Motors

Automation

Energy

Transmission and Distribution

Coatings

CFW11 - AOI

Configuration

Driving efficiency and sustainability

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WEG CFW11 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.
-	-
-	-

Safety & Legal

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Only use Add On Instructions (AOI's) from WEG Electric Corp. for their intended purpose.
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 CFW11 drive using the Ethernet IP interface to communicate with a Rockwell PLC with an AOI. It must be used together with the CFW11 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
CFW11 User's Manual	10000063093 / 10	WEG
CFW11 Programming Manual	10004274148 / 02	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 CFW11 AOI Configuration

Prerequisites

Exclusions

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

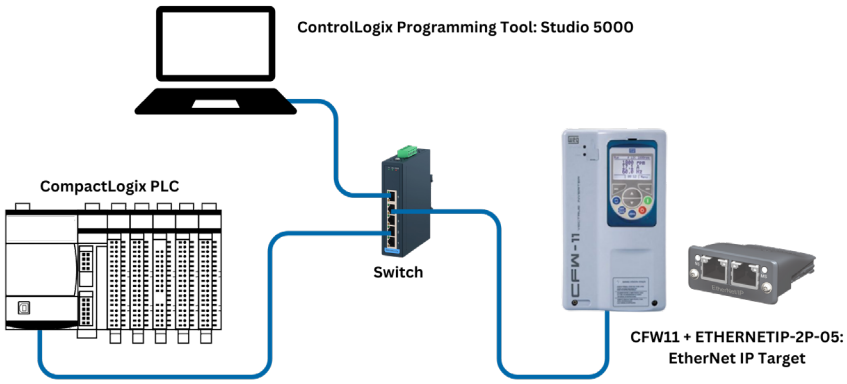
The connection and configuration of the IP network is beyond the scope of this document.

All non-communication specific parameters on the CFW11 are excluded from the configuration requirements of this document.

System Components

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

- A ControlLogix or CompactLogix PLC controller running version 20 (or higher) firmware.
- A CFW11 running version 6.4 (or higher) firmware with an EtherNet/IP card installed (ETHERNET/IP-05 or ETHERNETIP-2P-05).
- A 10/100 or Faster Ethernet network with IP connectivity and IP addresses for both the PLC and CFW11. 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 CFW11 Ethernet card documentation for information about the proper network installation.



WEG CFW11 AOI Configuration

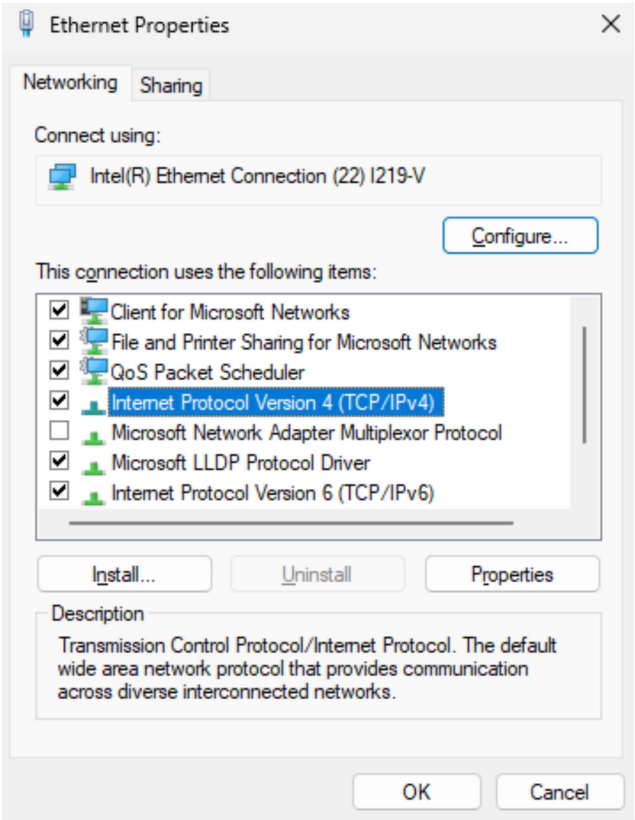
IP Address and Network Configuration

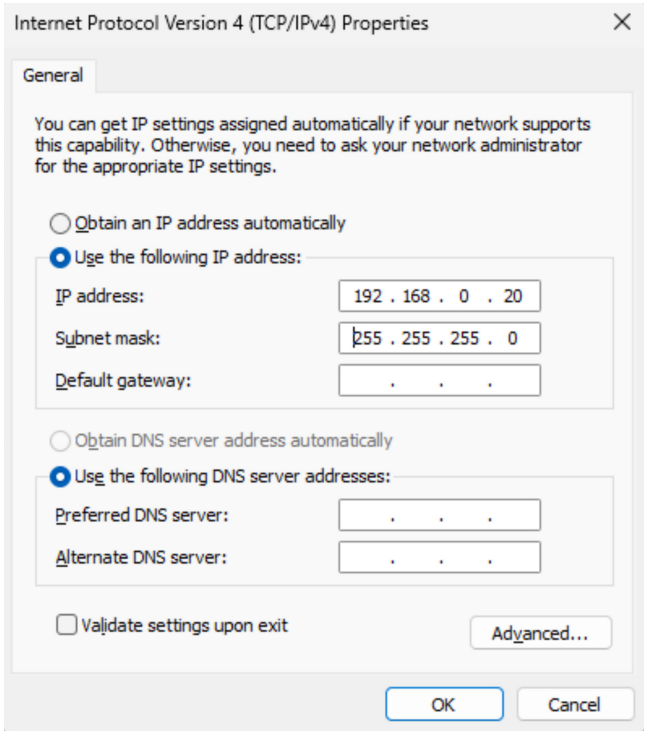
To allow communication among the devices, they need to have an compatible IP address configuration. It means the IP address must be at the same range, according to network mask. For this example, we will use the following IP addresses in this document:

- 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
  CFW11: 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

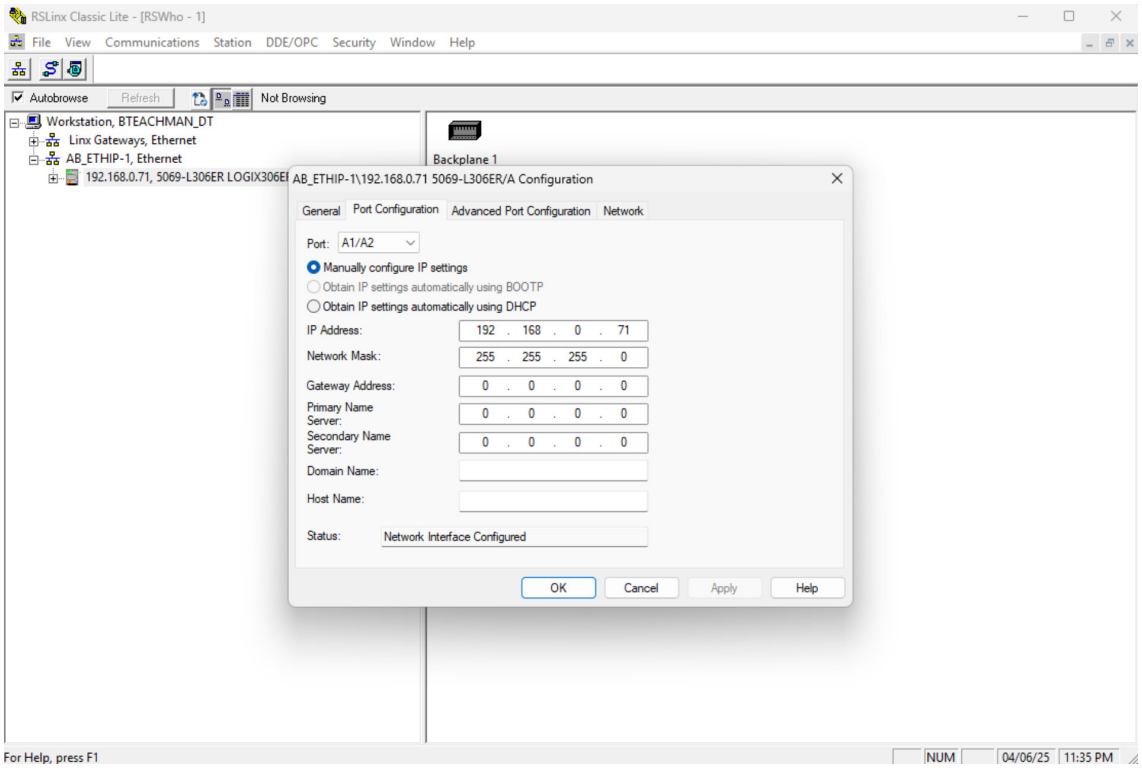




WEG CFW11 AOI Configuration

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.



CFW11 Ethernet Interface

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

- P0843 IP Address Config: 0 (Parameters).
- P0844 IP Address 1: 192
- P0845 IP Address 2: 168
- P0846 IP Address 3: 0
- P0847 IP Address 4: 126
- P0848 CIDR: 24
- P0849 Gateway 1: 0
- P0850 Gateway 2: 0
- P0851 Gateway 3: 0
- P0852 Gateway 4: 0

✓ **NOTE!**

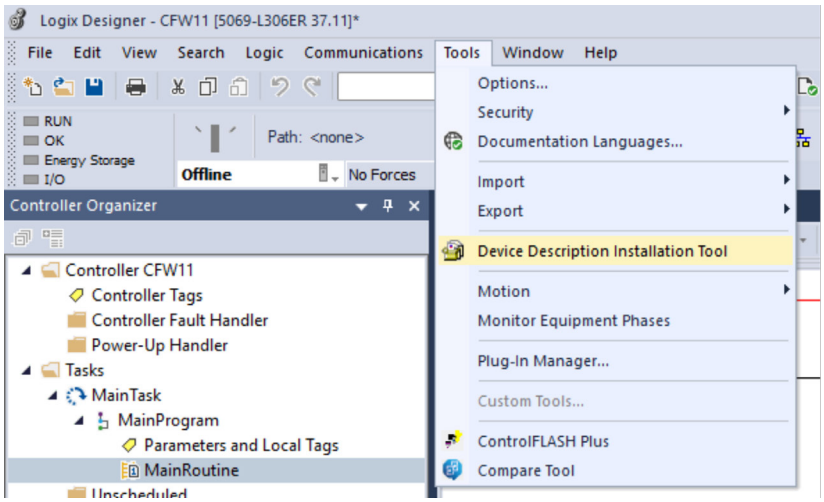
After changing these configurations, for the modification to be effective, the equipment must be turned off and then turned on again.

WEG CFW11 AOI Configuration

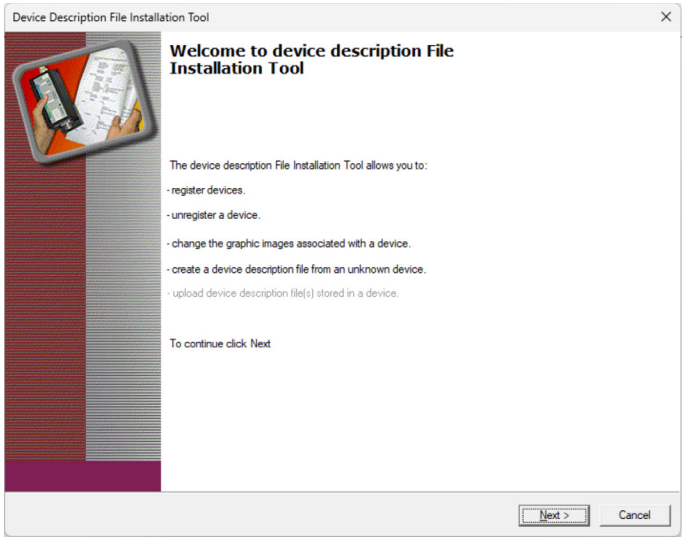
EDS Installation

Begin by adding the EDS file for the CFW11 if it not already in the project.

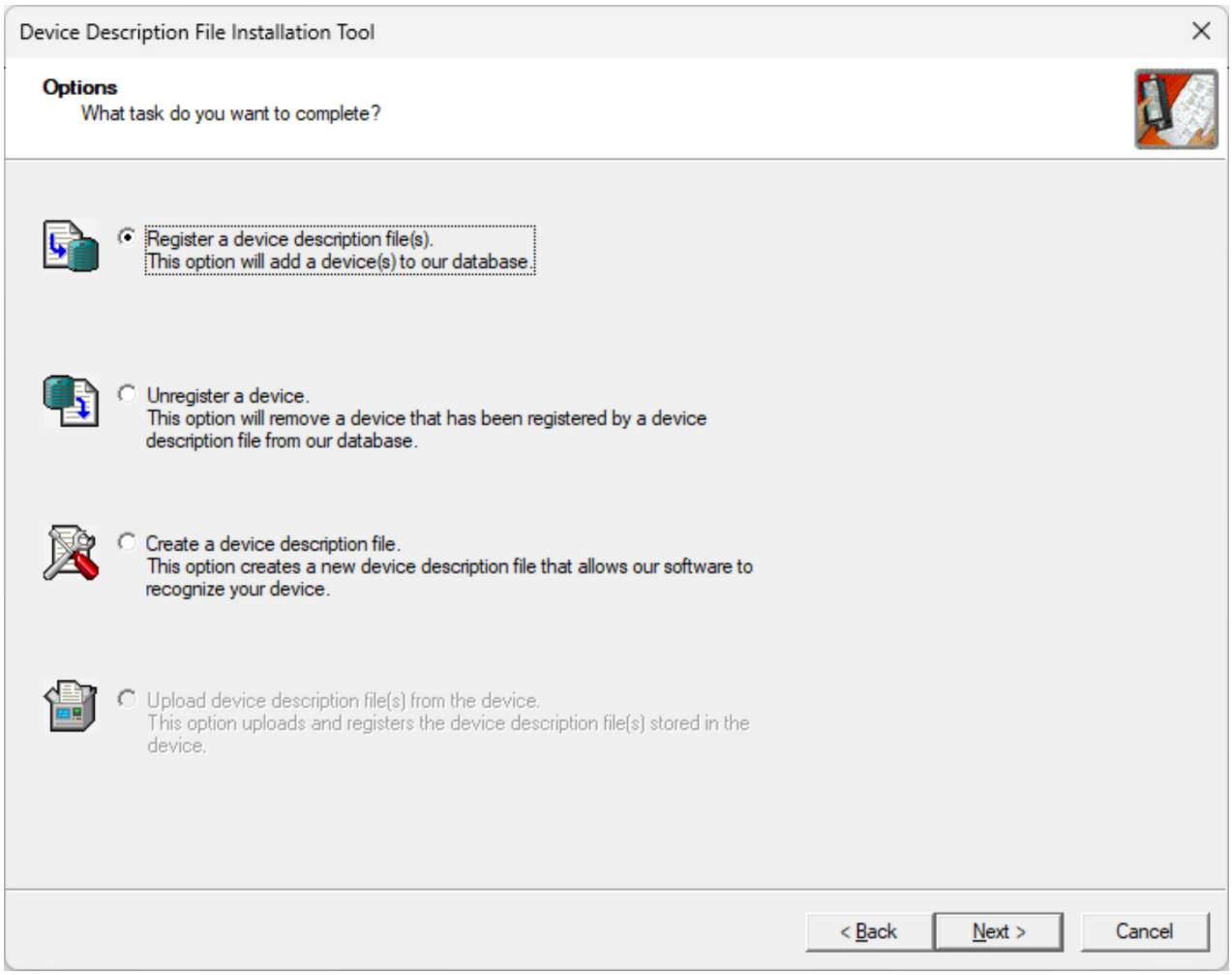
> ✓ **NOTE!**
>
> Please ensure you select the appropriate version of the EDS file. There are two versions available: single Ethernet port (ETHERNET/IP-05) and dual Ethernet port (ETHERNETIP-2P-05). This manual uses the ETHERNETIP-2P-05 as the example, but the same process would be used for the ETHERNET/IP-05.



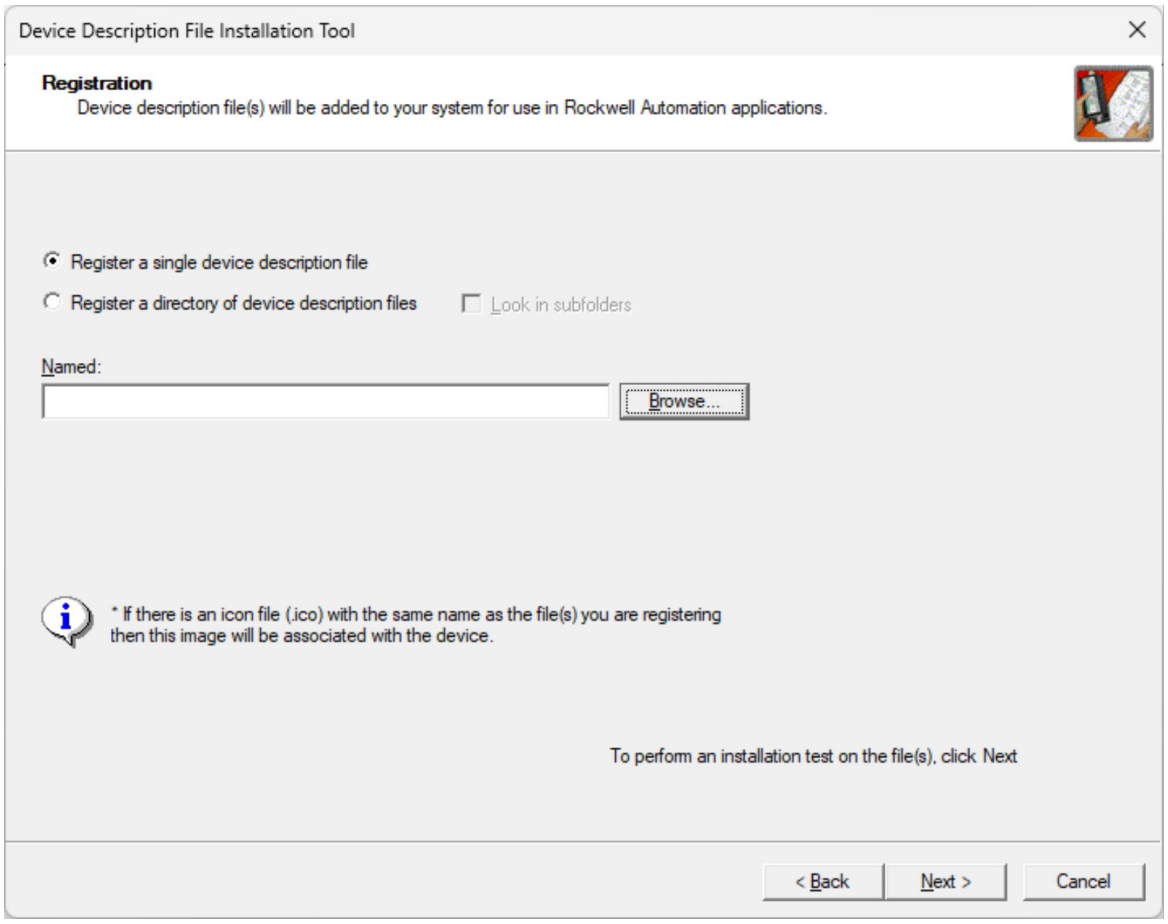
From inside Logix Designer, go to Tools -> Device Description Installation Tool



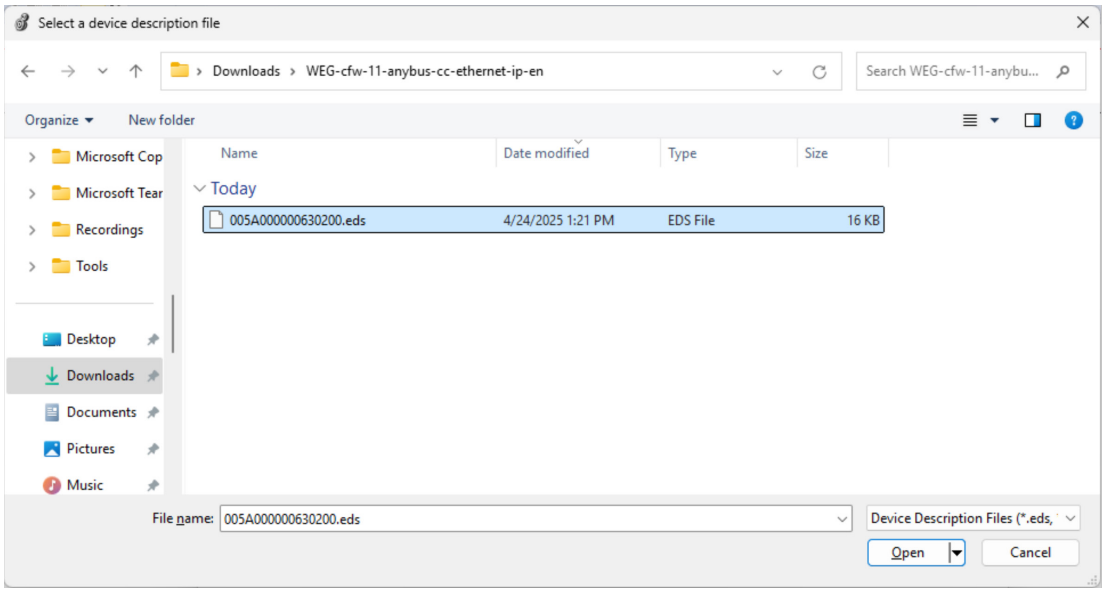
Click Next >


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

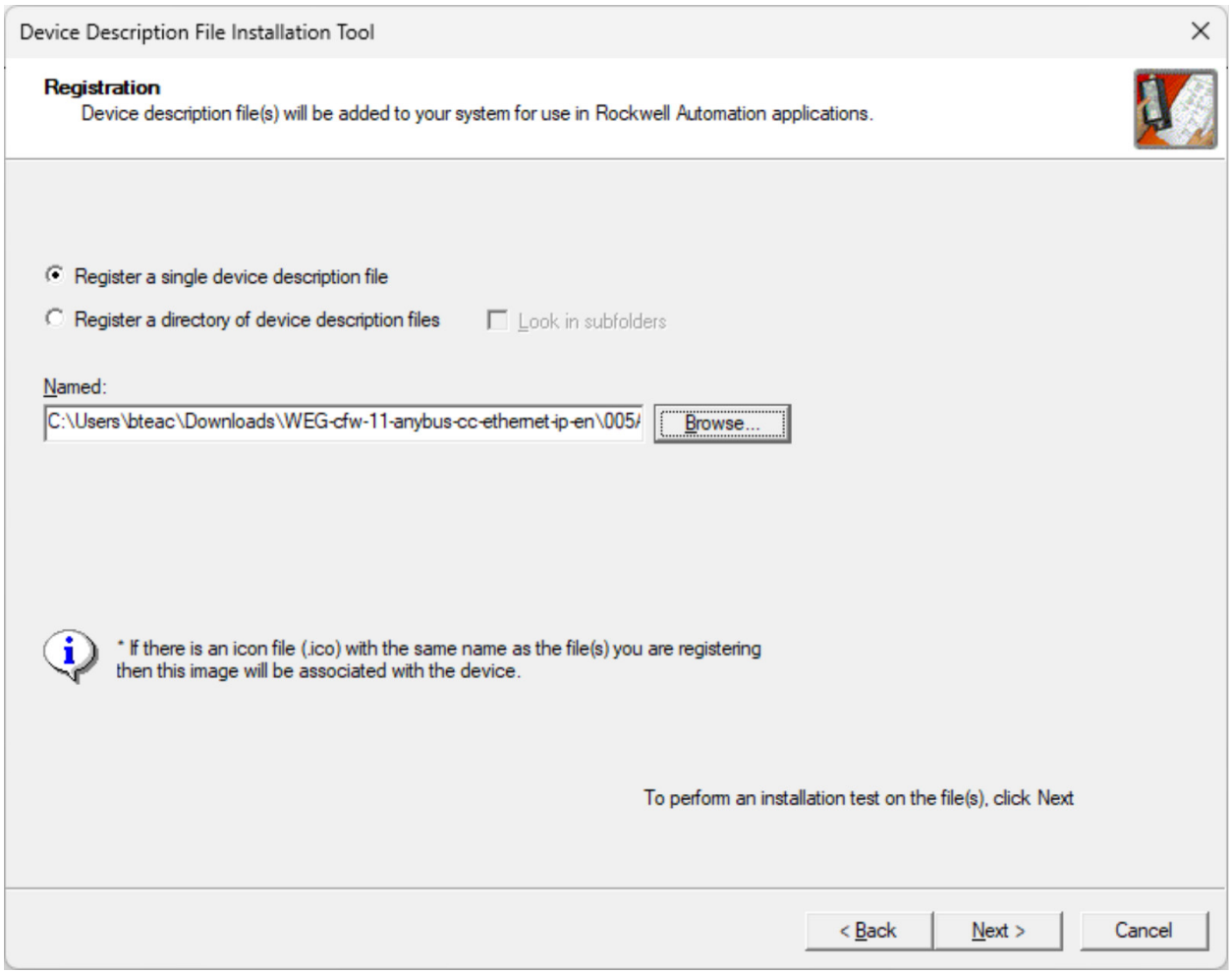
Click Next >



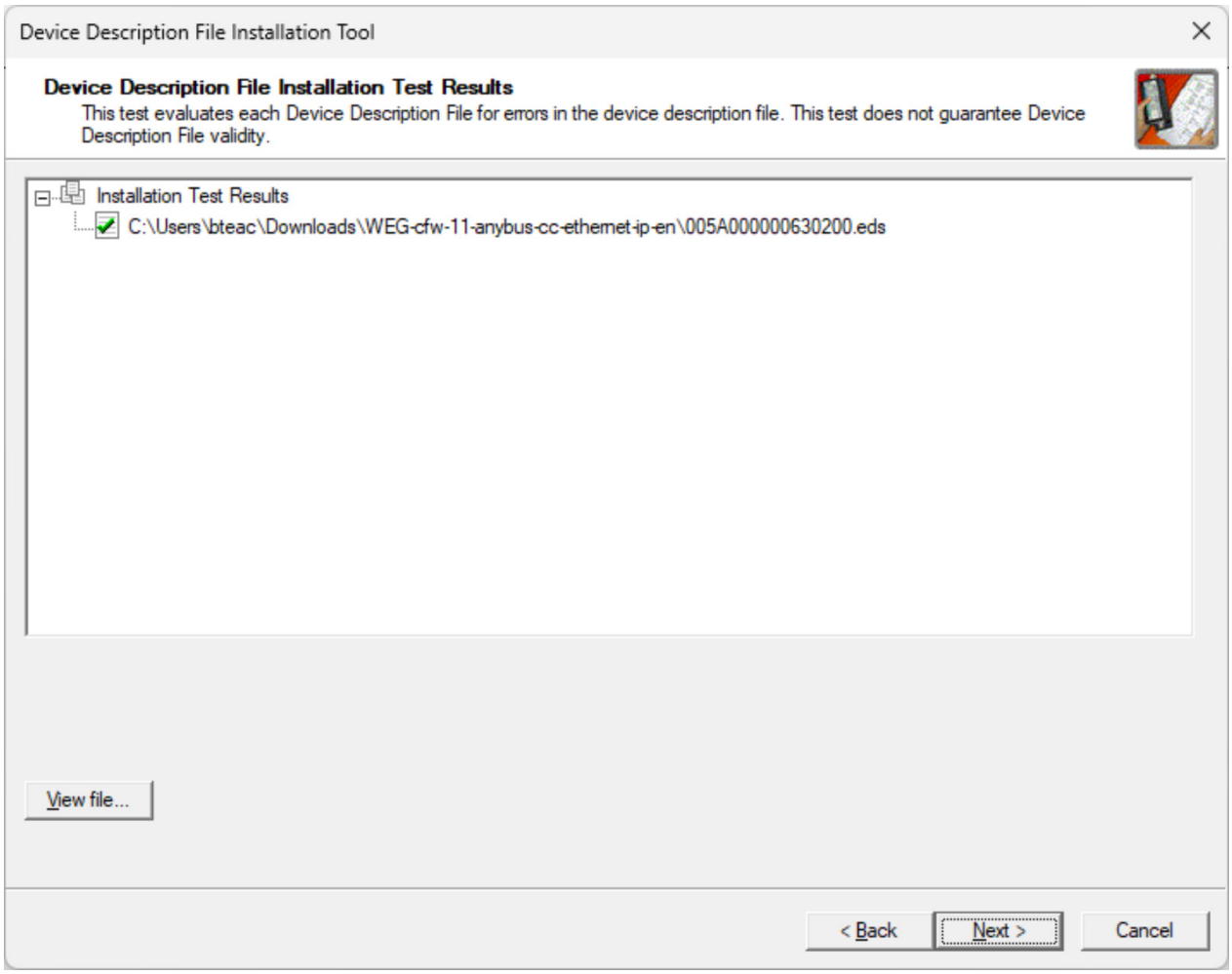
Click Browse ...



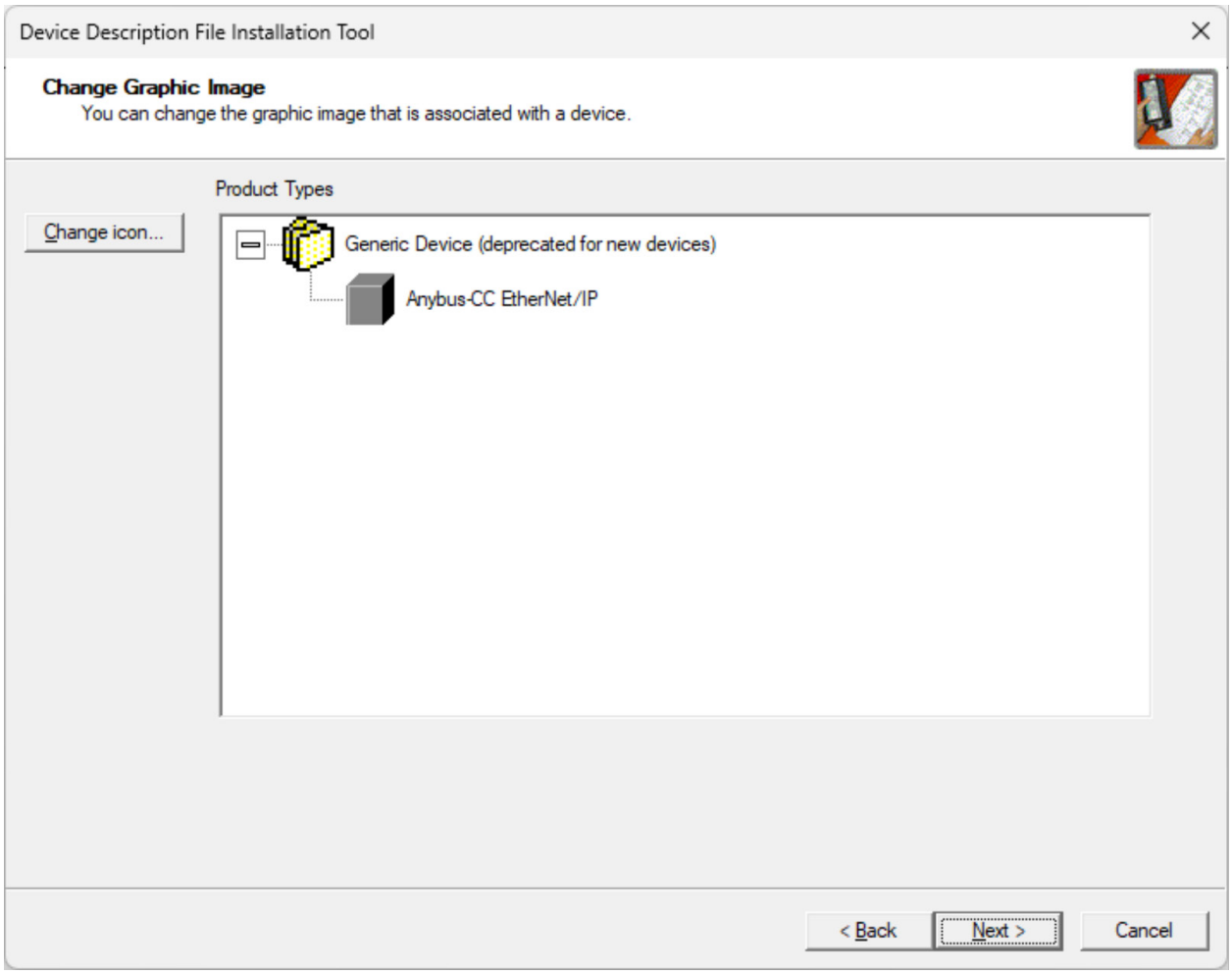
Browse to where the downloaded eds file is located and click Open


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\WEG-cfw-11-anybus-cc-ethernet-ip-en\005
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

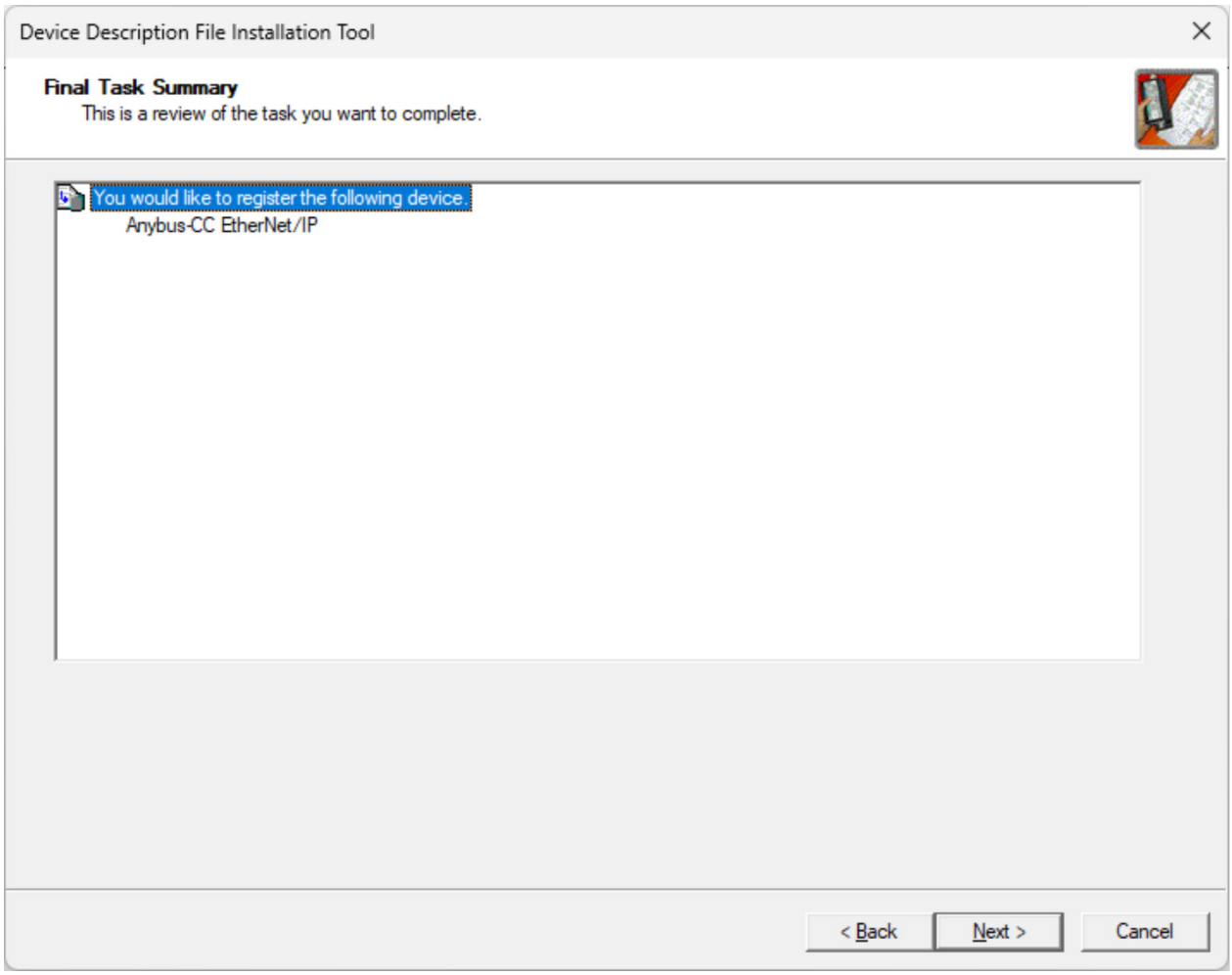
Click Next >



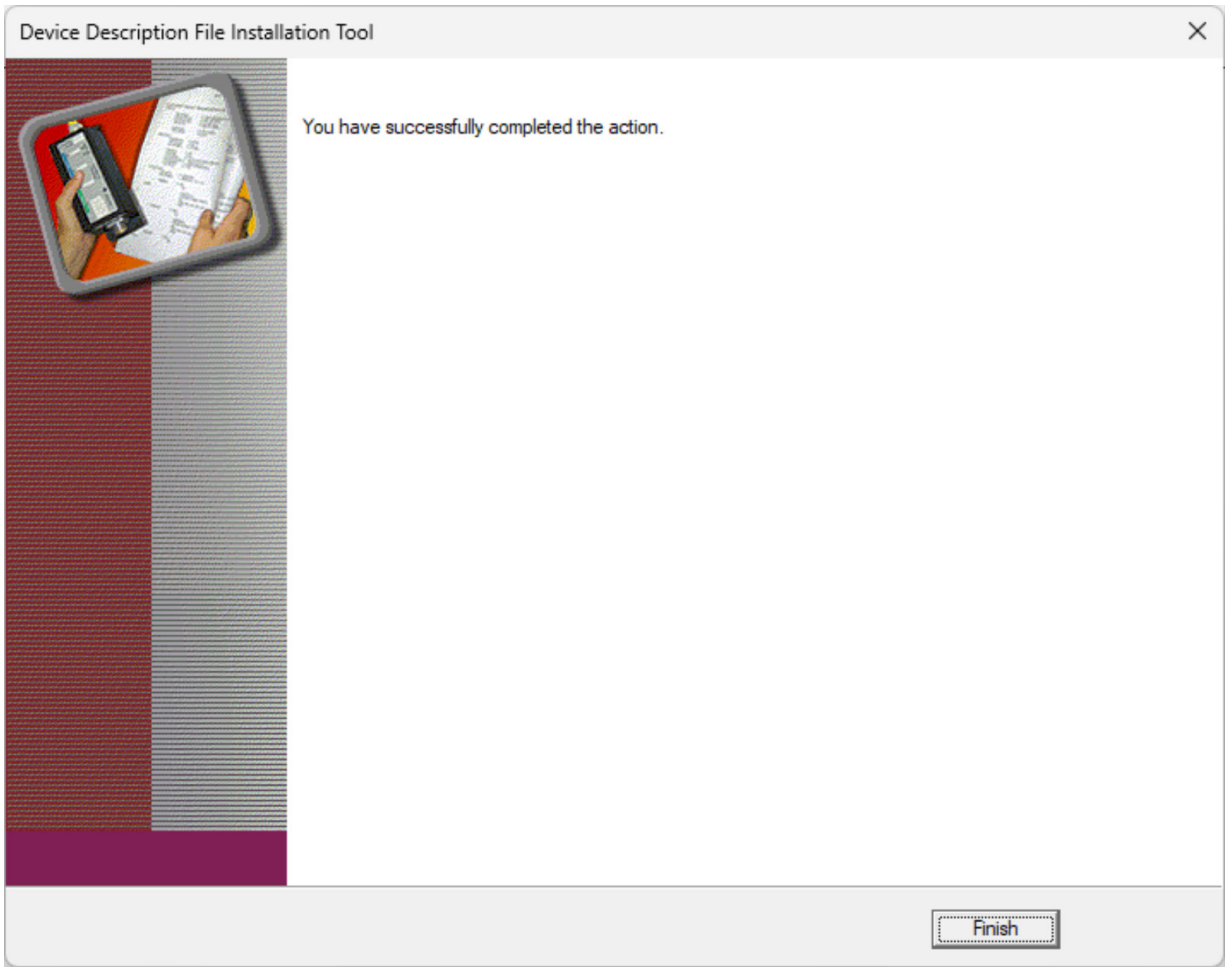
There should be a green checkmark. Click Next >



Click Next >


Device Description File Installation Tool
Final Task Summary
This is a review of the task you want to complete.
You would like to register the following device.
Anybus-CC EtherNet/IP
< Back
Next >
Cancel

Click Next >



Click Finish

The EDS file is now installed and the CFW11 can be added as an Ethernet/IP device in the device tree.

AOI

CFW11

This AOI controls the CFW11 and handles the following additional parameters:

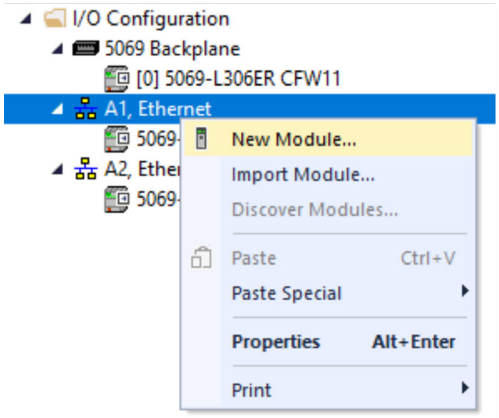
Outputs

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

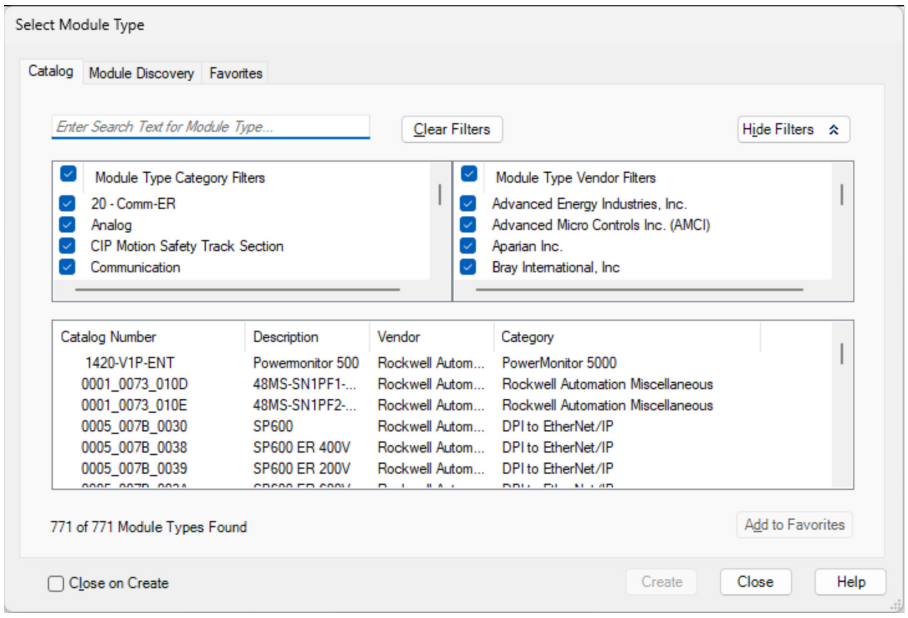
Inputs

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

Create the EtherNet/IP Device



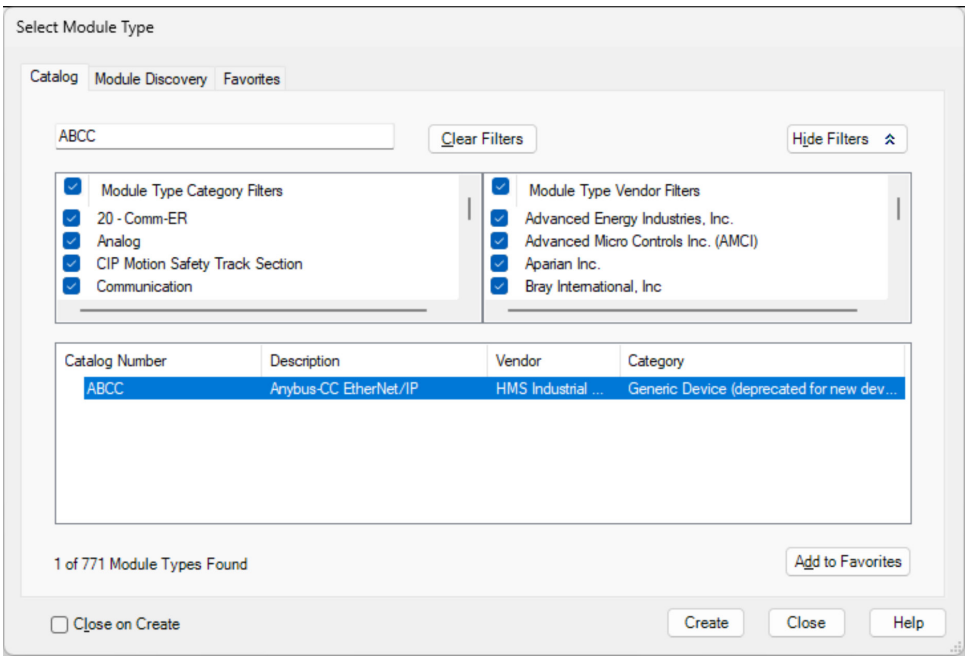
In the device tree, right click on the Ethernet bus that will contain the CFW11 and click New Module...



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

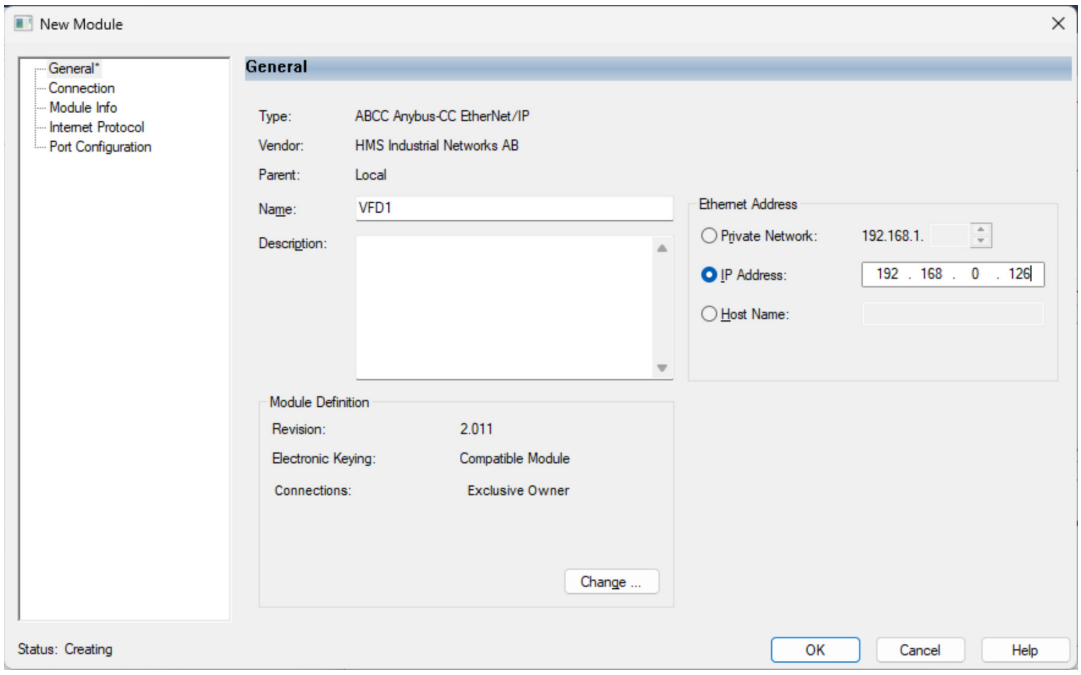
✓ **NOTE!**

Please ensure you select the appropriate version of the EDS file. There are two versions available: single Ethernet port (ETHERNET/IP-05) and dual Ethernet port (ETHERNETIP-2P-05). This manual uses the ETHERNETIP-2P-05 as the example, but the same process would be used for the ETHERNET/IP-05.



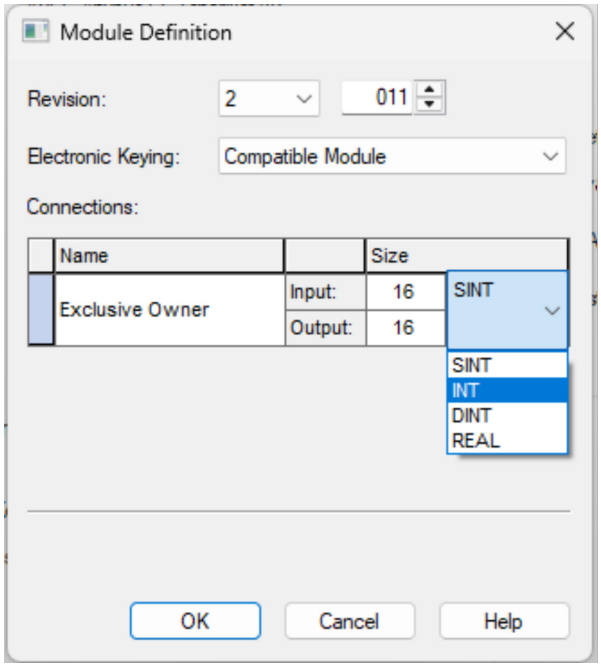
There should be an entry matching the above screenshot.

Highlight the ABCC and click Create

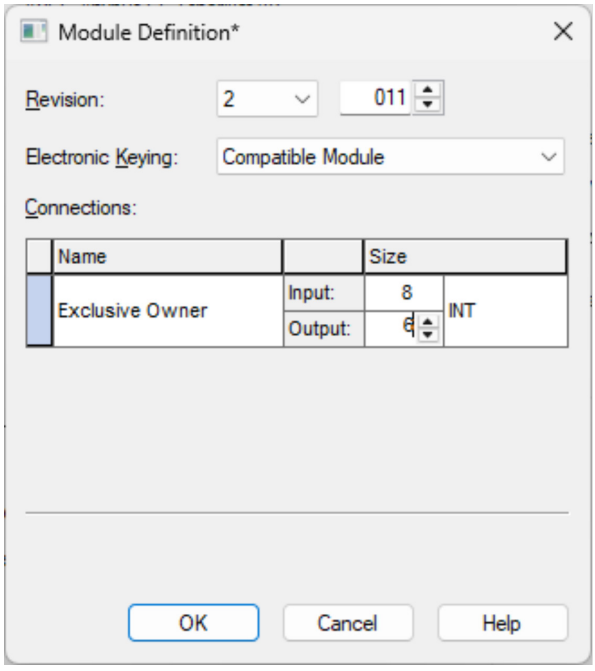


Give the CFW11 a name and enter the IP address of the drive.

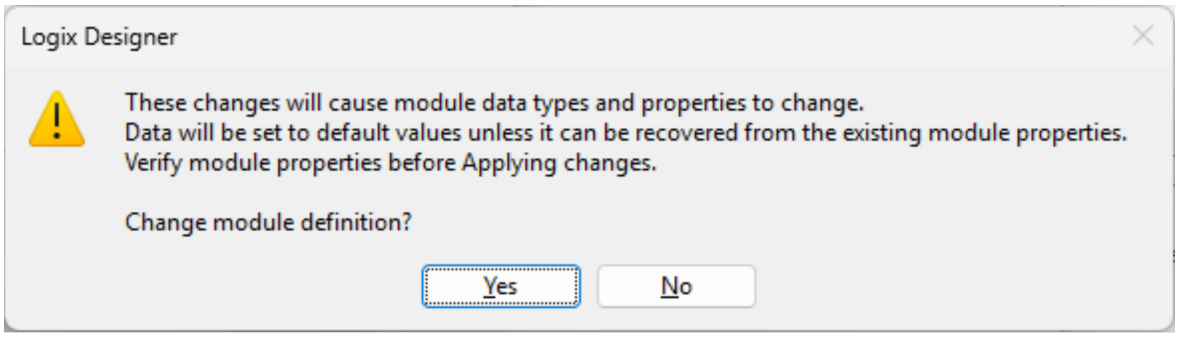
Before clicking on OK, click on the Change ... button in the module definition.



Change the type to INT

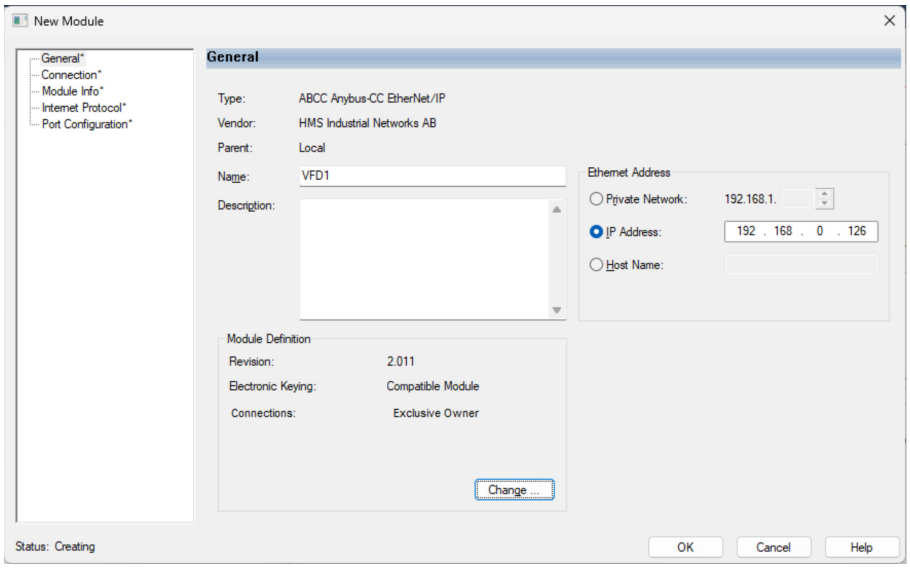


The Input and output size should be set to 8 and 6 respectively. Click OK



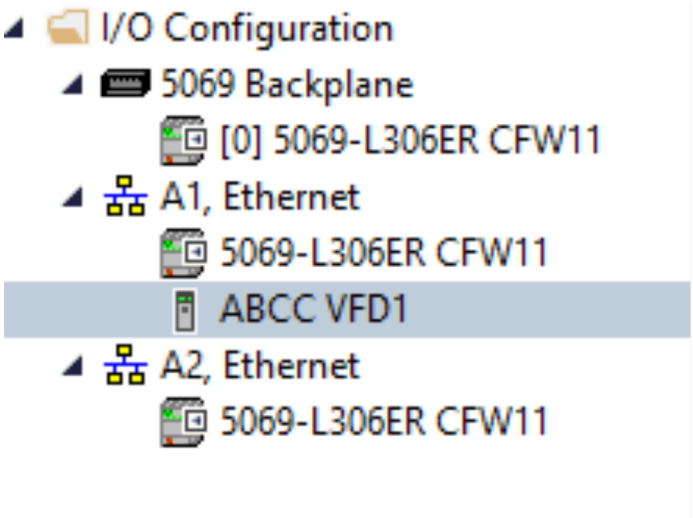
Click Yes

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



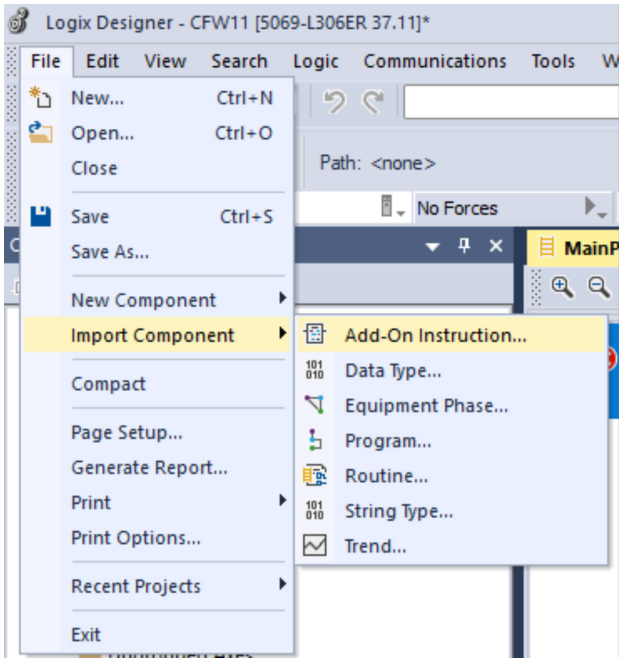
See the Trouble Shooting section to learn more about changing the RPI.

Once satisfied with the settings, Click OK

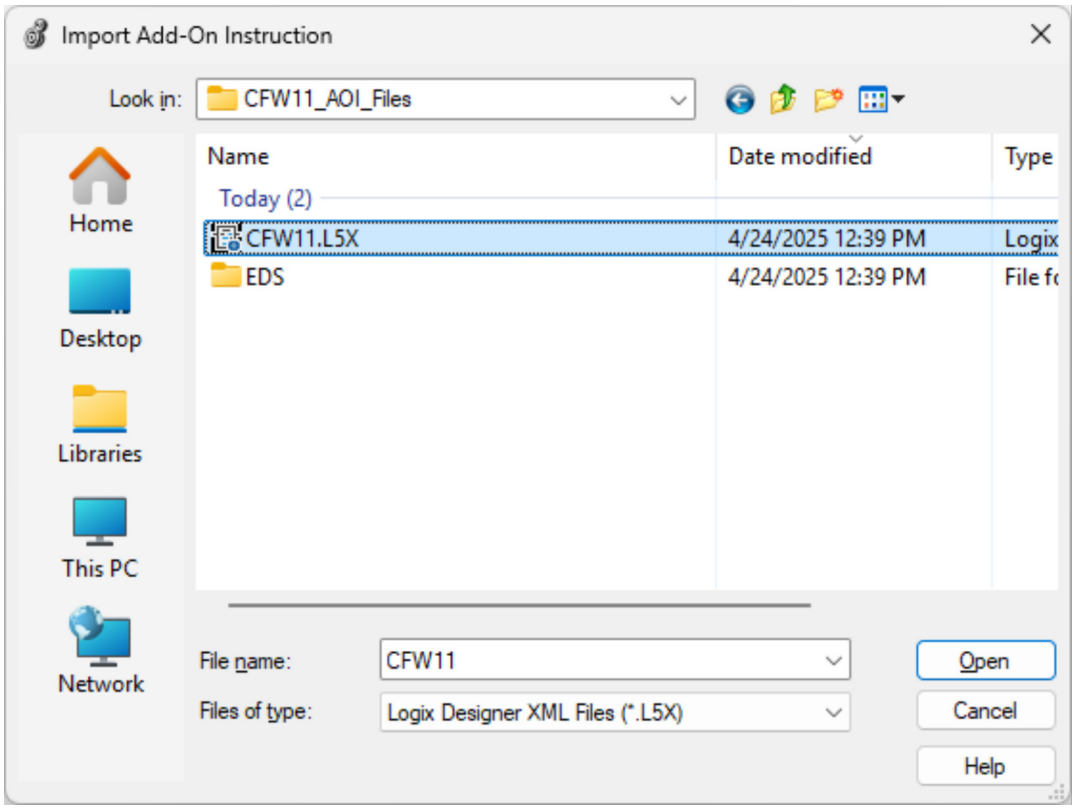


There should now be an instance of the CFW11 in the device tree

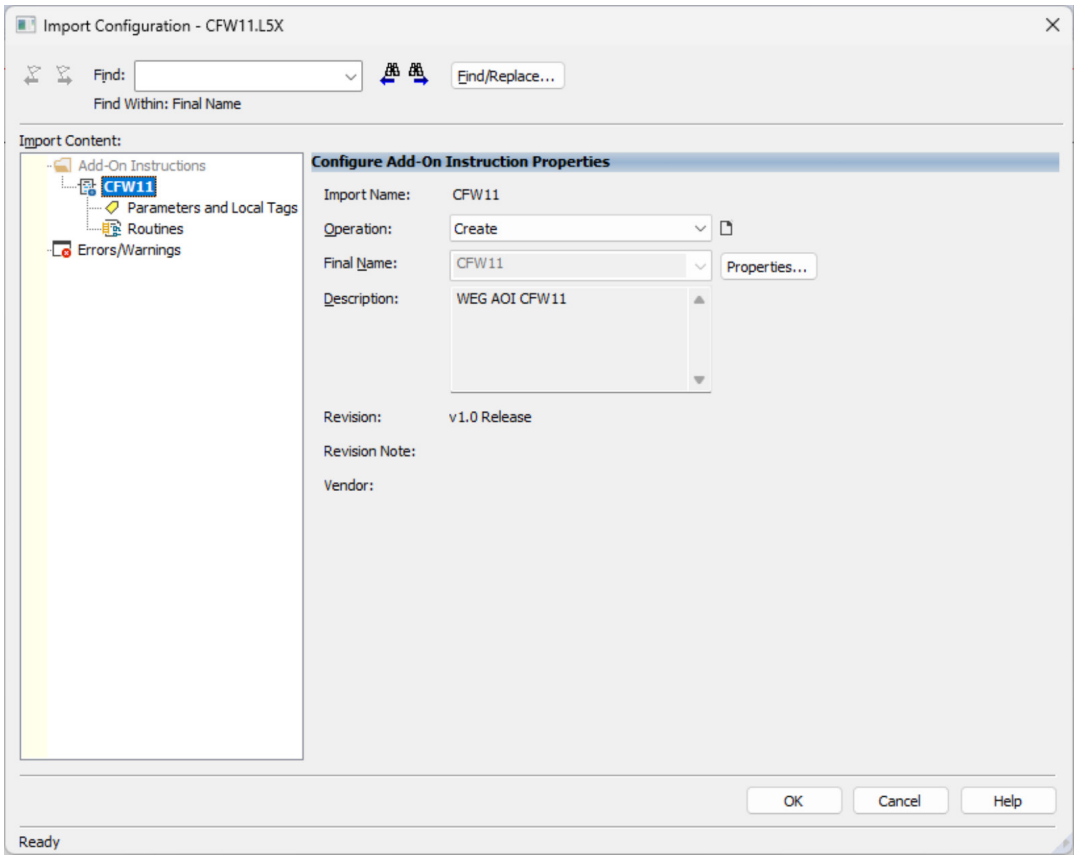
AOI Import



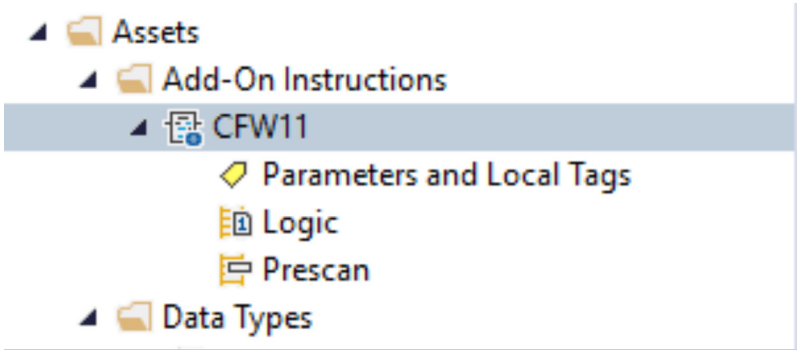
From the menu bar go to File, Import Component, Add-On Instruction...



Select the appropriate add-on instruction (CFW11.L5X) and click Import...



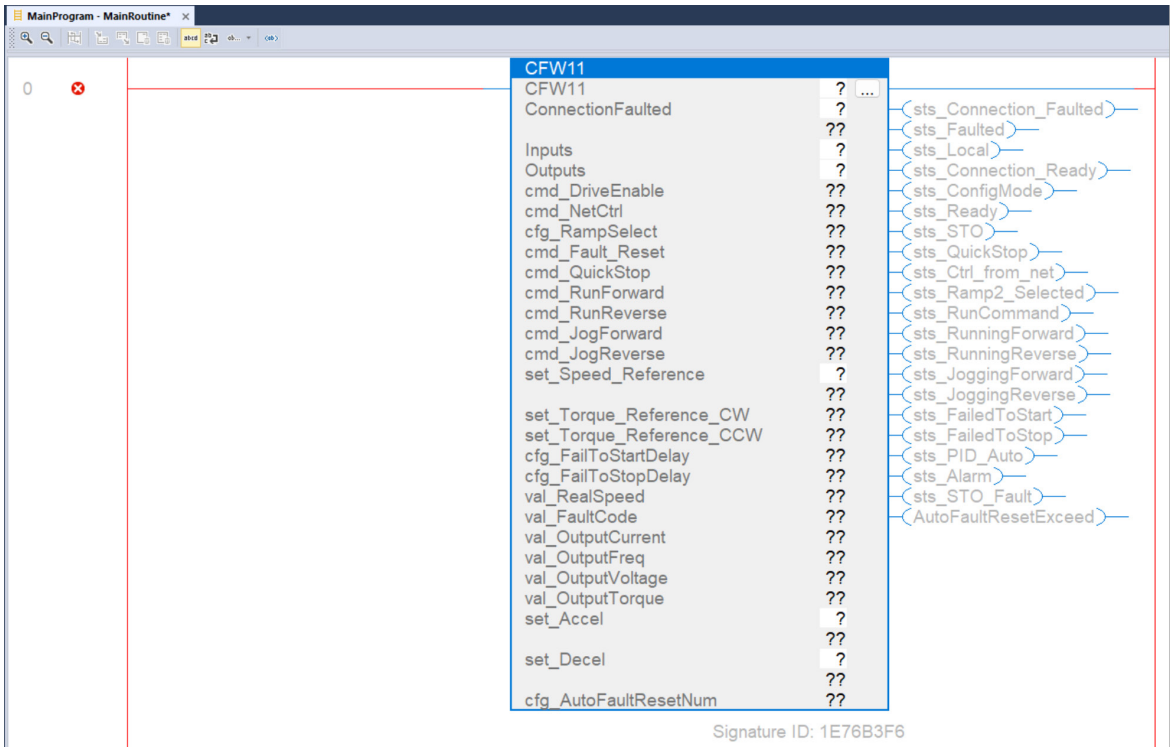
Review the proposed changes and click OK



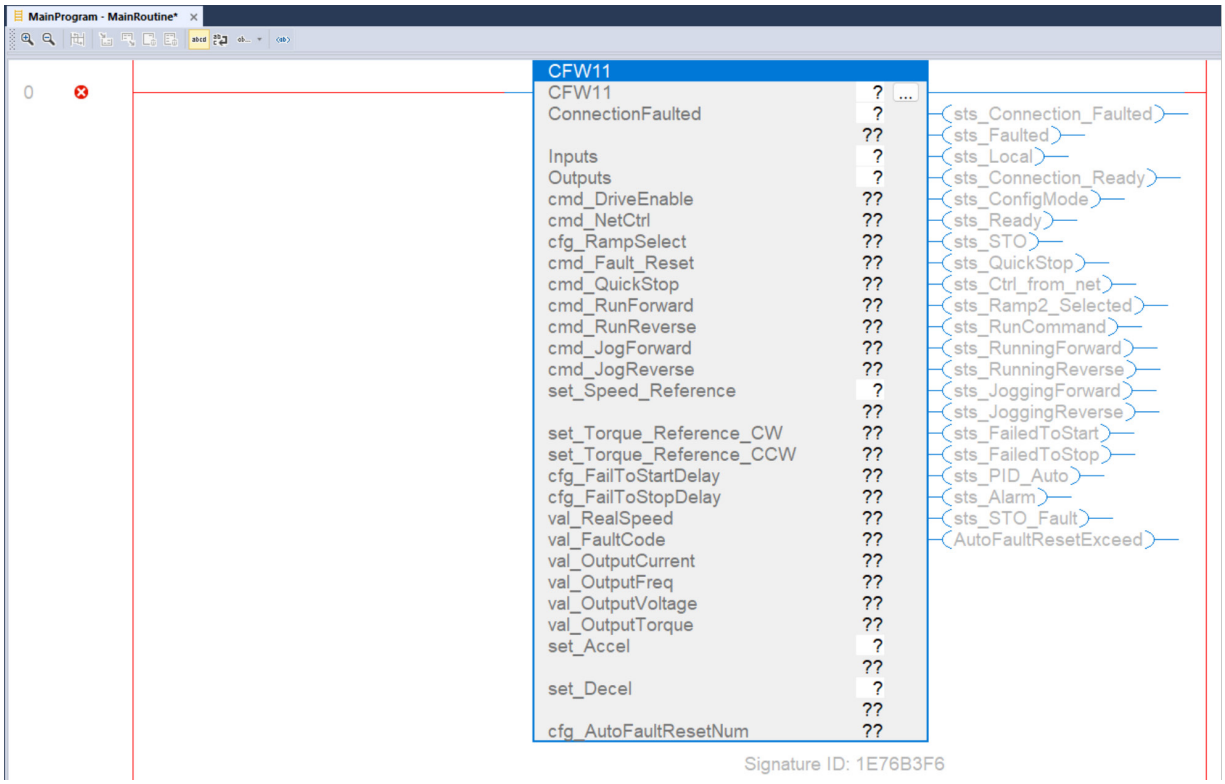
There should now be this add-on instruction in the project.

AOI Usage

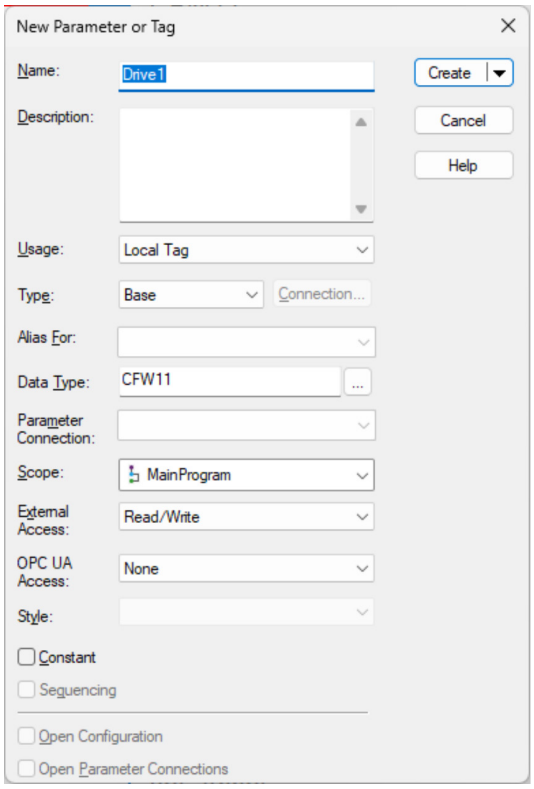
On an empty rung of ladder, add an instance of the newly imported add-on instruction by clicking on the Toolbox bar and clicking the CFW11 symbol under Add-On



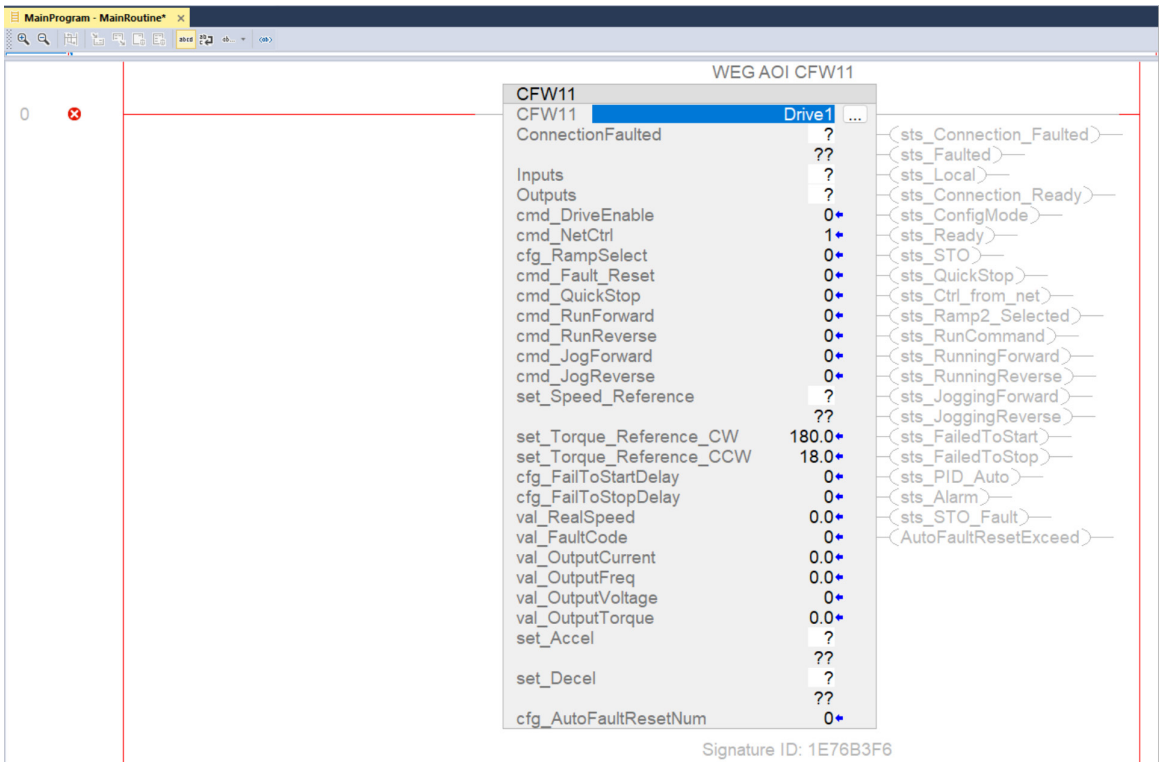
Your ladder logic should look like this after you add the add-on instruction



The Add-On requires a tag to be created. Create this tag by typing a name in the CFW11 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

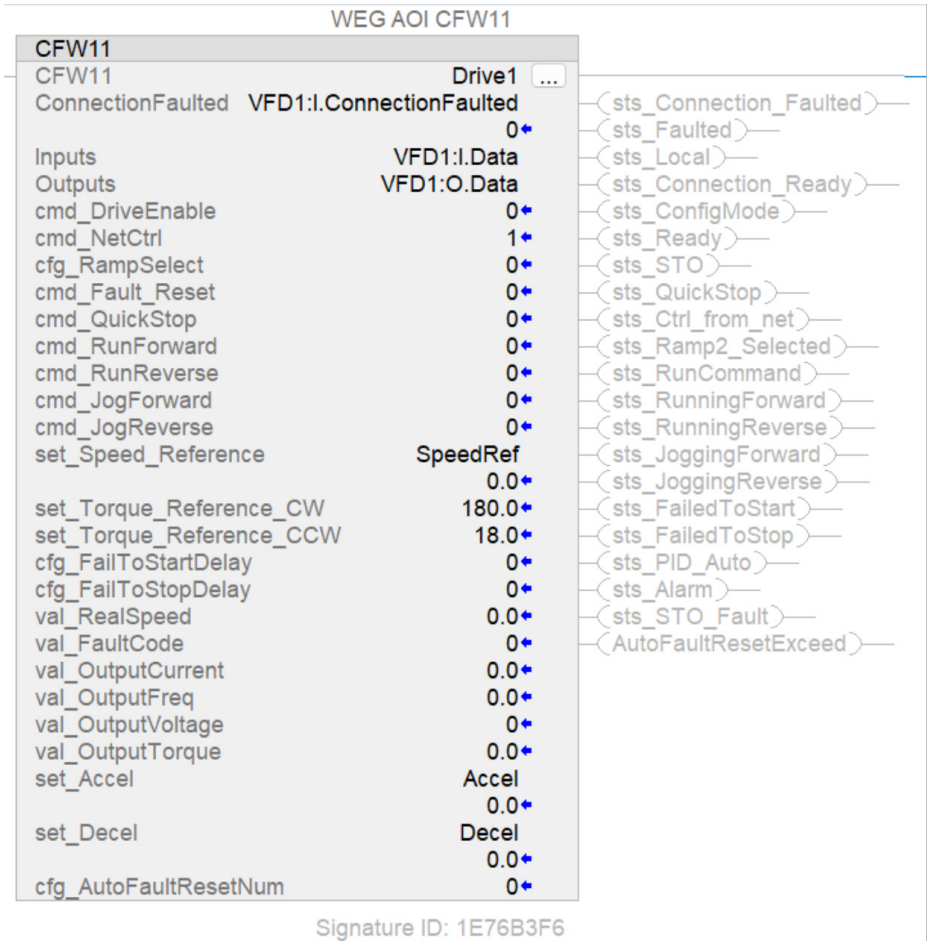


The majority of your parameters for the add-on instruction should now show values

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

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



AOI Parameter Description

InOut Parameters

Parameter	Type	Description
Inputs	INT[8]	Input Assembly from CFW11
Outputs	INT[6]	Output Assembly to CFW11

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 CFW11 Ethernet Module. 1 = Connection is faulted 0 = Connection is OK
cfg_RampSelect	BOOL	1 = Ramp 2 (P0102/P0103) 0 = Ramp 1 (P0100/P0101)
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 = Remote (Ethernet) control 0 = Local (Other) control
cmd_QuickStop	BOOL	1 = Quick stop 0 = No Quick Stop (must be 0 to run)
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 1 Setpoint (0.1-999.0) in Seconds
set_Decel	REAL	Deceleration Ramp 1 Setpoint (0.1-999.0) in Seconds
set_Torque_Reference_CW	REAL	Clockwise Torque Reference in %
set_Torque_Reference_CCW	REAL	Counter-Clockwise Torque Reference in %
cfg_AutoFaultResetNum	DINT	Maximum number of tries that AOI will send fault reset command while being maintained

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_FireMode	BOOL	1 = Drive Operating in Fire Mode
sts_PID_Auto	BOOL	1 = PID in Automatic Mode 0 = PID in Manual Mode
sts_Local	BOOL	1 = Local 0 = Remote
sts_QuickStop	BOOL	1 = Quick stop commanded 0 = No 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
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
val_OutputTorque	REAL	Output Torque Applied to Motor
AutoFaultResetExceed	BOOL	Indicates when the maximum number of automatic fault clears has been exceeded. Set cmd_Fault_Reset to 0 to reset and allow fault clear to resume. 1 = Max number of fault clears reached. Fault Reset Disabled 0 = Under threshold for automatic fault clears. Fault Reset Allowed.

CFW11 Parameter Requirements

The following paramaters must be set in the CFW11:

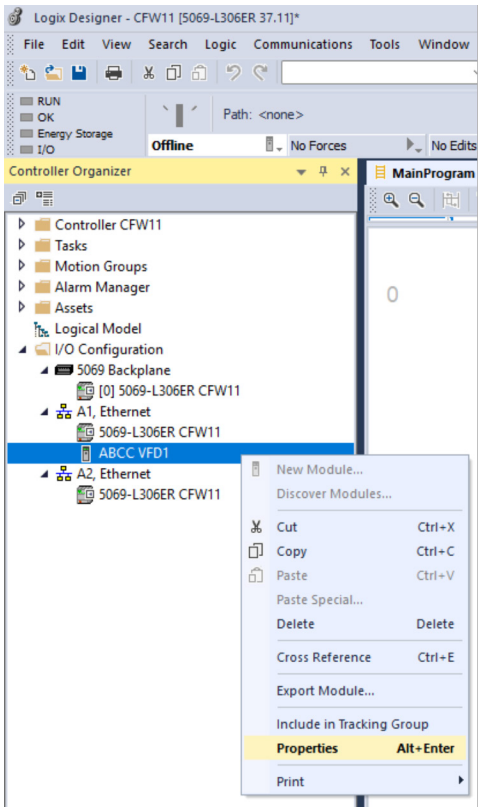
Parameter	Setting
P0105 1st/2nd Ramp Select.	4 = Anybus-CC
P0220 LOC/REM Selection Src	7 = Anybus-CC LOC
P0222 REM Reference Sel.	10 = Anybus-CC
P0226 REM FWD/REV Sel.	7 = Anybus-CC FWD
P0228 REM JOG Selection	4 = Anybus-CC
P0727 Anybus I/O Words	1 = 1 Word
P0728 Anybus Read Word #3	9
P0729 Anybus Read Word #4	49
P0730 Anybus Read Word #5	3
P0731 Anybus Read Word #6	5
P0732 Anybus Read Word #7	6
P0734 Anybus Write Word #3	100
P0735 Anybus Write Word #4	101
P0736 Anybus Write Word #5	169
P0737 Anybus Write Word #6	170

Trouble Shooting

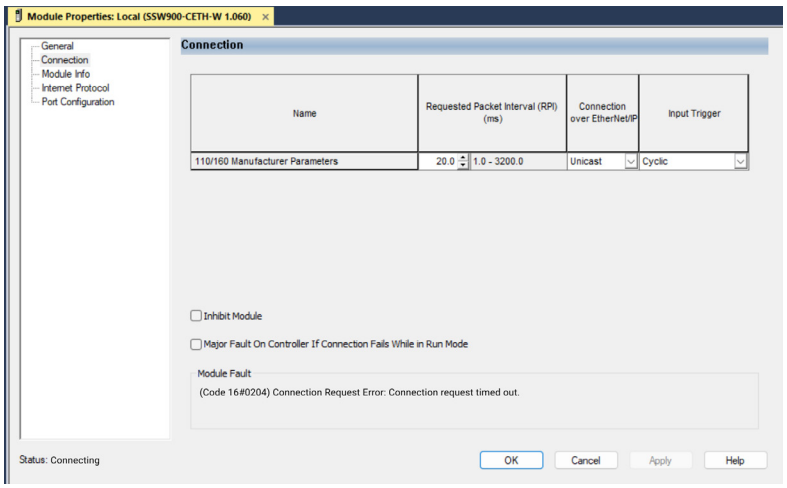
This section is to help with any problems you may encounter.

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 CFW11 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.

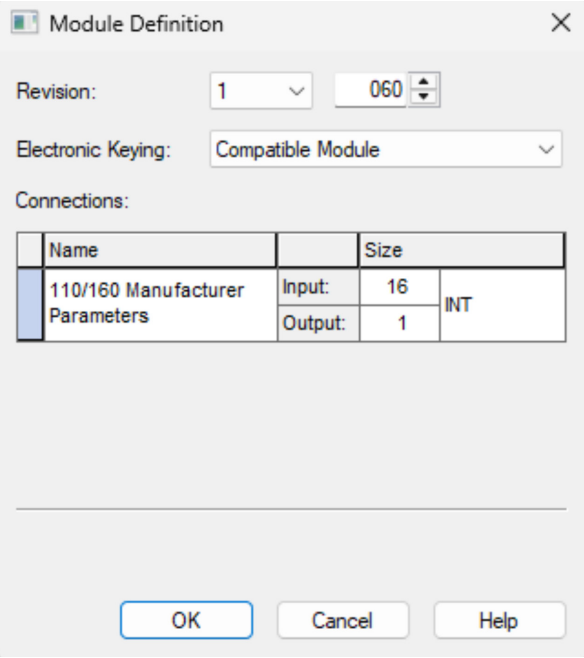


Error Code 16#0005 = Connection Request Error: Bad Class.

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 “CFW11 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 “CFW11 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:

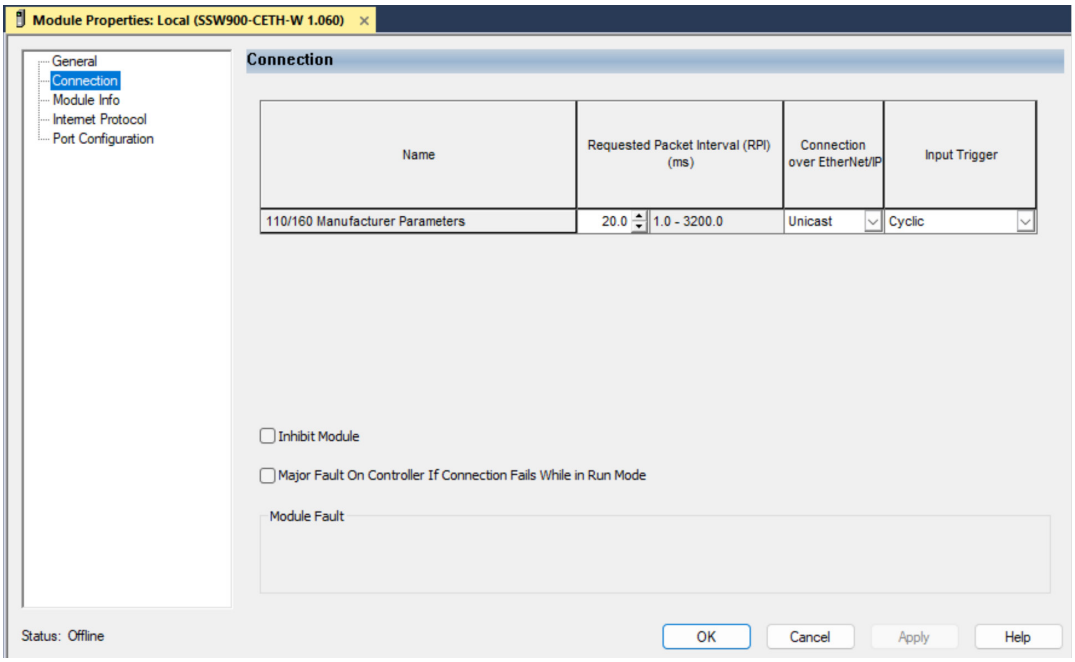
- Check the programmed connection size in the PLC and the VFD (example the VFD is sending 2 words and the PLC is programmed to 4 words).
- Ensure the comm format for the module is set to a data type of INT in the PLC. This can be found under the properties for the module.

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:

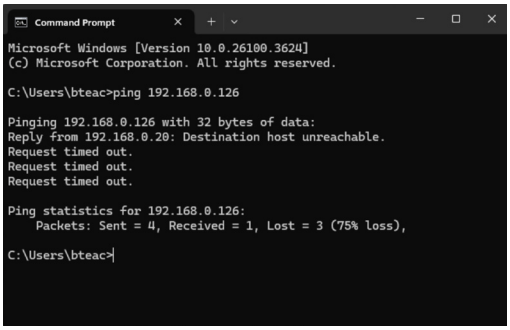
- Check the programmed connection size in the PLC and the VFD (example the VFD is sending 2 words and the PLC is programmed to 4 words).
- Ensure the comm format for the module is set to a data type of INT in the PLC. This can be found under the properties for the module.

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 A129: Anybus is Offline

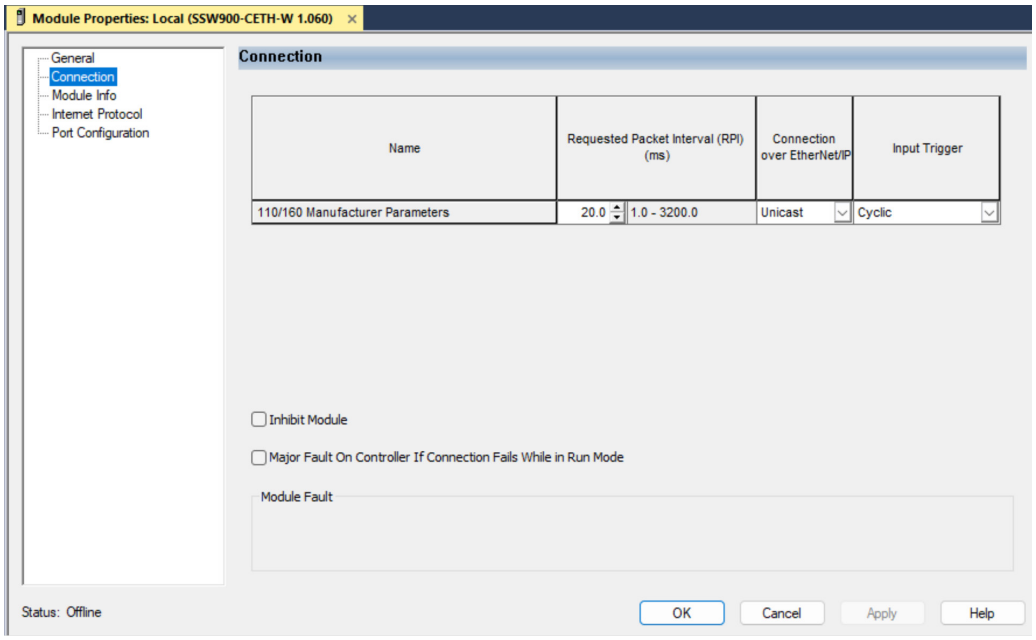
This alarm indicates an interruption of the Anybus-CC communication. The EtherNet/IP card is running on Anybus.

What to check:

- Programming error. Master and slave set with a different number of I/O words.
- Communication with the master has been lost (broken cable, unplugged connector, etc.).

3) 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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