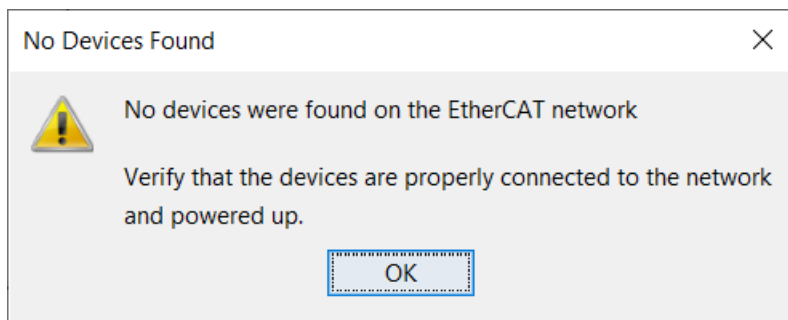


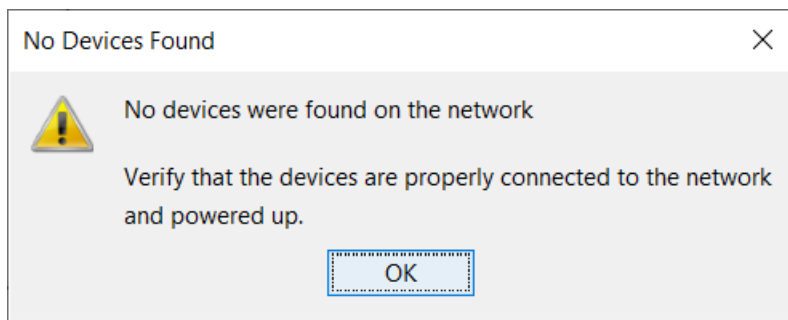
Debugging CME Ethernet Connectivity

Introduction

Copley provides customers with free, easy to use software: "Copley Motion Explorer" (CME). Sometimes, when attempting to connect over EtherCAT or UDP, one can encounter an error. For EtherCAT, the error is: "No devices were found on the EtherCAT network. Verify that the devices are properly connected to the network and powered up."



For UDP, the error is: "No devices were found on the network. Verify that the devices are properly connected to the network and powered up."



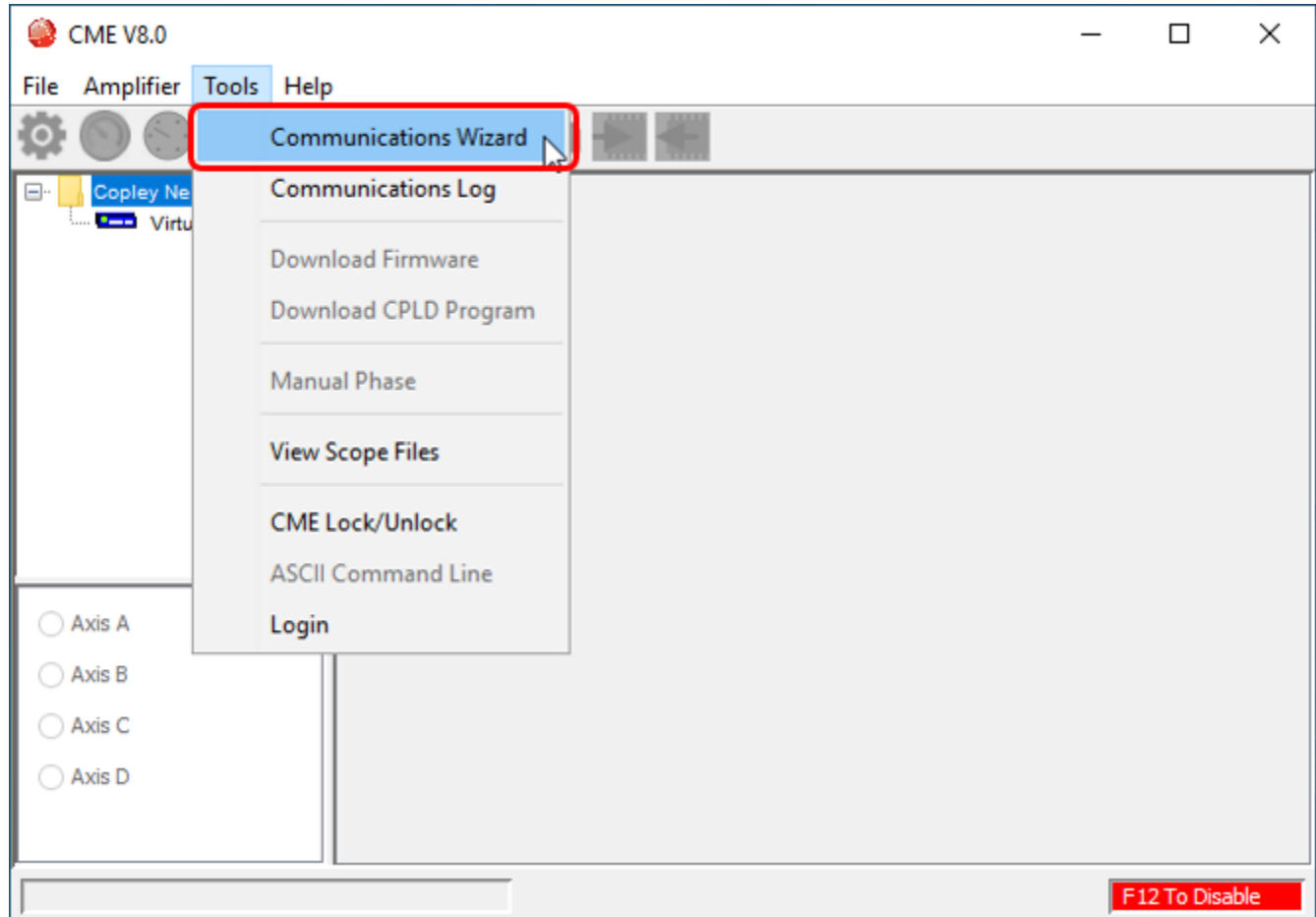
The following is an overview of the steps to debug this issue:

1. a. For EtherCAT Connection: Verify that the drive's operating mode is "CANopen over EtherCAT (CoE)" and that the drive is enabled.
b. For UDP Connection: Set bit 9 of the Network Options Parameter.
2. Ensure that the Windows Defender Firewall is not blocking messages.
3. Set a static IP address and check that the Adapter Network Category is set to private using the Windows PowerShell.

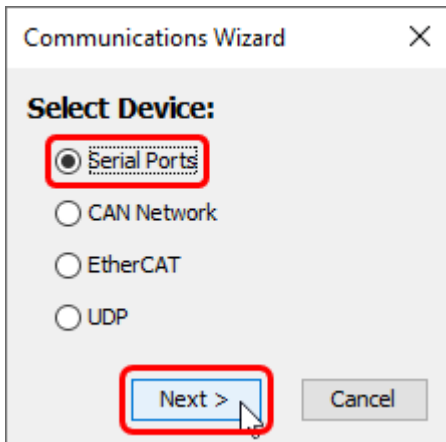
Step 1a: Verify Operating Mode over Serial (For EtherCAT only)

Connect to CME over serial. Copley Controls recommends using the SER-USB-RJ11, which we manufacture using authentic Prolific parts.

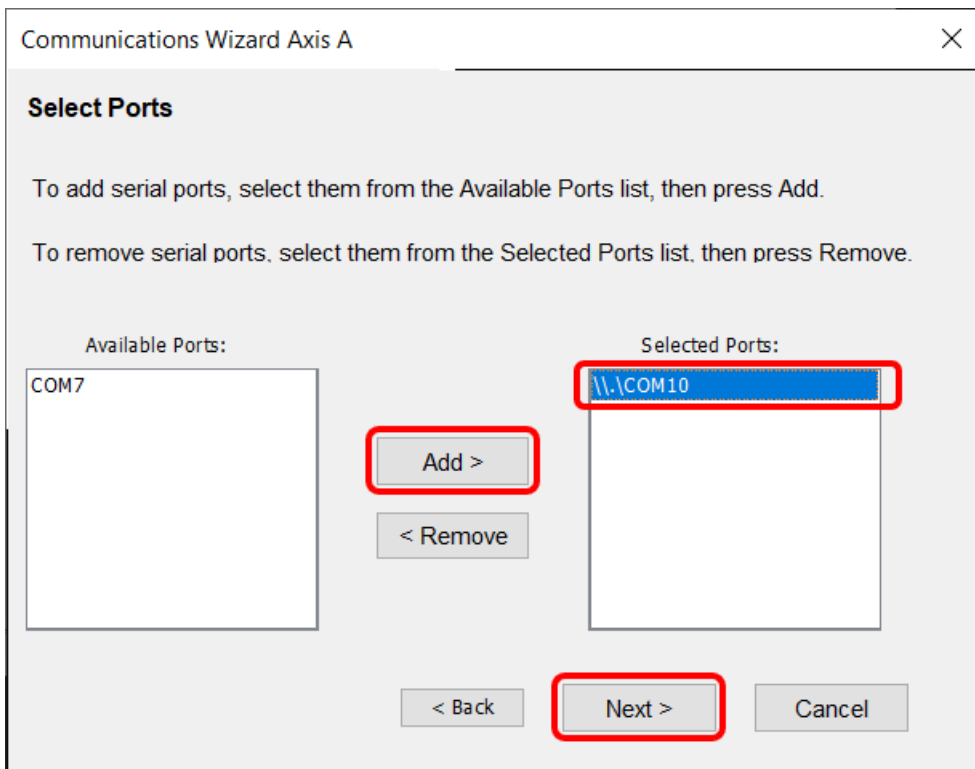
First select Tools > Communications Wizard.



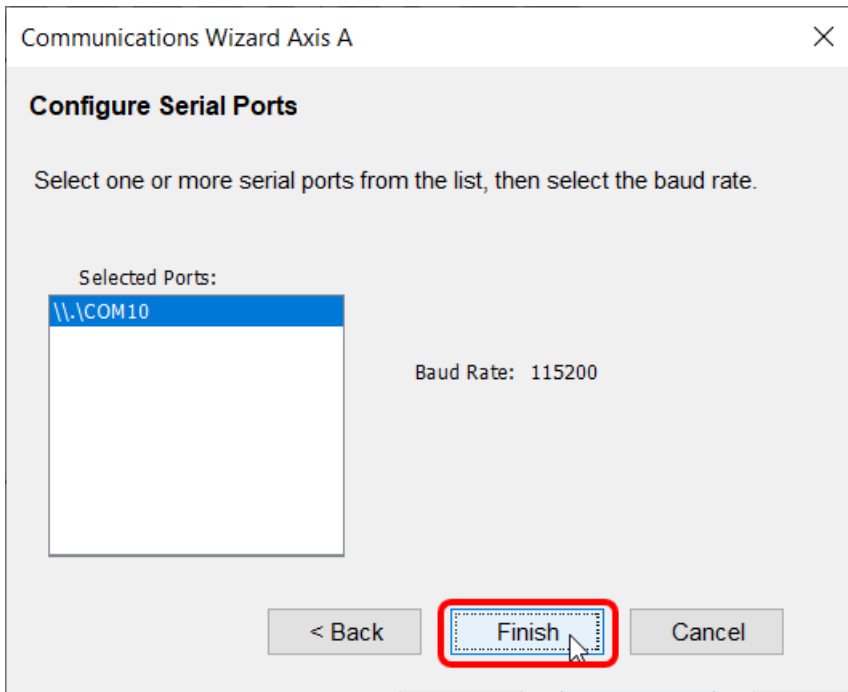
Next, select "Serial Ports," then "Next."



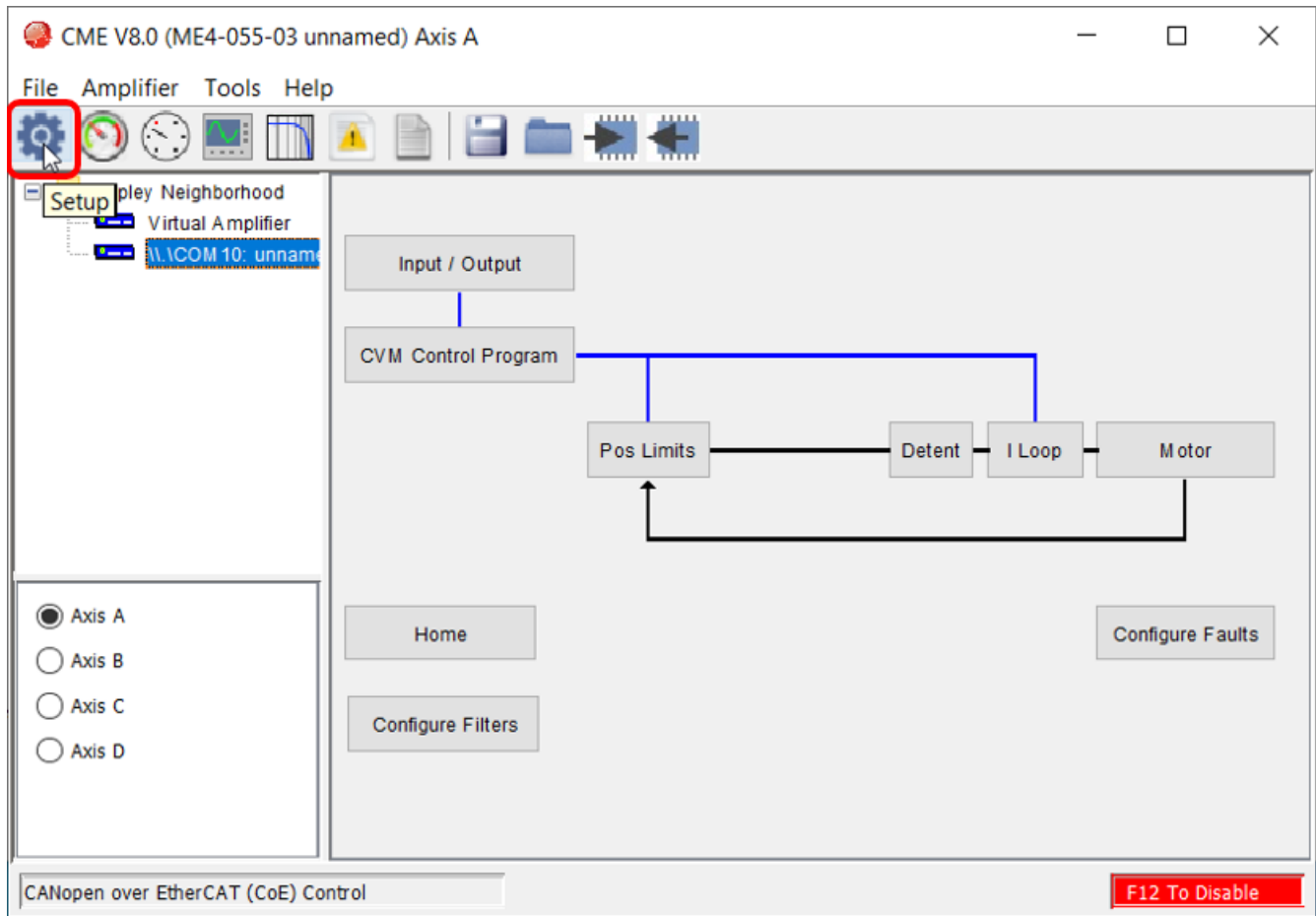
Select the COM port in use. Click "Add," then "Next."



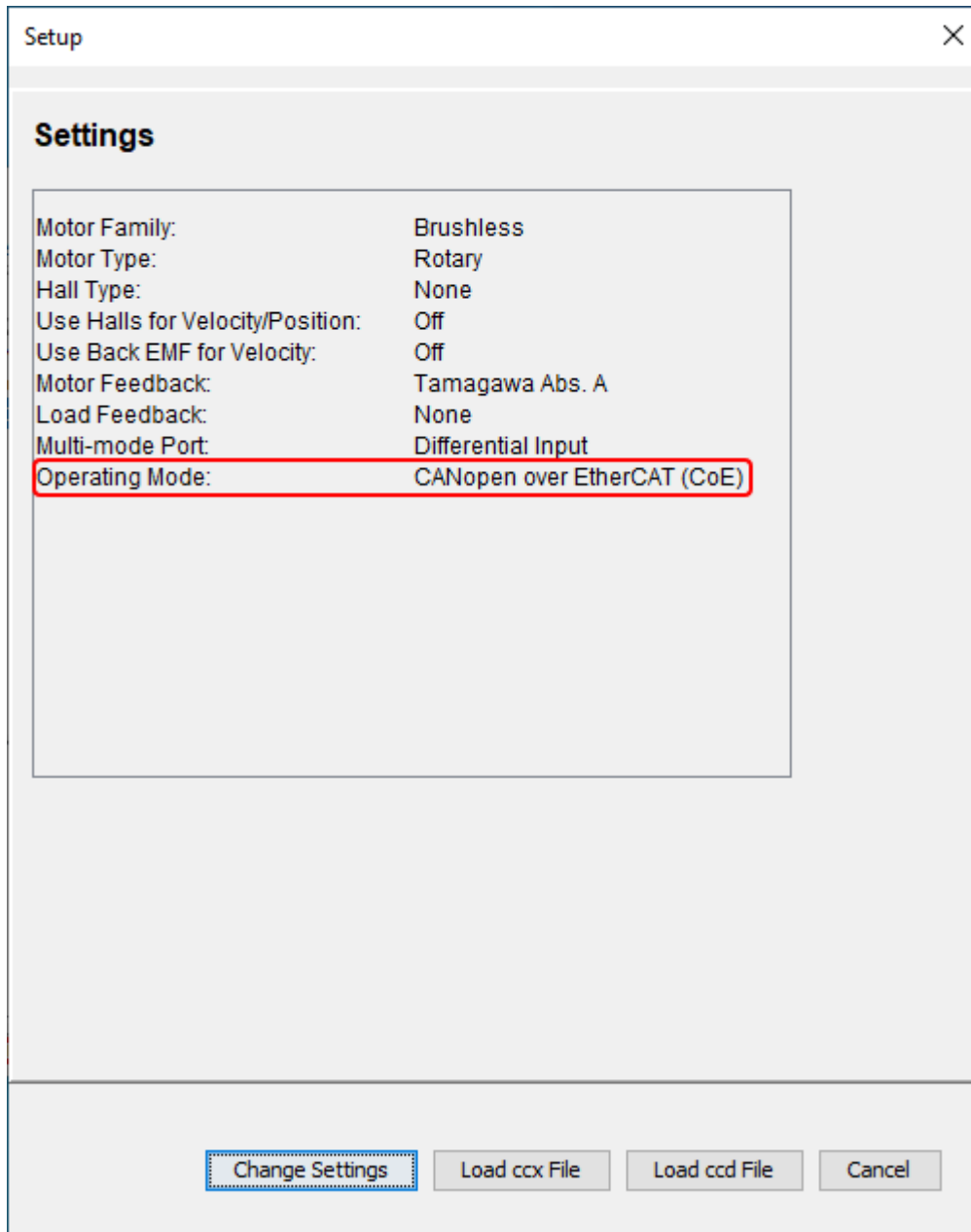
Click "Finish."



We should now be connected to the drive over serial. Next, select the Setup icon on the top left.



Verify that the Operating Mode is "CANopen over EtherCAT (CoE)."



If the Operating Mode is not "CANopen over EtherCAT (CoE)," then perform the following steps to change it.

Click "Change Settings" followed by "Next," until reaching the "Operating Mode Options" screen.

Under "Operating Mode," select "Position" in the drop-down menu. Under "Command Source," select "CANopen over EtherCAT (CoE)."

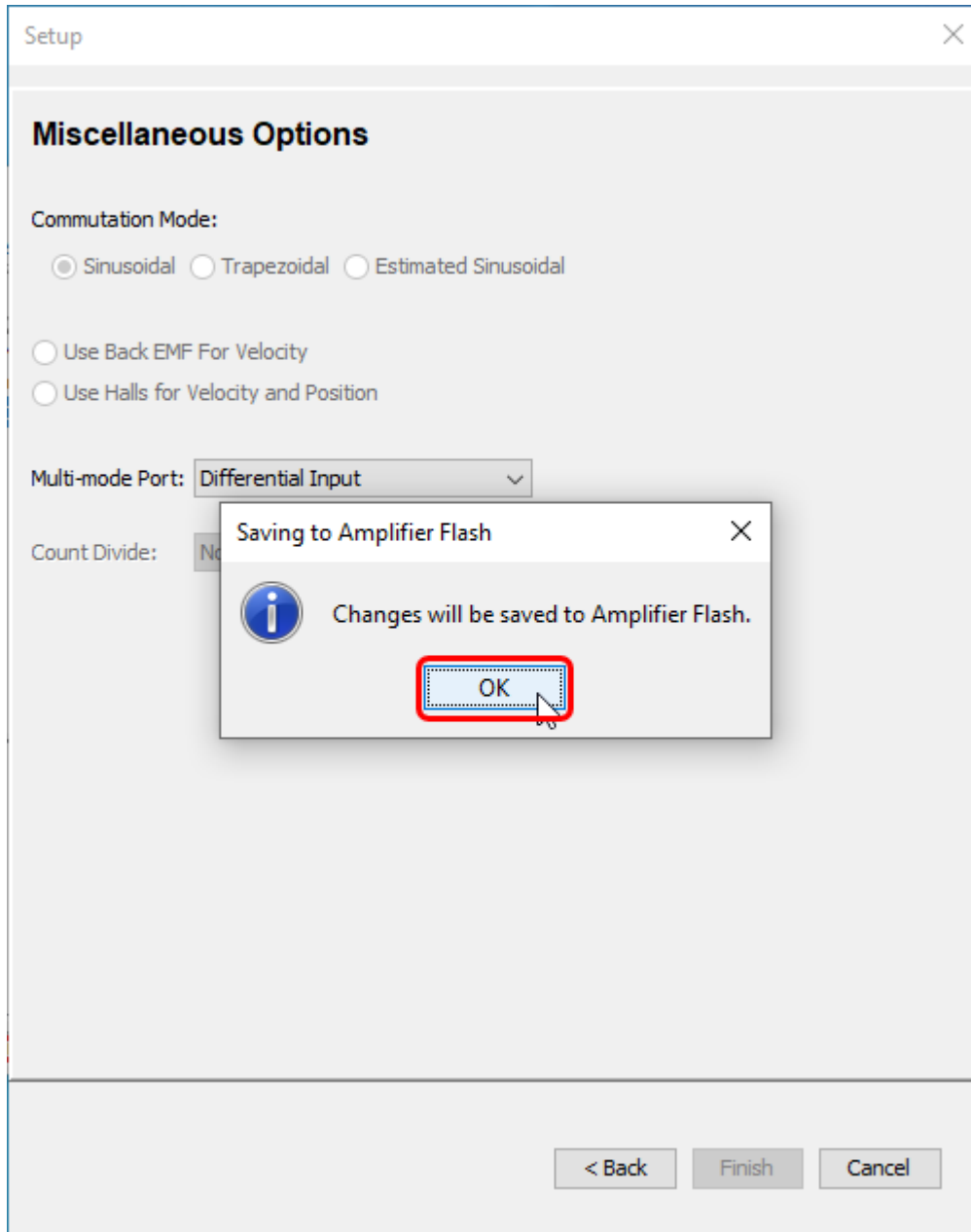
Operating Mode Options

Operating Mode:

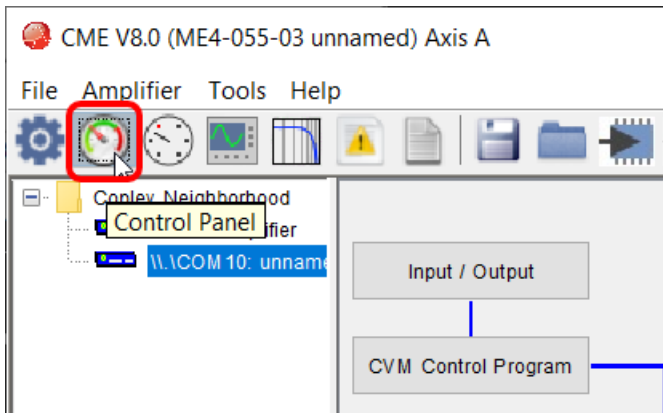
Command Source:

Click "Next," followed by "Finish."

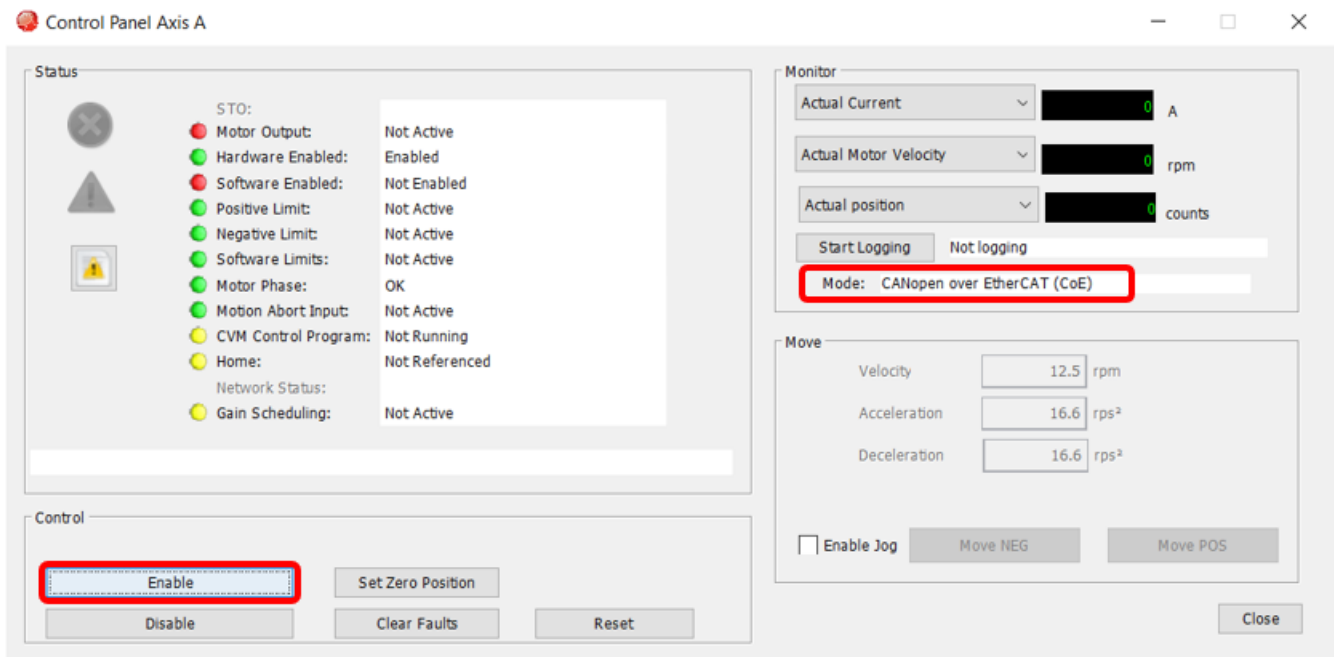
A message dialog box will appear stating that the changes will be saved to FLASH memory. Click OK.



Next, open the Control Panel by clicking the icon shown below.



Click the Enable button outlined in red below. Notice that the Mode textbox does not display "Disabled."



Close the Control Panel and close CME. Continue to Step 2: Allowing CME through the Firewall.

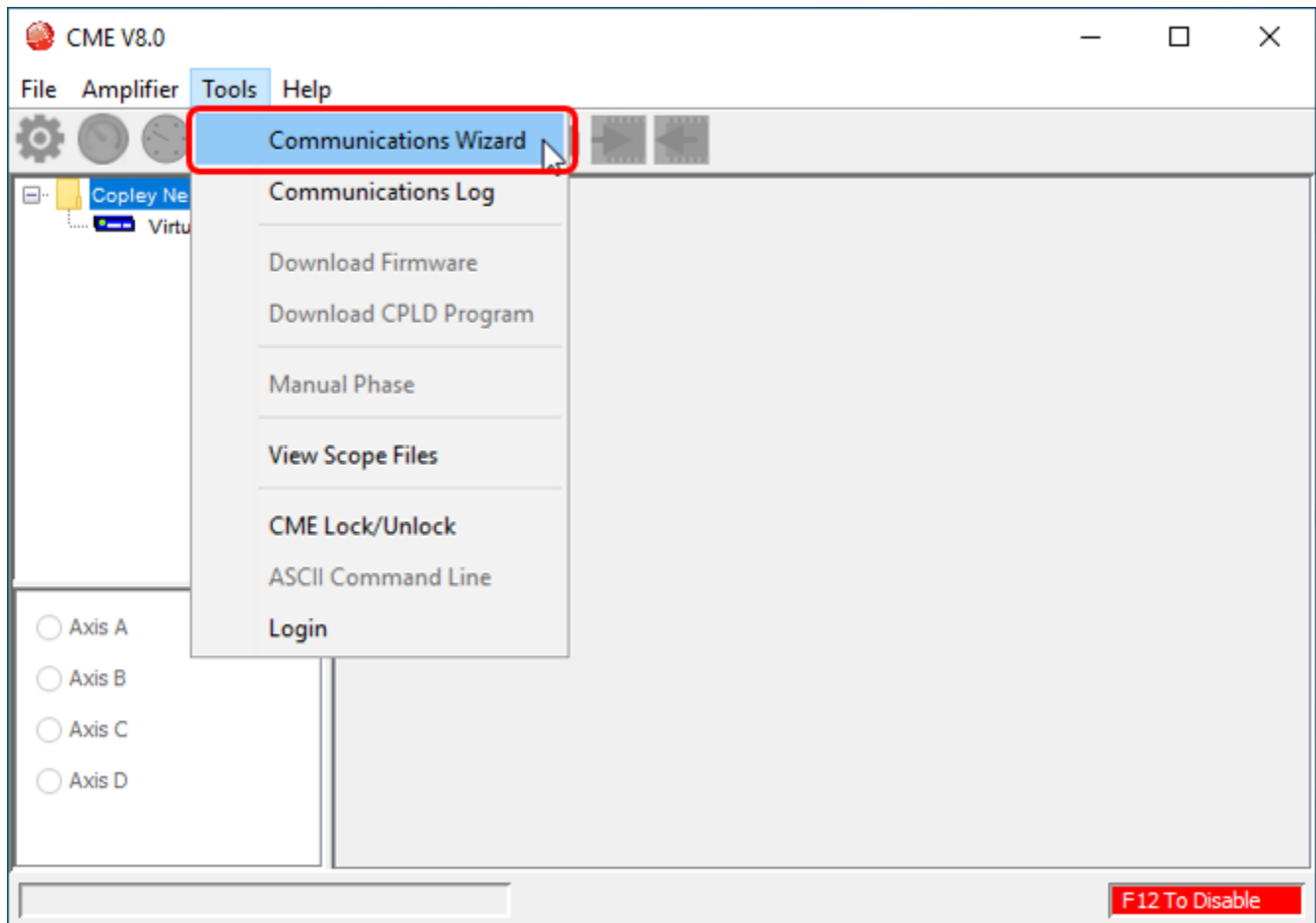
Step 1b: Set Bit 9 of the Network Options Parameter (For UDP only)

The drive’s network must be configured to use UDP protocol. Therefore, set bit 9 of the Network Options Parameter. The bit-mapping of this parameter is shown below in an excerpt from the Parameter Dictionary.

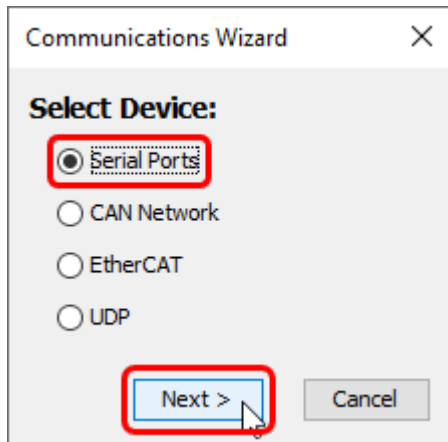
0x121	0x21B3	RF	INT16	Network Options. Configures the drive’s network. Details of its meaning depend on type of network implemented in drive.																		
				EtherCAT																		
				<table border="1"> <thead> <tr> <th>Bits</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>If set, disable some extra checks of SYNC0 configuration which were added for improved network conformance.</td> </tr> <tr> <td>1</td> <td>If set, drive will follow EtherCAT state machine even when running in a non- EtherCAT mode of operation.</td> </tr> <tr> <td>2</td> <td>If set, object 0x1002 is bit-wise OR of all axes Event Status Register (0xA0) for multi-axis drives. If clear, 0x1002 is for axis 1 only.</td> </tr> <tr> <td>3</td> <td>If set, value of Network Node Id Configuration (0xC1) will be used as network alias on powerup. If clear, alias will be set from address switches</td> </tr> <tr> <td>4-7</td> <td>Reserved.</td> </tr> <tr> <td>8</td> <td>If set, PDO mapping will be saved to flash when parameters are saved using object 0x1010</td> </tr> <tr> <td>9</td> <td>If set, use standard Ethernet protocols (UDP, Modbus TCP, TCP/IP) rather than standard EtherCAT operation</td> </tr> <tr> <td>10-15</td> <td>Reserved</td> </tr> </tbody> </table>	Bits	Meaning	0	If set, disable some extra checks of SYNC0 configuration which were added for improved network conformance.	1	If set, drive will follow EtherCAT state machine even when running in a non- EtherCAT mode of operation.	2	If set, object 0x1002 is bit-wise OR of all axes Event Status Register (0xA0) for multi-axis drives. If clear, 0x1002 is for axis 1 only.	3	If set, value of Network Node Id Configuration (0xC1) will be used as network alias on powerup. If clear, alias will be set from address switches	4-7	Reserved.	8	If set, PDO mapping will be saved to flash when parameters are saved using object 0x1010	9	If set, use standard Ethernet protocols (UDP, Modbus TCP, TCP/IP) rather than standard EtherCAT operation	10-15	Reserved
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10-15	Reserved																					

First, connect to CME over serial. Copley Controls recommends using the SER-USB-RJ11, which we manufacture using authentic Prolific parts.

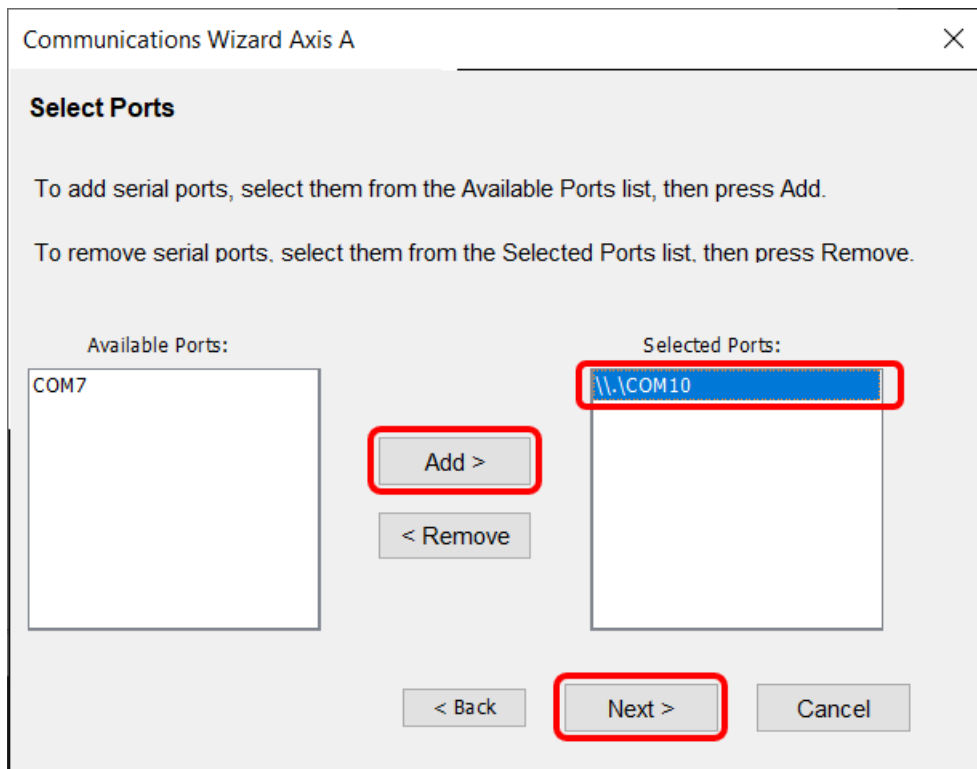
First select Tools > Communications Wizard.



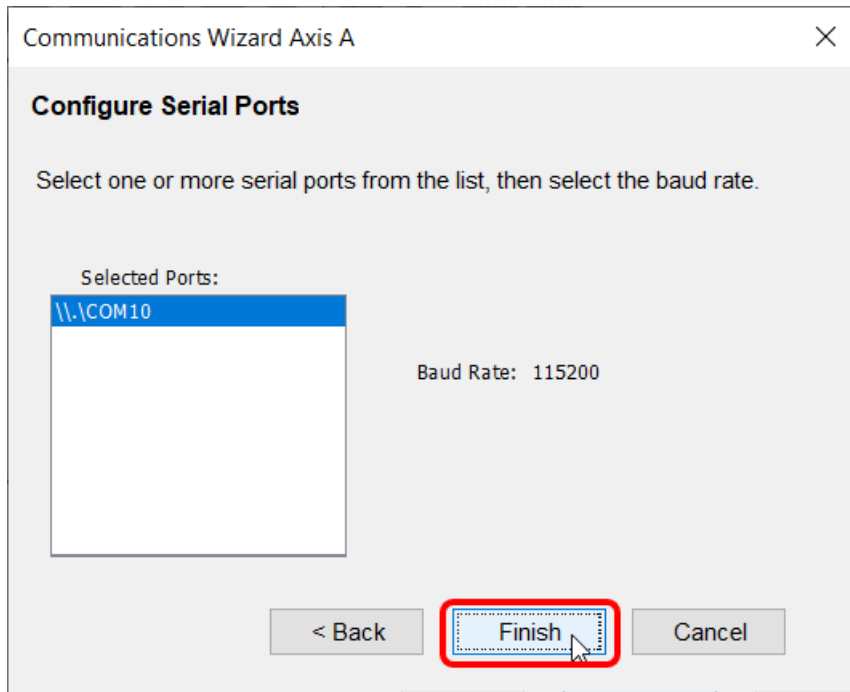
Next, select "Serial Ports," then "Next."



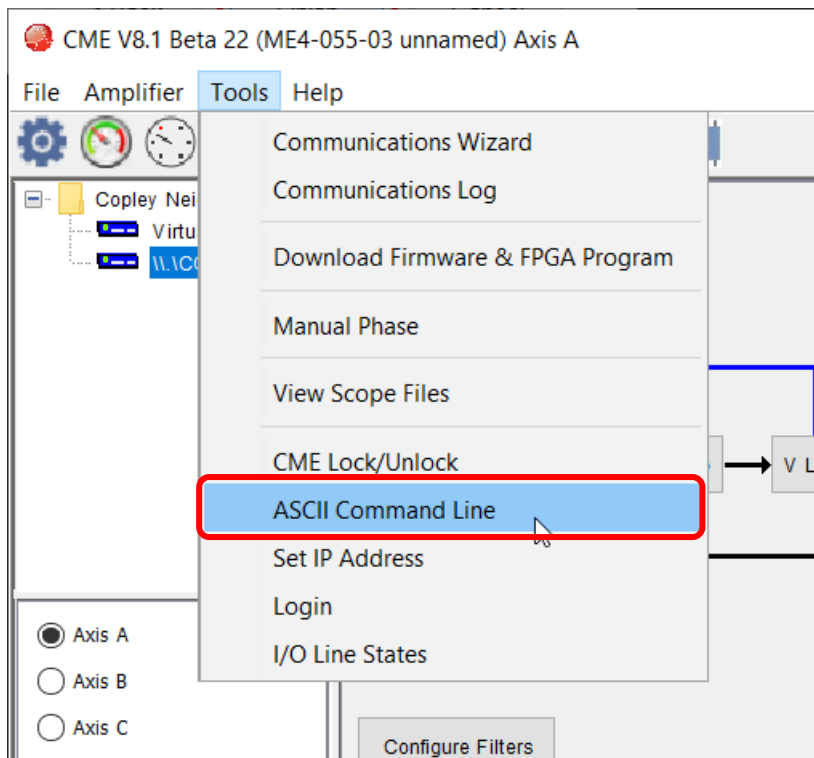
Select the COM port in use. Click "Add," then "Next."



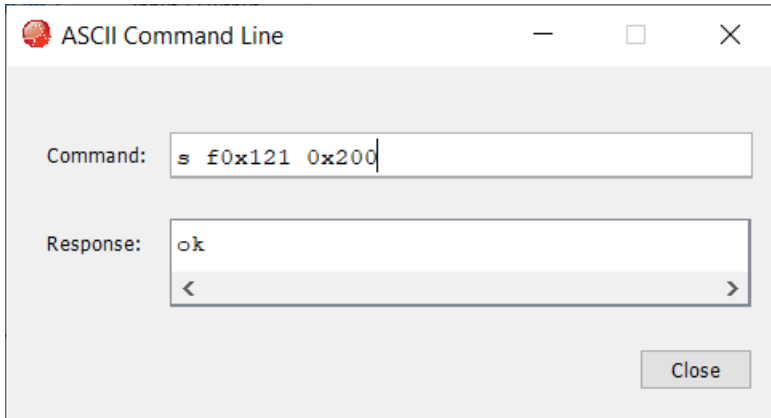
Click "Finish."



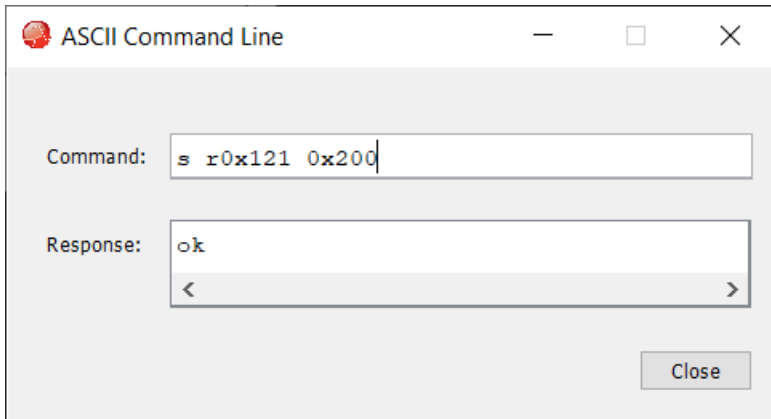
Open the ASCII Command Line by selecting Tools > ASCII Command Line.



Type the command "s f0x121 0x200" to set bit 9 of the Network Options Parameter in FLASH memory. Press the Enter key to send the command.



Type the command "s r0x121 0x200" to set bit 9 of the Network Options Parameter in RAM. Press the Enter key to send the command.

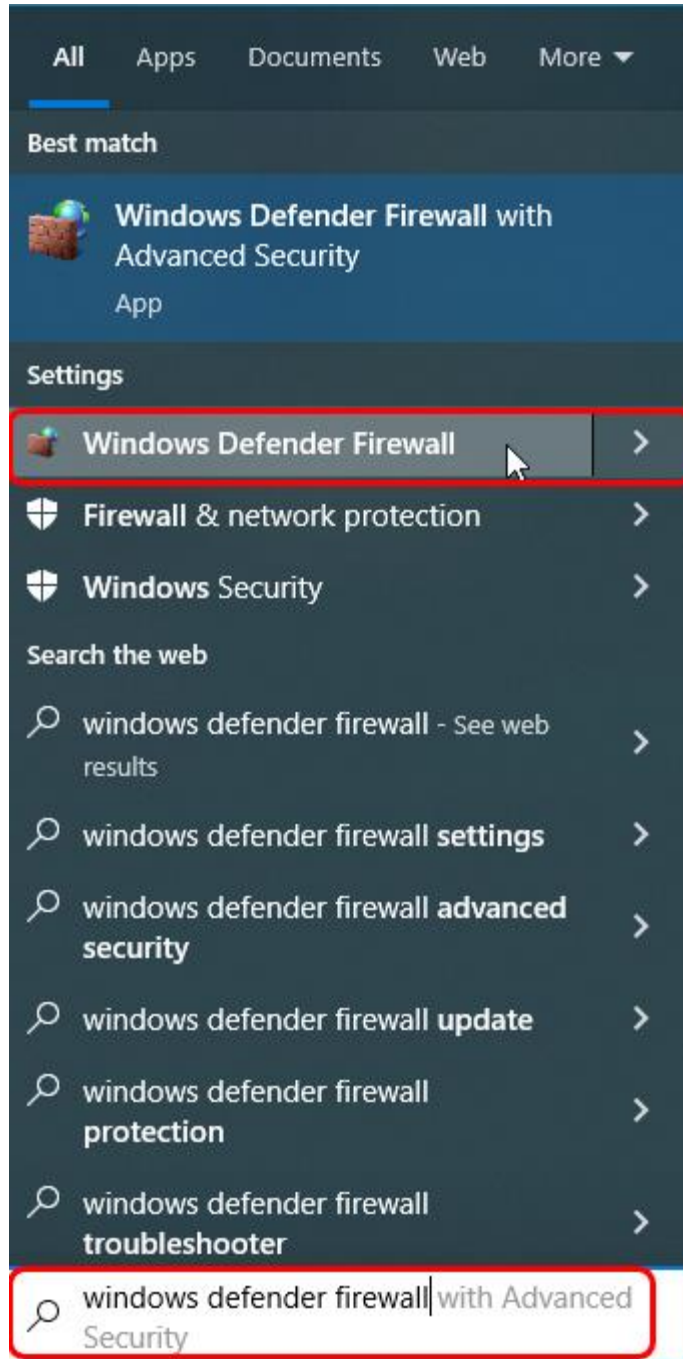


Close CME. Continue to Step 2: Allowing CME through the Firewall.

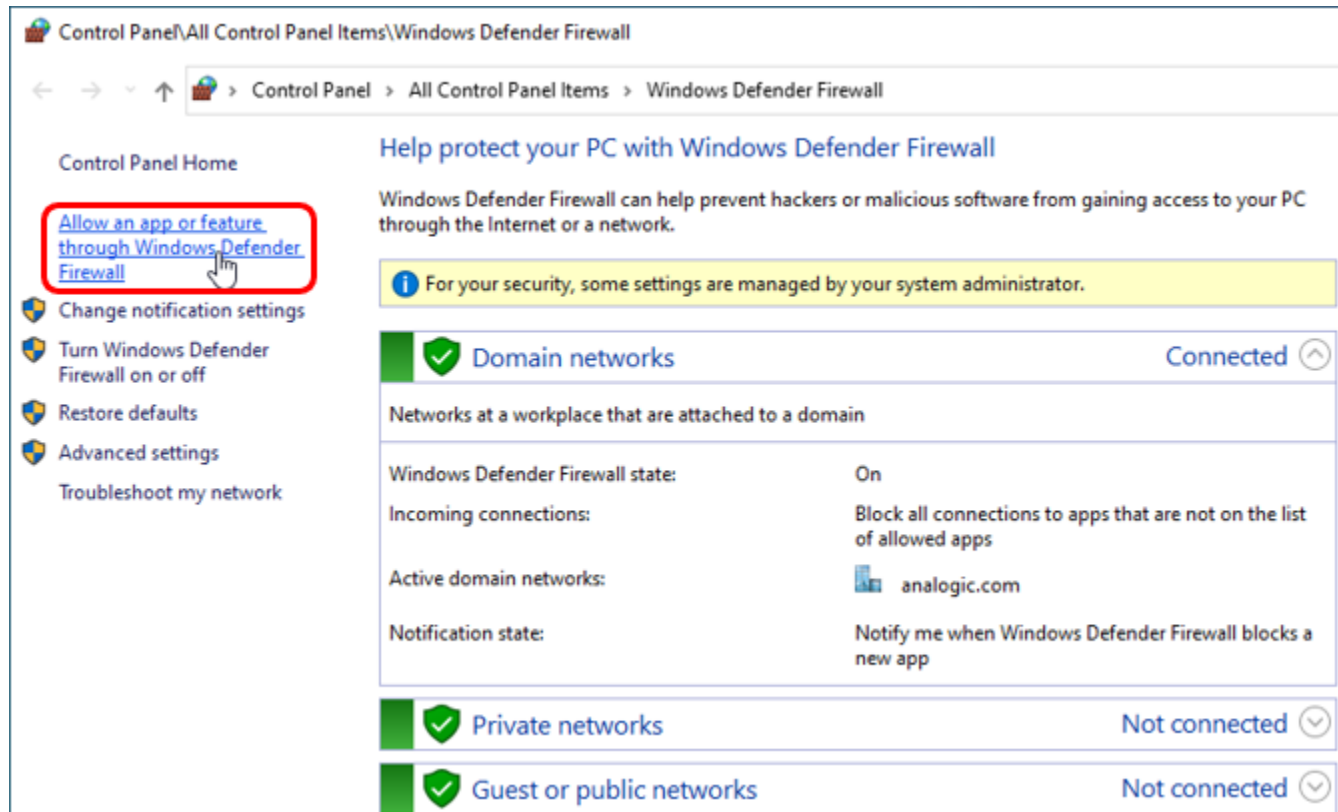
Step 2: Allowing CME through the Firewall

CME sends EtherCAT frames in raw EtherCAT form contained in a UDP wrapper. Because it utilizes UDP packets, Windows may block them. Performing the following steps ensures that Windows will let the messages pass through the firewall.

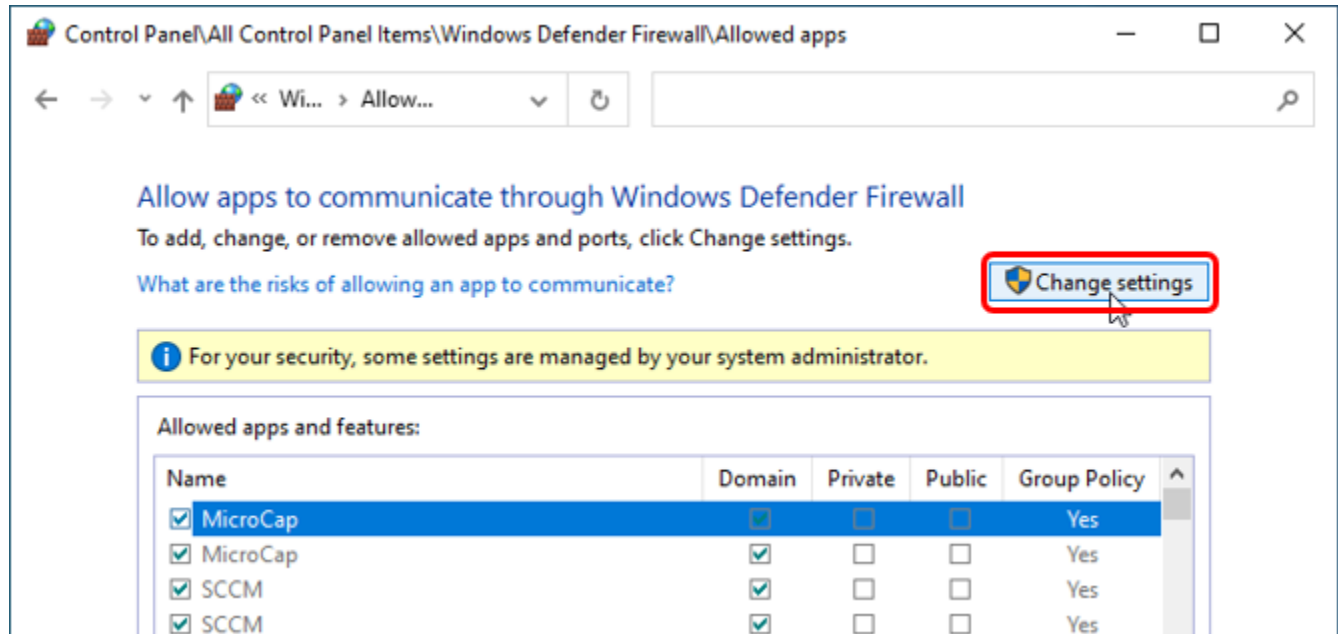
Click on the search bar and type "Windows Defender Firewall."



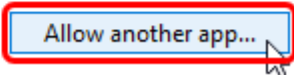
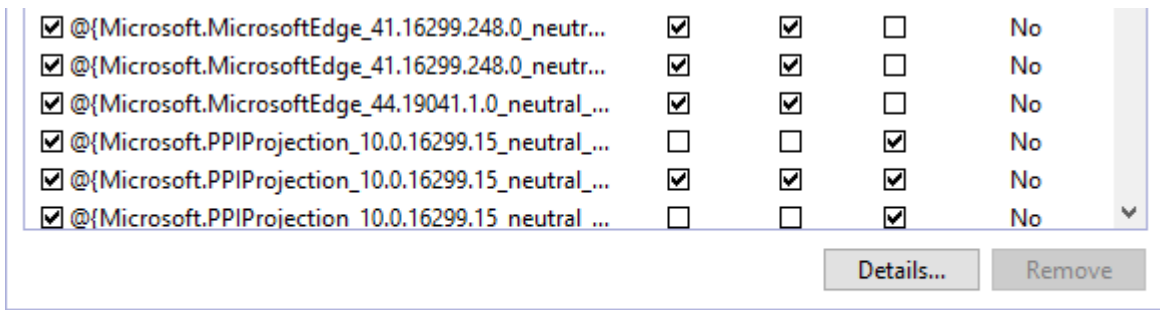
Next, select "Allow an app or feature through Windows Defender Firewall."



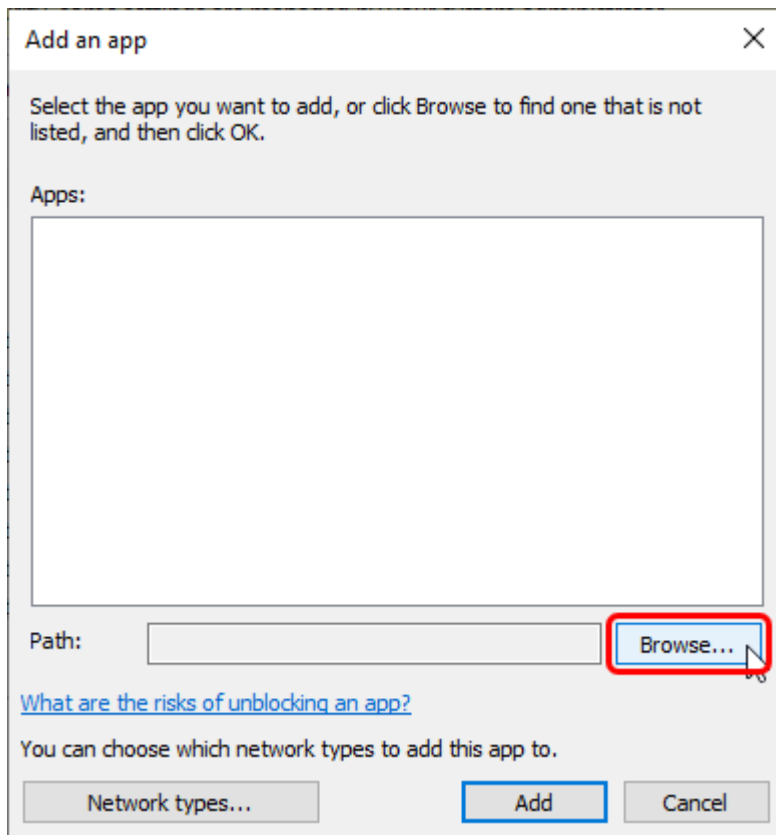
Select "Change settings."



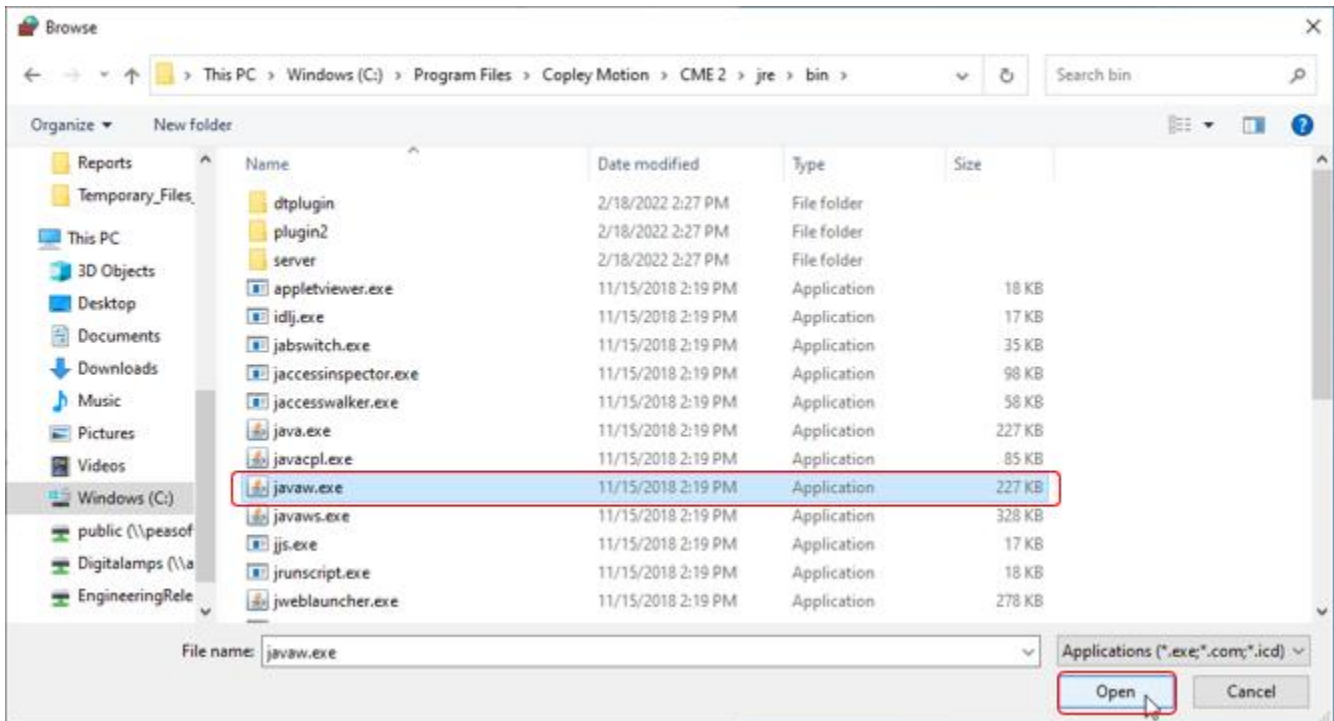
Select "Allow another app..."



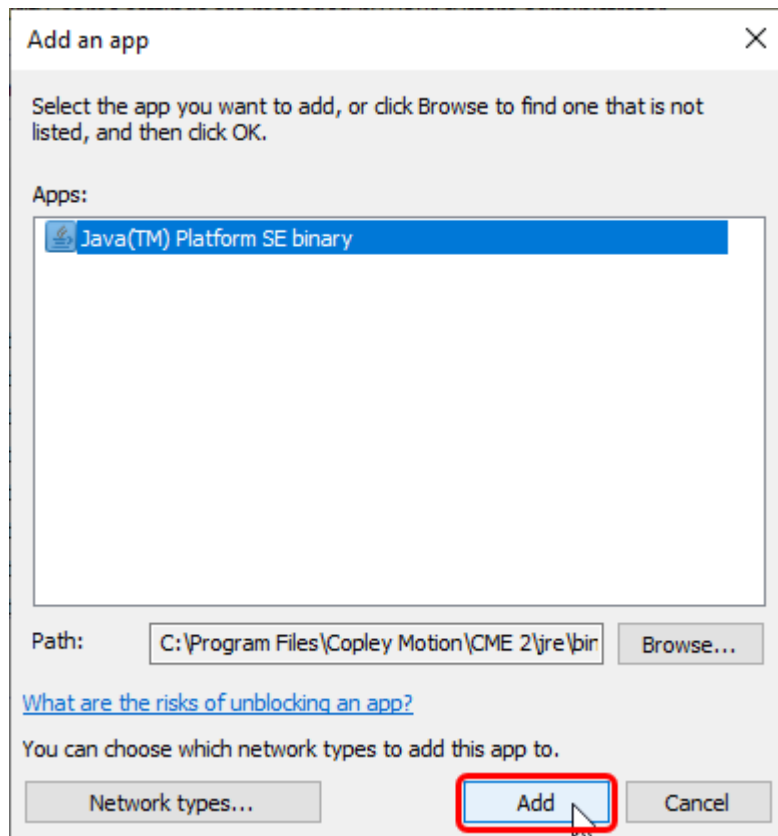
Click "Browse..."



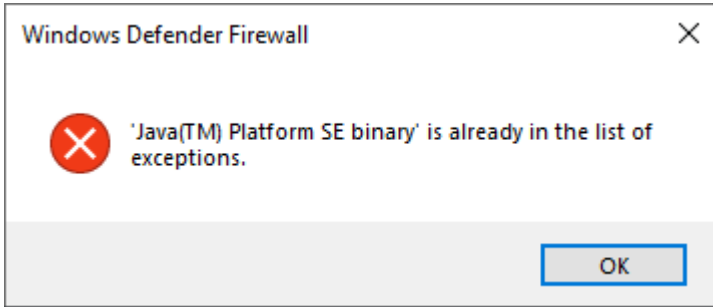
Navigate to "Windows(C:)\Program Files\Copley Motion\CME 2\jre\bin\javaw.exe," and click Open.



Click Add.



If the executable is already in the list of allowed programs, the following dialogue box may appear. Click OK in this case.



Find "Java(TM) Platform SE binary" in the list of allowed programs, and make sure that all three "Domain," "Private," and "Public" are checked. Click OK.

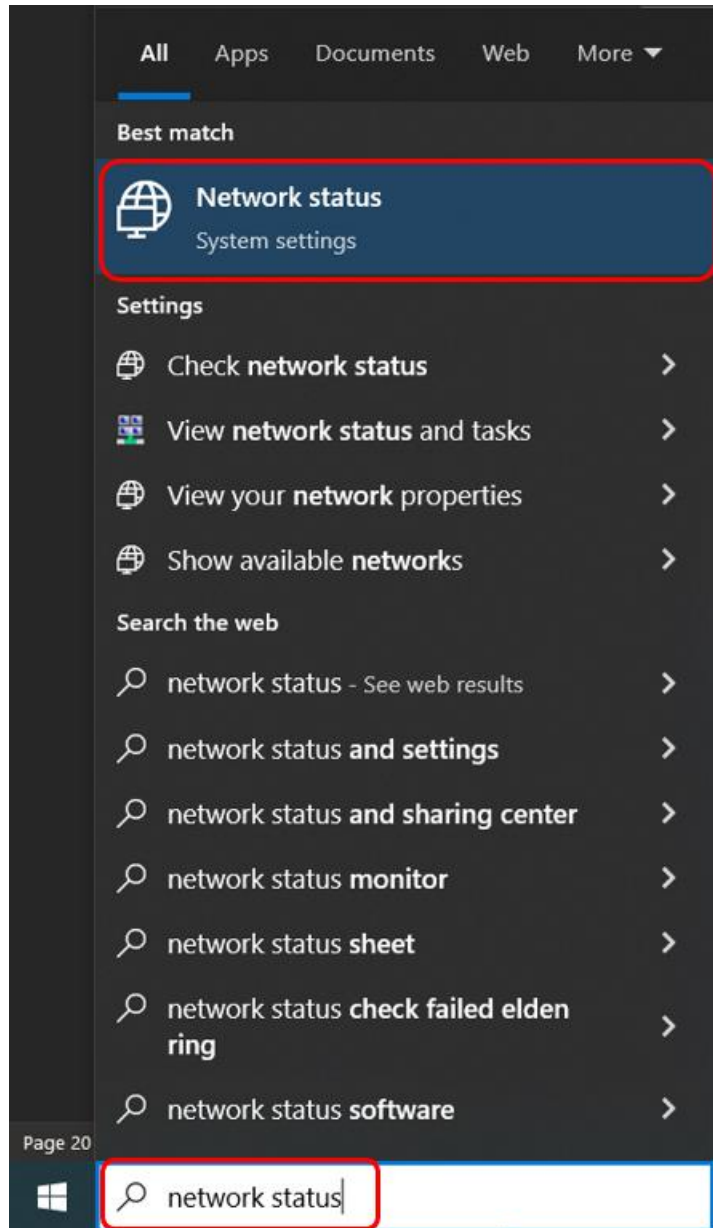
Allowed apps and features:				
Name	Domain	Private	Public	Group Policy
<input checked="" type="checkbox"/> HPSAPS	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	No
<input type="checkbox"/> iSCSI Service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	No
<input checked="" type="checkbox"/> Java(TM) Platform SE binary	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	No

Next, open CME and attempt to connect using the desired method (EtherCAT or UDP). If the issue still exists, try using a USB-to-Ethernet adapter instead of a direct connection to the computer's Ethernet port. Continue to Step 3: Setting Static IP Address and Checking the Adapter Network Category.

Step 3: Setting Static IP Address and Checking the Adapter Network Category

When using a USB-to-Ethernet adapter, a static IP address must be set, and the Adapter Network Category must be private.

To set a static IP address for the adapter, type "Network Status" in the Windows search bar and select the Network Status icon shown below.



Under "Advanced network settings," select "Change adapter options."

Advanced network settings



Change adapter options

View network adapters and change connection settings.



Network and Sharing Center

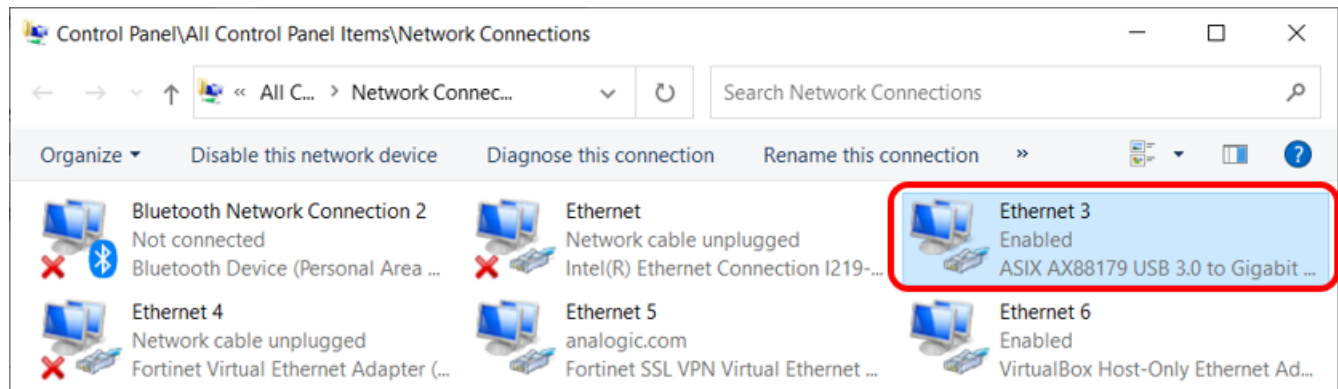
For the networks you connect to, decide what you want to share.



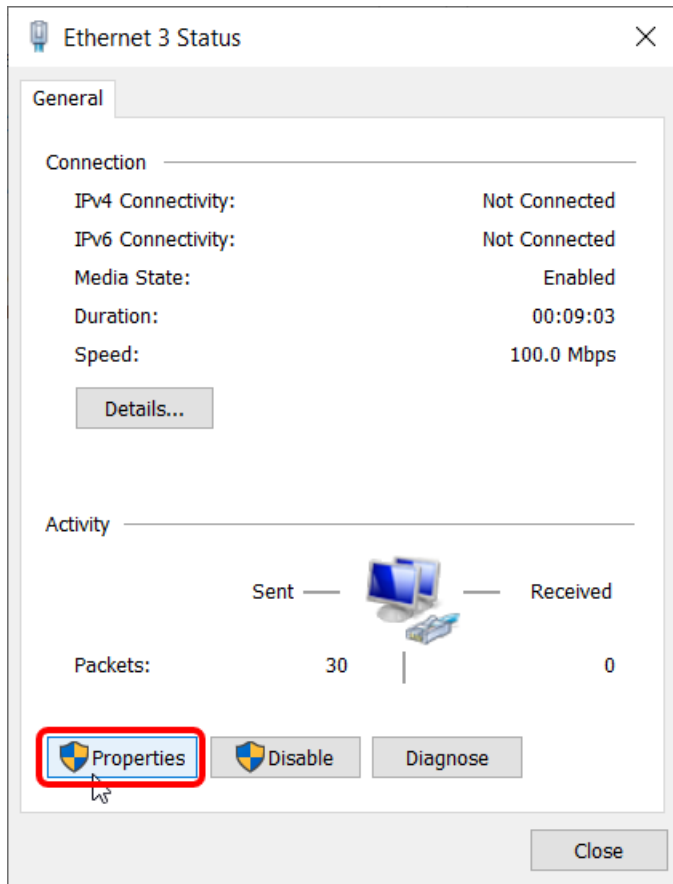
Network troubleshooter

Diagnose and fix network problems.

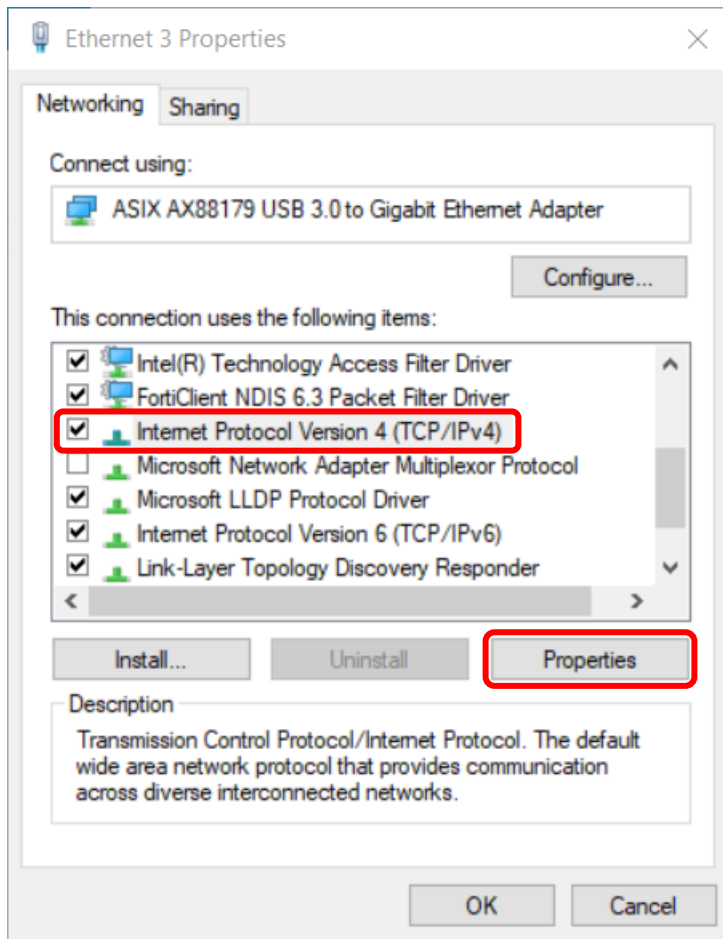
Double-click on the adapter connected to the drive.



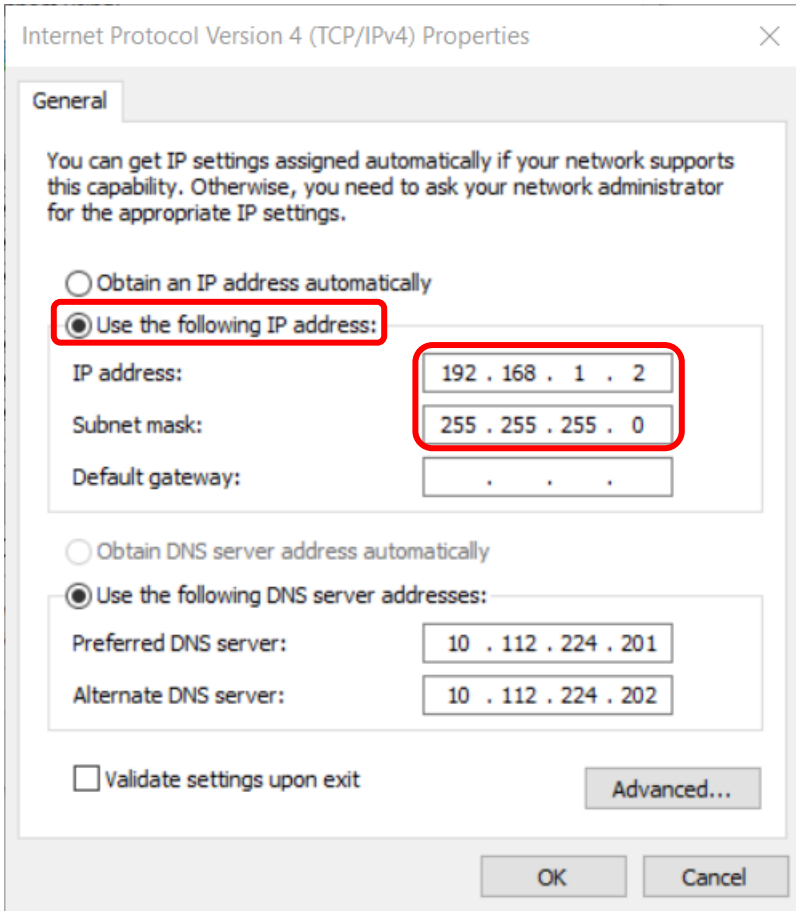
Click the Properties button.



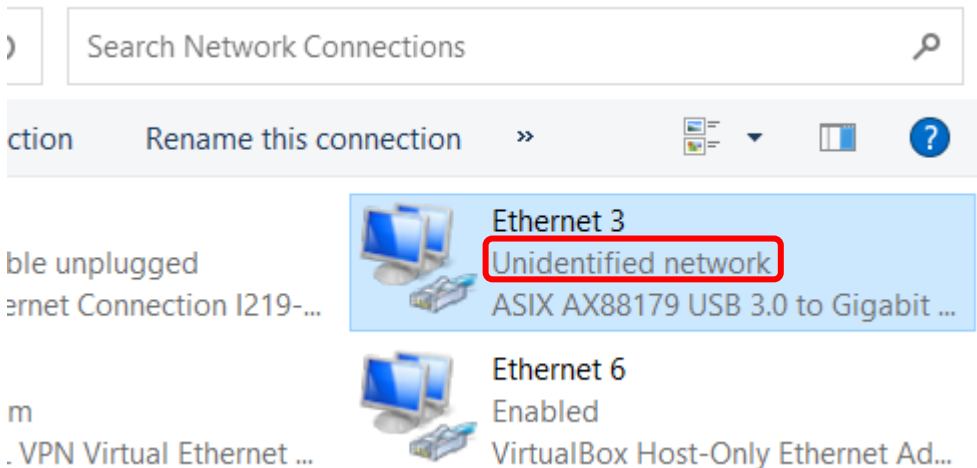
Select the "Internet Protocol Version 4 (TCP/IPv4)" in the list shown below and click the Properties button.



Click "Use the following IP address" radio button and set a static IP address (and subnet mask). See example below. Make sure the IP address is not being used by any other device on the system.

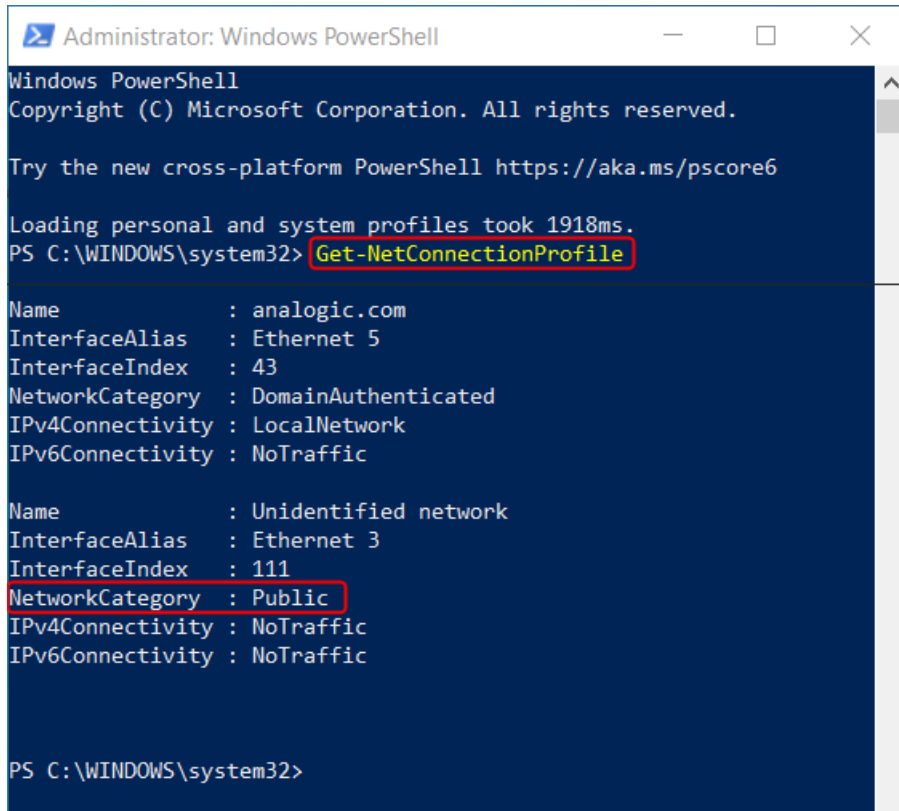


Note that now the Ethernet adapter is labeled as "Unidentified network" in the Control Panel.



Next, change the adapter network category to private. To change this setting, perform the following steps.

First, open the Windows PowerShell as an administrator. Then type the following command to retrieve information about the network adapters on the system: "Get-NetConnectionProfile". Press the Enter key.



```
Administrator: Windows PowerShell
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

Loading personal and system profiles took 1918ms.
PS C:\WINDOWS\system32> Get-NetConnectionProfile

Name           : analogic.com
InterfaceAlias  : Ethernet 5
InterfaceIndex  : 43
NetworkCategory : DomainAuthenticated
IPv4Connectivity : LocalNetwork
IPv6Connectivity : NoTraffic

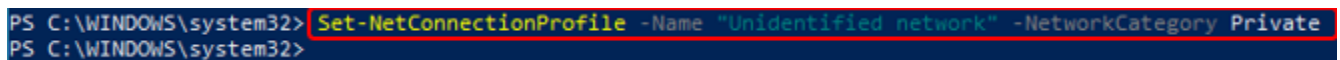
Name           : Unidentified network
InterfaceAlias  : Ethernet 3
InterfaceIndex  : 111
NetworkCategory : Public
IPv4Connectivity : NoTraffic
IPv6Connectivity : NoTraffic

PS C:\WINDOWS\system32>
```

In the screenshot above, the NetworkCategory of the adapter is set to "Public." Set it to "Private" by using the following command:

```
"Set-NetConnectionProfile -Name "Unidentified network" -NetworkCategory Private
```

Type the command into Windows PowerShell and press the Enter key.



```
PS C:\WINDOWS\system32> Set-NetConnectionProfile -Name "Unidentified network" -NetworkCategory Private
PS C:\WINDOWS\system32>
```

Now use the "Get-NetConnectionProfile" command to verify that the setting has been changed.

```
PS C:\WINDOWS\system32> Get-NetConnectionProfile

Name           : analogic.com
InterfaceAlias  : Ethernet 5
InterfaceIndex  : 43
NetworkCategory : DomainAuthenticated
IPv4Connectivity : LocalNetwork
IPv6Connectivity : NoTraffic

Name           : Unidentified network
InterfaceAlias  : Ethernet 3
InterfaceIndex  : 111
NetworkCategory : Private
IPv4Connectivity : NoTraffic
IPv6Connectivity : NoTraffic

PS C:\WINDOWS\system32>
```

Next, open CME and attempt to connect using the desired method (EtherCAT or UDP). If the issue still exists, please contact your I.T. department.

Conclusion

Perform the three steps outlined on the first page of this document to debug CME's EtherCAT or UDP connectivity. If the issue is not resolved after performing these steps, please contact your I.T. department.

Revision History

Date	Version	Revision
6/01/2022	Rev 00	Initial release