APPLICATION INSTRUCTION

VALVE AND PUMP CONFIGURATION SOFTWARE

CONNECT TO ETHERCAT VIA TWINCAT MAINDEVICE

Rev B March 2026

Moog Valve and Pump Configuration Software (MoVaPuCo)

Foreword

The document was written and checked to the best of our ability.

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We reserve the right to make changes to this document at any time and without specified reasons.

Completeness

This document is complete only when used in conjunction with the product-related hardware and software documentation required for the relevant application, as for example operating instructions of the valve and other manuals.

Selection and qualification of personnel

As specified in the product-related hardware and software documentation required for the relevant application, only users properly qualified and authorized for these tasks may work with and on our products.

Note

This document has been prepared with great care in compliance with the relevant regulations, state-of-the-art technology and our many years of knowledge and experience, and the contents have been generated to the best of the authors' knowledge. However, the possibility of error remains and improvements are possible.
Please feel free to submit any comments about possible errors and incomplete information to us.

Document version

The following table shows possible language versions of this document:

ES	DA	DE	EL	EN	FR	IT	NL	PT	FL	SV	CS	ET	LV	HU	MT	PL	SK	SL	BG	RO	GA
-	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Revision record

The following table shows the revision record:

Revision	Description	Prepared	Checked	Approved	Date
A	Initial version	HOS			Jun. 2025
B	Update of text and figures	KLD	Yes	HOS/SCN	March 2026

Reader instructions

Warnings

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

NOTICE indicates possible property damage.

The following table shows the structure of a warning:

⚠ SIGNAL WORD

Type and source of hazard

Possible consequences of not avoiding the potential hazard

- ➢ How to avoid the hazardous situation

Notes

The following table shows typographic elements:

Symbol	Explanation
	Notes about important operations and other useful information
➢	This is an action to be carried out
•	This is a bullet list
Name	Name of the described element
Start → Program	A sequence of instructions to click with the mouse to get to a program window, menu or dialog

The following table shows the abbreviations adopted in Moog documents:

Abbreviation	Explanation
DCV	Digital Controlled Valve
MoVaPuCo	Moog Valve and Pump Configuration Software
CoE	CANopen over EtherCAT
EoE	Ethernet over EtherCAT
SDO	Service Data Object
IP	Internet Protocol
SubDevice	SubordinateDevice, formerly EtherCAT Slave
MDevice	MainDevice, formerly EtherCAT Master

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1. Introduction

The EtherCAT Mailbox function enables the **Moog Valve and Pump Configuration Software** (MoVaPuCo) to access Moog valves and pumps as soon as they are connected to the EtherCAT MainDevice (e.g., TwinCAT) in an EtherCAT network.

You can use this connection with MoVaPuCo to perform the same configuration steps as can be performed with a direct connection via the service interface (X10) of the valve. This eliminates the need for a direct connection via the X10 interface of a valve. Operation via EtherCAT is somewhat slower than a direct connection via X10.

	A simultaneous connection via the service interface X10 and the EtherCAT MainDevice is in principle possible but is not recommended.

Preconditions:

- MoVaPuCo Version 3.3 or higher.
- TwinCAT MainDevice from version V 2.10.0 (Build 1340) with mailbox gateway support. Note: Smaller MainDevice controllers may not support the mailbox gateway functionality.
- If MoVaPuCo and TwinCAT MainDevice are installed on the same computer, IP/network configuration is simplified. Remote maintenance from a remote computer is also possible.
- The EtherCAT network on which the valves are located must be fully operational (nodes must reach the network status **pre-operational**).

	The IP addresses given here are only examples. Confirm with your network administrator that the IP addresses you want to use are not already assigned. The use of fixed IP addresses facilitates configuration as well as possible diagnostics and troubleshooting

1.1. Variant 1: MoVaPuCo runs on the same Computer as the TwinCAT Runtime

1.1.1. IP address settings

The following description uses placeholders as described in the table below. Replace the IP address example values with the IP addresses of your network.

Placeholder	Description	Example Value
<ETHERCAT>	EtherCAT port of the PLC	192.168.118.83
<MAILBOX>	EtherCAT Mailbox interface of the PLC	192.168.118.254

	The <MAILBOX> address is derived from the EtherCAT port address <ETHERCAT> by replacing the last octet with 254.

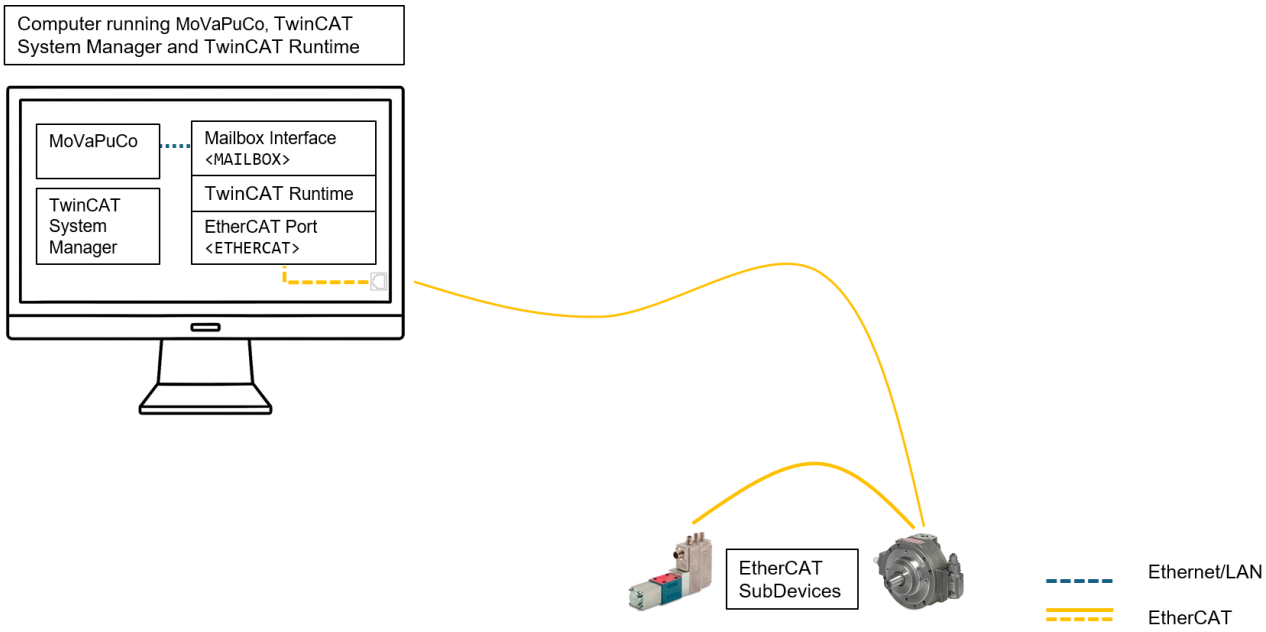
Before you start

Write down the IP addresses you will use:

Placeholder	Description	Your IP address
<ETHERCAT>	EtherCAT port of the PLC	_____
<MAILBOX>	EtherCAT Mailbox interface of the PLC	_____

	In the next chapter you will find the description for placeholders <PC_ETHERNET> and <PLC_ETHERNET>. These placeholders are not required for this configuration (variant 1).
	The placeholders <ETHERCAT> and <MAILBOX> are identical for variant 1 and variant 2

1.1.2. Network overview



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Figure 1: MoVaPuCo runs on the same Computer as the TwinCAT Runtime: Block diagram, placeholders and wiring.

1.2. Variant 2: MoVaPuCo and TwinCAT run on separate computers

MoVaPuCo and TwinCAT Runtime are each installed on a separate computer.
The computers are connected via LAN/Internet.

1.2.1. IP address settings

The following description uses placeholders as described in the table below. Replace the IP address example values with the IP addresses of your network.

Placeholder	Description	Example Value
<PC_ETHERNET>	Ethernet port of the PC/Computer	10.49.158.60
<PLC_ETHERNET>	Ethernet port of the PLC	10.49.150.80
<ETHERCAT>	EtherCAT port of the PLC	192.168.118.83
<MAILBOX>	EtherCAT Mailbox interface of the PLC	192.168.118.254



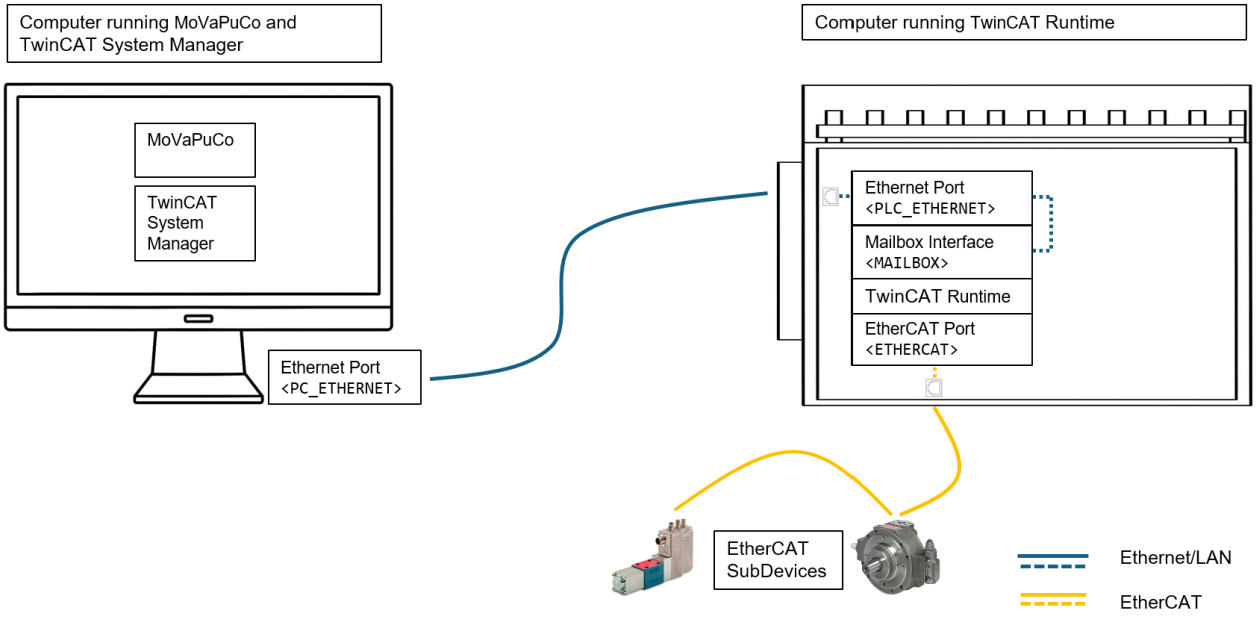
The <MAILBOX> address is derived from the EtherCAT port address <ETHERCAT> by replacing the last octet with 254.

Before you start

Write down the IP addresses you will use:

Placeholder	Description	Your IP address
<PC_ETHERNET>	Ethernet port of the PC/Computer	_____
<PLC_ETHERNET>	Ethernet port of the PLC	_____
<ETHERCAT>	EtherCAT port of the PLC	_____
<MAILBOX>	EtherCAT Mailbox interface of the PLC	_____

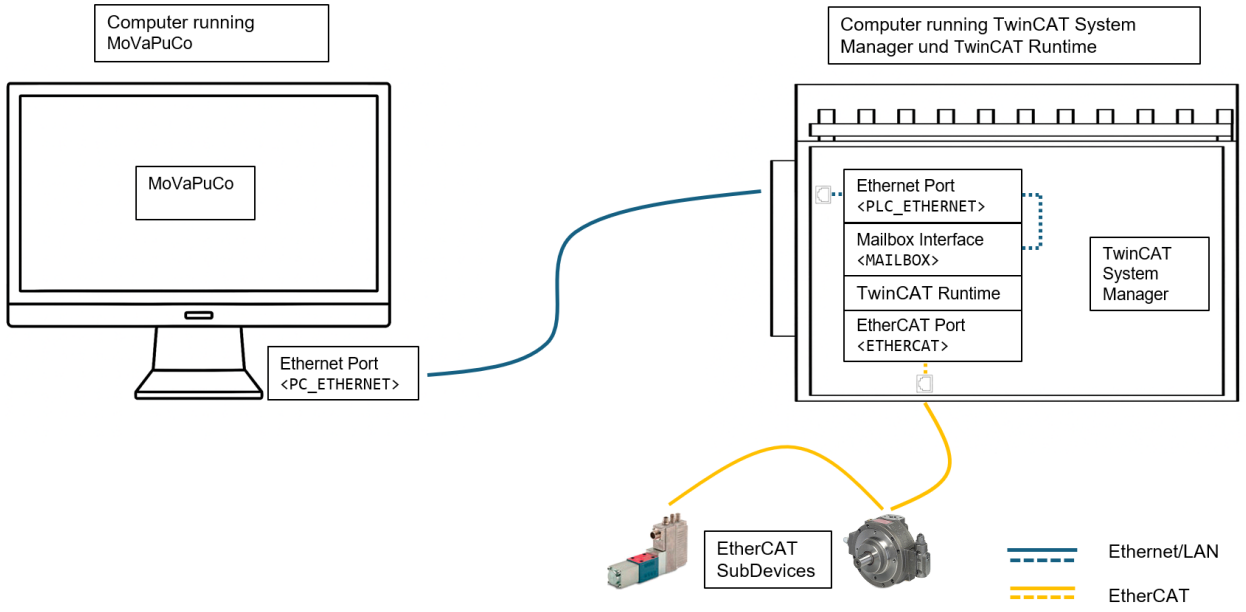
1.2.2. Network overview



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Figure 2: MoVaPuCo and TwinCAT run on separate computers, TwinCAT Runtime runs on the same computer as MoVaPuCo. Block diagram, placeholders and wiring.

or (the configuration for the MoVaPuCo connection is the same)



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Figure 3: MoVaPuCo and TwinCAT Runtime run on separate computers, TwinCAT Runtime runs on the same computer as the TwinCAT Runtime. Block diagram, placeholders and wiring.

2. Configuration of TwinCAT for variants 1 and 2

Configure the network adapter that is used for the EtherCAT interface (see chapter 6.1 ‘Configuration of the EtherCAT network adapter’). You need the IP address <ETHERCAT> (in the example: 192.168.118.83) of this network adapter to configure and activate EoE support with the mailbox gateway in TwinCAT.

	IP routing is not available on small controllers such as the Beckhoff CX9080. Therefore, a connection with MoVaPuCo cannot be established via these controllers.
	Make sure that during your work with MoVaPuCo no simultaneous access (mailbox, CoE/SDO) to valve parameters by a control program occurs.

Start the TwinCAT System Manager / Solution Explorer for this purpose.

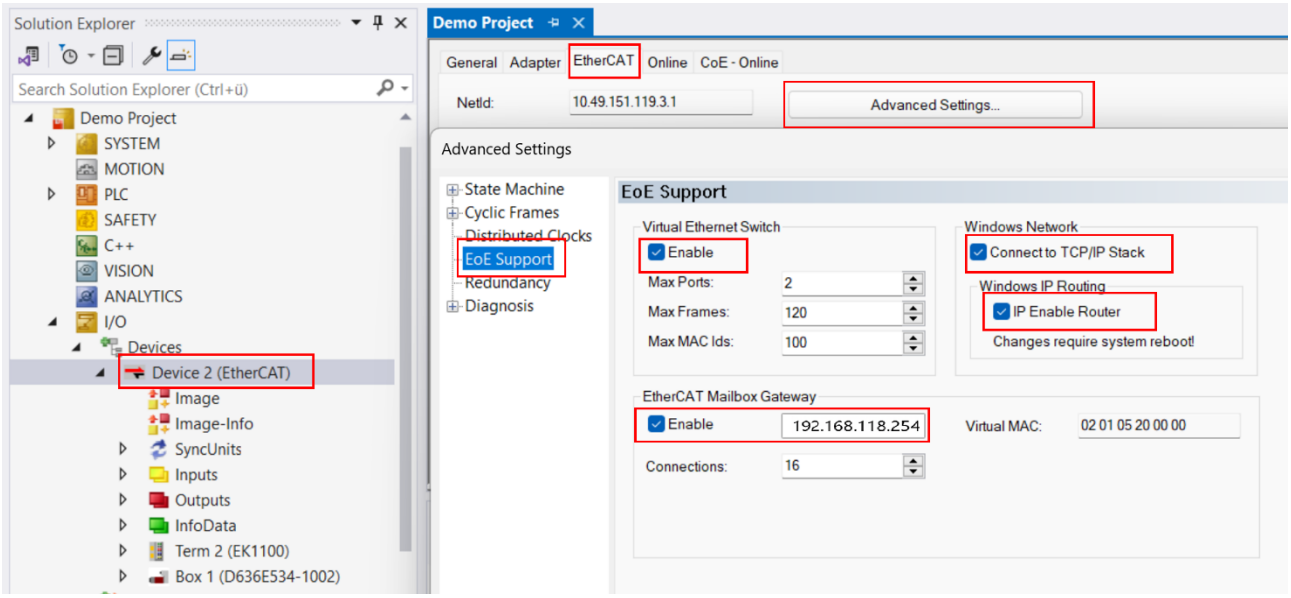


Figure 4: Set up of Mailbox functionality at the TwinCAT System Manager

Execute the following steps:

1. In TwinCAT project view, select the EtherCAT- MainDevice (in this example **Device 2 (EtherCAT)**).
2. Select the **EtherCAT** tab.
3. Click the **Advanced Settings** button.
4. Select **EoE Support**
5. At **Virtual Ethernet Switch**: Check the **Enable** checkbox.
6. At **Windows network**: Check the **Connect to TCP/IP Stack** checkbox
7. At **Windows IP-Routing**: Check the **IP Enable Router** checkbox. (For small controllers, e.g., CX9080, this option may be unavailable and will be greyed out; in that case, a connection with MoVaPuCo is not possible)
8. At **EtherCAT Mailbox Gateway**: Check the **Enable** checkbox.
9. Enter the IP address of the mailbox gateway if it is not suggested automatically. This address is derived from the EtherCAT port address <ETHERCAT> (in the example above: 192.168.118.83) by replacing the last octet with 254 (result: 192.168.118.**254**).
10. Enter a value in the **Connections** field that is equal to or greater than the number of valves to be accessed by MoVaPuCo via EtherCAT.

11. Note the IP address <MAILBOX> of the **EtherCAT Mailbox Gateway** for later entry in MoVaPuCo (here 192.168.118.254).
12. Activate the new TwinCAT configuration (Menu: Actions | Start/Restart TwinCAT in Run mode) to activate the Mailbox Gateway.
13. Save these settings.

3. Routings Configuration

This step is only necessary if MoVaPuCo and TwinCAT run on different computers (variant 2).

If MoVaPuCo is installed on the same computer as the TwinCAT Runtime, you can skip this chapter and continue with chapter 4.

3.1. Start Routing and RAS Service

The Routing and RAS (Remote Access) service must be activated on the system on which the TwinCAT runtime is running.

Locate **Routing and RAS (RemoteAccess)** in the Windows Services list, set the startup type to **Automatic** and start the service by a click to **Start**.

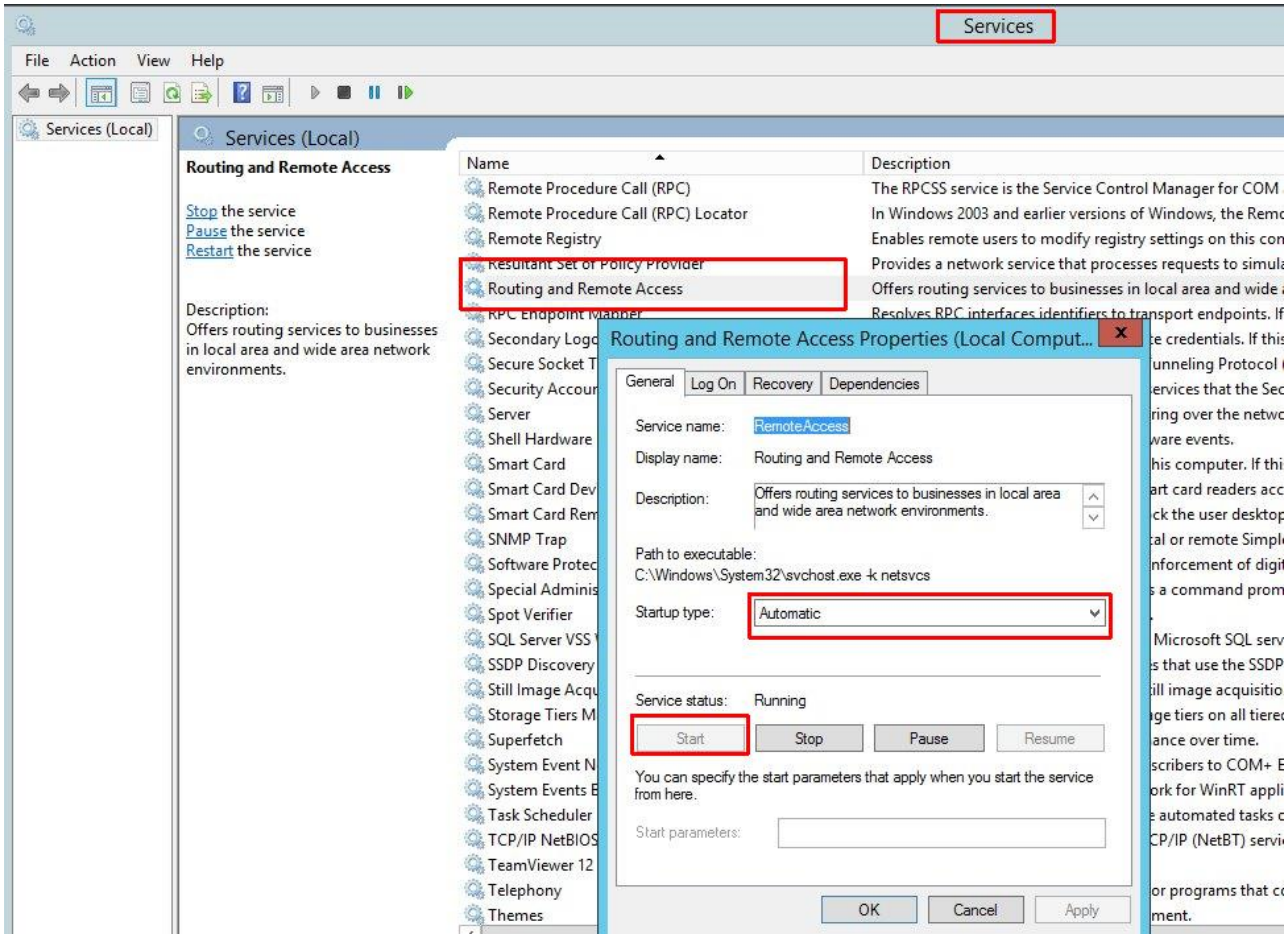


Figure 5: Screenshot of Windows Services 'Routing and Remote Access Properties''

Start the Windows command prompt (cmd.exe) and enter the following command to check the network configuration:

```
ipconfig /all
```

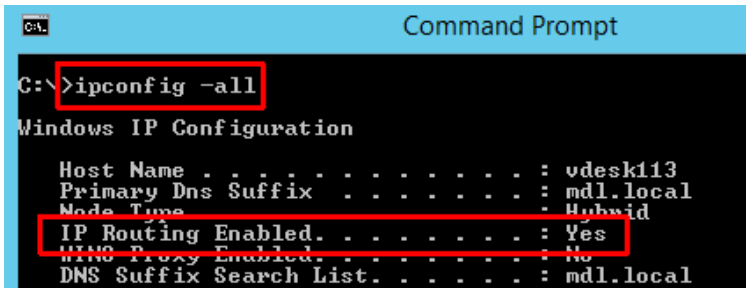


Figure 6 Screenshot of Windows command prompt

Use the **ping** command to check whether the mailbox is accessible. Use the `<MAILBOX>` address. Example:

```
ping 192.168.118.254
```

3.2. Enable routing

The MoVaPuCo computer needs information about which network connection it can use to find the mailbox interface. This is done using the **route** command.

NOTICE

Wrong network settings

Incorrect route commands can disrupt the network or the computer.

- ➢ Consult a network administrator!

	IP addresses 169.254.0.0 to 169.254.255.255 (Zeroconf or Zero Configuration Networking) are not routed. A connection using these addresses is not possible.

Example:

Mailbox IP `<MAILBOX>`: 192.168.118.254

IP of the TwinCAT Runtime computer `<PLC_ETHERNET>`: 10.49.150.80

Start the Windows command prompt (cmd.exe) on the MoVaPuCo computer and enter the following command:

```
route add 192.168.118.254 mask 255.255.255.255 10.49.150.80
```

Explanation: Tells the computer that the IP address `<MAILBOX>` of the mailbox interface (192.168.118.254) can be reached via the computer `<PLC_ETHERNET>` with IP 10.49.150.80.

Use the **route** command to get the network routing tables:

```
route -4 print
```

Displays the IPv4 route table

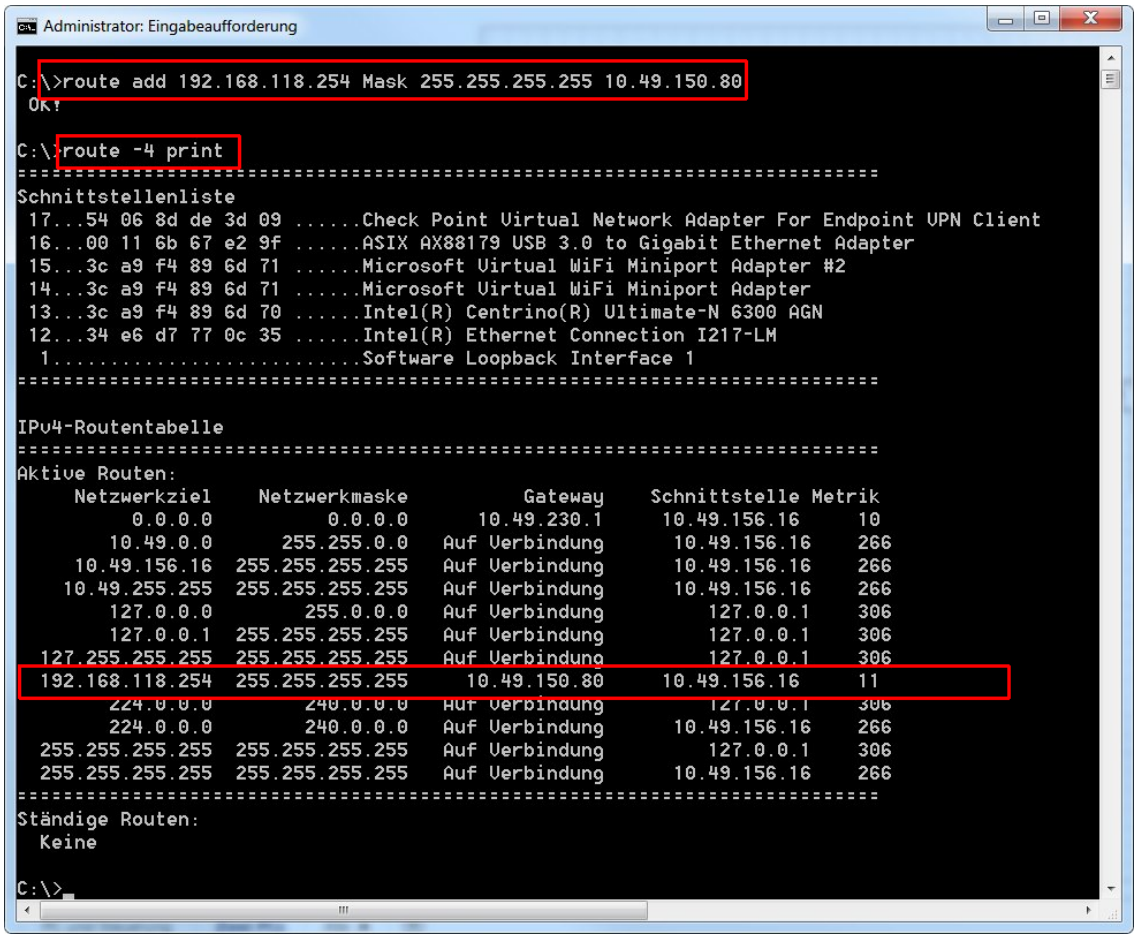


Figure 7 Screenshot of Windows command prompt

Use the following command if you want to delete the route, which you created before:

```
route delete 192.168.118.254 Mask 255.255.255.255 10.49.150.80
```

This deletes the entry from the routing table.

Use the following command to add a persistent route, as described before:

```
route -p add 192.168.118.254 Mask 255.255.255.255 10.49.150.80
```

The **-p** parameter makes the route persistent (it remains after reboot).

3.3. Check the access to the EoE-Mailbox interface

Use the following steps to verify that the EoE interface of the EtherCAT MainDevice can be reached from the computer running MoVaPuCo.

Start the Windows command prompt (cmd.exe) on the MoVaPuCo computer and enter the following command (use the IP address <PLC_ETHERNET>):

```
ping 10.49.150.80
```

This command checks whether the computer that runs the TwinCAT Runtime is reachable and the network connection exists.

Use the following command to **ping** the mailbox gateway (use the IP address of <MAILBOX>):

```
ping 192.168.118.254
```

Checks whether the mailbox gateway in the TwinCAT system is reachable, the routing is correct and the mailbox is active.

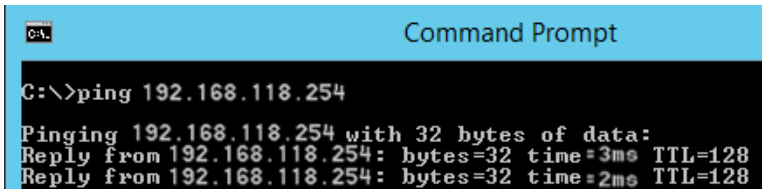


Figure 8 Screenshot of Windows command prompt

4. Setting up the SubDevice Nodes

This step is necessary for variant 1 and variant 2.

Now the mailbox interface must be activated for each EtherCAT SubDevice node, and the timing must be set.

The following settings must be made for each SubDevice node/box (valve) that will be accessed with the service tool (mailbox protocol).

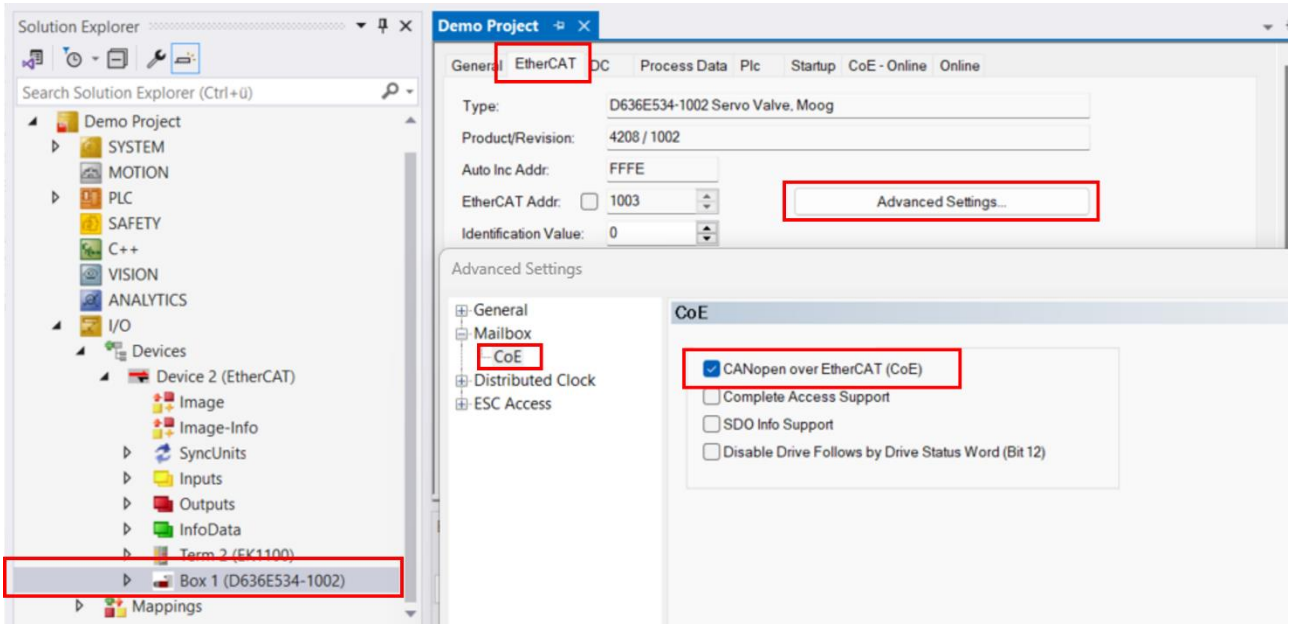


Figure 9 Screenshot of TwinCAT Solution Explorer: Activate the ‚CANopen over EtherCAT (CoE)' function.

Execute the following steps:

1. In the TwinCAT System Manager project view, click the SubDevice node (box/valve) to be configured. In this example, **Box 1 (D638-252-0001 Servo Valve, Moog)**.
2. Select the tab **EtherCAT**.
3. Click the **Advanced Settings** button.
4. Select **Mailbox → CoE**
5. Check the checkbox **CANopen over EtherCAT (CoE)**

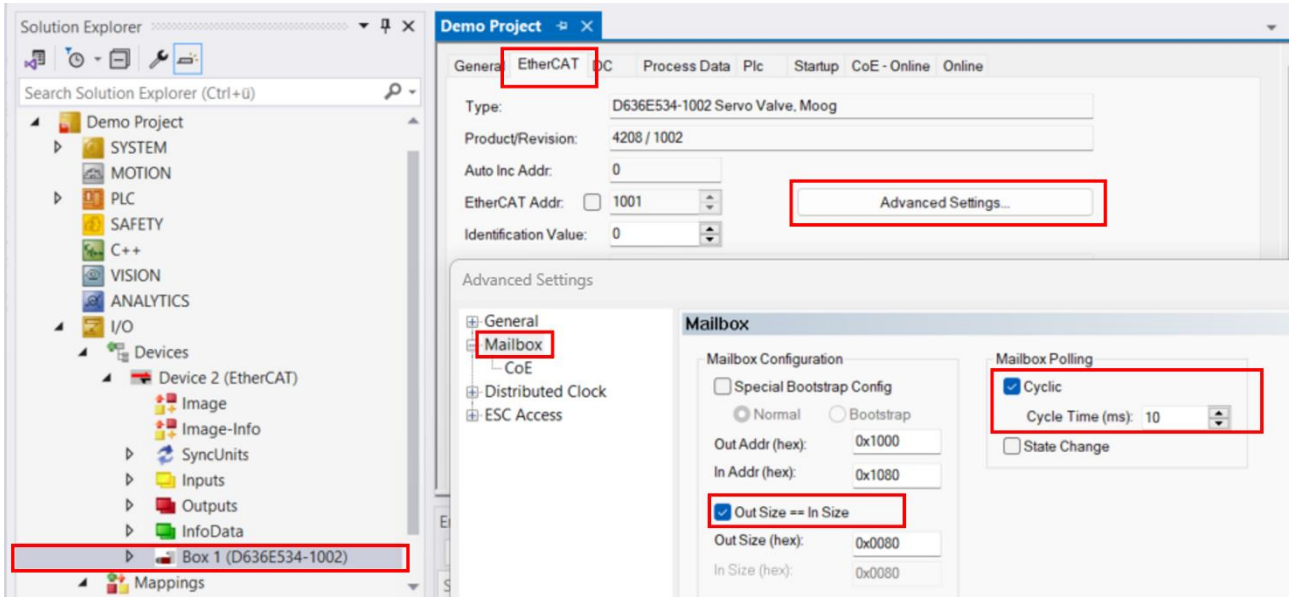


Figure 10 Screenshot of TwinCAT Solution Explorer: Mailbox settings.

Then execute the following steps:

6. Select **Mailbox**.
7. Set a short cycle time for the mailbox data exchange. **Cycle Time (ms):** 10.
   This setting determines the timing of transmissions to the service tool.
8. Ensure that **Out Size == In Size** is checked.
9. Activate the new TwinCAT configuration to activate the new settings.

NOTICE

High busload at the EtherCAT communication

A short cycle time enables faster communication with the service tool but also increases bus load.

- ➢ It is strongly recommended to restore the cycle time to the original value (20–50 ms) after ending the connection to the service tool.

NOTICE

Competing access to valve parameters

While working with MoVaPuCo, ensure no simultaneous access (mailbox, CoE/SDO) by a control program to valve parameters occurs, to avoid competing accesses.

- ➢ To prevent competing access:
  - Switch the EtherCAT network to the Pre-Operational state.
  - Stop the PLC application program on the controller (TwinCAT-PLC).

5. Configure the connection to the EtherCAT MainDevice in MoVaPuCo

This step is necessary for variant 1 and variant 2.

⚠ WARNING

Connect to the correct device

Device mix-ups can cause incorrect system behavior.

- ➢ Ensure you select the correct device before changing the configuration.

Execute the following steps:

1. Verify that the EtherCAT MainDevice is running and that nodes are in **Pre-Operational** or a higher state.
2. Verify that the mailbox gateway is reachable: Use ‘ping xxx.xxx.xxx.254’ (see "Check the access to the EoE-Mailbox interface").
3. Start MoVaPuCo.
4. In MoVaPuCo: Click the **EtherCAT ...** button to open the connection settings window button to set the connection.
5. At **IP:**, enter the IP address of the Mailbox Gateway of the TwinCAT Runtime system that you noted when activating the gateway in the EtherCAT MainDevice (`<MAILBOX>`). Click **Add MainDevice** to confirm. MoVaPuCo will then establish the connection to the EtherCAT MainDevice.

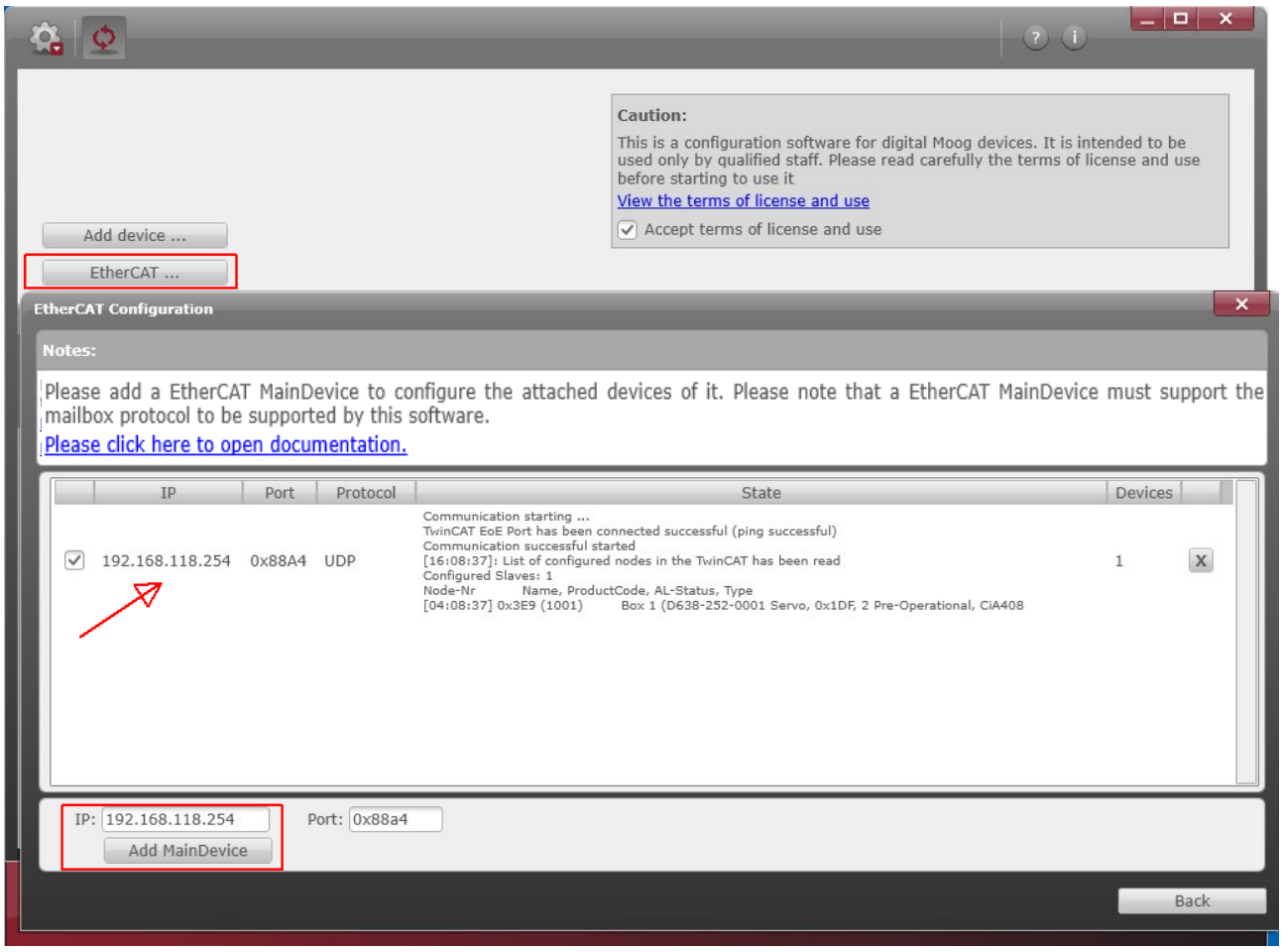


Figure 11 Screenshot: EtherCAT Settings in MoVaPuCo.

6. You can trigger the search again by activating the checkbox. If the mailbox gateway is not found, check the messages in the state field.
7. Click **Back** to close the window. MoVaPuCo will automatically read the list of connected valves from the mailbox gateway and display it in the main window.
8. In the start window of MoVaPuCo, select the valve you want to configure.
9. Now you can configure the selected valve in MoVaPuCo in the usual way. If a valve is connected for the first time, loading may take up to 3 minutes, depending on the network and variant of the connection.

6. Appendix

6.1. Configuration of the EtherCAT Network Adapter

This IP address must be configured in the IPv4 settings of the network adapter used for EtherCAT communication. This example describes how to configure the IP address <ETHERCAT> statically to the example value 192.168.118.83.

Open the Windows **Control Panel** and navigate to the **Network Configuration**.

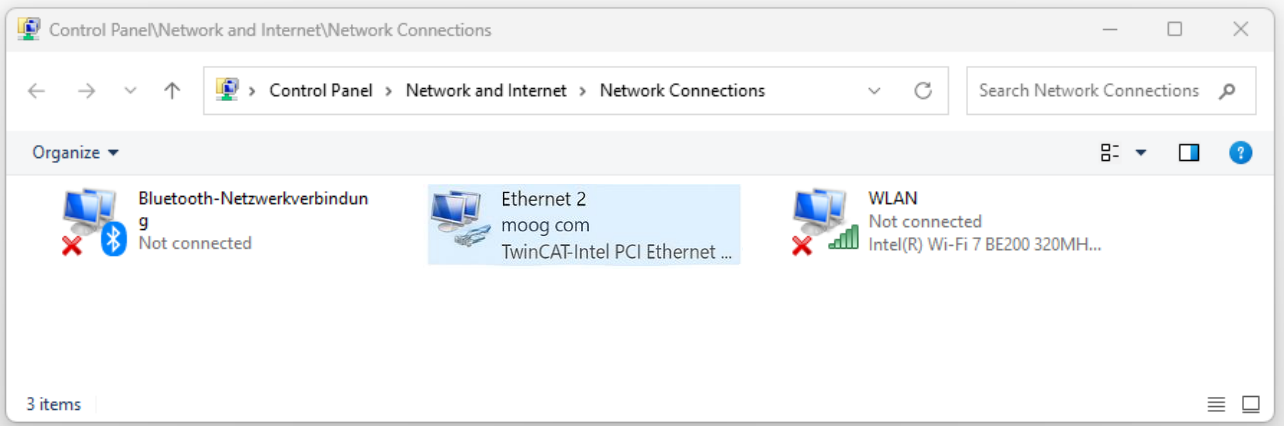
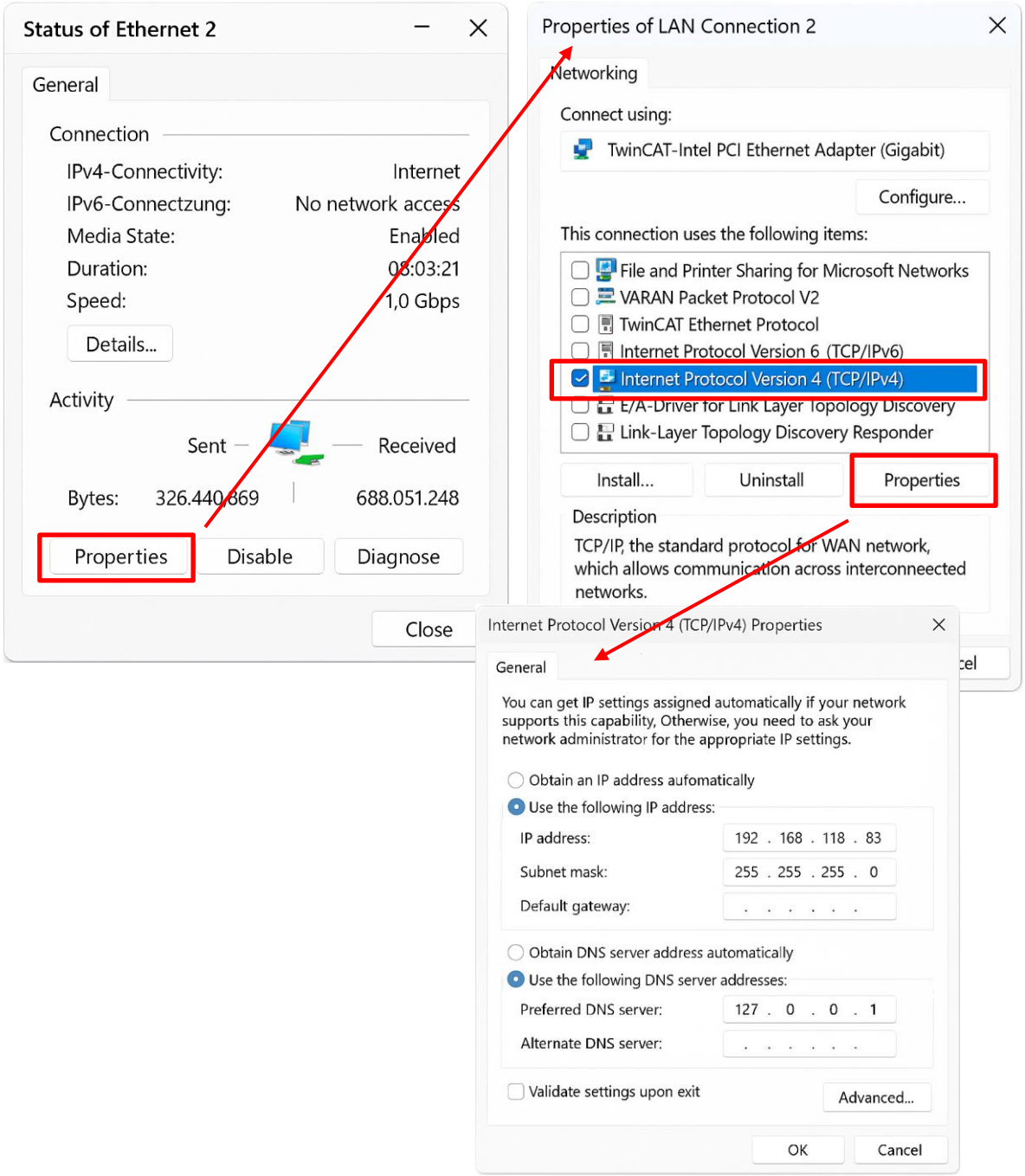


Figure 12 Screenshot of Windows Control Panel 'Network Connections'.

Execute the steps shown below to open the IP address settings:



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Figure 13 Screenshots of Windows Control Panel dialogs to for IP settings.

NOTICE

Own subnet mask for the network adapter used for EtherCAT

Ensure that only one network adapter is configured for a given <ETHERCAT> subnet at a time.

- For all network adapters used, limit the range of possible network addresses via the respective subnet mask (e.g. by entering the subnet mask: 255.255.255.0. In this example, the first three octets (192.168.118.*) must not be used for another network adapter).

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