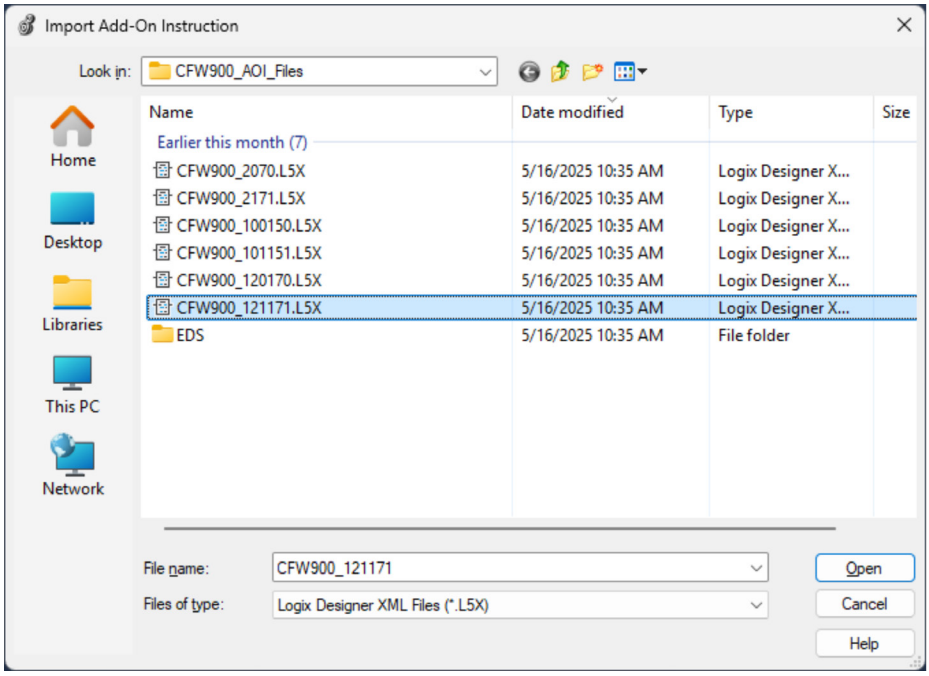


There should now be an instance of the CFW900 in the device tree

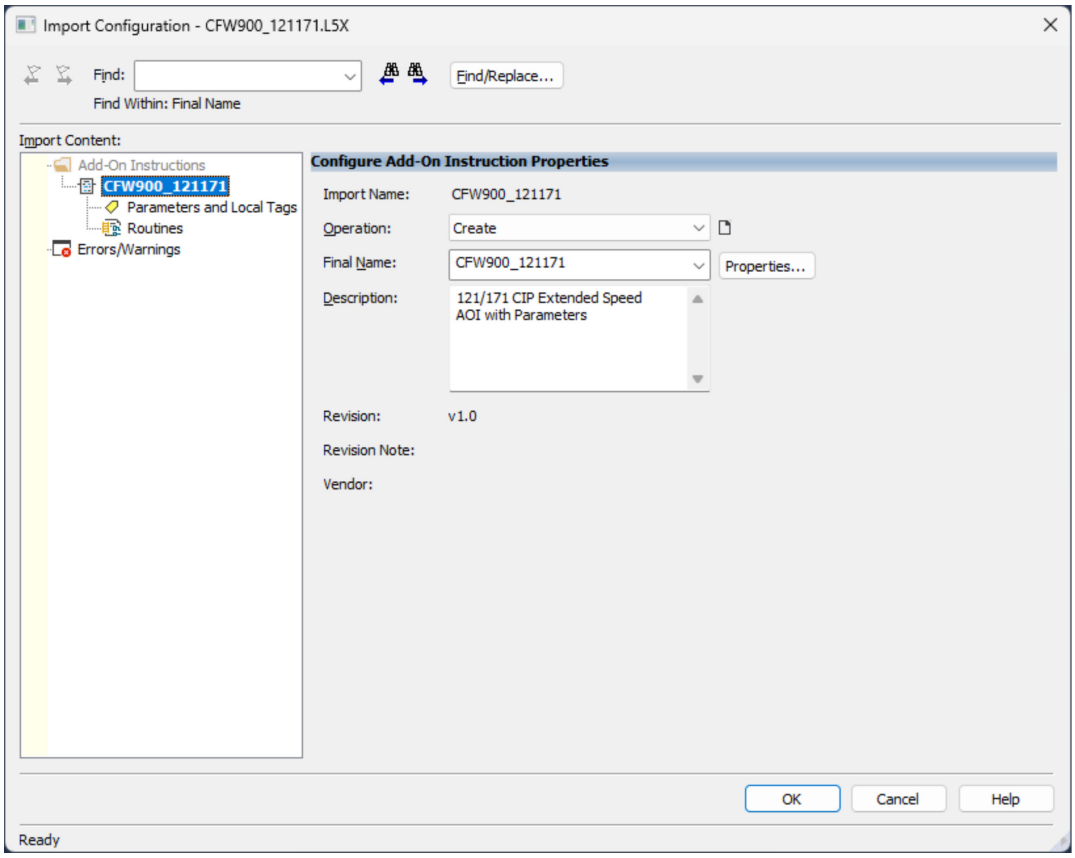
AOI Import



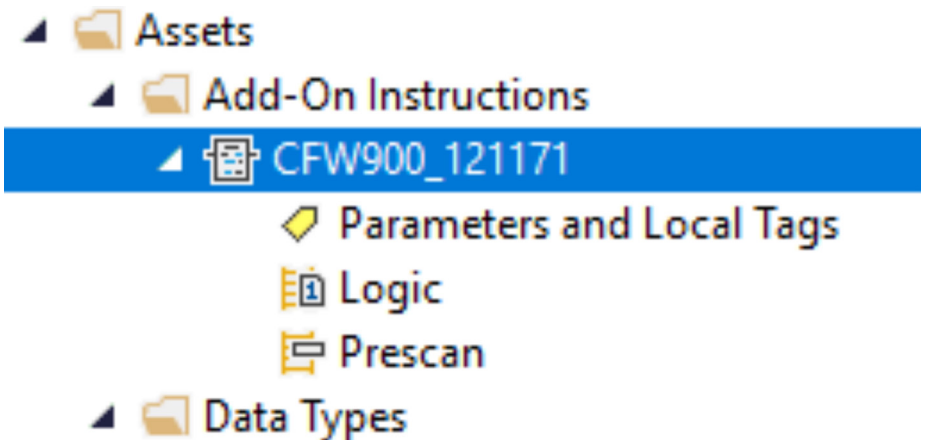
From the menu bar go to File, Import Component, Add-On Instruction...



Select the appropriate add-on instruction (CFW900_121171.L5X) and click Import...



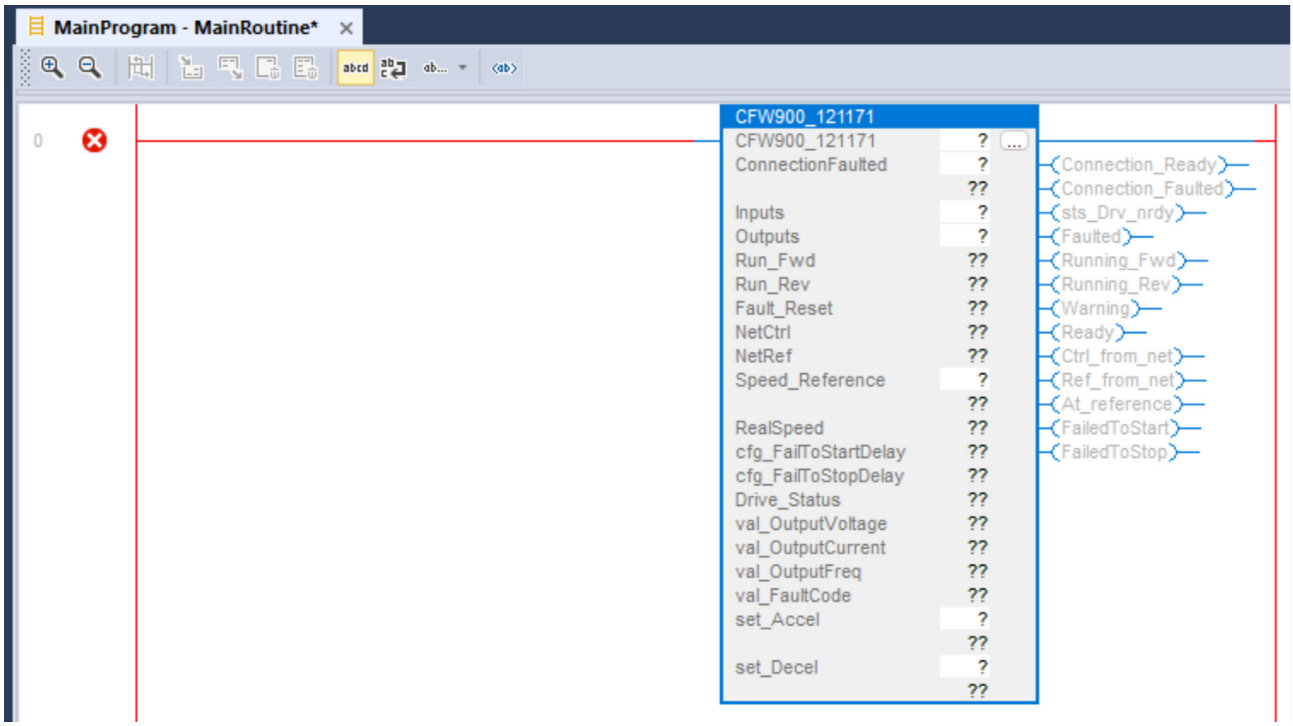
Review the proposed changes and click OK



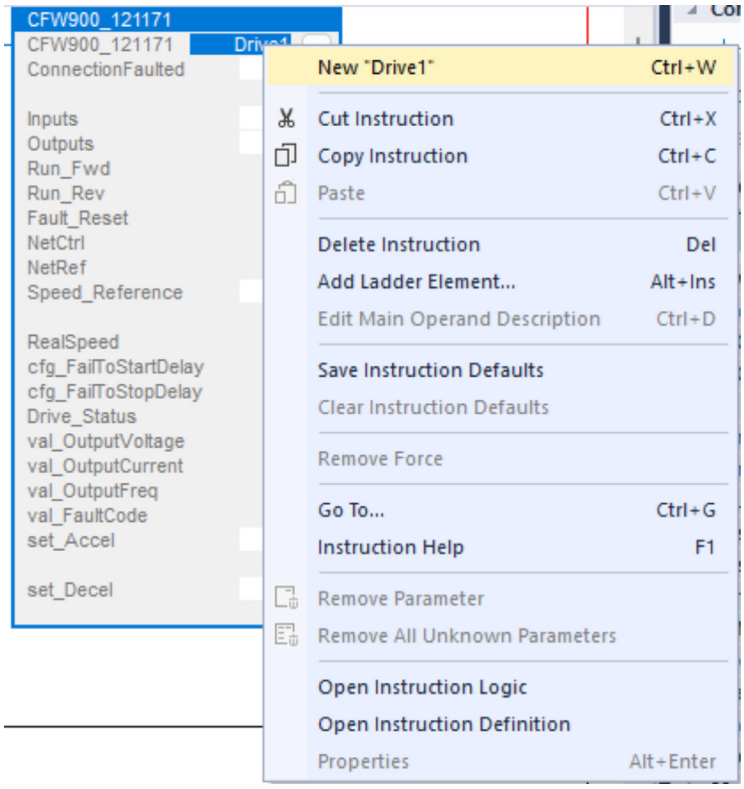
There should now be this add-on instruction in the project.

AOI Usage

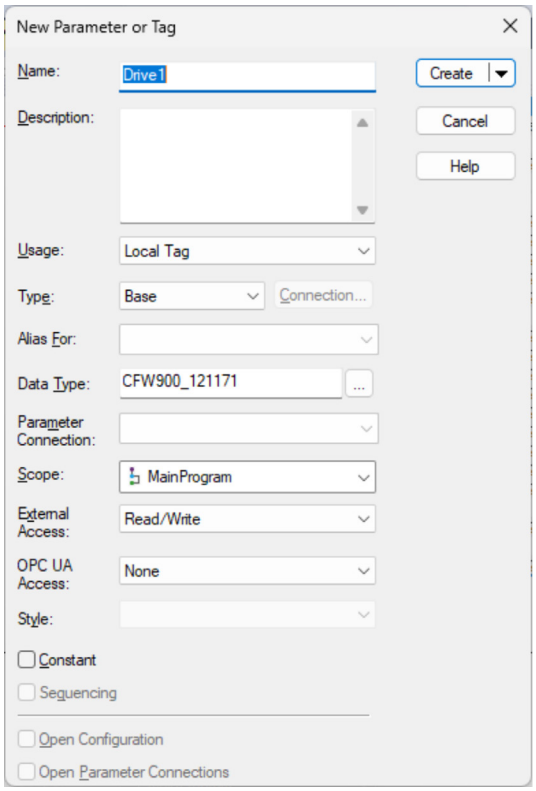
On an empty rung of ladder, add an instance of the newly imported add-on instruction by clicking on the Toolbox bar and clicking the CFW900_121171 symbol under Add-On



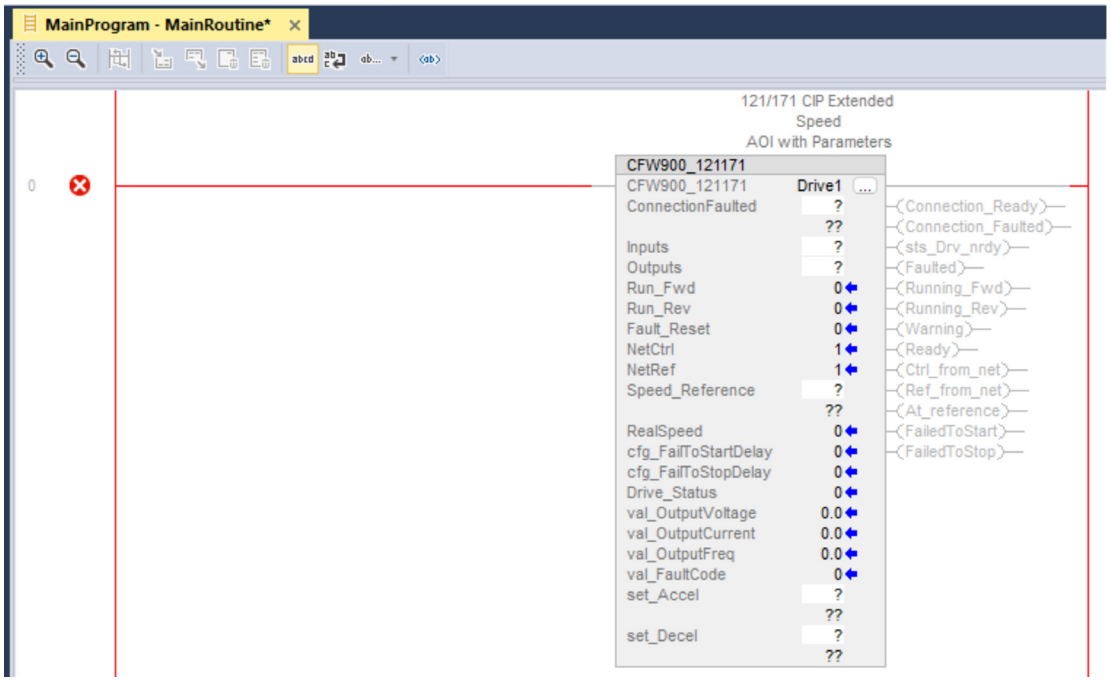
Your ladder logic should look like this after you add the add-on instruction



The Add-On requires a tag to be created. Create this tag by typing a name in the CFW900 field and right clicking and selecting New Tag



Give any appropriate description and scope (the tag can be either program or controller scoped and then click Create

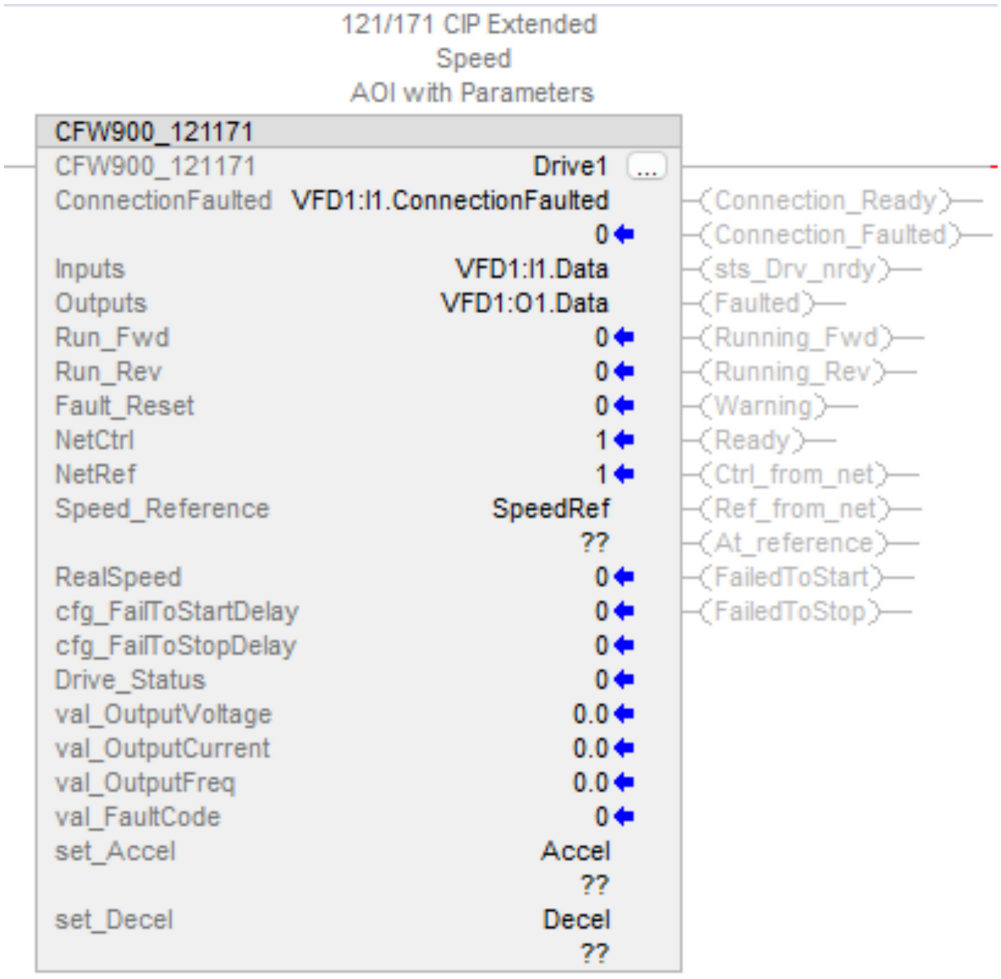


The majority of your parameters for the add-on instruction should now show values

Next, the Connection Faulted, Inputs, Outputs, set_Speed_Reference, set_Accel, and set_Decel need to be populated as follows:

- ConnectionFaulted = VFD1:I1.ConnectionFaulted
- Inputs = VFD1:I1.Data
- Outputs = VFD1:O1.Data
- set_Speed_Reference = SpeedRef
- set_Accel = Accel
- set_Decel = Decel

You will need to create the SpeedRef, Accel, and Decel tags with a data type of REAL.



CFW900_121171 AOI (Extended Speed Control + IO) – AOI Parameter Descrpition

InOut Parameters

Parameter	Type	Description
Inputs	INT[10]	Input Assembly from CFW900
Outputs	INT[10]	Output Assembly to CFW900

Input Parameters

Parameter	Type	Description
Cfg_FailToStartDelay	DINT	Time in seconds before faulting on fail to start if VFD does not start when commanded Set to 0 to disable
Cfg_FailToStopDelay	DINT	Time in seconds before faulting on fail to stop if VFD does not stop when commanded Set to 0 to disable
ConnectionFaulted	BOOL	From CFW900 Ethernet Module. 1 = Connection is faulted 0 = Connection is OK
Fault_Reset	BOOL	1 = Send Reset Fault Signal to VFD 0 = No action
Run_Fwd	BOOL	1 = Run Forward 0 = Stop
Run_Rev	BOOL	1 = Run Reverse 0 = Stop
Speed_Reference	INT	Speed Setpoint (RPM) Negative Speed will reverse direction of motor
NetCtrl	BOOL	1 = R2 Control (Ethernet) 0 = R1 Control (other)
NetRef	BOOL	1 = R2 Reference (Ethernet) 0 = R1 Reference (other)
Set_Accel	REAL	Acceleration Ramp Setpoint (0.1-999.9) in Seconds
Set_Decel	REAL	Deceleration Ramp Setpoint (0.1-999.9) in Seconds

Output Parameters

Parameter	Type	Description
connection_Faulted	BOOL	Goes high when connections interrupted. If "Run" signal is set, it must be reset before this will clear 1 = Connection has been faulted from VFD to PLC 0 = Connection OK
connection_Ready	BOOL	1 = Connection from VFD to PLC is established 0 = Connection not established
faulted	BOOL	1 = VFD Fault, connection fault, or failedToStart/Stop Fault 0 = No faults
realSpeed	INT	Current Speed (RPM)
running_Fwd	BOOL	1 = VFD running forward 0 = VFD not running forward
running_Rev	BOOL	1 = VFD running in reverse 0 = VFD not running in reverse
at_reference	BOOL	1 = VFD has reached programmed speed
ctrl_from_net	BOOL	1 = VFD Controlled remotely (PLC) 0 = VFD Controlled Locally
drive_Status	INT	0 = Non-existent 1 = Startup 2 = Not Ready 3 = Ready 4 = Enabled 5 = Stopping 6 = Fault Stop 7 = Faulted
failedToStart	BOOL	1 = VFD failed to start in time allotted 0 = Normal
failedToStop	BOOL	1 = VFD failed to stop in time allotted 0 = Normal

Output Parameters

Parameter	Type	Description
ref_from_net	BOOL	1 = using speed reference from remote source 0 = using speed reference from local source
sts_Drv_nrdy	BOOL	1 = indicates AOI detected a not ready state and run_fwd/run_rev must be set to 0 to clear 0 = Normal
warning	BOOL	1 = VFD is in alarm condition 0 = VFD is not in alarm condition
val_FaultCode	DINT	Fault code from VFD
val_OutputCurrent	REAL	Output current in Amps from VFD
val_OutputFreq	REAL	Output frequency in Hertz from VFD
val_OutputVoltage	REAL	Output voltage in Volts from VFD

CFW900 Parameter Requirements

The following paramaters must be set in the CFW900:

Parameter	Setting
C9.5.1 EtherNet/IP I/O Instances	5 = 121/171 CIP + I/O data They have the same data format as the 21/71 CIP Extended Speed Control instances. In addition, it is possible to program up to 48 parameters of the equipment itself for reading and/or 48 for writing via network
C9.5.2 Readings 1st Word	1 – (Range: 0-100: STOPPED) It sets the index of the first programmable reading word for data exchange with the network (input to the network master), configured in C9.5.2
C9.5.3 Readings Quantity	8 – (Range: 0-50: STOPPED) It sets the number of programmable reading words for data exchange with the network (input to the network master), from the first word set in C9.5.3.
C9.5.4 Writings 1st Word	1 - (Range: 0-100: STOPPED) It sets the index of the first programmable writing word for data exchange with the network (output to the network master), configured in C9.5.4.
C9.5.5 Writings Quantity	8 - (Range: 0-50: STOPPED) It sets the number of programmable writing words for data exchange with the network (output to the network master), from the first word set in C9.5.5.
C4.1.1 Command mode	2 = Remote 2 Fixed in Remote 2 command mode
C4.2.2.1 General Enable	7 = Ethernet
C4.2.2.2 Run/Stop	6 = Ethernet
C4.2.2.3 Direction of Rotation	7 = Ethernet
C4.2.2.4 JOG	7 = Ethernet
C4.3.1.2.2 Remote 2 Mode	6 = Ethernet
C9.2.1.1 Word #1	3
C9.2.1.2 Word #2	7
C9.2.1.3 Word #3	5
C9.2.1.4 Word #4	60
C9.2.1.5 Word #5	USER DEFINED
C9.2.1.6 Word #6	USER DEFINED
C9.2.1.7 Word #7	USER DEFINED
C9.2.1.8 Word #8	USER DEFINED
C9.2.2.2 Word #1	100
C9.2.2.3 Word #2	101
C9.2.2.4 Word #3	USER DEFINED
C9.2.2.5 Word #4	USER DEFINED
C9.2.2.6 Word #5	USER DEFINED
C9.2.2.7 Word #6	USER DEFINED
C9.2.2.8 Word #7	USER DEFINED
C9.2.2.9 Word #8	USER DEFINED

CFW900_100150 AOI (Manufacture Speed + IO)

This AOI is used when the 100/150 Manufacture Speed + IO is desired.

This uses the WEG status word and is controlled slightly differently from the CIP style controls.

Additionally, the AOI handles the following additional parameters:

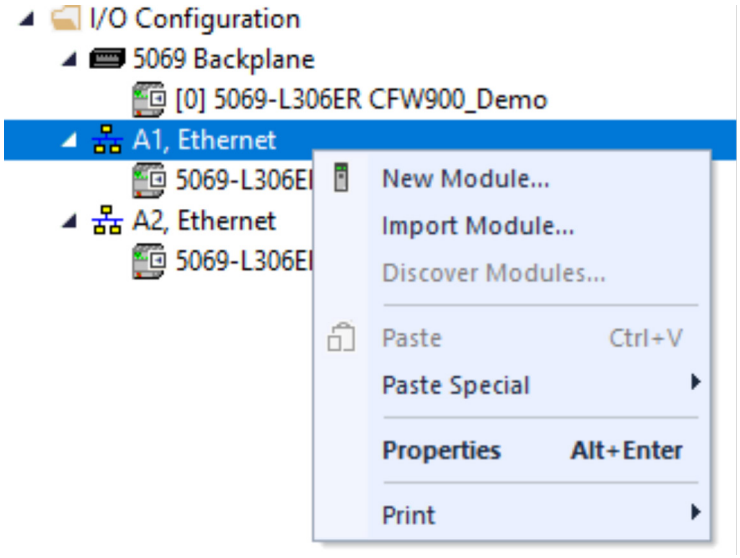
Outputs

- Output Current
- Output Voltage
- Output Frequency
- Last Fault Code

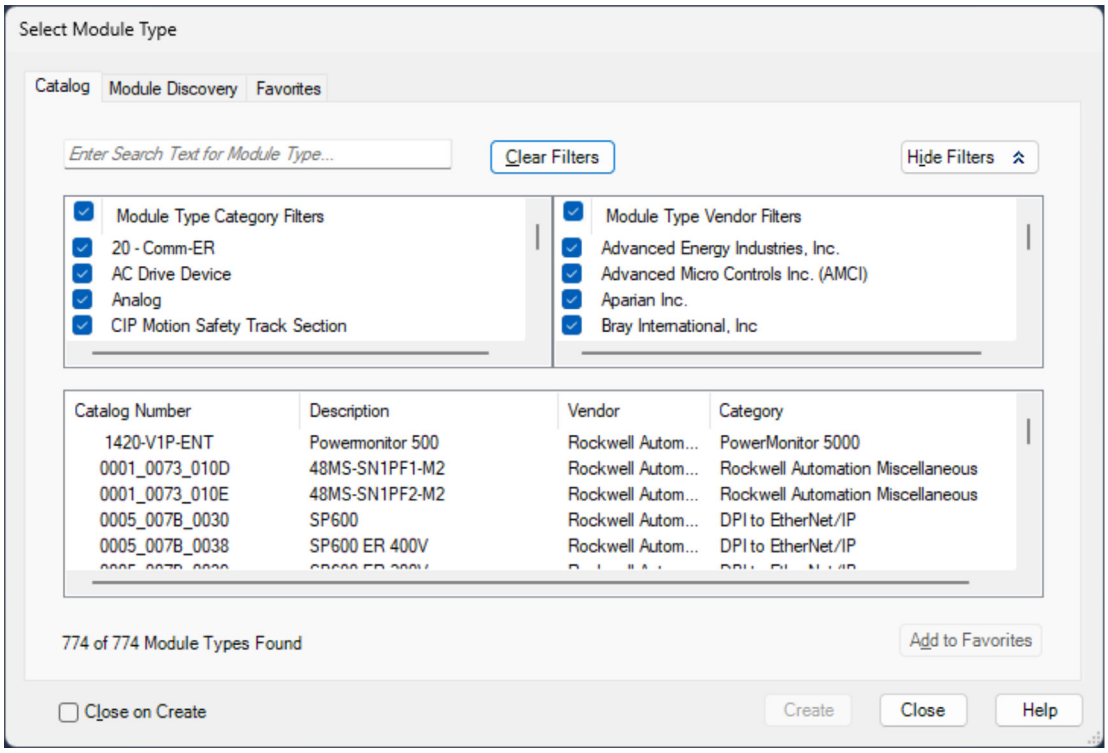
Inputs

- Acceleration Ramp 1
- Deceleration Ramp 1

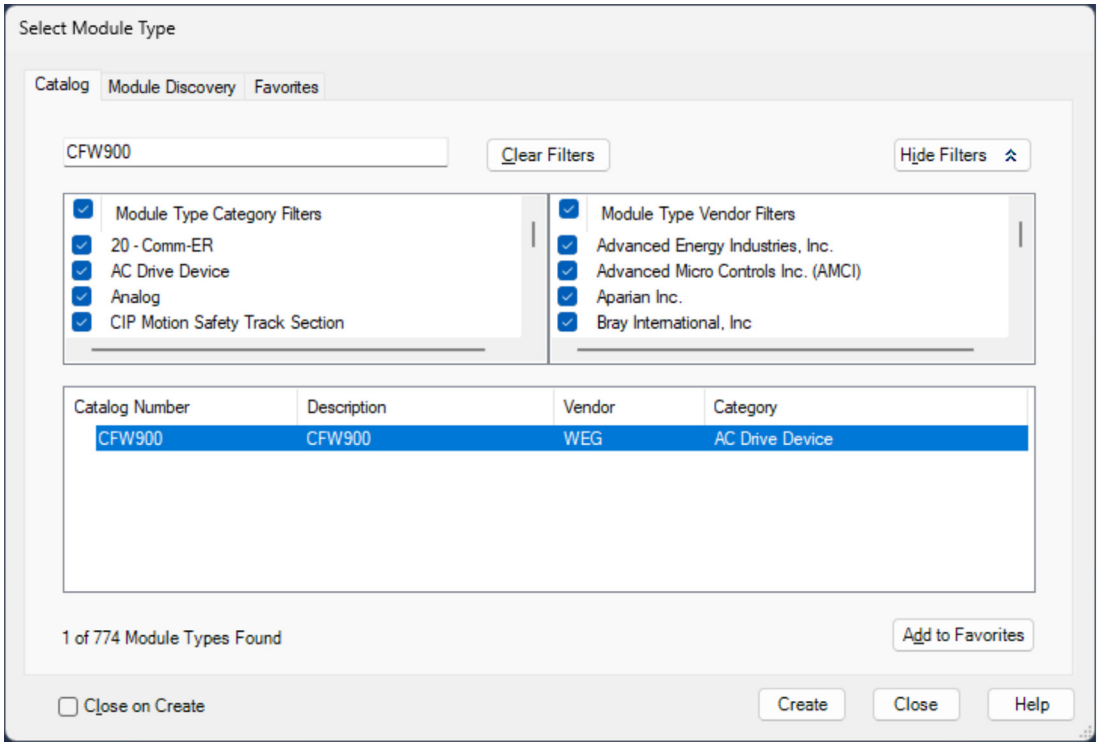
Create the EtherNet/IP Device



In the device tree, right click on the Ethernet bus that will contain the CFW900 and click New Module...

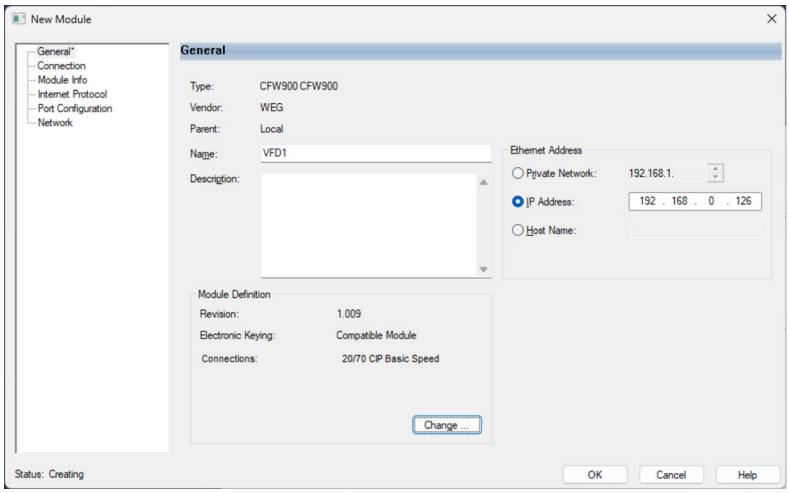


In the Select Module Type dialog box, enter “CFW900” in the search field



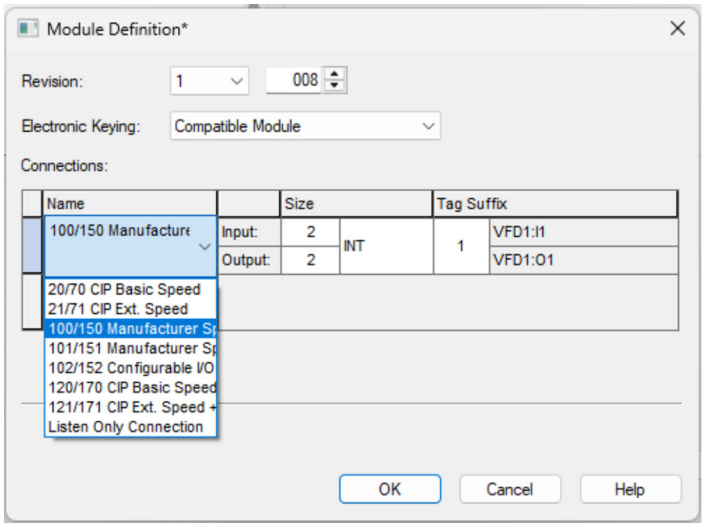
There should be an entry matching the above screenshot.

Highlight the CFW900 and click Create

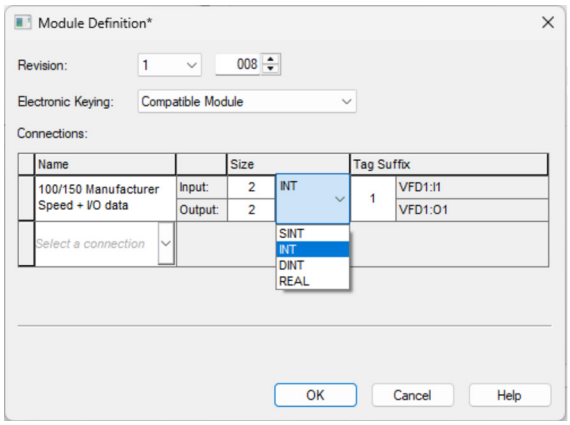


Give the CFW900 a name and enter the IP address of the drive.

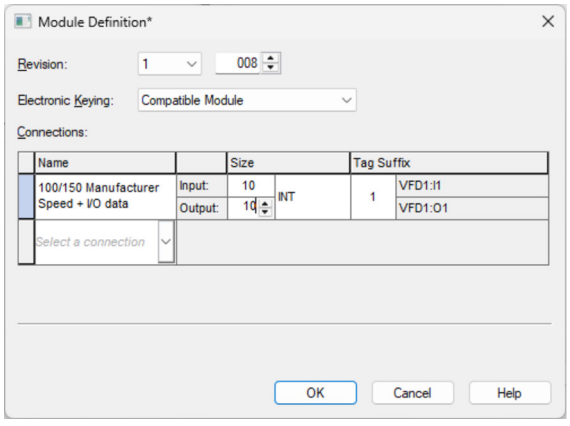
Before clicking on OK, click on the Change … button in the module definition.



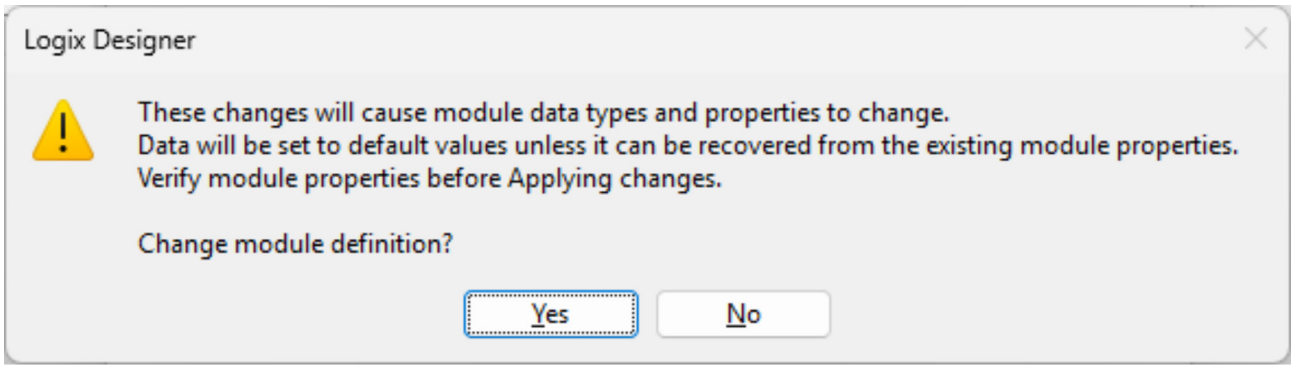
Select the name of 100/150 Manufacturer Speed + I/O Data



Change the type to INT

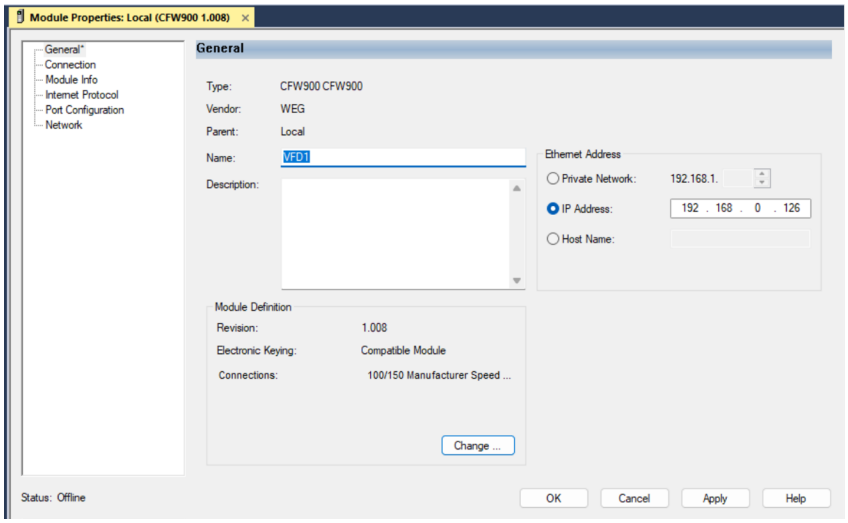


The Input and output size should be set to 10 and 10 respectively. Click OK



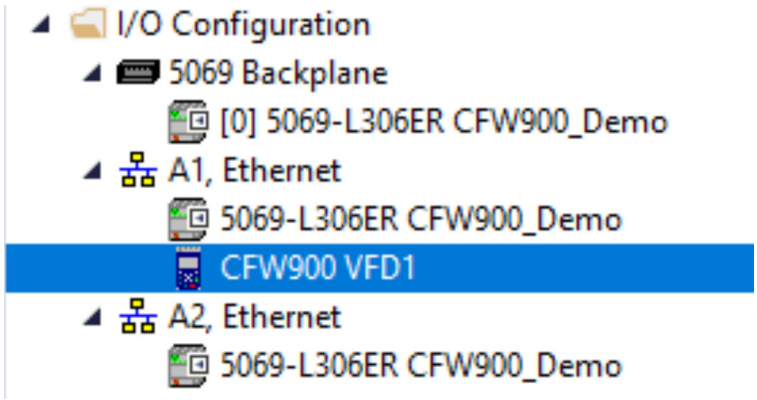
Click Yes

At this point, no other changes are required. However, changing the RPI can be done if the need arises.



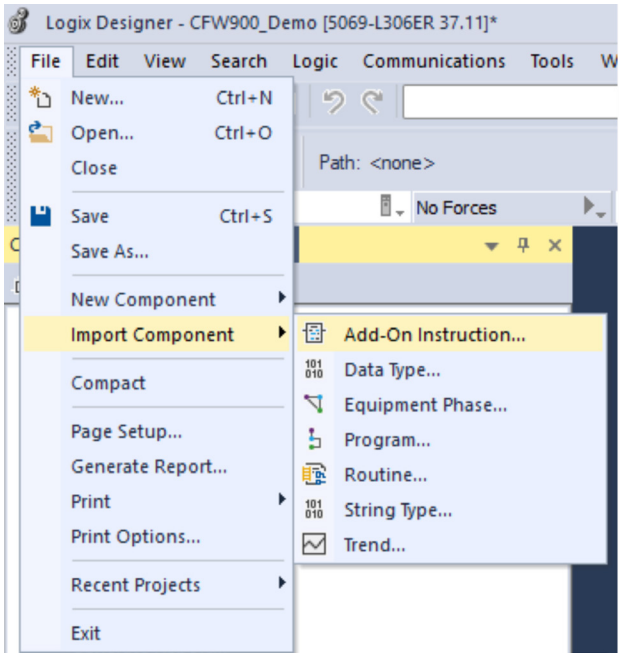
See the Trouble Shooting section to learn more about changing the RPI.

Once satisfied with the settings, Click OK

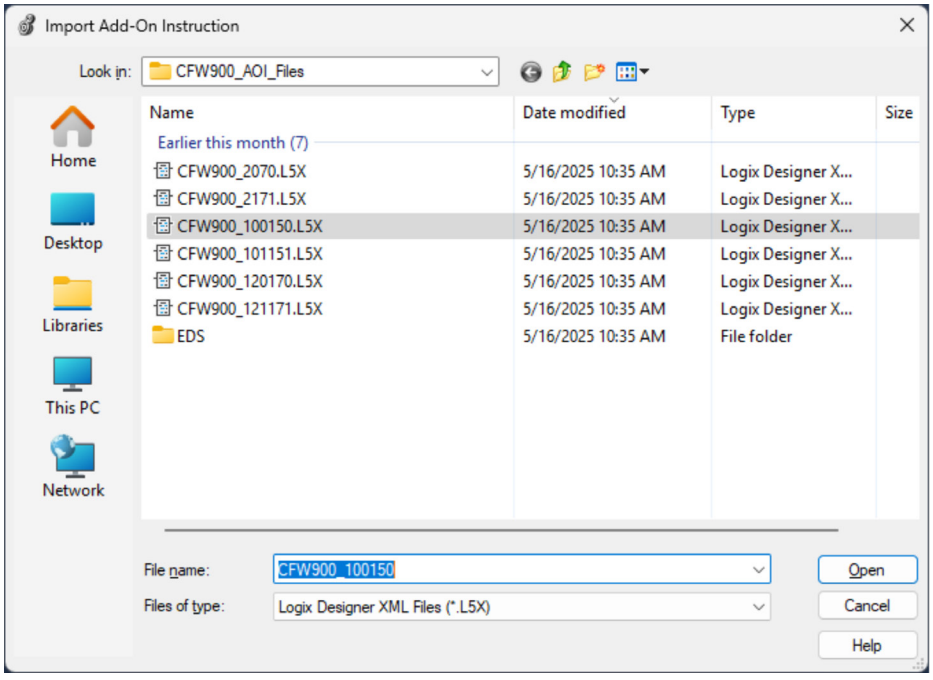


There should now be an instance of the CFW900 in the device tree

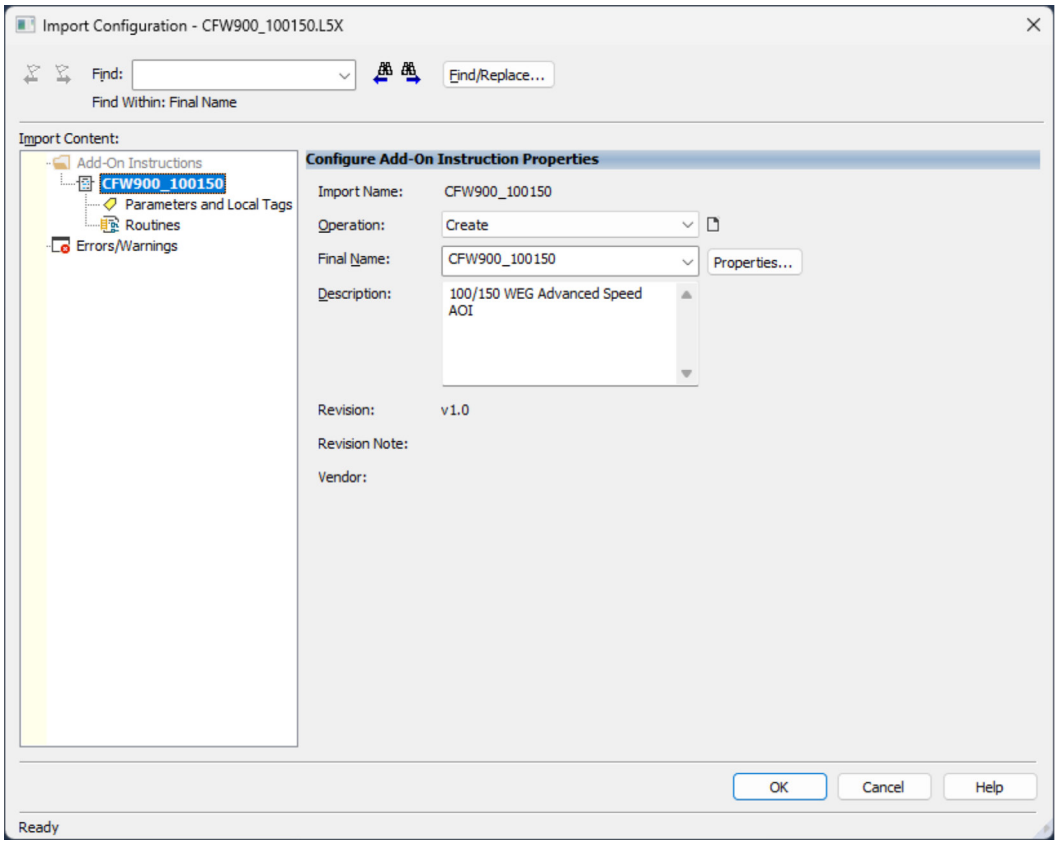
AOI Import



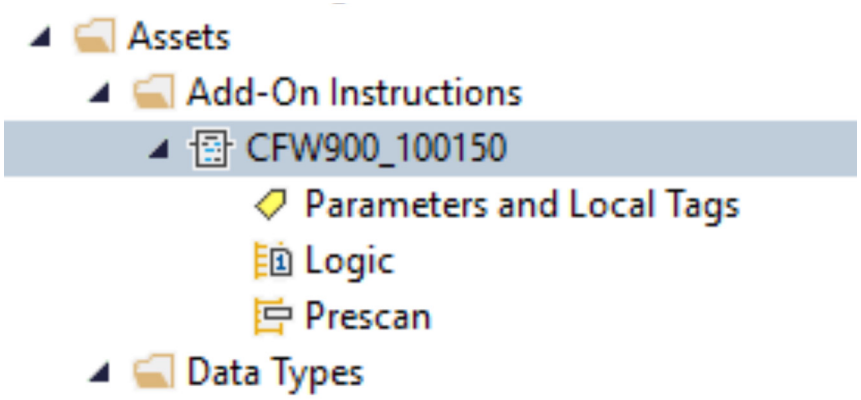
From the menu bar go to File, Import Component, Add-On Instruction...



Select the appropriate add-on instruction (CFW900_100150.L5X) and click Import...



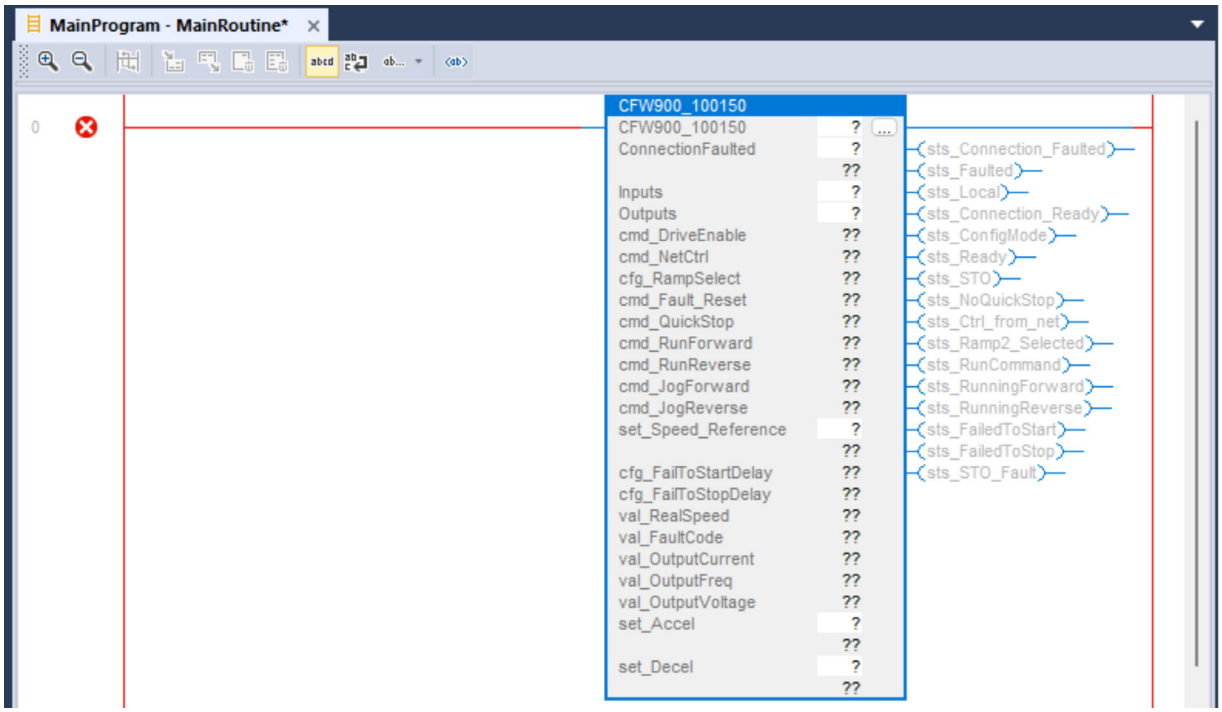
Review the proposed changes and click OK



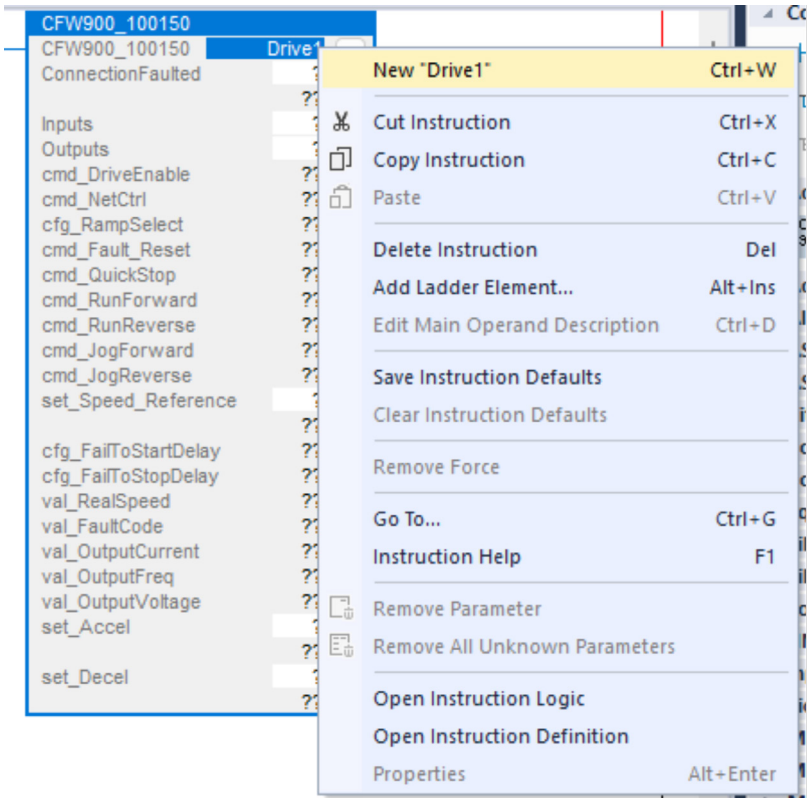
There should now be this add-on instruction in the project.

AOI Usage

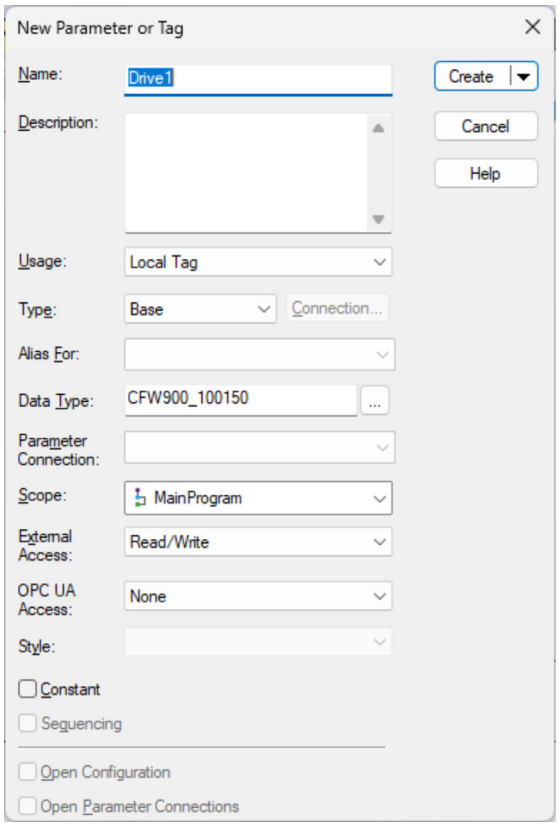
On an empty rung of ladder, add an instance of the newly imported add-on instruction by clicking on the Toolbox bar and clicking the CFW900_100150 symbol under Add-On



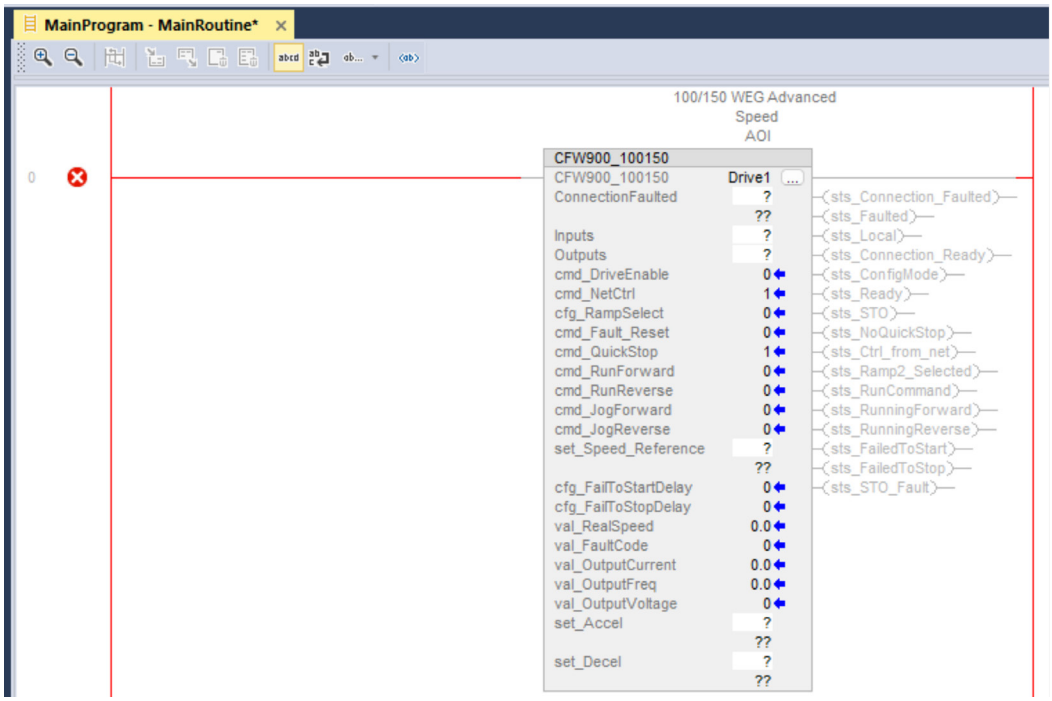
Your ladder logic should look like this after you add the add-on instruction



The Add-On requires a tag to be created. Create this tag by typing a name in the CFW900 field and right clicking and selecting New Tag



Give any appropriate description and scope (the tag can be either program or controller scoped and then click Create

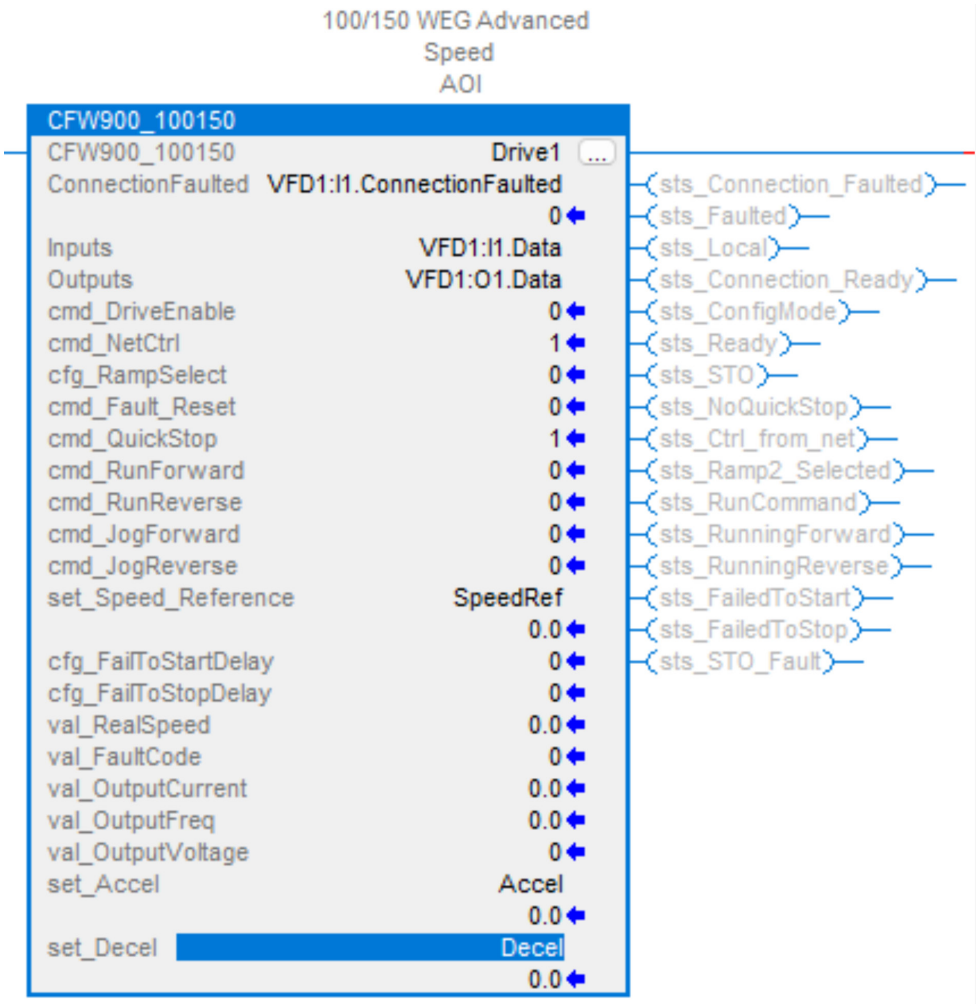


The majority of your parameters for the add-on instruction should now show values

Next, the Connection Faulted, Inputs, Outputs, set_Speed_Reference, set_Accel, and set_Decel need to be populated as follows:

- ConnectionFaulted = VFD1:I1.ConnectionFaulted
- Inputs = VFD1:I1.Data
- Outputs = VFD1:I1.Data
- set_Speed_Reference = SpeedRef
- set_Accel = Accel
- set_Decel = Decel

You will need to create the SpeedRef, Accel, and Decel tags with a data type of REAL.



CFW900_100150 AOI (Manufacture Speed + IO) – AOI Parameter Descrpition

InOut Parameters

Parameter	Type	Description
Inputs	INT[10]	Input Assembly from CFW900
Outputs	INT[10]	Output Assembly to CFW900

Input Parameters

Parameter	Type	Description
Cfg_FailToStartDelay	DINT	Time in seconds before faulting on fail to start if VFD does not start when commanded Set to 0 to disable
Cfg_FailToStopDelay	DINT	Time in seconds before faulting on fail to stop if VFD does not stop when commanded Set to 0 to disable
ConnectionFaulted	BOOL	From CFW900 Ethernet Module. 1 = Connection is faulted 0 = Connection is OK
cfg_RampSelect	BOOL	1 = Ramp 2 (C.6.1.4/C.6.1.5) 0 = Ramp 1 (C.6.1.1/C.6.1.2)
cmd_DriveEnable	BOOL	1 = Enable operation of VFD 0 = Disable operation of VFD
cmd_Fault_Reset	BOOL	1 = Send Reset Fault Signal to VFD 0 = No action
cmd_JogForward	BOOL	1 = Jog Forward 0 = No Action / Stop
cmd_JogReverse	BOOL	1 = Jog Reverse 0 = No Action / Stop
cmd_NetCtrl	BOOL	1 = R2 (Ethernet) control 0 = R1 (Other) control
cmd_QuickStop	BOOL	1 = No Quick stop (must be 1 to run) 0 = Quick Stop
cmd_RunForward	BOOL	1 = Run Forward 0 = Stop
cmd_RunReverse	BOOL	1 = Run Reverse 0 = Stop
set_Speed_Reference	REAL	Speed Setpoint (0-100%)
set_Accel	REAL	Acceleration Ramp Setpoint (0.1-999.9) in Seconds
set_Decel	REAL	Deceleration Ramp Setpoint (0.1-999.9) in Seconds

Output Parameters

Parameter	Type	Description
sts_ConfigMode	BOOL	1 = VFD in Config Mode 0 = VFD in Operation Mode
sts_Connection_Faulted	BOOL	Goes high when connections interrupted. If “Run” signal is set, it must be reset before this will clear 1 = Connection has been faulted from VFD to PLC 0 = Connection OK
sts_Connection_Ready	BOOL	1 = Connection from VFD to PLC is established 0 = Connection not established
sts_Ctrl_from_net	BOOL	1 = VFD controlled remotely (PLC) 0 = VFD controlled locally
sts_Faulted	BOOL	1 = VFD Fault, connection fault, or failedToStart/Stop Fault 0 = No faults
sts_FailedToStart	BOOL	1 = VFD failed to start in time allotted 0 = Normal
sts_FailedToStop	BOOL	1 = VFD failed to stop in time allotted 0 = Normal
sts_Local	BOOL	1 = Local 0 = Remote
sts_NoQuickStop	BOOL	1 = No quick stop commanded 0 = Quick stop commanded
sts_Ramp2_Selected	BOOL	1 = Ramp 2 rates selected 0 = Ramp 1 rates selected
sts_Ready	BOOL	1 = VFD is ready to operate (states Ready, Enabled, or Stopping) 0 = VFD is not ready to operate
sts_RunCommand	BOOL	1 = Commanded to run 0 = Not commanded to run
sts_RunningForward	BOOL	1 = Running forward 0 = Not running forward
sts_RunningReverse	BOOL	1 = Running reverse 0 = Not running reverse

Output Parameters

Parameter	Type	Description
sts_STO	BOOL	1 = Safe Torque Off is active 0 = Safe Torque Off is not active
sts_STO_Fault	BOOL	1 = AOI is preventing running due to STO trip until cmd_RunForward/Reverse shows a rising edge 0 = Normal Operation
val_FaultCode	DINT	Fault code 1 from VFD
val_OutputCurrent	REAL	Output current in Amps from VFD
val_OutputFreq	REAL	Output frequency in Hertz from VFD
val_OutputVoltage	REAL	Output voltage in Volts from VFD

CFW900 Parameter Requirements

The following paramaters must be set in the CFW900:

Parameter	Setting
C9.5.1 EtherNet/IP I/O Instances	8 = 100/150 Manuf. + I/O data. These instances represent the operating interface of the equipment according to the CFW900 frequency inverter profile. Besides the control and status words, speed reference and effective value, it is possible to program up to 48 parameters of the device itself for reading and/or 48 for writing via network.
9.5.2 Readings 1st Word	1 – (Range: 0-100: STOPPED) It sets the index of the first programmable reading word for data exchange with the network (input to the network master), configured in C9.5.2
C9.5.3 Readings Quantity	8 – (Range: 0-50: STOPPED) It sets the number of programmable reading words for data exchange with the network (input to the network master), from the first word set in C9.5.3.
C9.5.4 Writings 1st Word	1 - (Range: 0-100: STOPPED) It sets the index of the first programmable writing word for data exchange with the network (output to the network master), configured in C9.5.4.
C9.5.5 Writings Quantity	8 - (Range: 0-50: STOPPED) It sets the number of programmable writing words for data exchange with the network (output to the network master), from the first word set in C9.5.5.
C4.1.1 Command mode	7 = Ethernet
C4.2.2.1 General Enable	6 = Ethernet
C4.2.2.2 Run/Stop	6 = Ethernet
C4.2.2.3 Direction of Rotation	7 = Ethernet
C4.2.2.4 JOG	7 = Ethernet
C4.3.1.2.2 Remote 2 Mode	6 = Ethernet
C9.2.1.1 Word #1	3
C9.2.1.2 Word #2	7
C9.2.1.3 Word #3	5
C9.2.1.4 Word #4	60
C9.2.1.5 Word #5	USER DEFINED
C9.2.1.6 Word #6	USER DEFINED
C9.2.1.7 Word #7	USER DEFINED
C9.2.1.8 Word #8	USER DEFINED
C9.2.2.2 Word #1	100
C9.2.2.3 Word #2	101
C9.2.2.4 Word #3	USER DEFINED
C9.2.2.5 Word #4	USER DEFINED
C9.2.2.6 Word #5	USER DEFINED
C9.2.2.7 Word #6	USER DEFINED
C9.2.2.8 Word #7	USER DEFINED
C9.2.2.9 Word #8	USER DEFINED

CFW900_101151 AOI (Manufacture Speed + IO + Torque)

This AOI is used when the 101/151 Manufacture Speed + IO is desired.

This uses the WEG status word and is controlled slightly differently from the CIP style controls.

This mode is suited for torque control

Additionally, the AOI handles the following additional parameters:

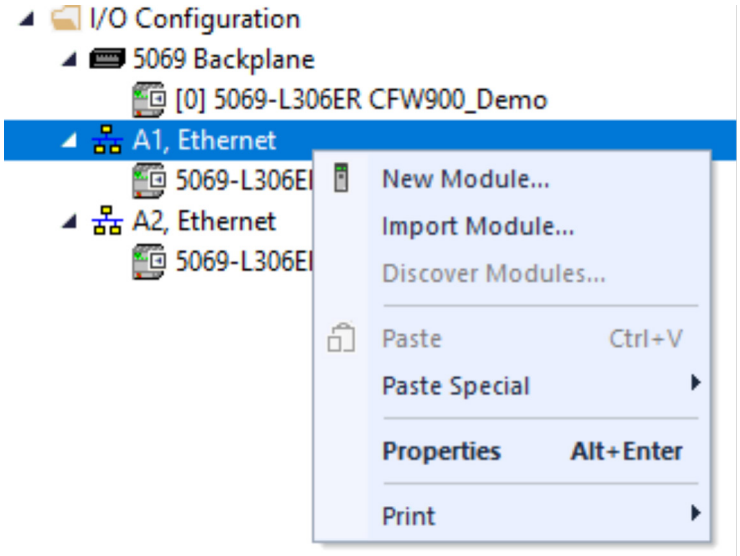
Outputs

- Torque Reference
- Output Current
- Output Voltage
- Output Frequency
- Last Fault Code

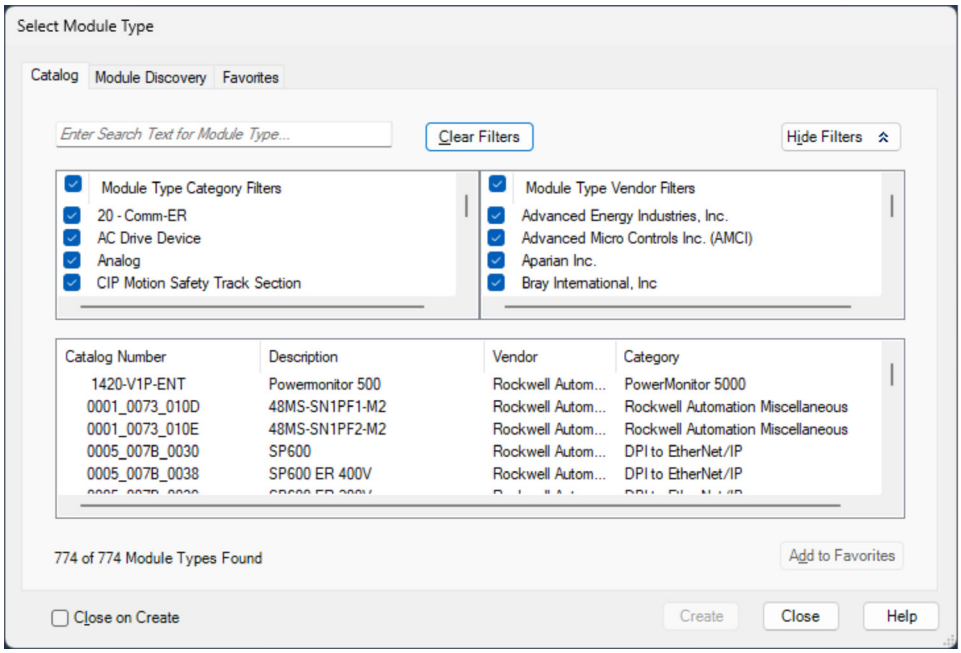
Inputs

- Acceleration Ramp 1
- Deceleration Ramp 1
- Torque IncRamp
- Torque DecRamp

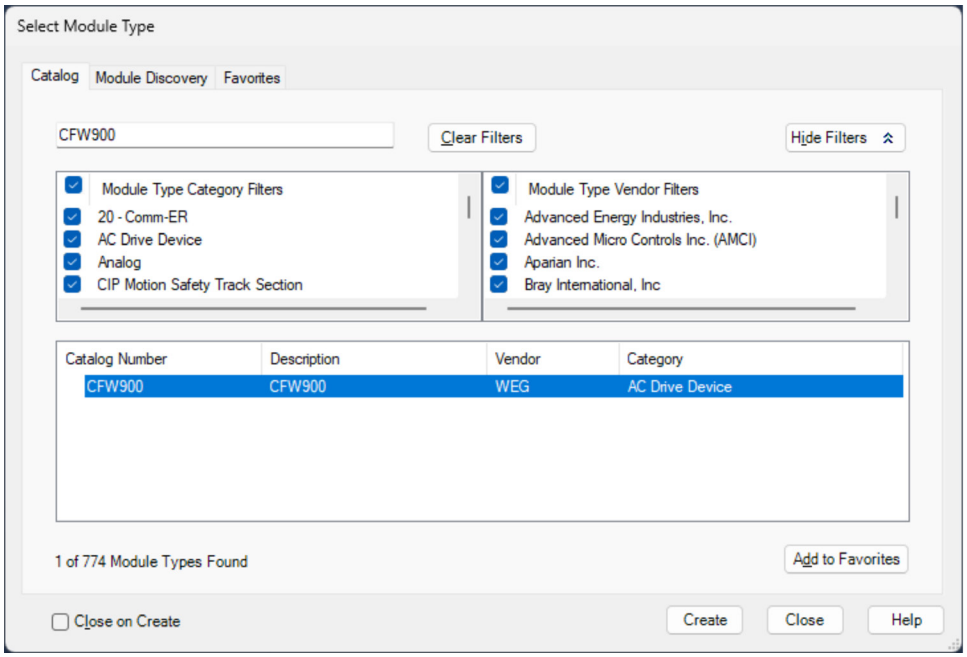
Create the EtherNet/IP Device



In the device tree, right click on the Ethernet bus that will contain the CFW900 and click New Module...

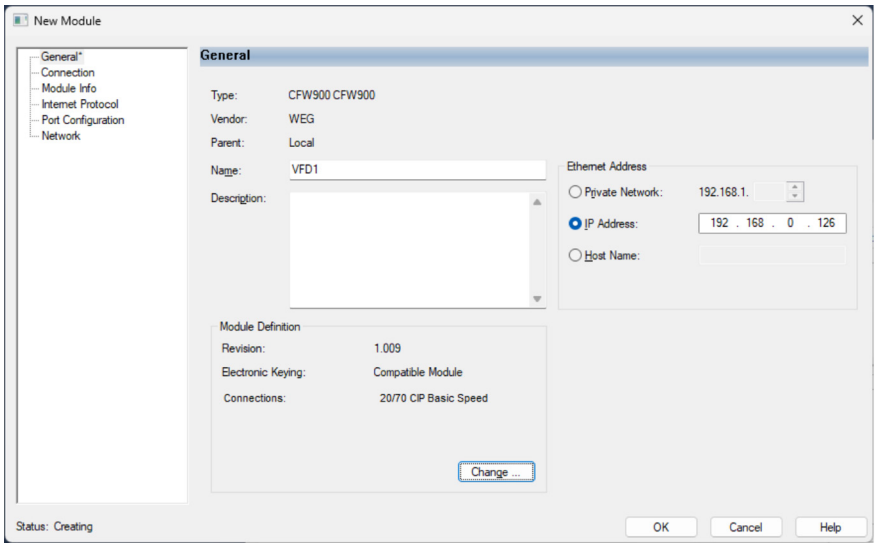


In the Select Module Type dialog box, enter “CFW900” in the search field



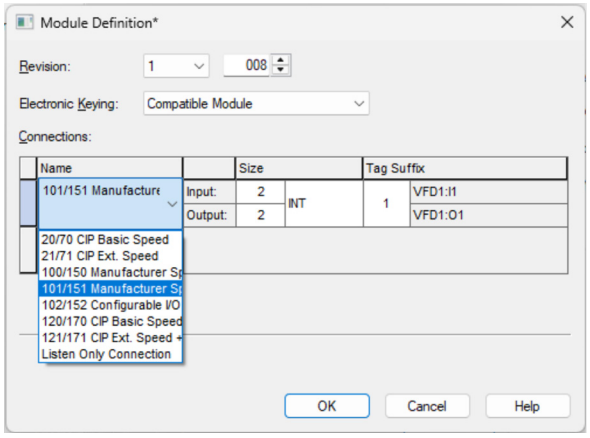
There should be an entry matching the above screenshot.

Highlight the CFW900 and click Create

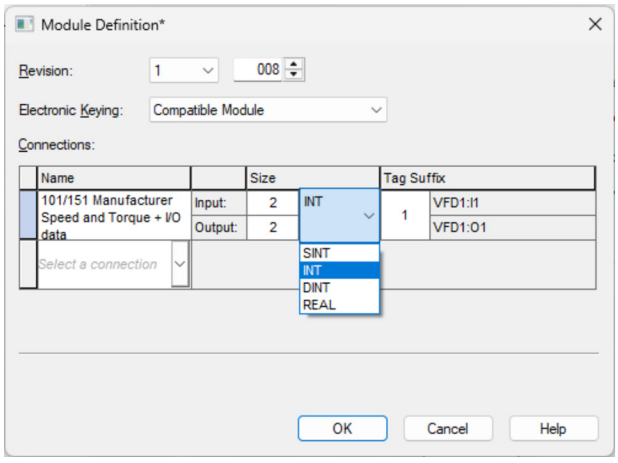


Give the CFW900 a name and enter the IP address of the drive.

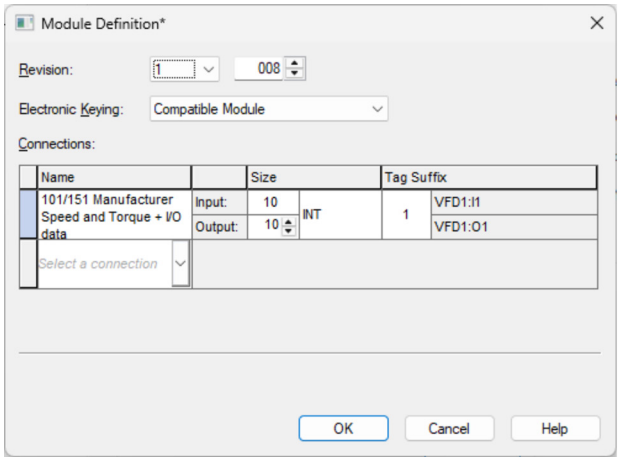
Before clicking on OK, click on the Change ... button in the module definition.



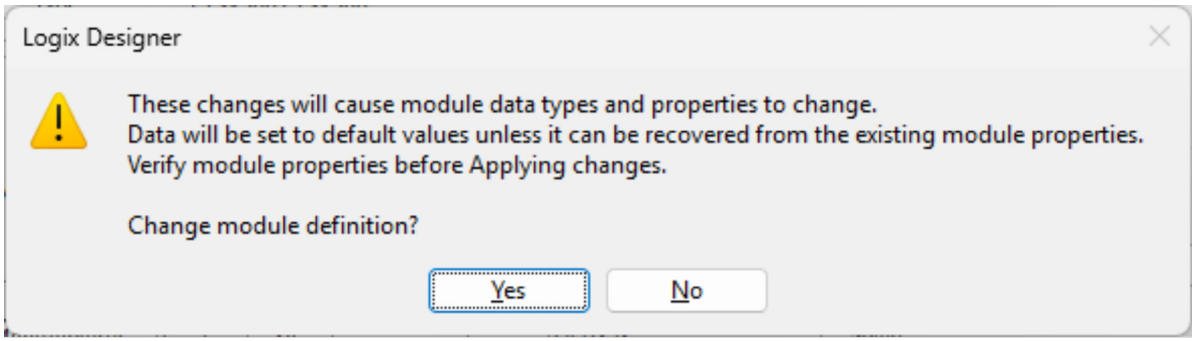
Select the name of 101/151 Manufacturer Speed and Torque + I/O Data



Change the type to INT

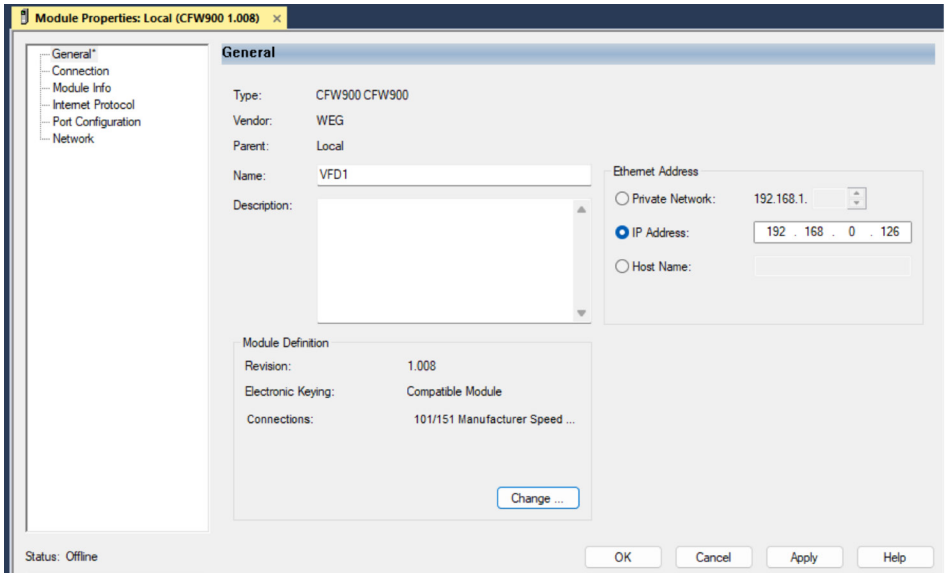


The Input and output size should be set to 10 and 10 respectively. Click OK



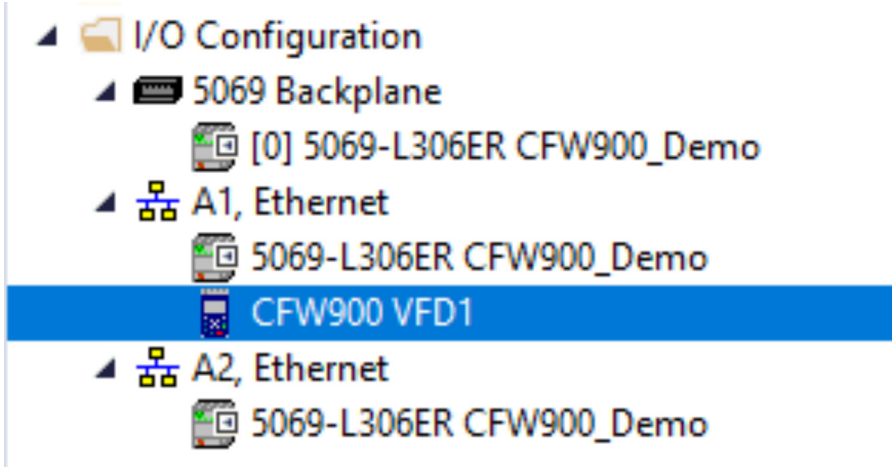
Click Yes

At this point, no other changes are required. However, changing the RPI can be done if the need arises.



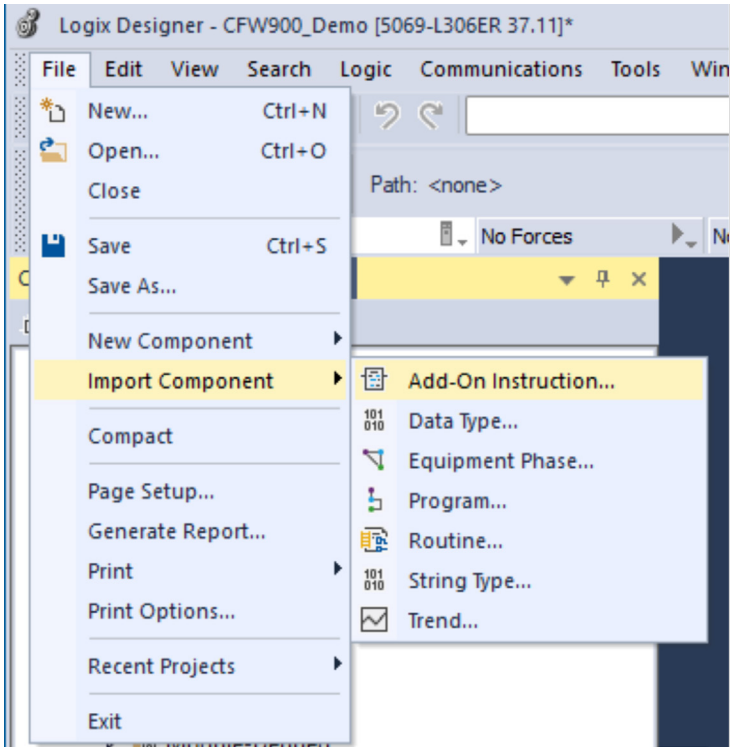
See the Trouble Shooting section to learn more about changing the RPI.

Once satisfied with the settings, Click OK

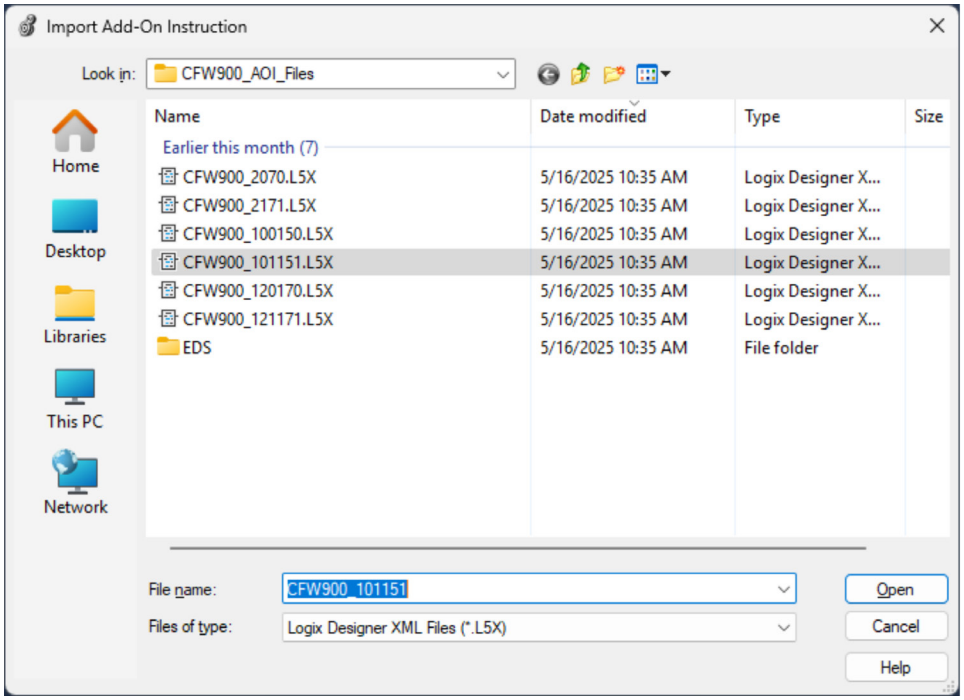


There should now be an instance of the CFW900 in the device tree

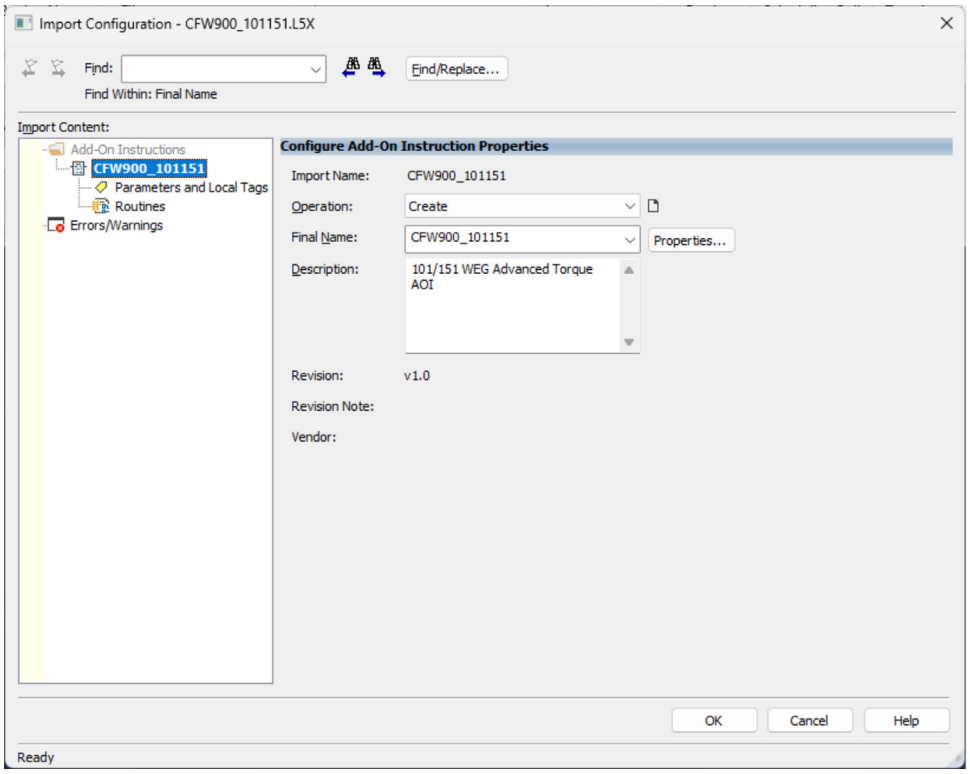
AOI Import



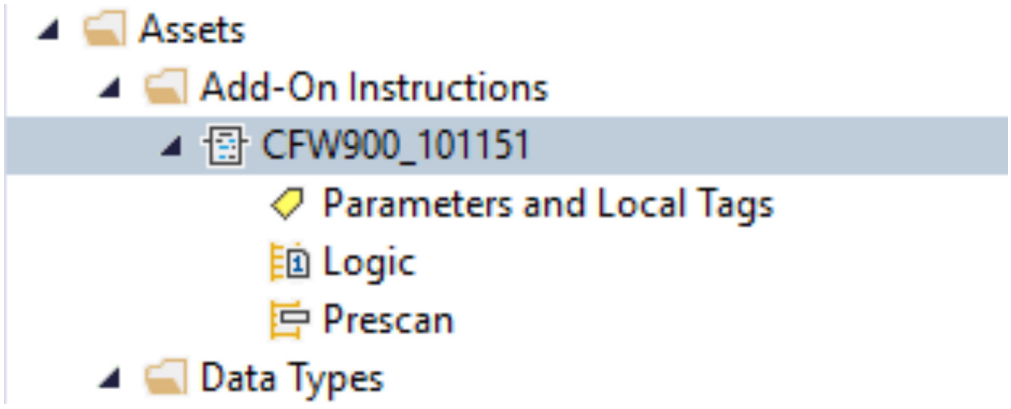
From the menu bar go to File, Import Component, Add-On Instruction...



Select the appropriate add-on instruction (CFW900.L5X) and click Import...



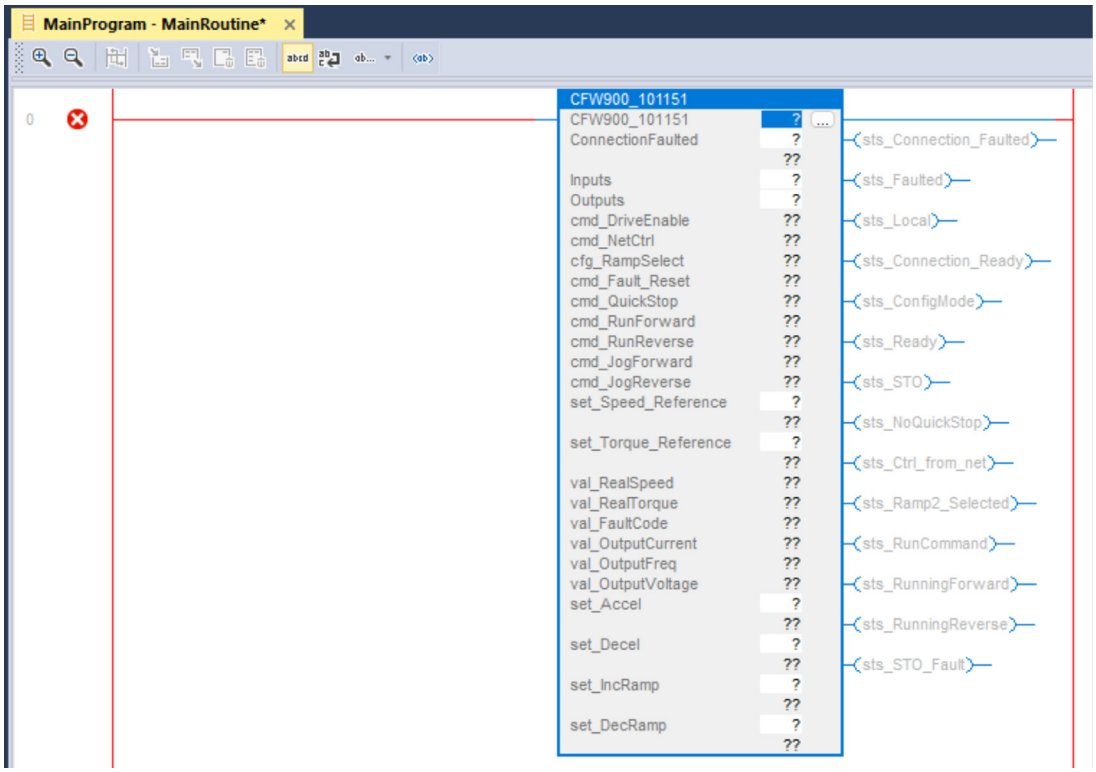
Review the proposed changes and click OK



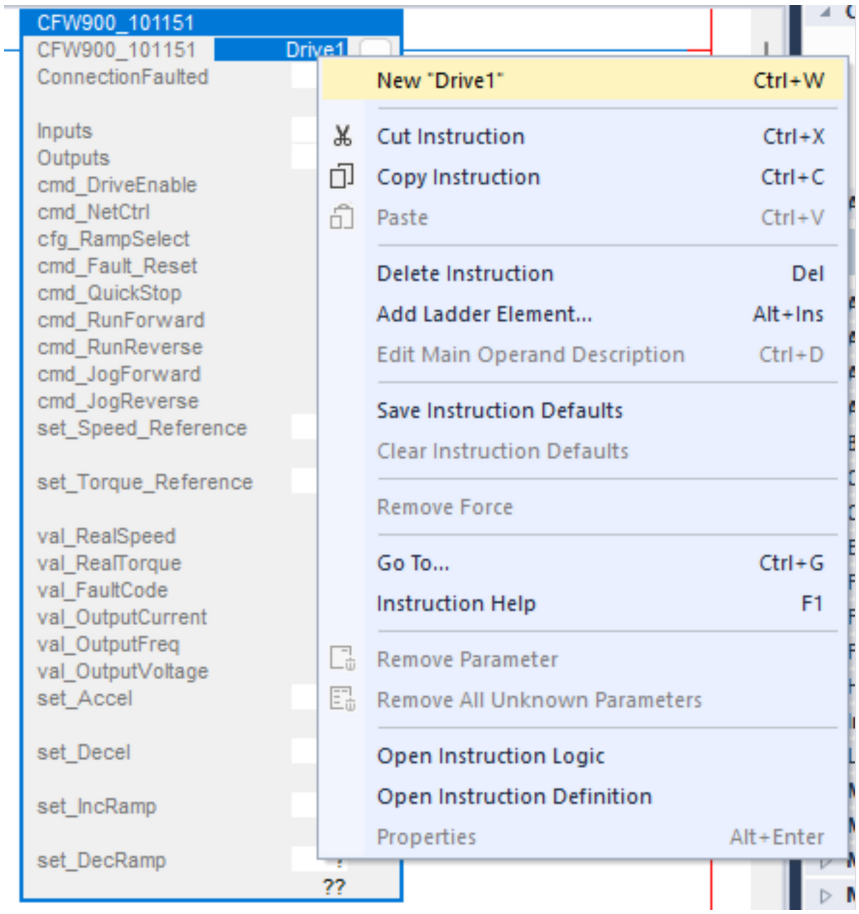
There should now be this add-on instruction in the project.

AOI Usage

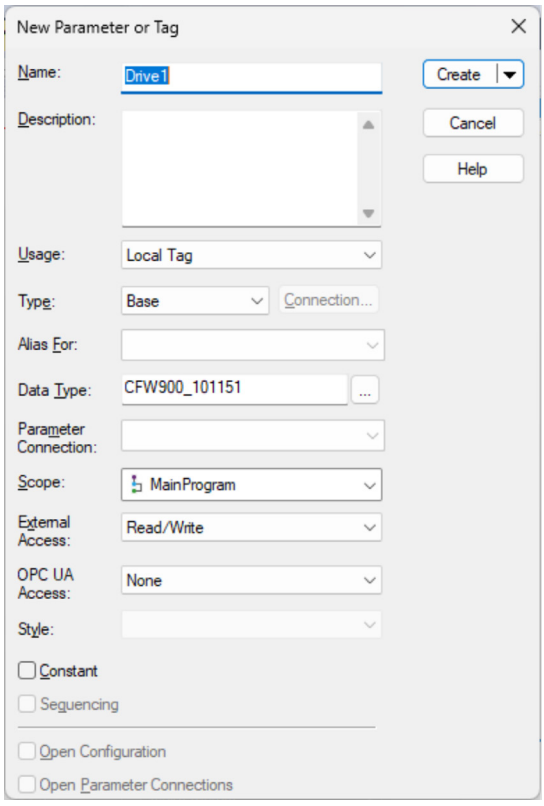
On an empty rung of ladder, add an instance of the newly imported add-on instruction by clicking on the Toolbox bar and clicking the CFW900_101151 symbol under Add-On



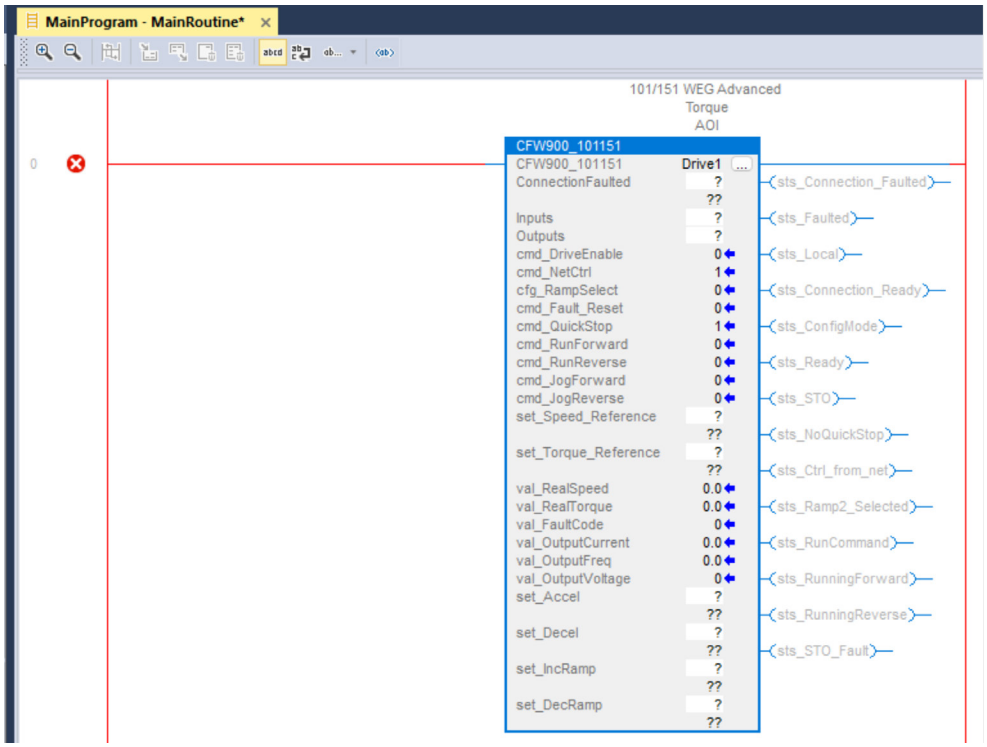
Your ladder logic should look like this after you add the add-on instruction



The Add-On requires a tag to be created. Create this tag by typing a name in the CFW900 field and right clicking and selecting New Tag



Give any appropriate description and scope (the tag can be either program or controller scoped and then click Create

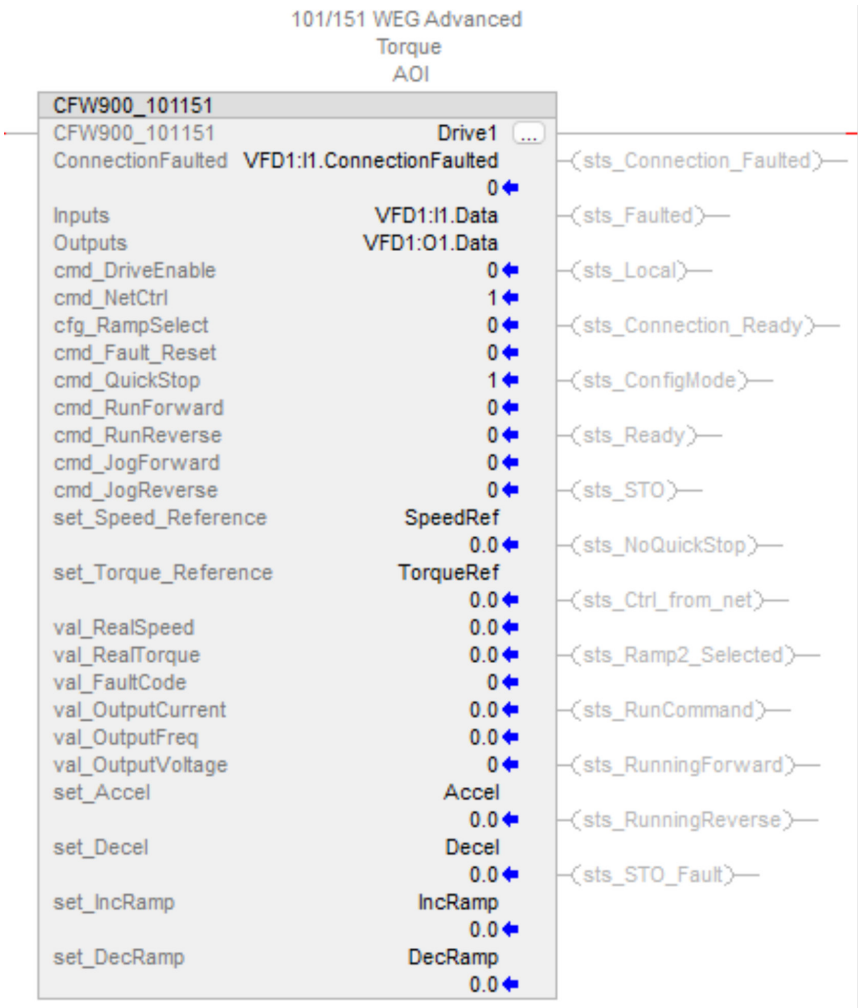


The majority of your parameters for the add-on instruction should now show values

Next the Connection Faulted, Inputs, Outputs, set_Speed_Reference, set_Torque_Reference, set_Accel, set_Decel, set_IncRamp, set_DecRamp need to be populated as follows:

- ConnectionFaulted = VFD1:I1.ConnectionFaulted
- Inputs = VFD1:I1.Data
- Outputs = VFD1:O1.Data
- set_Speed_Reference = SpeedRef
- set_Torque_Reference = TorqueRef
- set_Accel = Accel
- set_Decel = Decel
- set_IncRamp = IncRamp
- set_DecRamp = DecRamp

You will need to create the SpeedRef, TorqueRef, Accel, Decel, IncRamp, and DecRamp tags with a data type of REAL.



CFW900_101151 AOI (Manufacture Speed + IO + Torque) – AOI Parameter Descrpition

InOut Parameters

Parameter	Type	Description
Inputs	INT [10]	Input Assembly from CFW900
Outputs	INT [10]	Output Assembly to CFW900

Input Parameters

Parameter	Type	Description
Cfg_FailToStartDelay	DINT	Time in seconds before faulting on fail to start if VFD does not start when commanded Set to 0 to disable
Cfg_FailToStopDelay	DINT	Time in seconds before faulting on fail to stop if VFD does not stop when commanded Set to 0 to disable
ConnectionFaulted	BOOL	From CFW900 Ethernet Module. 1 = Connection is faulted 0 = Connection is OK
cfg_RampSelect	BOOL	1 = Ramp 2 (C.6.1.4/C.6.1.5) 0 = Ramp 1 (C.6.1.1/C.6.1.2)
cmd_DriveEnable	BOOL	1 = Enable operation of VFD 0 = Disable operation of VFD
cmd_Fault_Reset	BOOL	1 = Send Reset Fault Signal to VFD 0 = No action
cmd_JogForward	BOOL	1 = Jog Forward 0 = No Action / Stop
cmd_JogReverse	BOOL	1 = Jog Reverse 0 = No Action / Stop
cmd_NetCtrl	BOOL	1 = R2 (Ethernet) control 0 = R1 (Other) control
cmd_QuickStop	BOOL	1 = No Quick stop (must be 1 to run) 0 = Quick Stop
cmd_RunForward	BOOL	1 = Run Forward 0 = Stop
cmd_RunReverse	BOOL	1 = Run Reverse 0 = Stop

Parameter	Type	Description
set_Speed_Reference	REAL	Speed Setpoint (0-100%)
set_Torque_Reference	REAL	Torque Setpoint (in %)
set_Accel	REAL	Acceleration Ramp Setpoint (0.1-999.9) in Seconds
set_Decel	REAL	Deceleration Ramp Setpoint (0.1-999.9) in Seconds
set_DecRamp	REAL	Decreasing Torque control ramp (0.1-999.9) in seconds
set_IncRamp	REAL	Increasing Torque control ramp (0.1-999.9) in seconds

Output Parameters

Parameter	Type	Description
sts_ConfigMode	BOOL 0 = VFD in Operation Mode	1 = VFD in Config Mode
sts_Connection_Faulted	BOOL	Goes high when connections interrupted. If “Run” signal is set, it must be reset before this will clear 1 = Connection has been faulted from VFD to PLC 0 = Connection OK
sts_Connection_Ready	BOOL	1 = Connection from VFD to PLC is established 0 = Connection not established
sts_Ctrl_from_net	BOOL	1 = VFD controlled remotely (PLC) 0 = VFD controlled locally
sts_Faulted	BOOL	1 = VFD Fault, connection fault, or failedToStart/Stop Fault 0 = No faults
sts_FailedToStart	BOOL	1 = VFD failed to start in time allotted 0 = Normal
sts_FailedToStop	BOOL	1 = VFD failed to stop in time allotted 0 = Normal
sts_Local	BOOL	1 = Local 0 = Remote
sts_NoQuickStop	BOOL	1 = No quick stop commanded 0 = Quick stop commanded
sts_Ramp2_Selected	BOOL	1 = Ramp 2 rates selected 0 = Ramp 1 rates selected

Parameter	Type	Description
sts_Ready	BOOL	1 = VFD is ready to operate (states Ready, Enabled, or Stopping) 0 = VFD is not ready to operate
sts_RunCommand	BOOL	1 = Commanded to run 0 = Not commanded to run
sts_RunningForward	BOOL	1 = Running forward 0 = Not running forward
sts_RunningReverse	BOOL	1 = Running reverse 0 = Not running reverse
sts_STO	BOOL	1 = Safe Torque Off is active 0 = Safe Torque Off is not active
sts_STO_Fault	BOOL	1 = AOI is preventing running due to STO trip until cmd_RunForward/Reverse shows a rising edge 0 = Normal Operation
val_FaultCode	DINT	Fault code 1 from VFD
val_OutputCurrent	REAL	Output current in Amps from VFD
val_OutputFreq	REAL	Output frequency in Hertz from VFD
val_OutputVoltage	REAL	Output voltage in Volts from VFD

CFW900 Parameter Requirements

The following paramaters must be set in the CFW900:

Parameter	Setting
C9.5.1 EtherNet/IP I/O Instances	9 = 101/151 Manuf. + I/O data These instances represent an interface very similar to the 100/150 Manufacturer Speed Control + configurable I/O data, with the only difference being the possibility of sending the torque limit.
C9.5.2 Readings 1st Word	1 – (Range: 0-100: STOPPED) It sets the index of the first programmable reading word for data exchange with the network (input to the network master), configured in C9.5.2
C9.5.3 Readings Quantity	7 – (Range: 0-50: STOPPED) It sets the number of programmable reading words for data exchange with the network (input to the network master), from the first word set in C9.5.3.
C9.5.4 Writings 1st Word	1 - (Range: 0-100: STOPPED) It sets the index of the first programmable writing word for data exchange with the network (output to the network master), configured in C9.5.4.
C9.5.5 Writings Quantity	7 - (Range: 0-50: STOPPED) It sets the number of programmable writing words for data exchange with the network (output to the network master), from the first word set in C9.5.5.
C4.1.1 Command mode	7 = Ethernet
C4.2.2.1 General Enable	7 = Ethernet
C4.2.2.2 Run/Stop	6 = Ethernet
C4.2.2.3 Direction of Rotation	7 = Ethernet
C4.2.2.4 JOG	7 = Ethernet
C4.3.1.2.2 Remote 2 Mode	6 = Ethernet
C9.2.1.1 Word #1	3
C9.2.1.2 Word #2	7
C9.2.1.3 Word #3	5
C9.2.1.4 Word #4	60
C9.2.1.5 Word #5	USER DEFINED
C9.2.1.6 Word #6	USER DEFINED
C9.2.1.7 Word #7	USER DEFINED
C9.2.1.8 Word #8	USER DEFINED

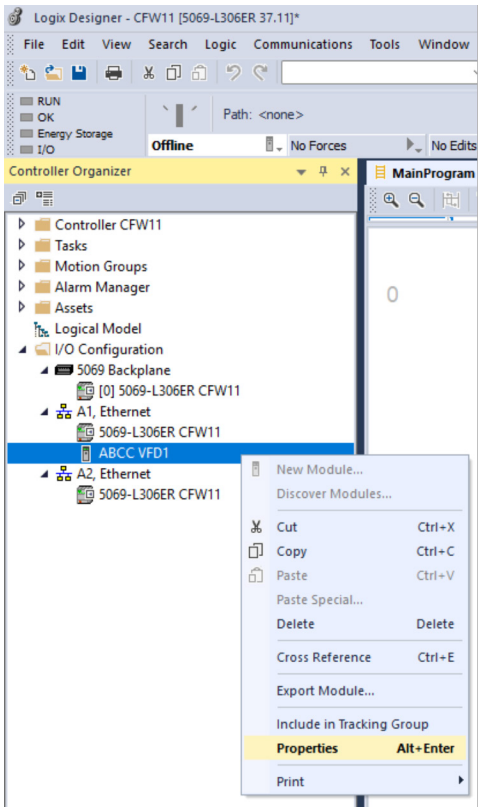
Parameter	Setting
C9.2.2.2 Word #1	100
C9.2.2.3 Word #2	101
C9.2.2.4 Word #3	4001
C9.2.2.5 Word #4	4002
C9.2.2.6 Word #5	USER DEFINED
C9.2.2.7 Word #6	USER DEFINED
C9.2.2.8 Word #7	USER DEFINED
C9.2.2.9 Word #8	USER DEFINED

Trouble Shooting

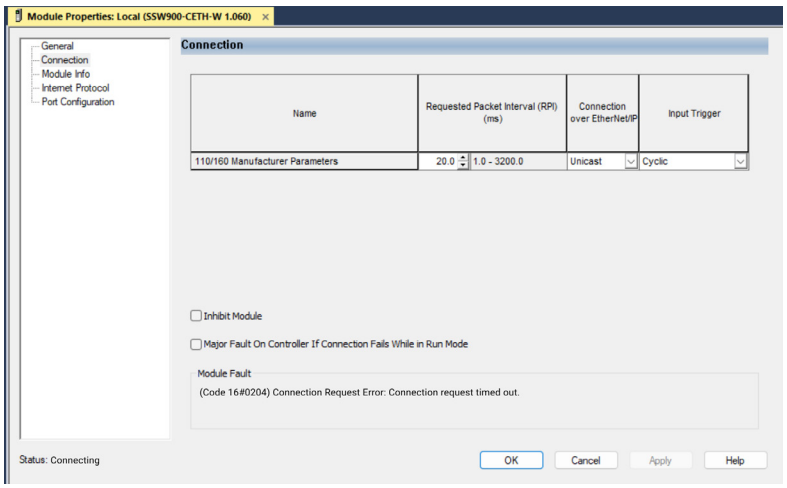
This section is to help with any problems you may encounter.

1) No Communication

a. The Studio 5000 Error Codes or Module Fault # can be found under the I/O Configuraiton Tab within the Studio 5000 software. Right-click on the CFW900 module and select Properties.



b. Next select the 'Connection' section. Then within the 'Module Fault' section, you will find the Module Fault number. Each error code corresponds to a specific issue or condition.

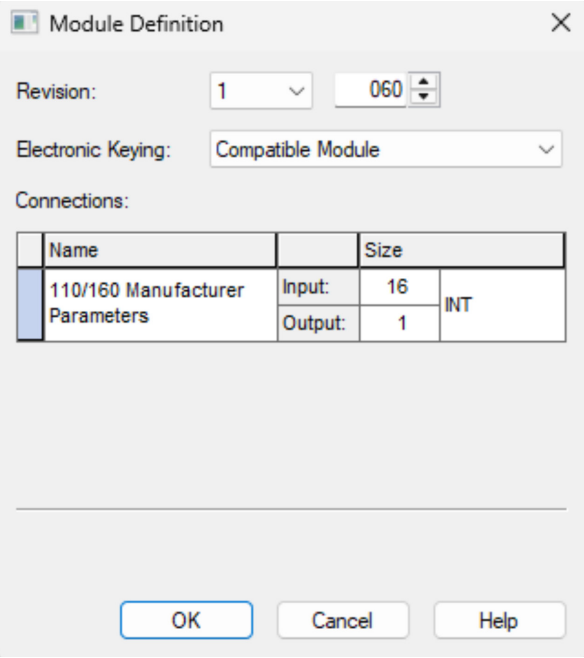


Error Code 16#0005 = Connection Request Error: Bad Class.

Reason: A discrepancy exists between PLC and the selected VFD module configuration.

What to check:

- Check the parameters in the VFD to insure they match what is listed in the “CFW900 Parameter Requirements” section of this document.
- Ensure that the programmed connection size in both the PLC and the VFD is consistent. For instance, if the VFD transmits 2 words, confirm that the PLC is configured to receive 2 words rather than 6.
- Ensure the comm format for the module is set to a data type of INT in the PLC. This can be found under the properties for the module.



Error Code 16#012a = Connection Request Error: Invalid output application path.

Reason: There is a mismatch between the PLC and VFD in the selected module.

What to check:

- Check the Module Definition to insure it is set to an input of 16 and an output of 1.
- Check the parameters in the VFD to insure they match what is listed in the “CFW900 Parameter Requirements” section of this document.

Error Code 16#0109 = Connection Request Error: Invalid connection size (Invalid Input size).

Reason: The input connection word size exceeds the capacity of the programmed word array in the PLC.

What to check:

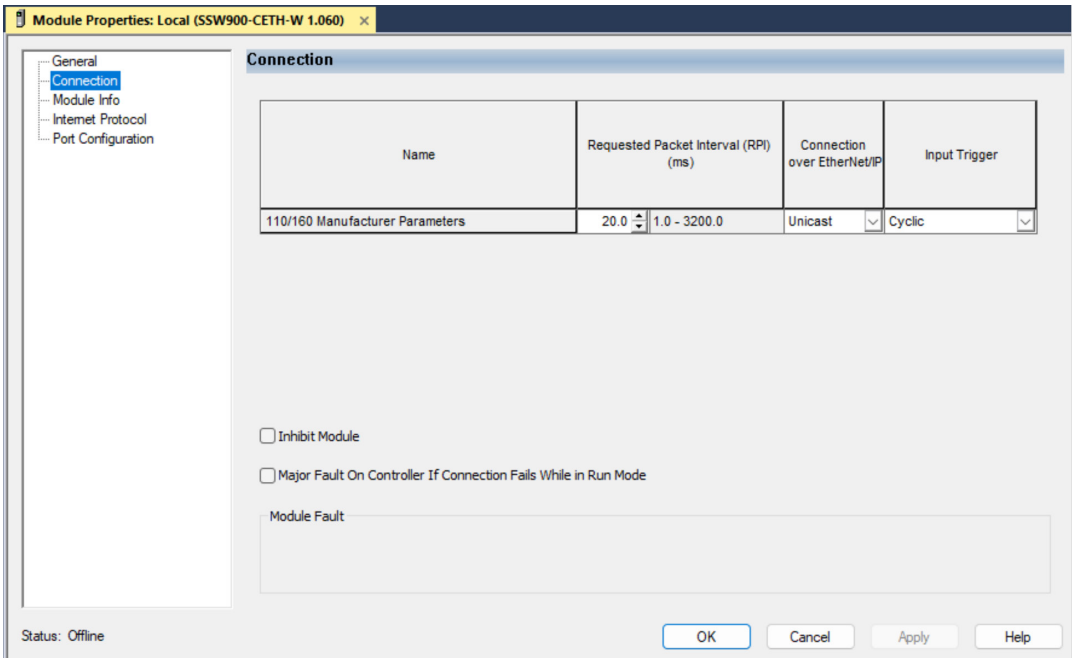
- Check the programmed connection size in the PLC and the VFD (example the VFD is sending 2 words and the PLC is programmed to 4 words).
- Ensure the comm format for the module is set to a data type of INT in the PLC. This can be found under the properties for the module.

Error Code 16#0111 = Requested Packet Interval (RPI) out of range.

Reason: The configured RPI rate is below the allowed rate for the VFD.

What to check:

- Increase the RPI rate in Studio 5000. This can be found under the module's Connection tab. A lower number means it is communicating more often.



Error Code 16#0127 = Connection Request Error: Invalid output size.

Reason: The connection words size is too large to fit in the programmed word array size in the PLC.

What to check:

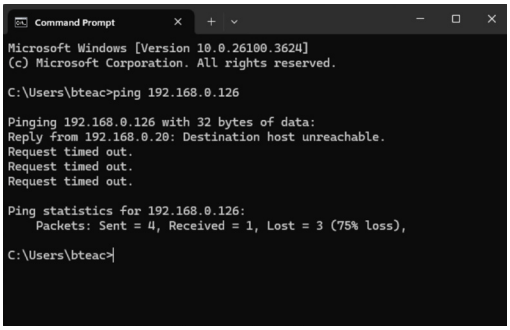
- Check the programmed connection size in the PLC and the VFD (example the VFD is sending 2 words and the PLC is programmed to 4 words).
- Ensure the comm format for the module is set to a data type of INT in the PLC. This can be found under the properties for the module.

Error Code 16#0204 = Connection Request Error: Connection request timed out.

Reason: The PLC is attempting to make a connection; however, the VFD is not responding.

What to check:

- Check to make sure DHCP is disabled if a Static IP Address is being programmed in the VFD. This means that Parameter C8.5.1 IP Address Config should be set to 0 = Parameters.
- Check the programming of the IP address of the VFD and Subnet.
- Check the programming of the IP Address in the PLC communicating to the VFD.
- Try to ping the VFD's IP address via a computer connected to the same network. To do this on a Windows 11 computer that is on the same network as your PLC and VFD:
    - o You can do this by clicking on the Start button, typing "cmd" into the search bar, and hitting Enter. Alternatively, you can press Windows + R, type "cmd", and click OK. Locate and correct the IP address problem.
    - o Once Command Prompt is open, type the ping command followed by the IP address of your VFD. For example: ping 192.168.0.126. Then press Enter.
    - o If you get "Request timed out". You are not able to communication with your VFD and likely your PLC can not either.
    - o In the Command Prompt, type the ping command followed by the IP address of your PLC.
    - o If you get "Request timed out". You are not able to communication with your PLC and likely your VFD can not either.



- Check network wiring.

2) VFD has A147: EtherNet/IP Communication Offline

This alarm indicates a communication error with EtherNet/IP master. It occurs when, for any reason, after the cyclic a communication of the master with the product is started, this communication is interrupted. This is detected if the I/O Exclusive Owner connection times out.

What to check:

- Check the status of the network master.
- Check network installation, broken cable or failed/ poor contact on the network connections.

3) VFD has A136 / F236: Master in Idle

This alarm actuates when communicating with the network master in Run mode, and transition to Idle mode is detected.

What to check:

- Set the switch that controls the master operation mode to Run or the corresponding bit on the configuration word of the master software. For further explanations, see the documentation of the master in use.

4) VFD has A145: SNTP Connection Timeout

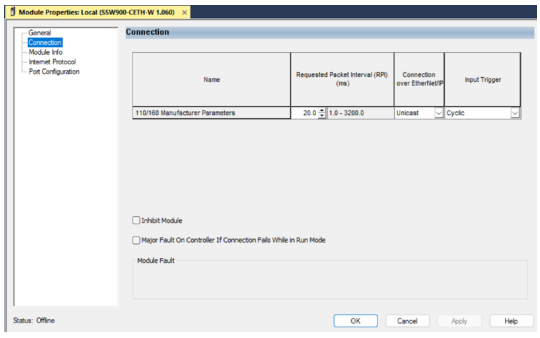
This alarm indicates that the inverter tried to connect to the NTP server and got no response. It occurs after starting the connection with the NTP server, and the server has not returned the response requested by the inverter.

What to check:

- Check the status of the network master.
- Check network installation, broken cable, or failed/poor contact on the network connections.

5) Communication is too slow, or network traffic is to high.

If your network is seeing heavy traffic or your communication to the VFD is too slow, you want to change your RPI rate in Studio 5000. This can be found under the module's Connection tab. A lower number means it is communicating more often.



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