*pro*Net - EtherNet/IP - CIP Safety Communication Module Configuration Instructions

FORTRESS

A Halma company

CIP Safety communication module Configuration Instructions

This document includes instructions for the configuration of an amGard*pro* *pro*Net EtherNet/IP device with a Rockwell Automation PLC using Studio 5000 Logix Designer. The device uses both safety and standard communication in parallel. The PLC must support this feature for the full functionality of the device. Standard-only communication can only be used in a non-safety application.

Important:

The *pro*Net systems are designed for use according to the installation and operating instructions enclosed. It must be installed by competent and qualified personnel who have read and understood the whole of this document prior to commencing installation. If the device or guarded machinery equipment is used in a manner not specified by the manufacturer, the protection 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 the applicable IEC/EN standards. 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.
In order to maintain device safety rating, overall system must be validated to BS EN ISO 13849-2 and/or evaluated in accordance with BS EN 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

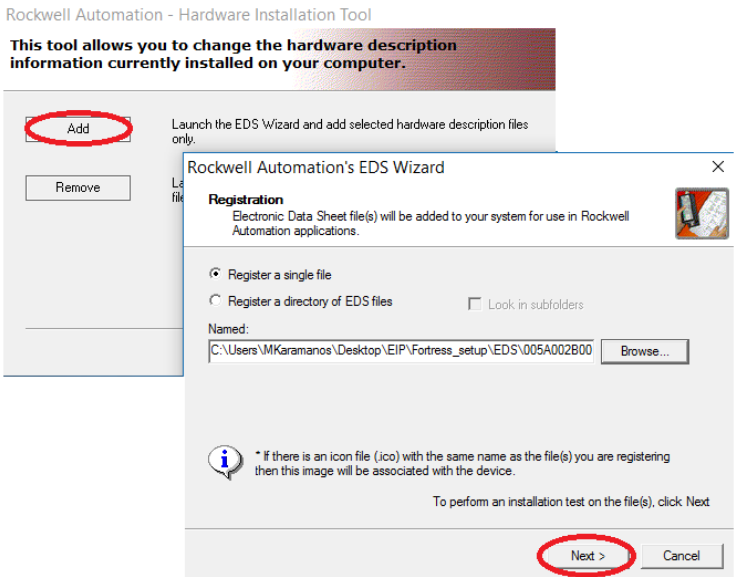
Setup Overview

1. Ensure the provided EDS file has been installed on the computer (Refer to section EDS Installation).
2. Create and configure module in Studio 5000 (Refer to section Integration with Studio 5000).
3. Connect power to unit (MS:Green flash, NS:Off, CS:Green flash). (Refer to Installation Instructions).
4. Connect data to unit (MS:Green flash, NS: Off, CS:Green flash, Link:Amber). (Refer to Installation Instructions).
5. Set IP address of unit (MS:Green+Red flash, NS:Green flash, CS:Green flash, Link:Amber flash). (Refer to section Setting or Changing the IP Address).
6. Reset ownership of the unit if it was previously connected to a different PLC (MS, NS, CS flashing Green). (Refer to section Resetting Safety Ownership).
7. Set the SNN (Safety Network Number) and disable Configuration Signature once the unit has connected (MS, NS, CS solid Green). (Refer to section Configuring the Safety Functions and Configuration Signature).
8. Set PLC to run mode and check that the unit is now running.

Initial Setup

EDS Installation

The provided EDS file should be added to your machine using the “EDS Hardware Installation Tool” by Rockwell Automation.



Initially, the device will not have an IP address set and will have DHCP enabled. The IP address can be set either using a DHCP or BOOTP service, or by manually setting the DIP switches. Each of these options are described in more detail in ‘Setting or Changing the IP Address’.

‘Figure 1 - Setting the Initial IP Address’ represents these processes. Note that a device with DHCP enabled will not retain its IP address after it has been power cycled and will need to be assigned its IP address anew.

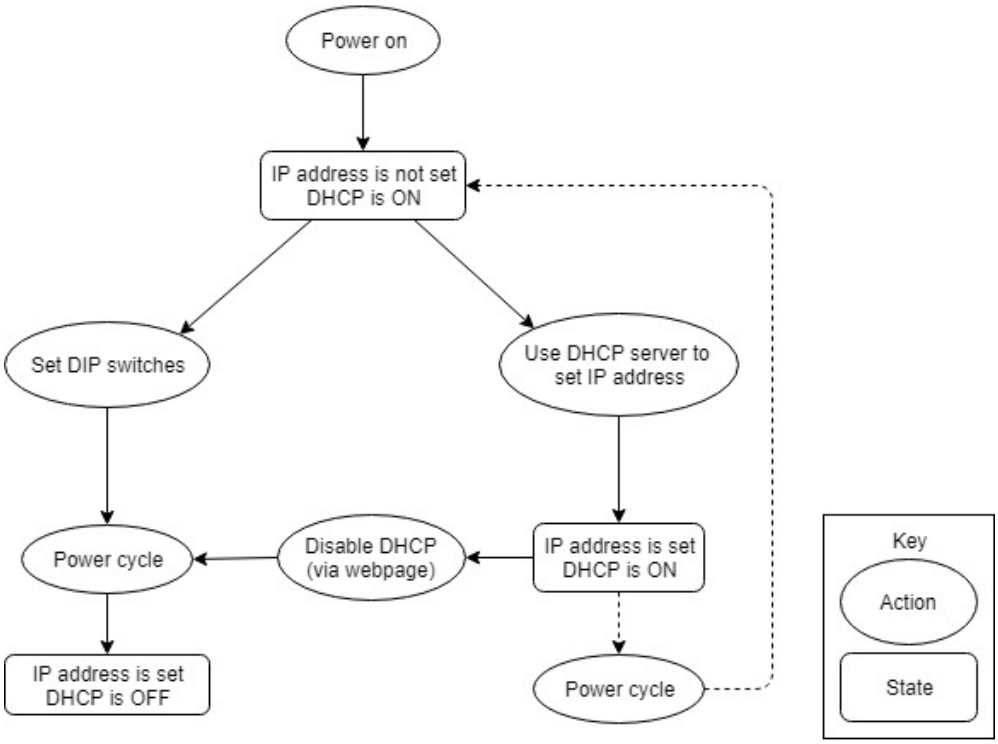


Figure 1 - Setting the Initial IP Address

Integration with Studio 5000

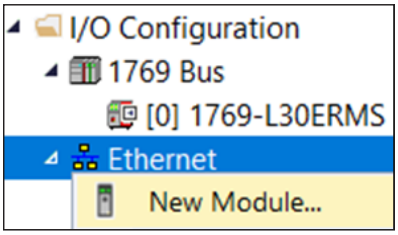
The following are basic instructions to configure the device within Studio 5000 Logic Designer. The user is responsible for ensuring that the settings used meet the requirements of the safety system.

Support for a device with parallel safety and standard communications is a feature of Studio 5000 version 28 and later only.

Support for EDS files with parallel safety and standard communications is a feature of version 32 and later only.

Studio 5000 Version 32 and Later

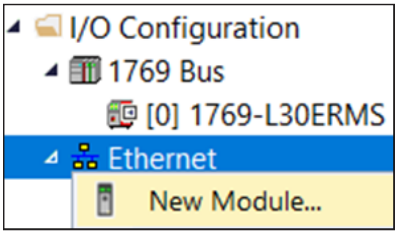
1. Within a Studio 5000 project with an EtherNet/IP-enabled PLC, right-click the EtherNet/IP driver under 'I/O Configuration' and select 'New Module…'.



2. Search for the "Fortress Interlocks" module and select 'Create'.
3. Give the new module a name and set its EtherNet address to match the IP address of the unit.
4. Set the Safety Network Number as described in 'Safety Network Number'.
5. Set the Configuration Signature as described in 'Configuration Signature'.
6. After confirming and downloading these settings to the PLC, the module status should switch to 'Running'. Should a fault occur, the module's 'Connection' tab will display a description of the fault.
7. Refer to the supplied memory map when writing your main and safety programs.

Studio 5000 Version 28 and Later

1. Within a Studio 5000 project with an EtherNet/IP-enabled PLC, right-click the EtherNet/IP driver under 'I/O Configuration' and select 'New Module…'.



2. Search for the "Generic EtherNet/IP Safety and Standard Module" module and select 'Create'.
3. Give the new module a name and set its EtherNet address to match the IP address of the unit.
4. Change the 'Module Definition' to the following device-specific parameters:

General	
Vendor	1425
Product Type	35
Product Code	5
Major Revision	1
Minor Revision	1

Electronic Keying	Exact Match
Connection:	Safety and Standard
Input Data:	Safety and Standard
Output Data:	Safety and Standard
Data Format:	SINT (8-Bit)

Note that the values marked '*' may differ from those shown here for some devices. Please refer to the supplied memory map document for the values for your specific device.

Connections						
Connection	Input		Output		Configuration	
	Assembly Instance	Size (bytes)	Assembly Instance	Size (bytes)	Assembly Instance	Size (bytes)
Safety Input	612	3	199	-	832	-
Safety Output	199	-	768	3	-	-
Standard	100	3*	150	2*	5	0

5. Set the safety network number as described in 'Safety Network Number'.
6. Set the Configuration Signature as described in 'Configuration Signature'.
7. After confirming and downloading these settings to the PLC, the module status should switch to 'Running'. Should a fault occur, the module's 'Connection' tab will display a description of the fault.
8. Refer to the supplied memory map when writing your main and safety programs.

Setting or Changing the IP Address

Once a device has an IP address, there are three methods to change that IP address. As with setting the initial IP address, both the DIP switches or a DHCP/BOOTP service can be used. Additionally, the device hosts a web page that can be used to change the IP address and disable the DHCP functionality.
The use of the DIP switches will override any other method of setting the IP address.

Note that changing the IP address of the device will invalidate its Safety Network Number and require its safety ownership be reset. See 'Resetting Safety Ownership' for details.

DIP Switches

Set the switches to your desired IP address. When using the DIP switches the IP address of the unit will always have the format "192.168.1.xxx". The DIP-Switches are used to identify the last byte of the address which must be between 1 and 254. 'Figure 2 – DIP switches for 192.168.1.200' shows an example configuration.

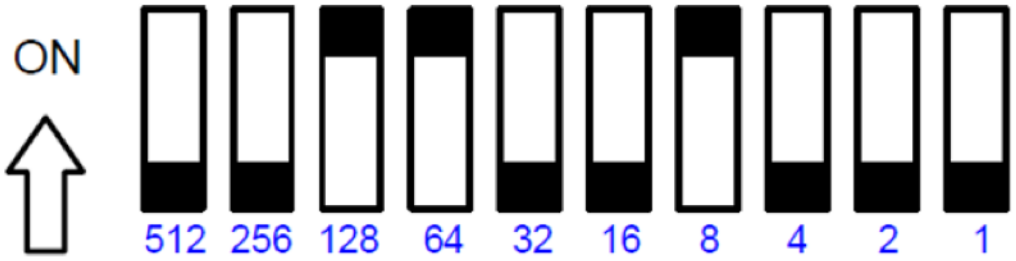


Figure 2 – DIP switches for 192.168.1.200

DHCP or BOOTP

By default, DHCP IP allocation is enabled on the device. The use of the DIP switches to set an IP address disables DHCP.

Changing the DIP switches from a non-zero value to zero while the device is operating will re-enable DHCP should it be disabled.

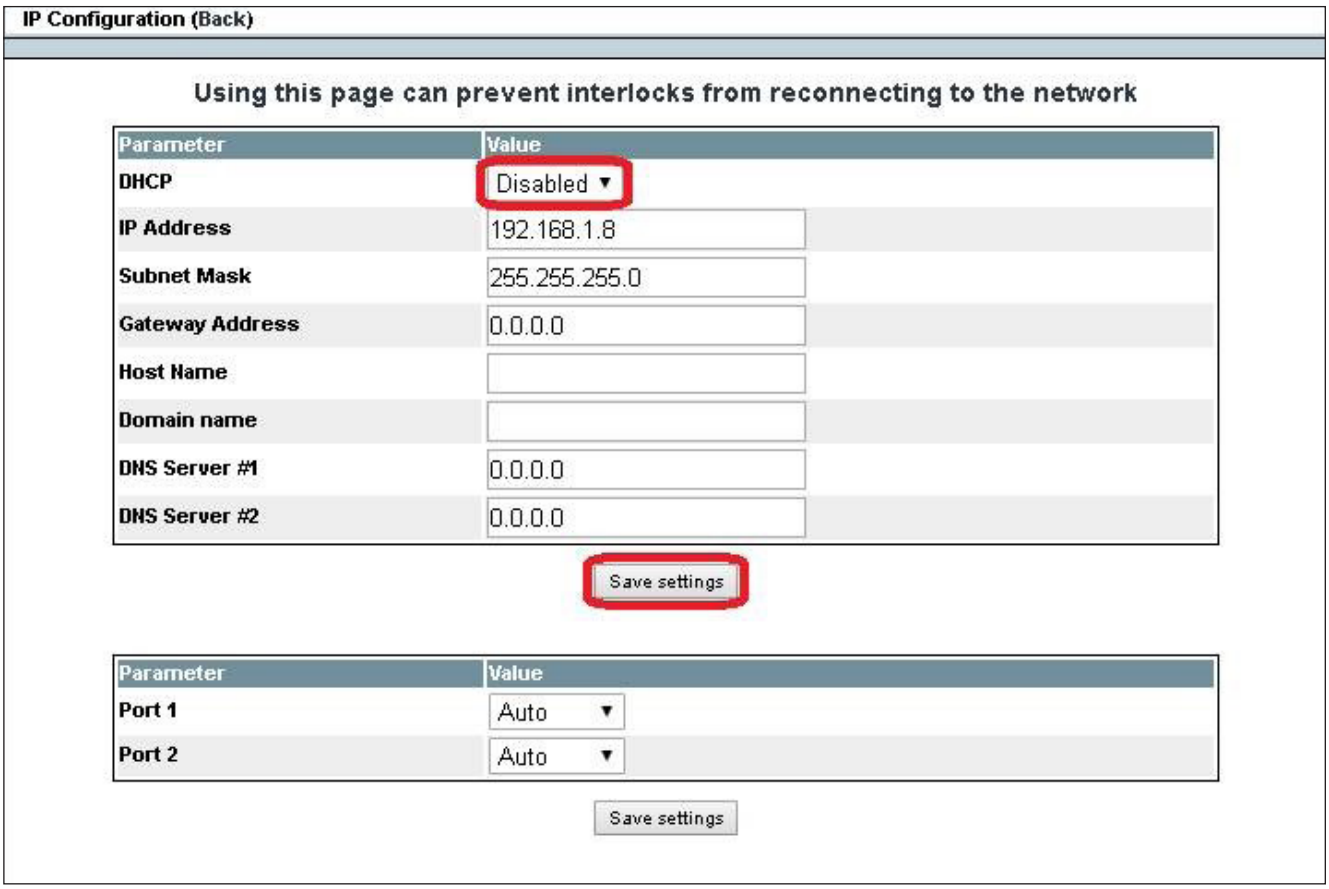
The device web page can be used to disable the DHCP functionality.

If the DHCP functionality is not disabled, the device will require a DHCP or BOOTP service every time it is power cycled.

Device Web Page

Should the device have an IP address set, a web page will be hosted at that address. The 'IP Configuration' tab allows the user to set any static IP address of their choice. The DHCP functionality can also be disabled from this page using the highlighted selection box.

Setting or Changing the IP Address

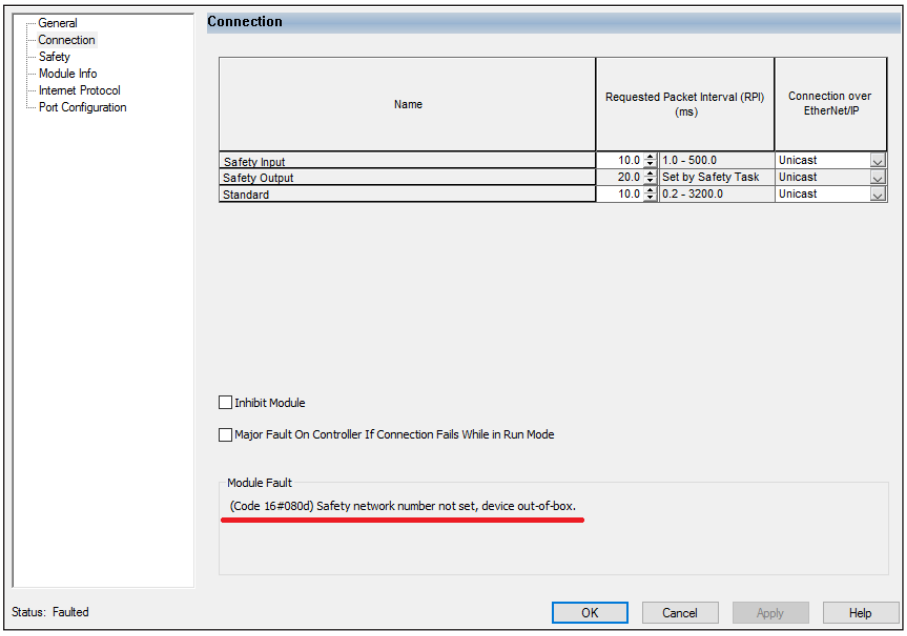


The user must press the highlighted ‘Save settings’ button and then power cycle the device for the new settings to take effect.

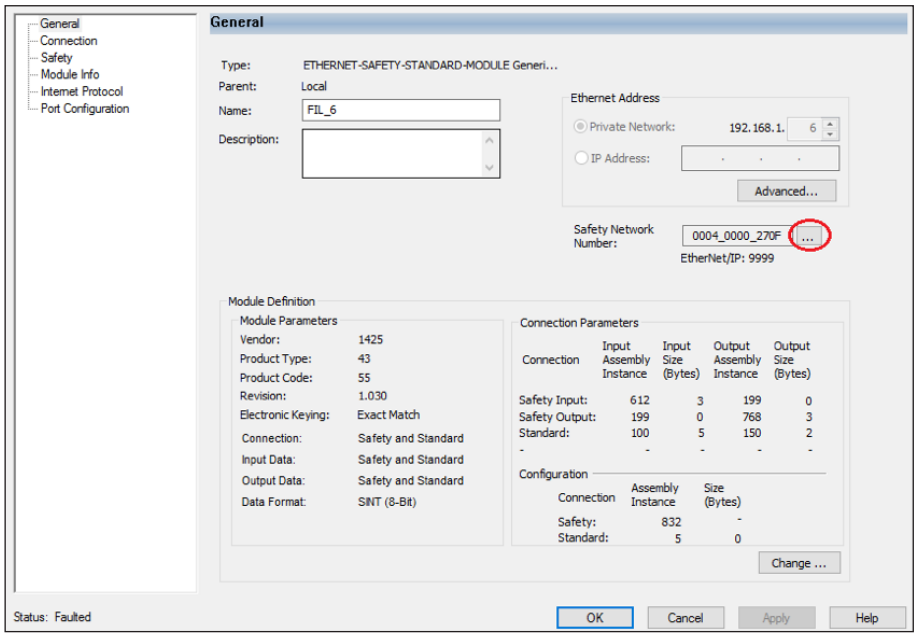
Safety Network Number

Should the connection tab of the module properties show the fault “(Code 16#080d) Safety network number not set, device out-of-box”, a new Safety Network Number must be sent to the device, using the instructions below.

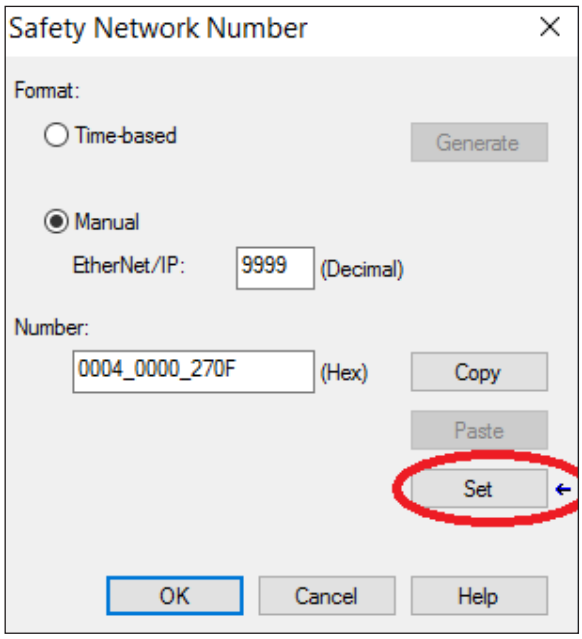
The Safety Network number will need to be reset should the IP address of the device change, as described in ‘Resetting Safety Ownership’.

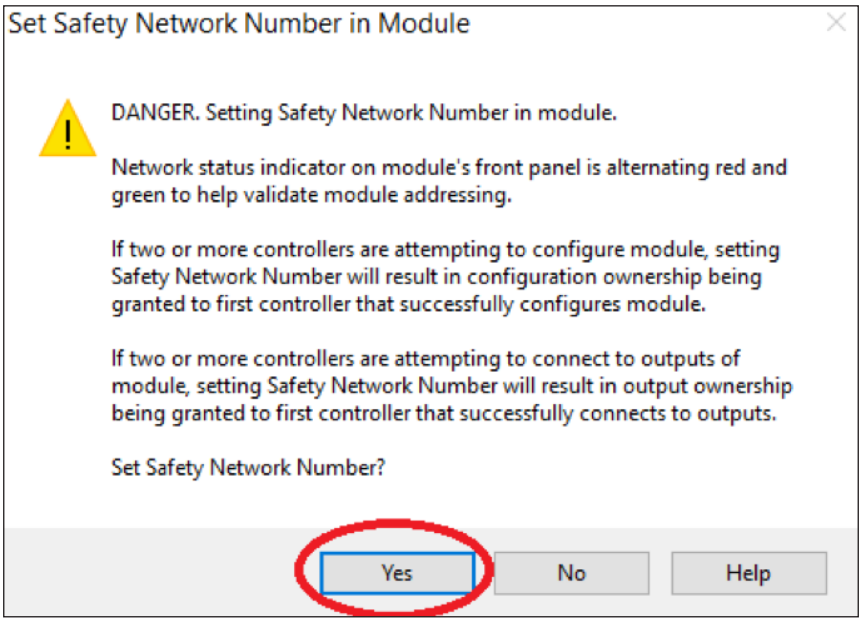


1. Under the general tab and open the Safety Network Number dialogue:



2. Ensure that the ‘Number’ matches that of the safety PLC.
3. Press the ‘Set’ button to send this value to the device. This action will need to be confirmed.

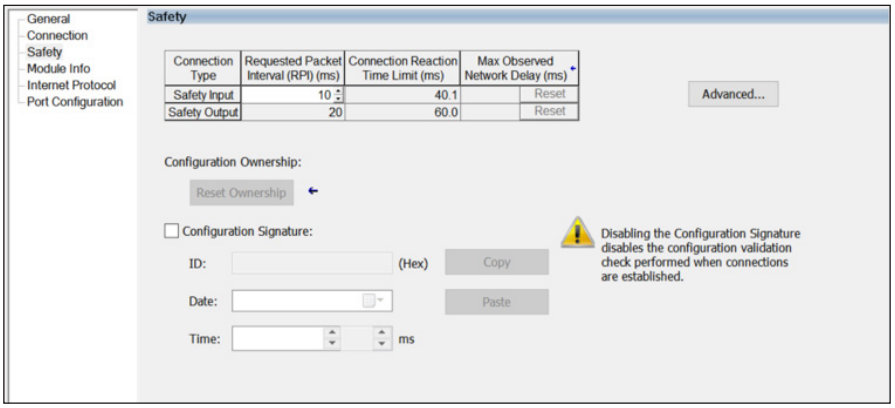




After a few seconds the unit should change to be have the “Running” status.

Configuring the Safety Functions and Configuration Signature

The device does not have any user-configurable safety functionality and therefore does not support the safety configuration signature. Un-check this box in order to create the module.

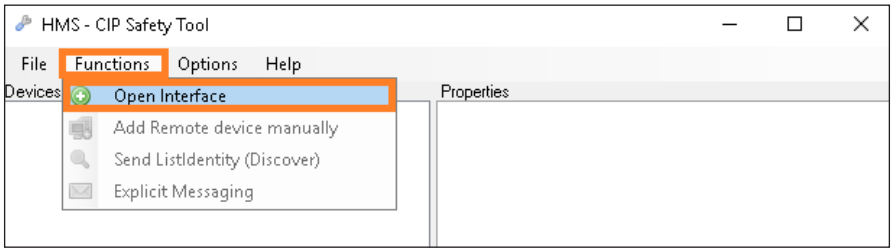


Resetting Safety Ownership

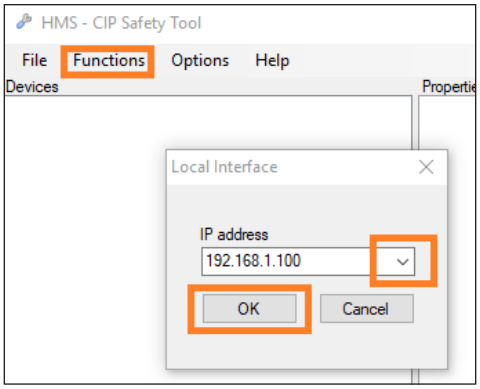
The device's safety ownership can only be reset by explicit message and cannot be reset from within Studio 5000. We recommend using this tool provided by HMS for this purpose:
https://files.fortressinterlocks.com/s/cX76xQ6sL8aiPgF.
Note that the device cannot be reset while it is connected to a PLC. Inhibit the relevant module on the PLC first if necessary.
This process will be necessary if the IP address of a unit is changed, as it allows a new Safety Network Number to be set.

Ownership Reset Tool

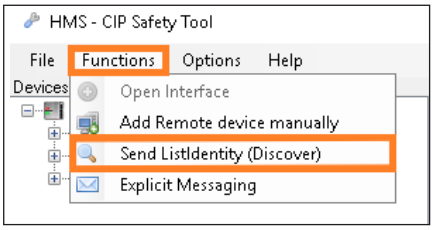
1. Start 'CipSafetyTool.exe' and select 'Open Interface' under the 'Functions' tab.



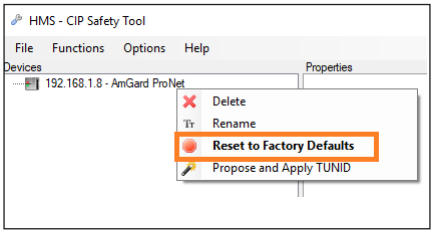
2. Select the IP address of your computer on the industrial network and click 'OK'.



3. Scan the network for devices using 'Send List Identity (Discover)' under 'Functions' tab.



4. Right-click on the device you want to reset from the 'Devices' tree and select 'Reset to Factory Defaults' from the context menu.



5. Keep the default password in the password window and click 'OK'.

The device will be removed from the 'Devices' tree when it is reset.

Diagnostic LED

LED	Colour	Description
LINK 1	OFF	No Ethernet link present
	AMBER	Ethernet link present
	AMBER FLASHING	Ethernet link with communication present
LINK 2	OFF	No Ethernet link present
	AMBER	Ethernet link present
	AMBER FLASHING	Ethernet link with communication present
READY	OFF	No power
	GREEN	The unit has power on internal 3.3V line
MS (Module Status)	OFF	No power
	GREEN	Unit is controlled by a scanner in Run state
	GREEN FLASHING	Unit is not configured, or Scanner in Idle State
	RED	Major Fault
	RED FLASHING	Recoverable fault. Module is configured, but stored parameters differ from currently used parameters.
NS (Network Status)	OFF	Unit does not have power or unit does not have an IP address
	GREEN	Unit is online; one or more connections established (CIP Class 1 or 3)
	GREEN FLASHING	Unit is online; no connections established
	RED	Fault on network
	RED FLASHING	One or more connections timed out (CIP Class 1 or 3)
CS* (CIP Safety)	OFF	CIP-safe communication error OR power off
	GREEN	CIP-safe communication active; safety signals normal
	GREEN FLASHING	Safety module not in run state
	RED	Boot failure
	RED FLASHING	Passivation error

**Note: LED will pulse amber every 3s*

Common LED fault states

Led Pattern	Status	Function	Solution
CS:Off NS:Off MS:Red	○ ○ ●	Safety Module not present	**1.** Contact Fortress Support
CS, NS, MS flashing Green	☼ ☼ ☼	Incorrect configuration / SNN mismatch / Unit owned by other controller	**1.** Check if unit configuration in Studio 5000 matches the provided values. **2.** Reset the unit using the ownership reset tool (Refer to Section Resetting Safety Ownership).
CS:Green flash NS:Red flash MS:Green flash	☼ ☼ ☼	Connection lost / timed out	**1.** Restart unit.
CS:Green flash NS:Green flash MS:Green + Red flash	☼ ☼ ☼	SNN not set/ module not configured	**1.** Set SNN from Studio 5000 (Refer to Section: Configuring the Safety Functions). **2.** Reset unit using the ownership reset tool (Refer to Section Resetting Safety Ownership).
CS:Green flash NS:Red MS:Red flash	☼ ● ☼	IP conflict	**1.** Change/Free up the target IP address.
CS:Red flash NS:Green MS:Green	☼ ● ●	Passivation error	**1.** Physical fault has occurred on a safety circuit. Locate fault by checking safety input byte 1 for qualifier status. Fault can be reset by toggling the relevant bit in safety output byte 1. If the fault persists please contact Fortress Technical Support.

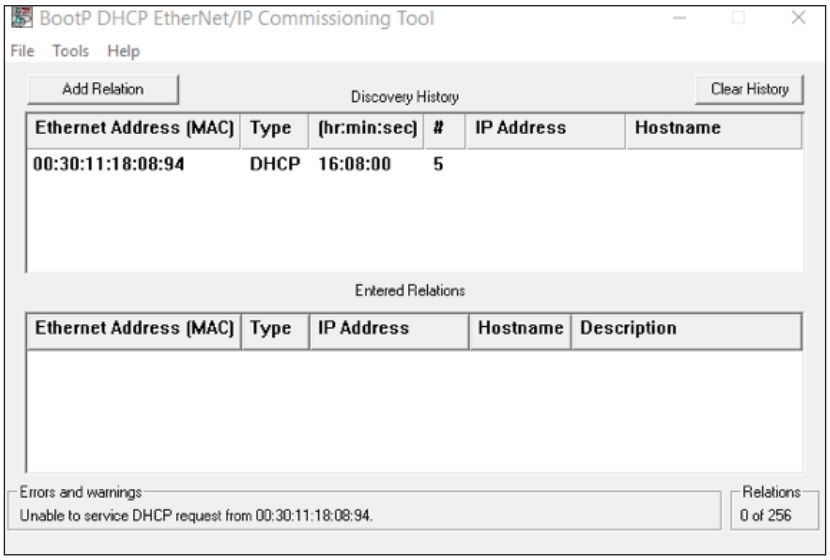
BOOTP DHCP EtherNet/IP Commissioning Tool

This tool, available from Rockwell Automation, allows a user to set the IP address of a device in DHCP mode.

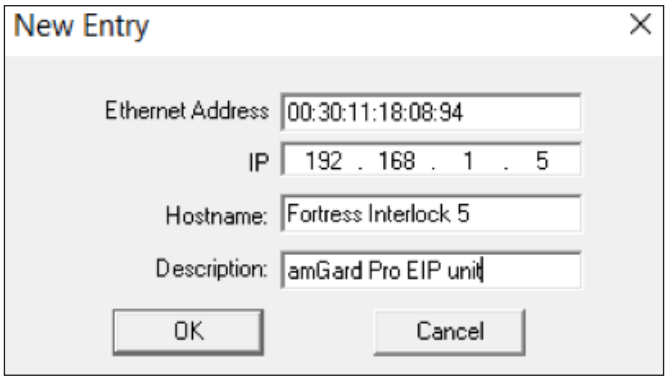
1. Ensure that the only enabled network adapter on your computer is that which connects it to the industrial network.

2. Run the 'BootP DHCP EtherNet/IP Commissioning Tool'.

3. The MAC address of the unit should appear in the 'Discovery History' section.



4. Add a new relation between the MAC address and a desired IP address.



5. Select the relation and click the 'Enable BOOTP/DHCP' button. It can take up to a minute for the device to be allocated its IP address.

FORTRESS

A **Halma** company