FORTRESS

EtherCAT® Safety over EtherCAT®

proNet - EtherCAT - FSoE Communication

amGardpro

EtherCAT Configuration Instructions

This document includes instructions for the configuration of an amGard*pro* *pro*Net EtherCAT device with TwinCAT 3.1. The instructions are based on an example system using a Beckhoff CX8110 Industrial PC (IPC) with EL6900 EtherCAT Safety master, EK1122 EtherCAT junction. An additional EL6601 Ethernet junction is used to allow the amGard*pro* *pro*Net device to communicate using Ethernet over EtherCAT to view the device webpage.

For EtherCAT controller or other hardware support, contact Beckhoff or the alternative supplier.

amGard*pro* *pro*Net EtherCAT devices use both safety and standard I/O communication. Devices should be used in accordance with the machine risk assessment.

For further information on Fortress amGard*pro* *pro*Net devices including I/O allocation, LED diagnostics and troubleshooting, see Fortress *pro*Net Networked Option Pod operating instructions available from Fortress.

Important:

*pro*Net devices are designed for use according to the operating instructions available on the Fortress website. Devices must be installed by competent and qualified personnel who have read and understood the whole of this document and associated operating instructions prior to commencing installation. If the device is used in a manner not specified by the manufacturer, the risk reduction provided by the equipment may be impaired. The device is not to be used as a Mains Isolator. The device is a component to be added to a permanent electrical installation meeting the requirements of applicable global and/or regional standards and regulations. All the voltages used within the connected circuits must be derived from a Safety Extra Low Voltage or Protected Extra Low Voltage power supply (SELV or PELV). Fortress Interlocks Ltd accepts no liability whatsoever for any situation arising from misuse or misapplication of the Device.

BEWARE OF INTENTIONAL MISUSE CAUSED BY OPERATORS WANTING TO BYPASS SAFETY SYSTEMS. THE INSTALLER SHOULD ASSESS THE RISKS AND MITIGATE AGAINST THEM.

The installation and operation of the unit must take into account the requirements of ISO 14119. Safety functions should be validated to ISO 13849-1 and/or evaluated in accordance with IEC 62061.

IF YOU HAVE ANY QUESTIONS OR QUERIES OF ANY NATURE WHATSOEVER PLEASE CONTACT THE SUPPLIER WHO WILL BE PLEASED TO ADVISE AND ASSIST.

Contents

Overview

In order to configure a Fortress amGard*pro proNet* EtherCAT device it is necessary to:

- Create a project loaded with the appropriate EtherCAT Slave Information (ESI) file.
- Connect and discover amGard*pro proNet* EtherCAT device within the project.
- Configure amGard*pro proNet* EtherCAT device and I/O.
- Create a safety project within the existing project.
- Configure amGard*pro proNet* EtherCAT device safety I/O.

For further information on Fortress amGard*pro proNet* devices including I/O allocation, see Fortress amGard*pro proNet* Networked Option Pod operating instructions available from Fortress.

Downloading / Installing / Updating ESI File

ESI (EtherCAT Slave Information) files define communication parameters and are required to integrate a Fortress amGard*pro proNet* EtherCAT device into a EtherCAT system. The ESI file also defines the I/O of a Fortress amGard*pro proNet* EtherCAT device, and modules that can be added to slots.

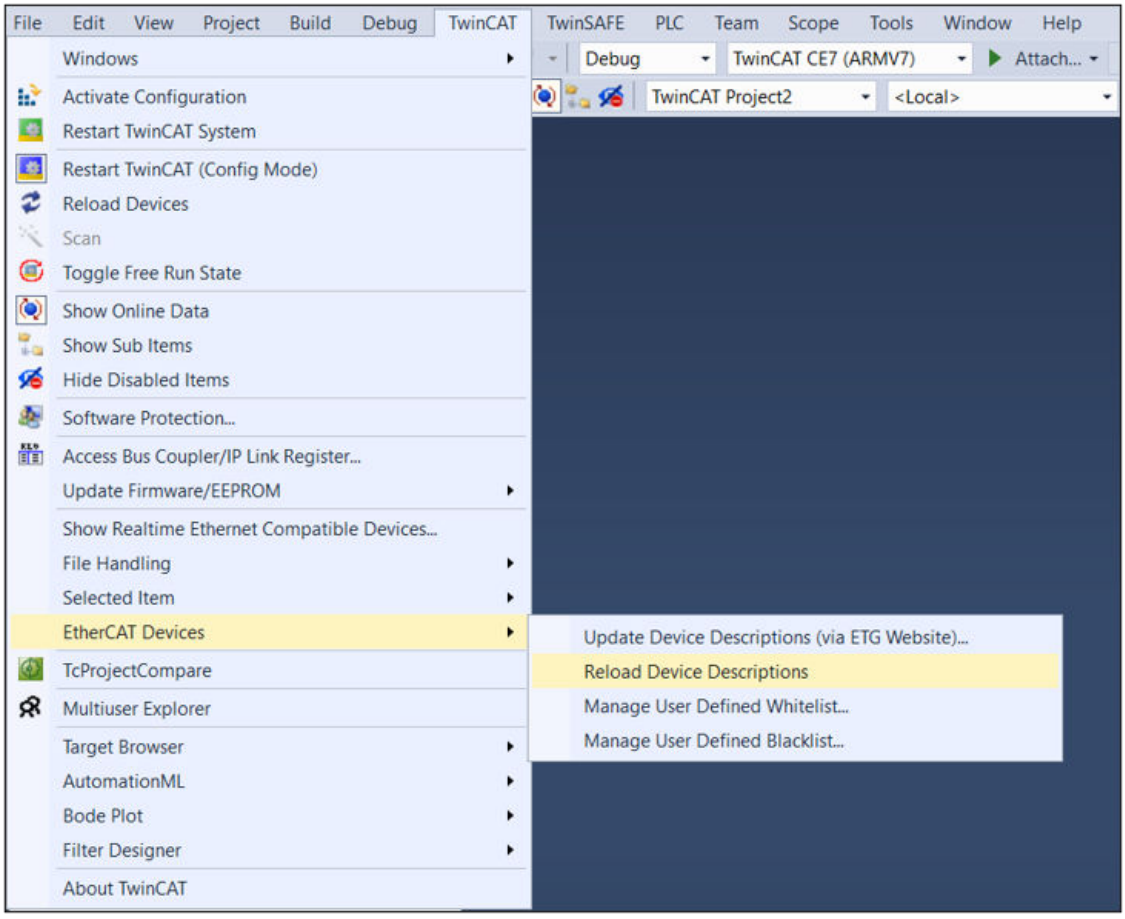
The amGard*pro proNet* ESI file can be obtained from the Fortress website.

To install the ESI file, copy the downloaded ESI file to the TwinCAT installation folder (Default directory: C:\TwinCAT\3.1\Config\Io\ EtherCAT).

To update an existing ESI file, replace the ESI file in TwinCAT installation folder (Default directory: C:\TwinCAT\3.1\Config\Io\ EtherCAT).

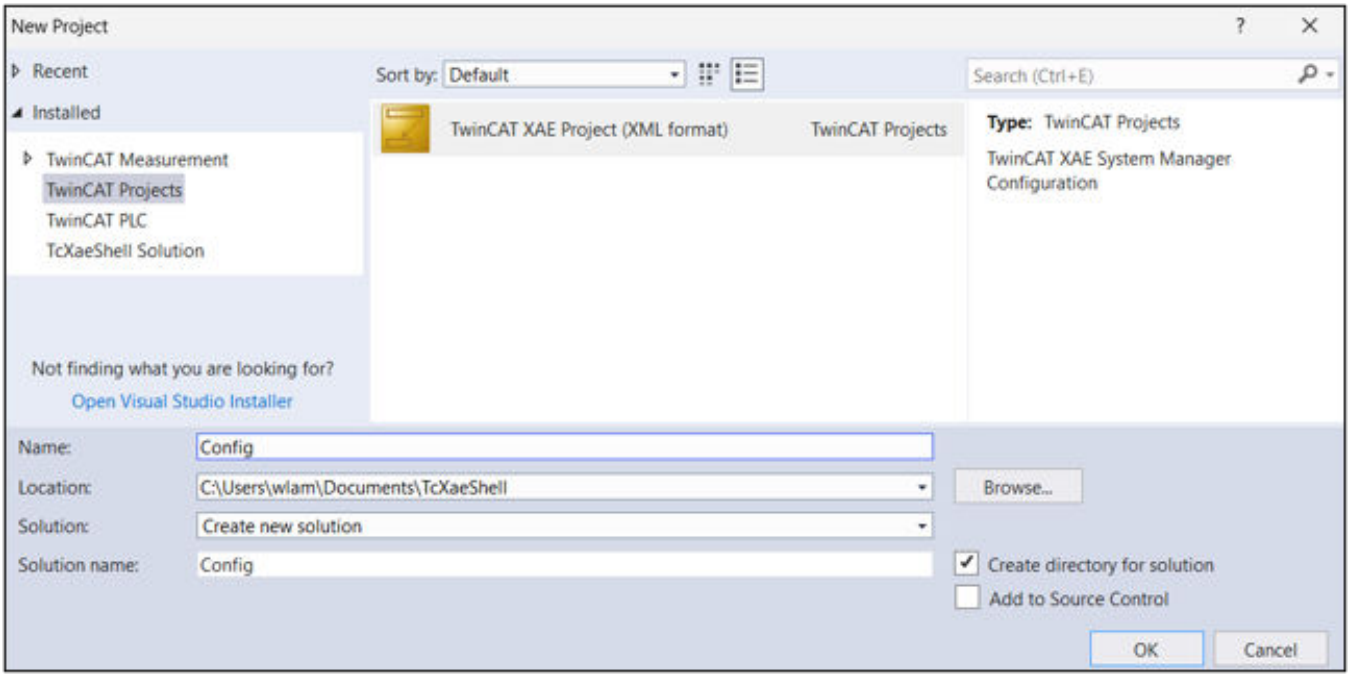
Launch TwinCAT.

If necessary, under TwinCAT, EtherCAT devices, select ‘Reload Device Descriptions.’



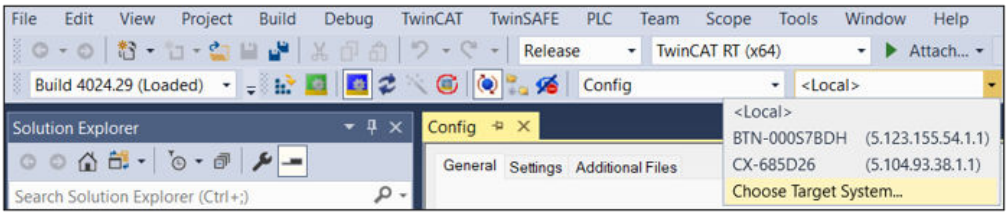
Creating a Project

Create a new TwinCAT project.

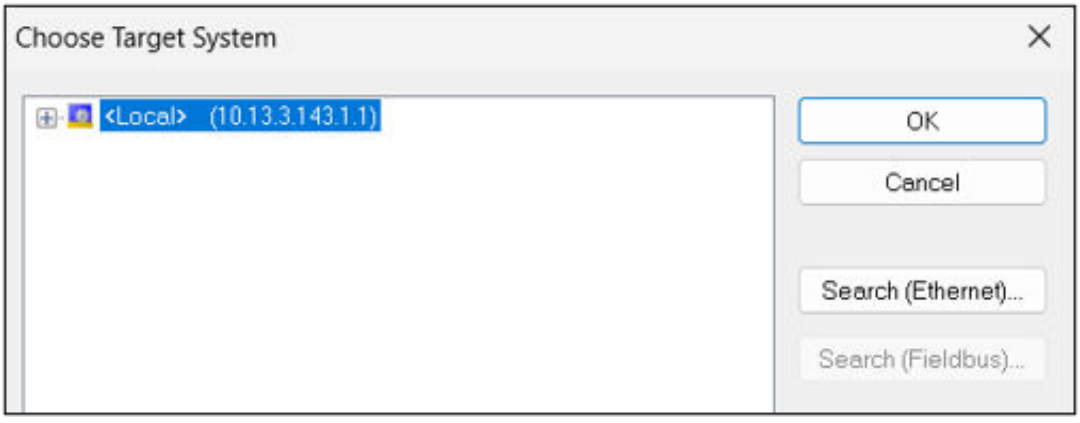


Connect to a Target System

The target system will default to ‘Local’. Select ‘Choose Target System’ to search for and connect to an IPC.



Select ‘Search (Ethernet)…’

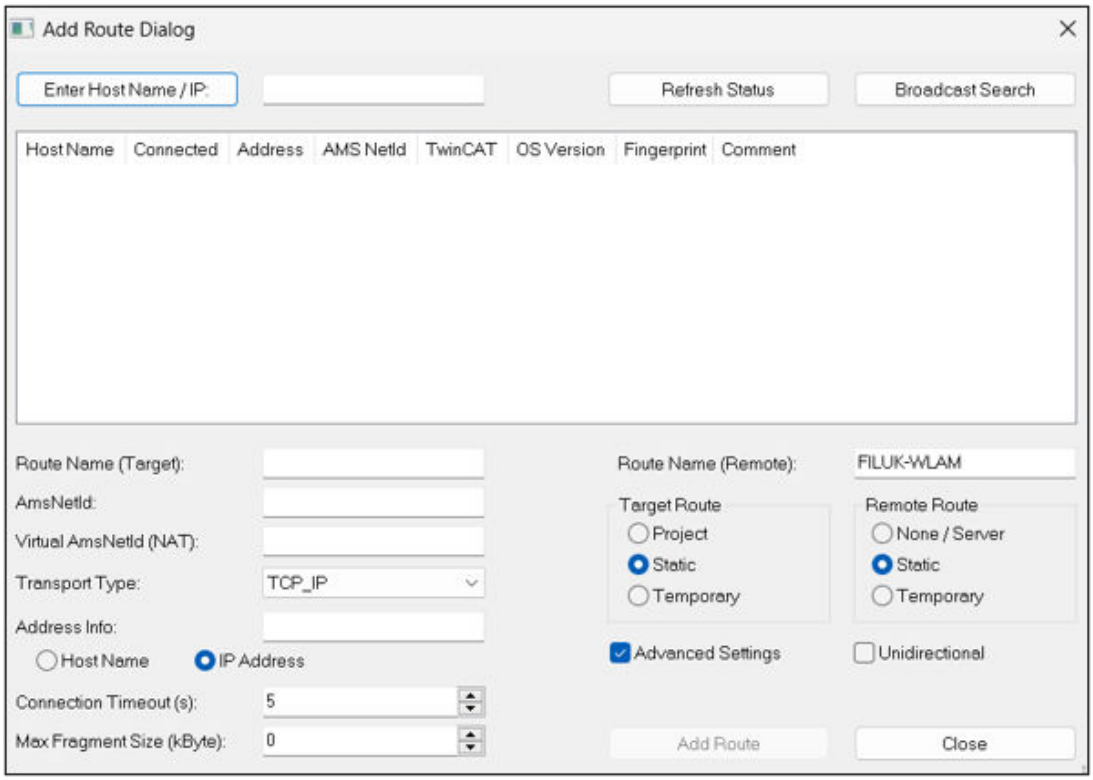


Connect to a Target System

In TwinCAT several Transport Type options are available to search for an IPC. In this example we will be using TCP_IP as our transport type. The IPv4 address and subnet mask of the IPC and TwinCAT PC network adapters must be set.

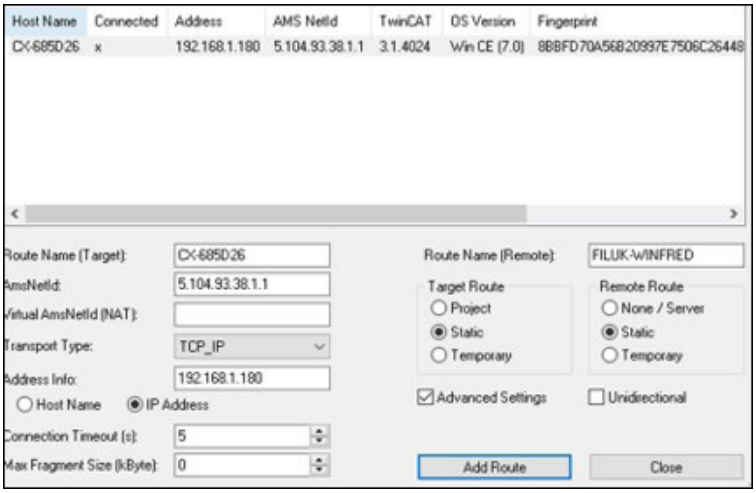
In this example the Ethernet port on the CX8110 IPC has been set to a static IP address of 192.168.1.180 and is connected to the TwinCAT PC with a static IP address of 192.168.1.214.

NOTE: The IP addresses must be within the same subnet to establish a connection.



Select ‘Broadcast Search’ from above window, then choose the Ethernet port in use and press ‘OK’.

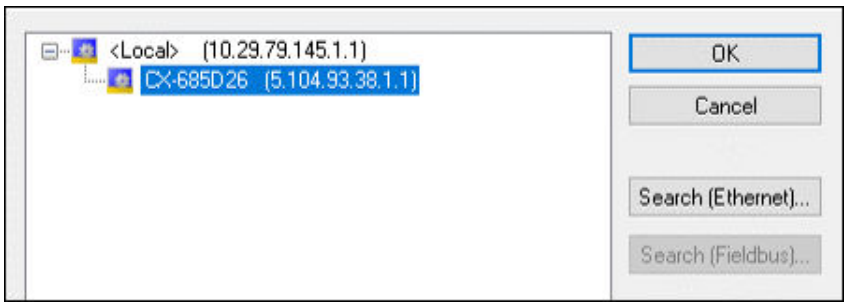
Compatible devices will be displayed in the window below. Select the IPC and press ‘Add Route’.



The default credentials for Beckhoff IPCs are User: ‘Administrator’ and Password: ‘1’. Press ‘OK’ to confirm.

Connect to a Target System

Close the 'Add Route' window and on the Choose Target System window, select the newly added route to the IPC and press ‘OK’.



Confirm ‘Yes’ to change solution platform.

Adding EtherCAT Devices to TwinCAT Project

Adding Devices to TwinCAT Project

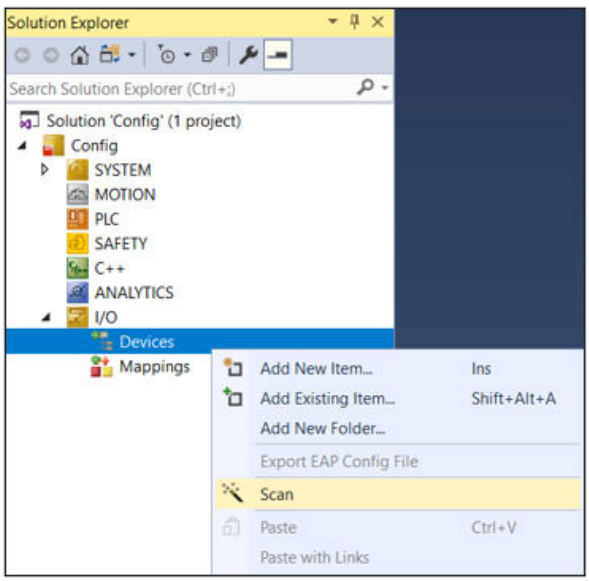
After a connection has been made between the TwinCAT PC and the IPC, Fortress *pro*Net EtherCAT devices that are physically connected to the IPC can be added to the TwinCAT project.

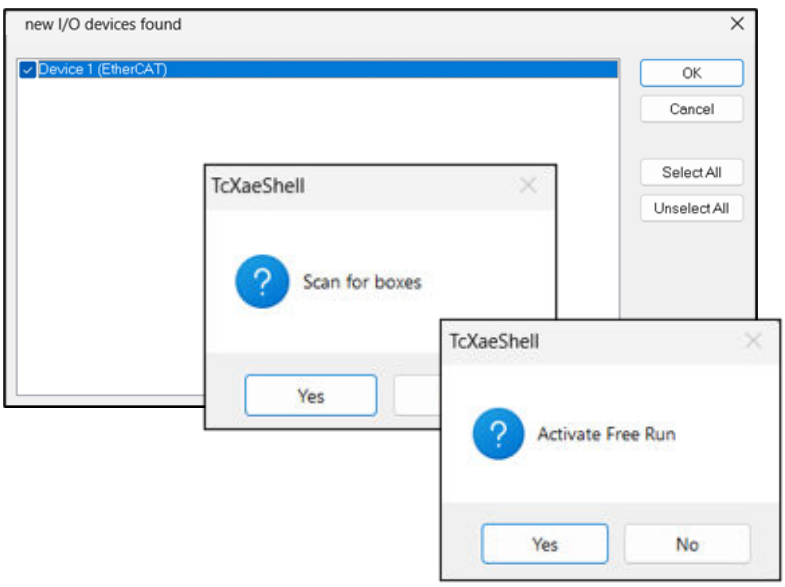
Power and connect any EtherCAT devices.

EtherCAT uses a bus topology by default. Data connections must use the Data in port on the Fortress device. Please refer to Fortress amGard*pro pro*Net Operating Instructions to identify the Data in and Data out ports.

EtherCAT devices can be added through selecting ‘Solution Explorer’, ‘Config’, ‘I/O’, ‘Devices’, then ‘Scan’.
Devices can also be added manually through ‘Add New Item.’

Found devices will be shown, select the EtherCAT master, ‘OK’, ‘Scan for boxes’ – Yes, ‘Activate Free Run’ – Yes.

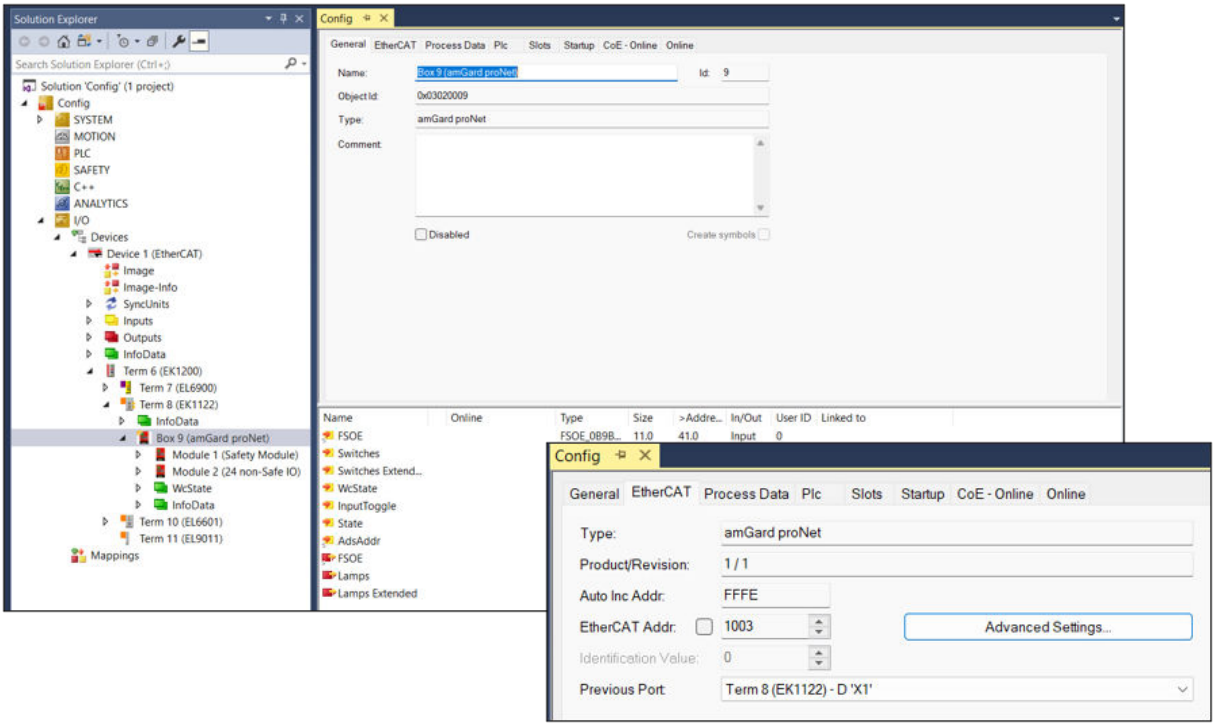




Viewing added amGard*pro proNet* Device

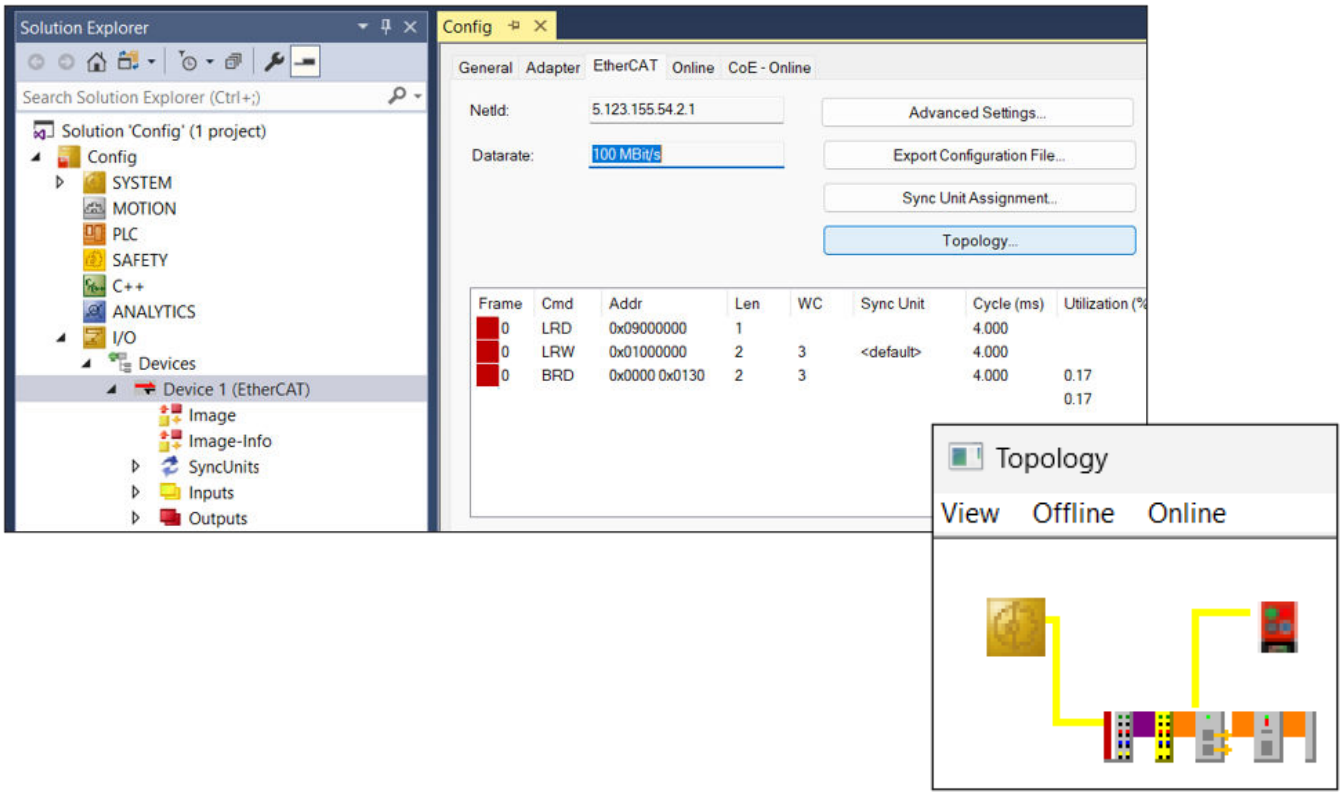
After scanning for devices, amGard*pro proNet* EtherCAT devices connected to an EtherCAT junction and communicating to the EtherCAT Master will be visible in 'Solution Explorer.'

The device EtherCAT address will be assigned automatically and can be viewed on the 'EtherCAT' tab.



Viewing System Topology

Device topology can be viewed from the EtherCAT Master device under the 'EtherCAT' tab.



Slot Configuration

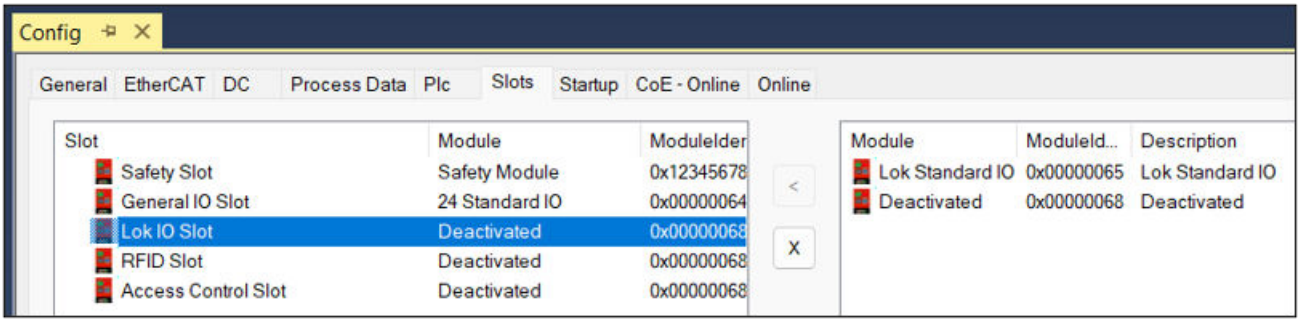
Now that an amGard*dpro pro*Net EtherCAT device has been added to the TwinCAT project, Slots need to be defined by selecting I/O modules appropriate for the device from the available I/O modules.

It is possible to select which I/O is added to the project by adding I/O modules to slots. This will reduce the number of unused I/O being presented in the project.

Modules can be selected in the slots tab of the amGard*dpro pro*Net EtherCAT device.

Initially, some slots will be filled with specific modules. Remaining slots will be filled with a 'Deactivated' module with no I/O. To use these slots, an alternative module needs to be selected.

To determine the I/O functionality of a particular Fortress device, see the Fortress amGard*dpro pro*Net Option Pod Operating Instructions for the general I/O allocation, or see a provided custom I/O allocation map available from Fortress.



Before activating the configuration, any safety I/O modules need to be configured by creating a Safety Project.

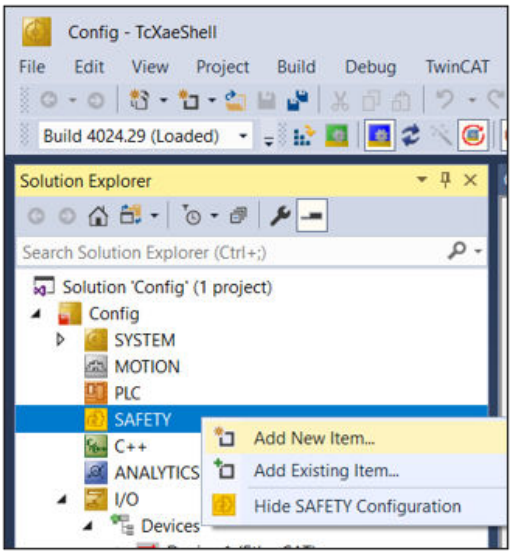
Creating a Safety Project

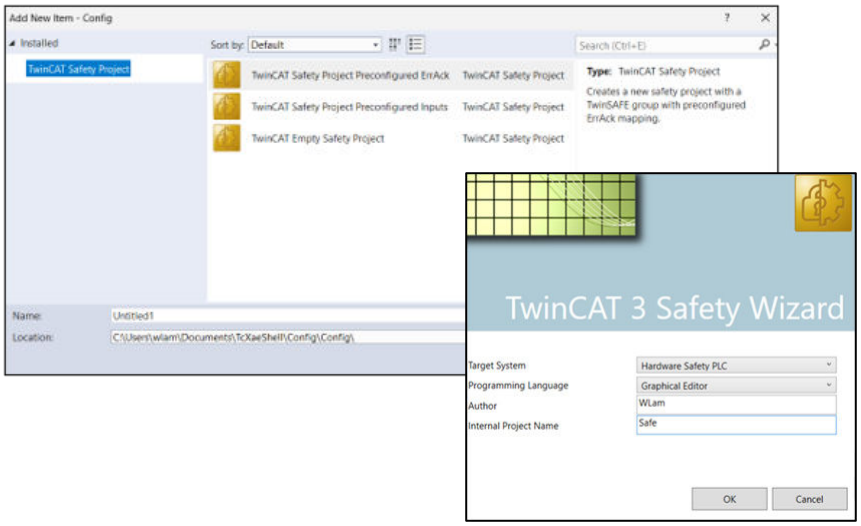
In Solution Explorer, Right click on 'SAFETY' and 'Add New Item.'

Create a Safety Project from the available options and select 'Add'.

In the TwinCAT Safety Wizard, choose options and select 'ok.'

For this example, a project with preconfigured ErrAck was used, alongside the EL6900 EtherCAT Safety master, selecting the 'Target System' as 'Hardware Safety PLC'.



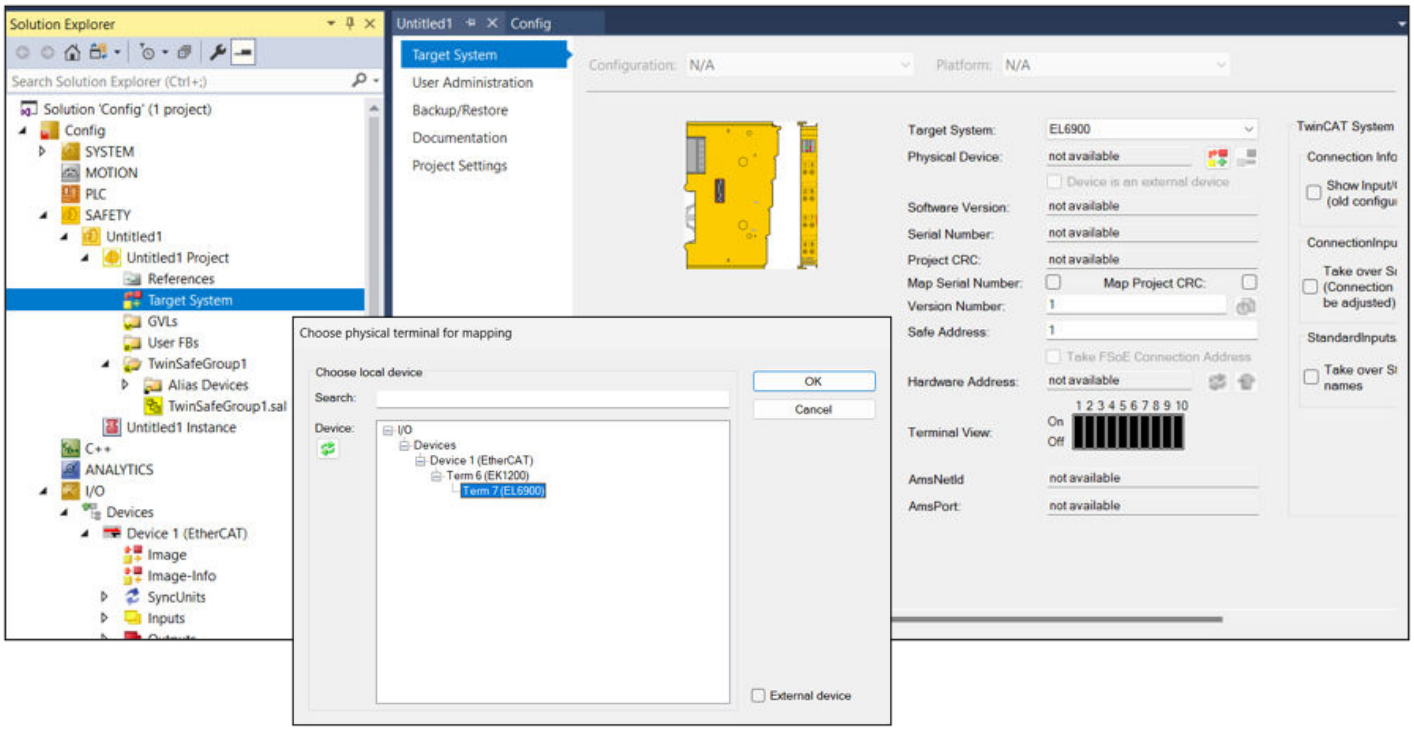


Configuring a Safety Project – EtherCAT Safety Master setup.

The safety project has now been created and can be seen in ‘Solution Explorer.’ Selecting ‘Target System’ opens the window below.

The EtherCAT Safety Master needs to be linked to the safety project.

‘Physical Device’ will show as ‘not available’, click  to select the device to be connected.

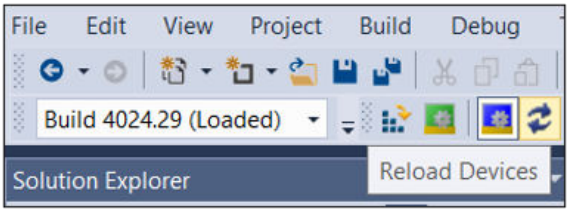


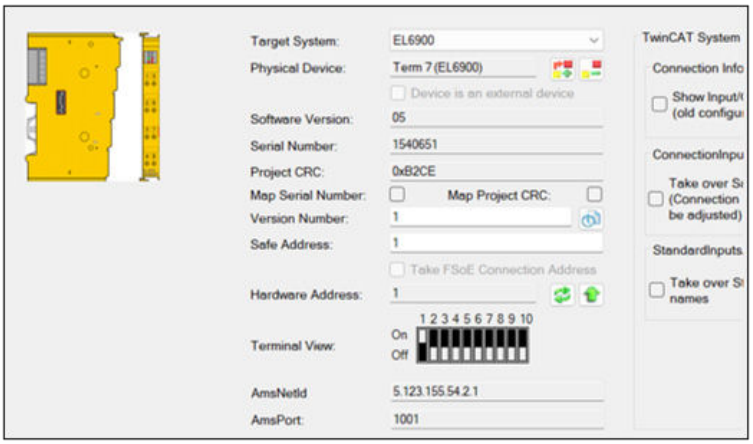
The Safe Address of the master needs to be set both on the device and in the safety project.

The Safe Address of a device can be seen through the ‘Terminal View’ when in Free Run.

(If not already, selecting reload devices will prompt to enter Free Run)

In this example, the Target System is the EL6900. The dip switch on EL6900 reflects the Safe Address of the module and it must be the same as the Safe Address entered within the safety project as shown.





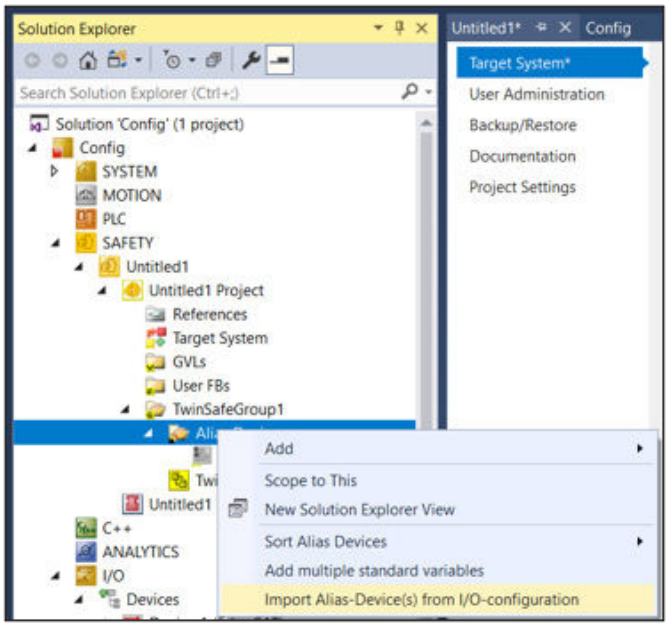
Configuring a Safety Project - Import Alias Device

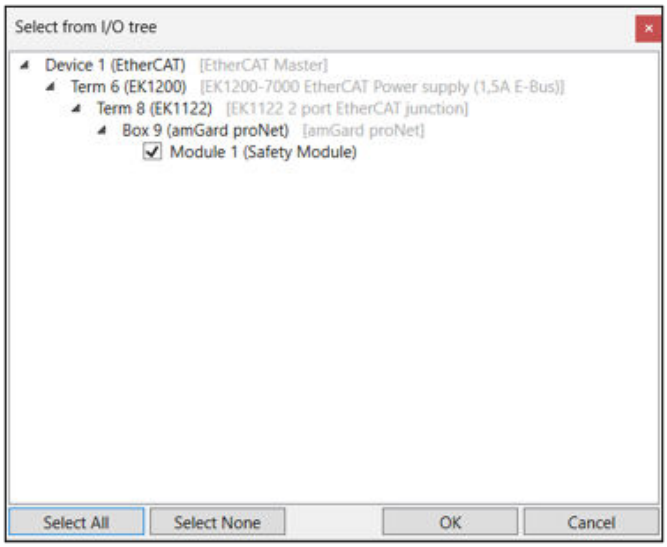
Fortress amGard*pro pro*Net EtherCAT device needs to be added to the safety project.

In Solution Explorer, select 'Import Alias-Device(s) from I/O-configuration.'

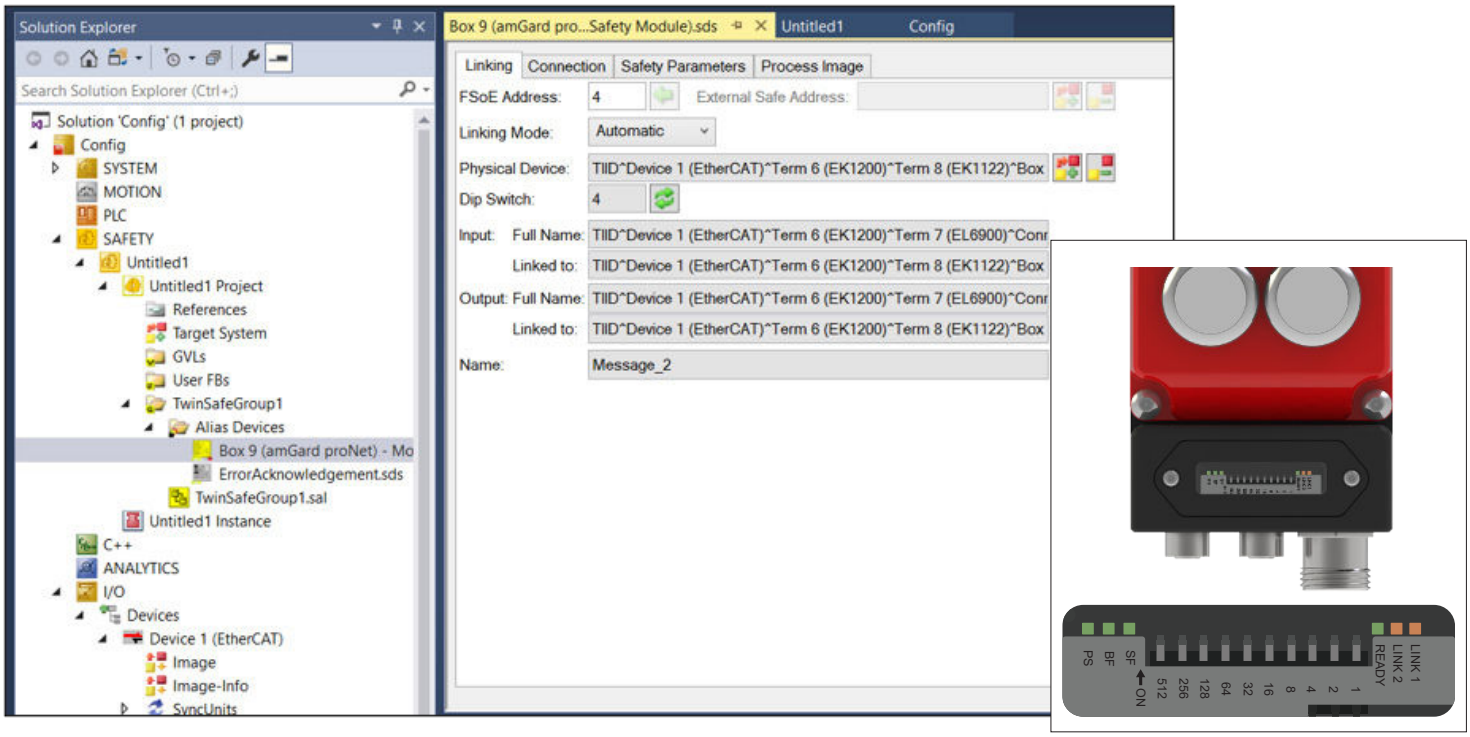
An Alias device must be imported to make use of the available safety I/O on amGard*pro pro*Net EtherCAT devices. Right click on Alias Devices and import Alias-Device(s) from I/O-configuration.

Select the Safety Module and press OK.





Select the amGard*pro pro*Net EtherCAT device under 'Alias Devices' to view device properties.



NOTE: The dip switch on amGard*pro pro*Net EtherCAT device reflects the FSoE Address of the module, it must be the same as the number entered within the safety project. The dip switch can be read in Free Run like above and the Fortress *pro*Net EtherCAT device will only update its value after a power cycle.

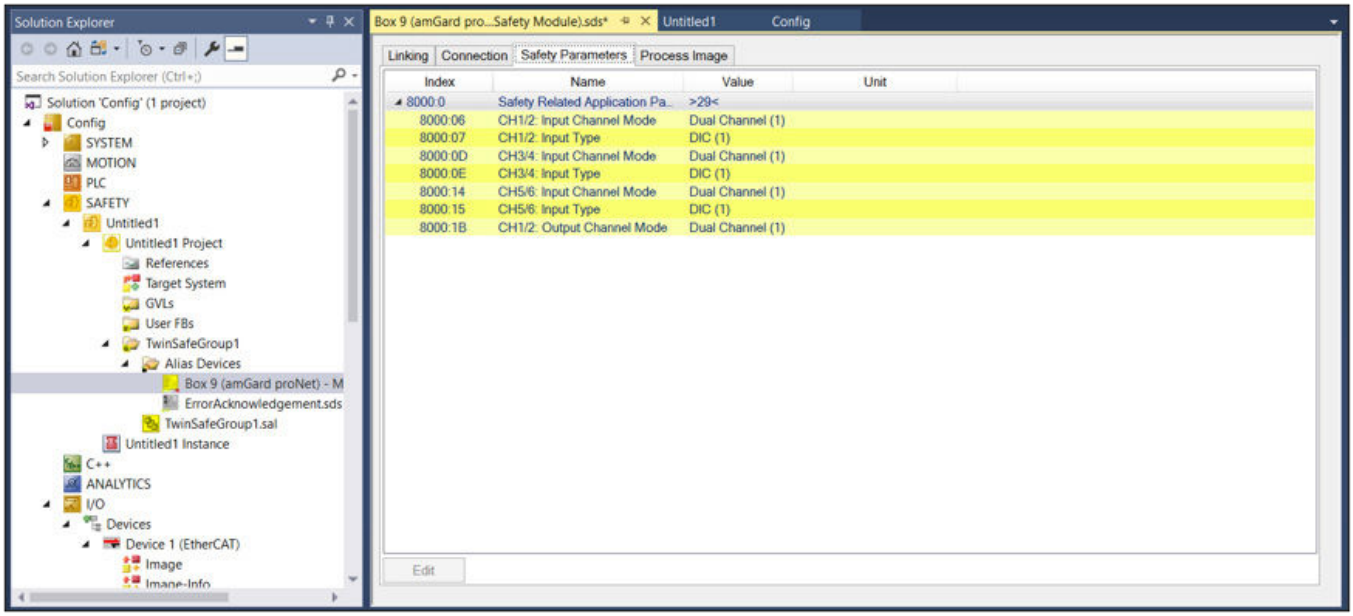
Configuring a Safety Project - Configure amGard*pro pro*Net EtherCAT device

By default Fortress amGard*pro pro*Net EtherCAT devices have 3 sets of dual channel safety inputs. These can be manually configured from the Safety Parameters tab for the device.

Input type ‘DIC’ refers to clean contact/volt free contacts.
Input type ‘DIS’ refers to OSSD.

To determine the I/O functionality of a particular Fortress device, see the Fortress amGard*pro pro*Net Option Pod Operating Instructions for the general I/O allocation, or see a provided custom I/O allocation map available from Fortress.

NOTE: VALIDATION IS REQUIRED TO CONFIRM PROPER OPERATION OF ALL SAFETY FUNCTIONS WHEN DEVICE SAFETY CONFIGURATION IS CHANGED.



Project Configuration Summary

The amGard*pro pro*Net EtherCAT device has now been connected and configured with the IPC and EtherCAT Safety Master. Safety and Standard I/O has been configured and is now accessible in the project.

Ethernet over EtherCAT (EoE)

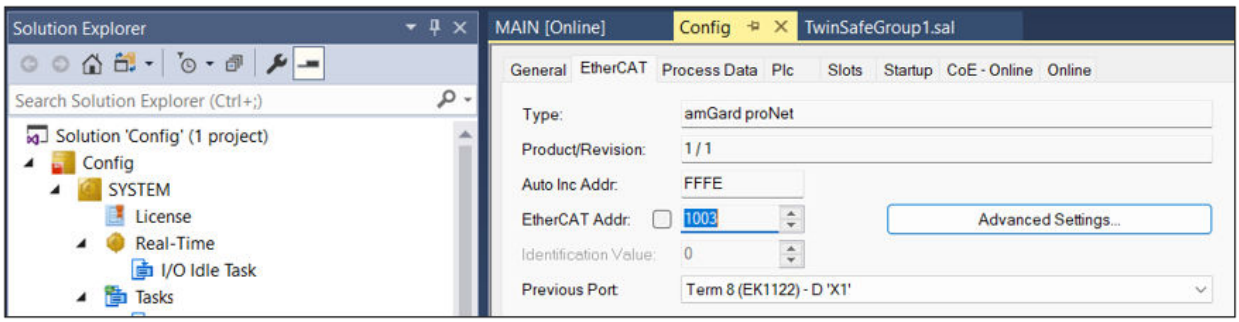
amGard*pro proNet* EtherCAT device information and diagnostics can be viewed through the device website. Configuring Ethernet over EtherCAT (EoE) and TCP/IP connections will allow the amGard*pro proNet* EtherCAT device website to be accessible and may be necessary for additional functionality.

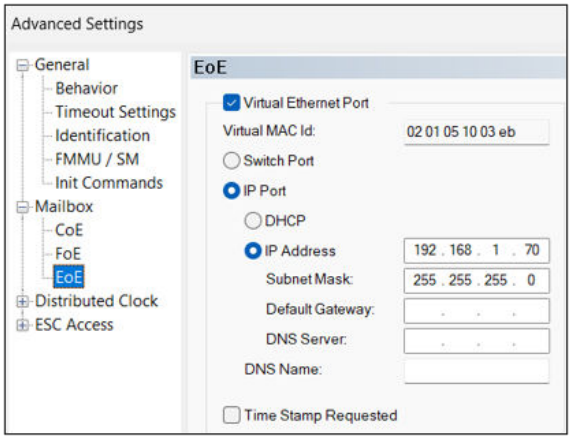
Ethernet over EtherCAT (EoE) is enabled on amGard*pro proNet* EtherCAT devices.

Configure EoE for an amGard*pro proNet* EtherCAT device using the 'EtherCAT' tab, select advanced settings.

On the Advanced Settings window, under 'Mailbox', select EoE. Select 'IP Port' and 'IP Address' to then assign an IP address and subnet mask.

The device now has an IP address and subnet.





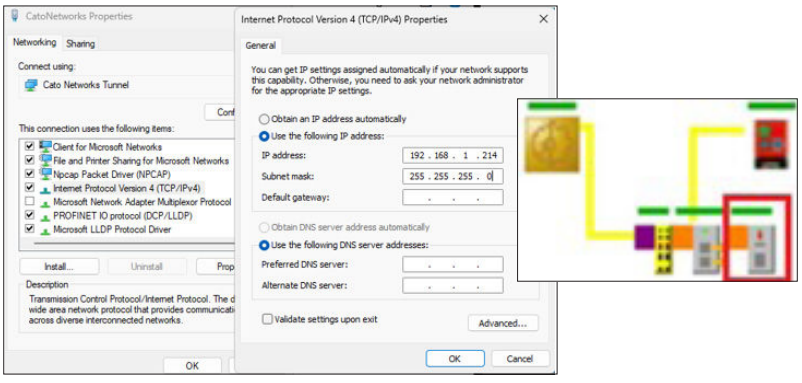
Accessing amGard*pro proNet* EtherCAT Device Webpage

To access the device webpage from a computer, the amGard*pro proNet* EtherCAT device must have an IP address and subnet defined. The computer attempting to access the device information must be on the same subnet, either through direct connection to the EtherCAT master or via an Ethernet junction (for example the EL6601 Ethernet Junction.)

First setup Ethernet over EtherCAT on *pro*Net as above, then match the IPv4 of the computer's Ethernet port connected to the *pro*Net device's subnet (directly as a EtherCAT master or via Ethernet junction like the EL6601).

This example project has the following topology, where the red box is the Ethernet junction EL6601. The computer accessing the webpage is connected to this Ethernet port.

In this example,
the amGard*pro proNet* EtherCAT device;
IP address 192.168.1. 70, subnet mask 255.255.255.0
The computer accessing the webpage;
IP address of 192.168.1.214, subnet mask 255.255.255.0



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