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# ILX56-PNC

**PROFINET Controller**

ControlLogix®

June 20, 2025

**USER MANUAL**

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ILX56-PNC User Manual
For Public Use.

June 20, 2025



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# Table of Contents

# 1 Preface

## 1.1 Introduction to the ILX56-PNC

This manual describes the installation, operation, and diagnostics of the ProSoft ILX56-PNC PROFINET Controller module. The ILX56-PNC module will operate as a PROFINET controller configuring, parameterizing, and exchanging data with PROFINET devices.

The ILX56-PNC slots into a 1756 ControlLogix backplane and operates as a PROFINET Controller, allowing the data from connected PROFINET devices to be exchanged with the ControlLogix controller.

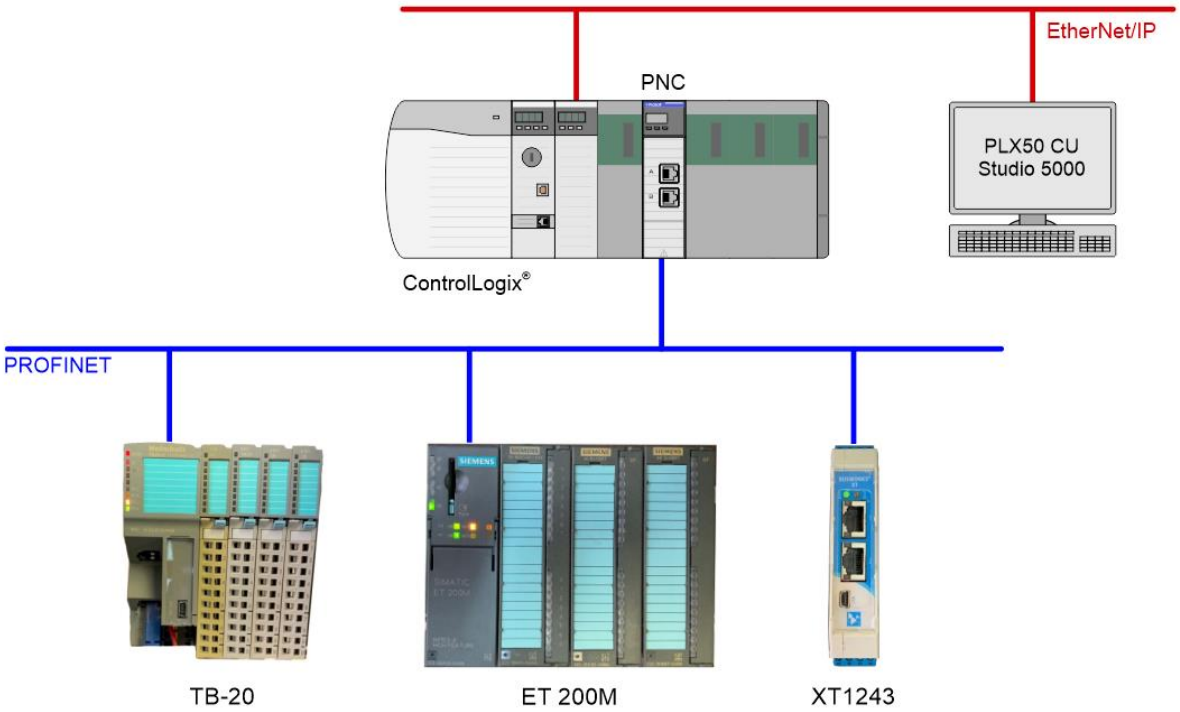



Figure 1.1 – Typical ILX56-PNC PROFINET architecture

The module is configured using the PLX50 Configuration Utility software from ProSoft. The PLX50 Configuration Utility is also used to configure and parameterize the PROFINET devices using the device GSDXML files.

## 1.2 Features

- The ILX56-PNC module operates as a PROFINET controller.
- Exchange up to 4096 bytes of input (and status) data and 4096 bytes of output (and control) data between the ControlLogix controller and the PROFINET devices.
- Cyclic communication with up to 64 x PROFINET device using PROFINET Real Time (RT) data exchange.
- Data formatted into engineering units for ControlLogix platform by using the automatically generated mapping imports for Logix User Defined Data Types (UDTs).
- The module supports Media Redundancy Protocol (MRP) and can operate as a MRP Manager or MRP Client.
- SD Card can be used for firmware and configuration backup.
- The module supports PROFINET devices using System Redundancy S2.
- Complies with PROFINET conformance class B.
- PROFINET device discovery, and name and address assignment (using DCP) supported.
- Statistics and diagnostics supported for the PROFINET controller and for each PROFINET device.
- Supports Alarm management from PROFINET devices and unloading into Logix.

## 1.3 Architecture

The figures below provide some typical examples of network configurations.

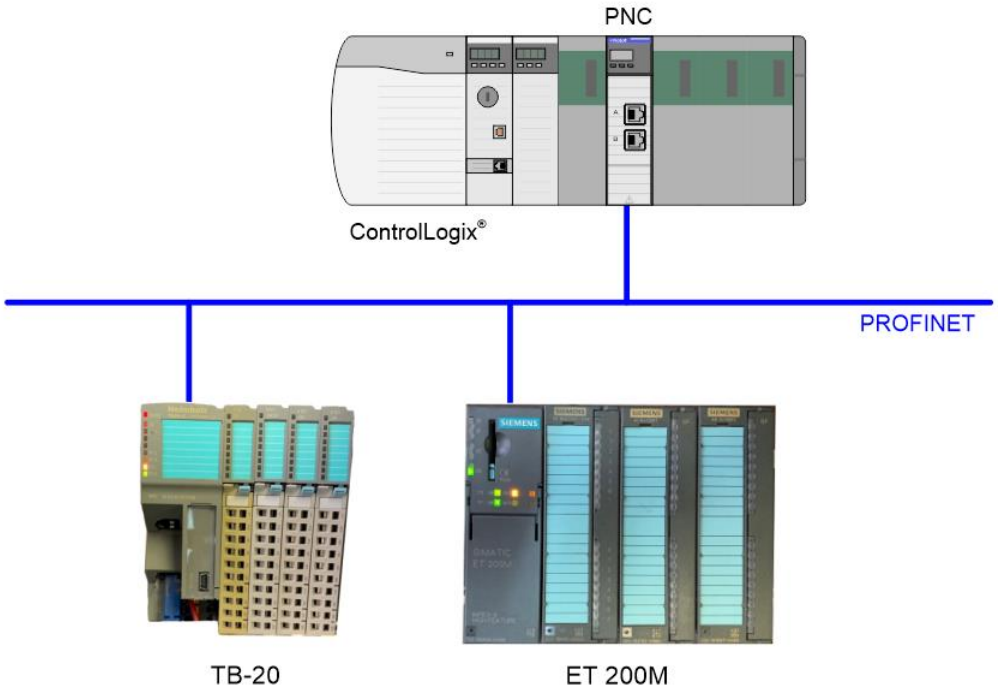



Figure 1.2 – Basic Configuration

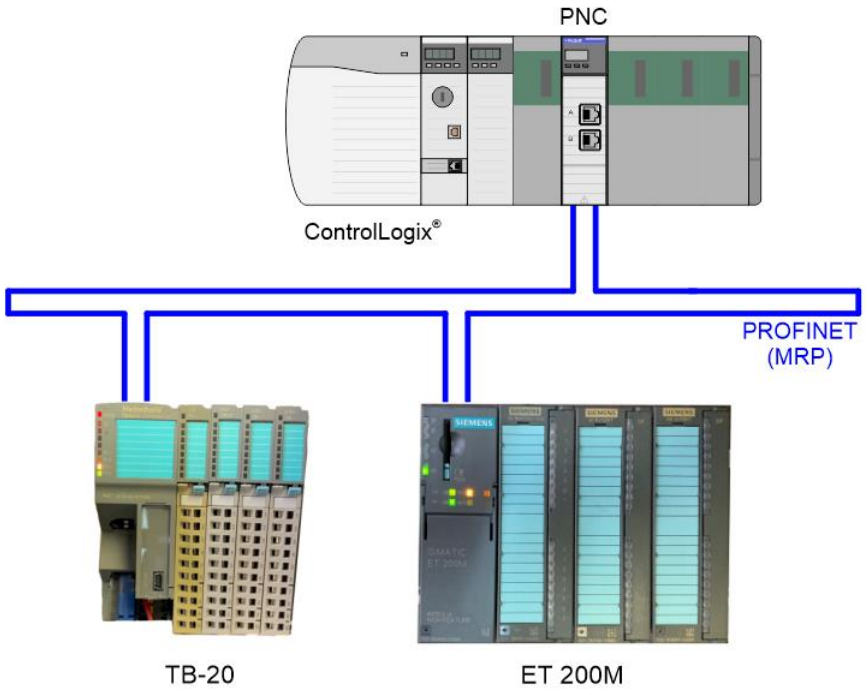



Figure 1.3 – Basic Configuration with PROFINET MRP

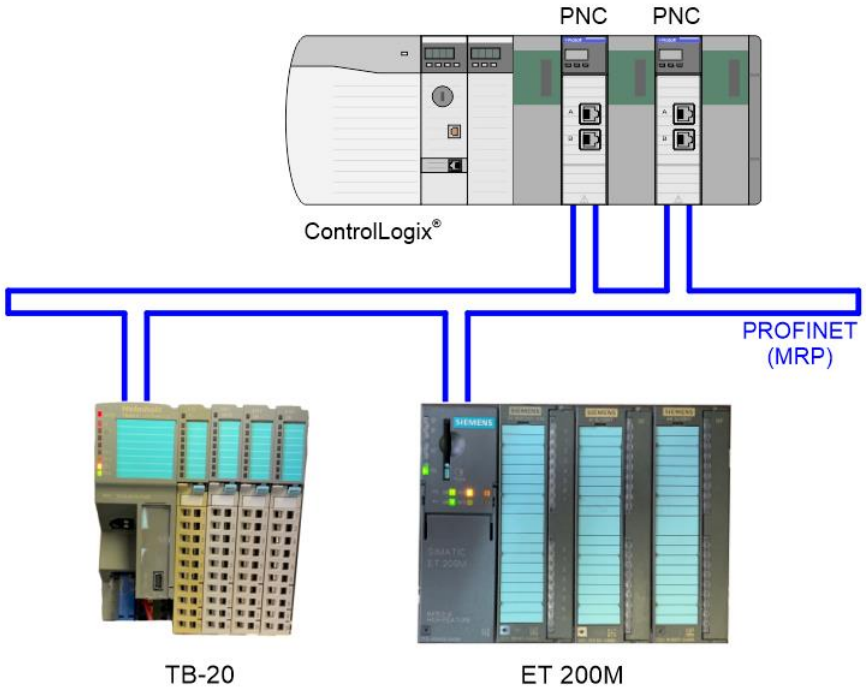



Figure 1.4 – Redundant PNC Configuration with PROFINET MRP

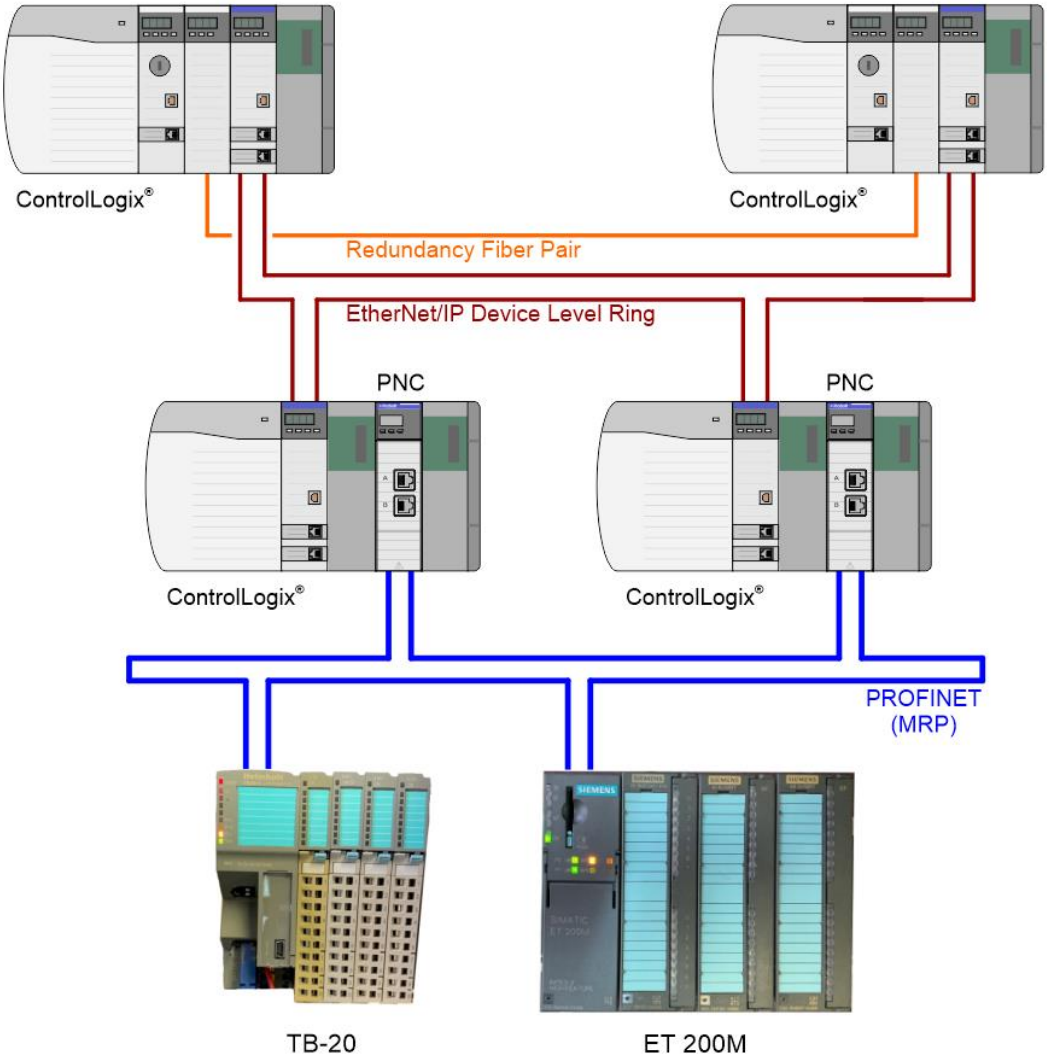



Figure 1.5 – Redundant ControlLogix and Redundant PNC Configuration with PROFINET MRP

## 1.4 Additional Information

The following documents contain additional information that can assist the user with the module installation and operation.

| Resource | Link |
|---|---|
| PLX50 Configuration Utility Installation | www.prosoft-technology.com |
| ILX56-PNC User Manual<br>ILX56-PNC Datasheet | www.prosoft-technology.com |

Table 1.1 - Additional Information

## 1.5 Support

Technical support is provided via the Web (in the form of user manuals, FAQ, datasheets etc.) to assist with installation, operation, and diagnostics.

For additional support the user can use either of the following:.

| Resource | Link |
|---|---|
| Contact us | www.prosoft-technology.com |
| Support email | support@prosoft-technology.com |

Table 1.2 - Support Details

## 1.6 Quickstart Guide

For a Quickstart Guide to configure the ILX56-PNC as a PROFINET Master to communicate with a SIEMENS SIMATIC ET200M PROFINET device, please see chapter *12 ILX56-PNC ET200M QuickStart*.

# 2 Installation

## 2.1 Module Layout

The ILX56-PNC module has two PROFINET (Ethernet) ports on the front of the module. These ports support Full- and Half-duplex, at speeds of 10Mbit/s, 100Mbit/s, or 1Gbit/s.

**Note:** All required power for the module is derived from the ControlLogix backplane.

The module provides 3 diagnostic LEDs and a 4-character alpha-numeric LED display. The LED display provides the mode and status of the module.


Figure 2.1 – ILX56-PNC front view

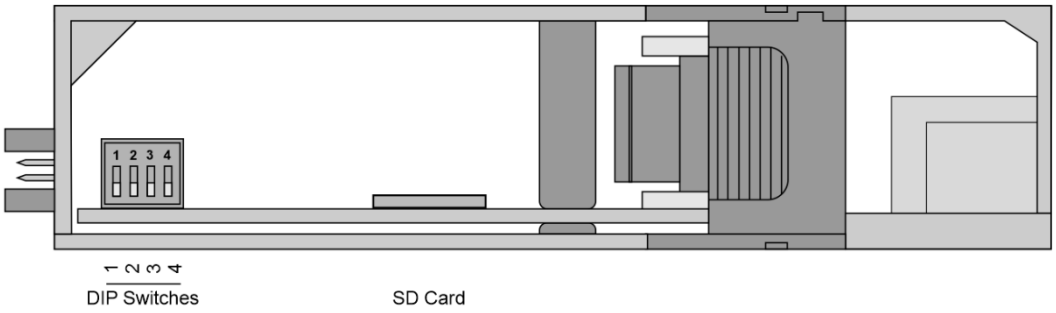



Figure 2.2 – ILX56-PNC bottom view

Located at the bottom of the module are four DIP Switches and an SD memory card slot. These switches can only be accessed when the module is removed from the ControlLogix chassis.

| DIP Switch | Description |
|---|---|
| DIP Switch 1 | Used to force the module into “Safe Mode”. When in “Safe Mode”, the module will not load the application firmware and will wait for new firmware to be downloaded. This should only be used in the rare occasion when a firmware update was interrupted at a critical stage. |
| DIP Switch 2 | Used to prevent changes to the configuration. |
| DIP Switch 3 | Reserved |
| DIP Switch 4 | Reserved |

Table 2.1 - DIP Switch Settings

# 3 Setup

This section of the document will walk you through the set-up process needed to use the ILX56-PNC module properly.

## 3.1 Install Configuration Software

The network setup and configuration of the module is done in the ProSoft PLX50 Configuration Utility. This software can be downloaded from www.prosoft-technology.com.

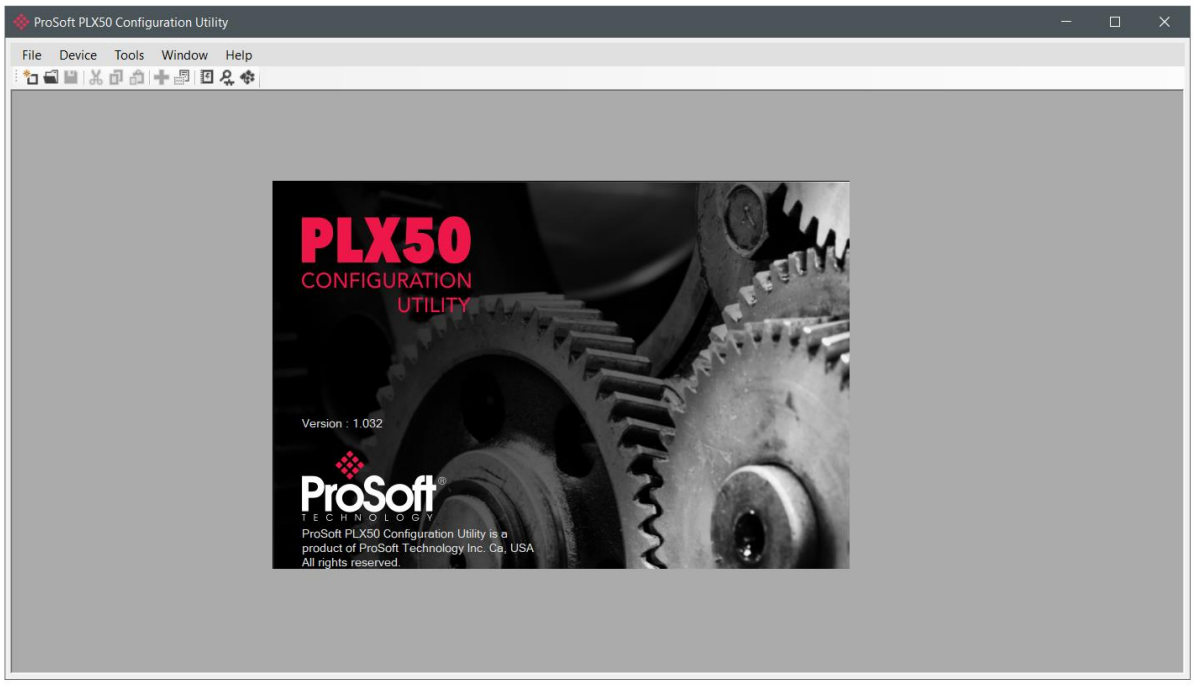



Figure 3.1 - ProSoft PLX50 Configuration Utility Environment

## 3.2 GSDML File Management

Each PROFINET device has an associated GSDML file that contains the necessary device parameters required to correctly configure the device for data exchange. The PLX50 Configuration Utility manages the GSDML library, which is used for adding devices to the ILX56-PNC.

**1** The GSDML File Manager is opened by selecting **GSDML FILE MANAGEMENT** under the *Tools* menu in the configuration utility.

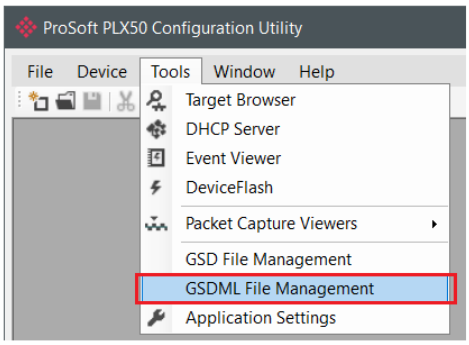
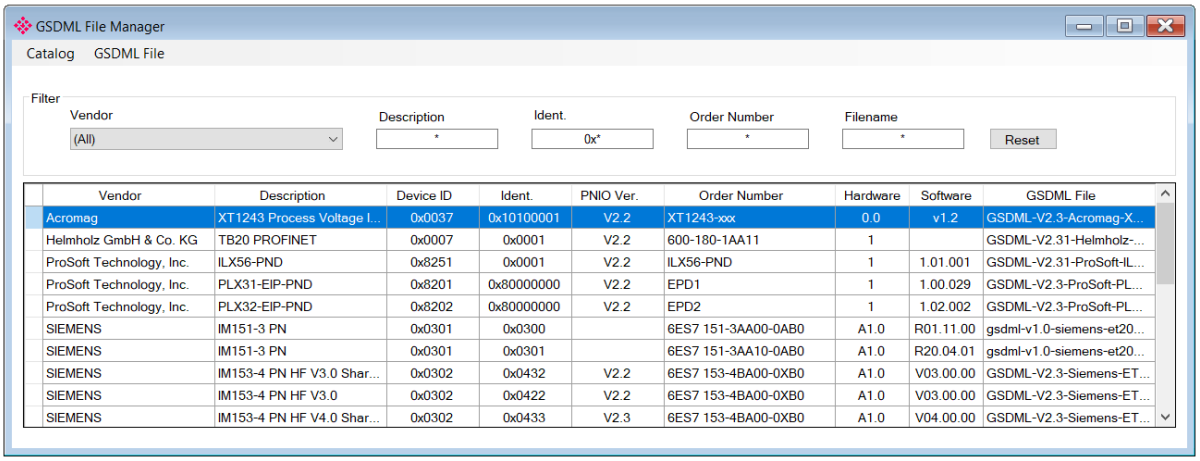



Figure 3.2 – Launching the GSDML File Management Tool

**2** Once the tool has been opened, a list of registered PROFINET devices is displayed.




| Vendor | Description | Device ID | Ident. | PNIO Ver. | Order Number | Hardware | Software | GSDML File |
|---|---|---|---|---|---|---|---|---|
| Acromag | XT1243 Process Voltage I... | 0x0037 | 0x10100001 | V2.2 | XT1243-xxx | 0.0 | v1.2 | GSDML-V2.3-Acromag-X... |
| Helmholz GmbH & Co. KG | TB20 PROFINET | 0x0007 | 0x0001 | V2.2 | 600-180-1AA11 | 1 | | GSDML-V2.31-Helmholz-... |
| ProSoft Technology, Inc. | ILX56-PND | 0x8251 | 0x0001 | V2.2 | ILX56-PND | 1 | 1.01.001 | GSDML-V2.31-ProSoft-IL... |
| ProSoft Technology, Inc. | PLX31-EIP-PND | 0x8201 | 0x80000000 | V2.2 | EPD1 | 1 | 1.00.029 | GSDML-V2.3-ProSoft-PL... |
| ProSoft Technology, Inc. | PLX32-EIP-PND | 0x8202 | 0x80000000 | V2.2 | EPD2 | 1 | 1.02.002 | GSDML-V2.3-ProSoft-PL... |
| SIEMENS | IM151-3 PN | 0x0301 | 0x0300 | | 6ES7 151-3AA00-0AB0 | A1.0 | R01.11.00 | gsdml-v1.0-siemens-et20... |
| SIEMENS | IM151-3 PN | 0x0301 | 0x0301 | | 6ES7 151-3AA10-0AB0 | A1.0 | R20.04.01 | gsdml-v1.0-siemens-et20... |
| SIEMENS | IM153-4 PN HF V3.0 Shar... | 0x0302 | 0x0432 | V2.2 | 6ES7 153-4BA00-0XB0 | A1.0 | V03.00.00 | GSDML-V2.3-Siemens-ET... |
| SIEMENS | IM153-4 PN HF V3.0 | 0x0302 | 0x0422 | V2.2 | 6ES7 153-4BA00-0XB0 | A1.0 | V03.00.00 | GSDML-V2.3-Siemens-ET... |
| SIEMENS | IM153-4 PN HF V4.0 Shar... | 0x0302 | 0x0433 | V2.3 | 6ES7 153-4BA00-0XB0 | A1.0 | V04.00.00 | GSDML-V2.3-Siemens-ET... |

Figure 3.3 – GSDML File Management Tool

**4** To add a new GSDML file, select the **ADD** option under the *GSDML File* menu.

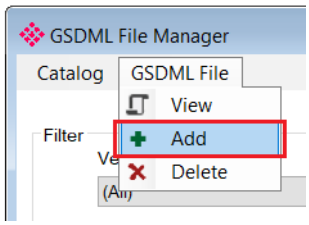



Figure 3.4 – GSDML File Adding

**5** Select the GSDML file and click **OPEN**.

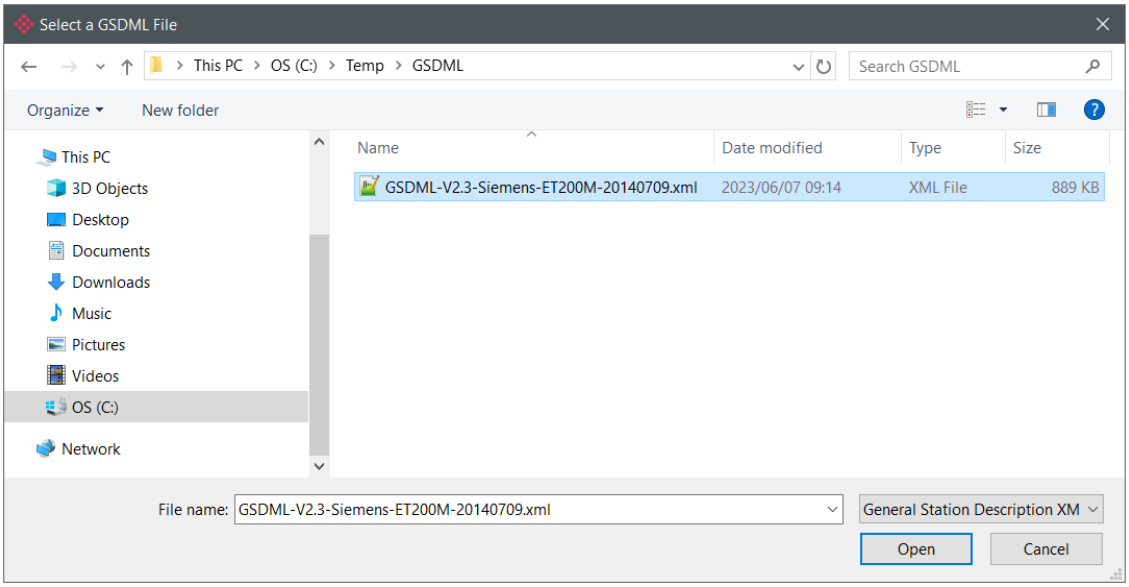



Figure 3.5 – GSDML File Adding

**6** The GSDML File Management tool will add the PROFINET device to the device list and recompile the GSDML catalog.

**7** A GSDML catalog can be exported from one PLX50 Configuration Utility and imported into another PLX50 Configuration Utility on a different workstation. This is achieved by selecting **EXPORT** under the *Catalog* menu on one machine and then selecting the **IMPORT** option on the other machine.

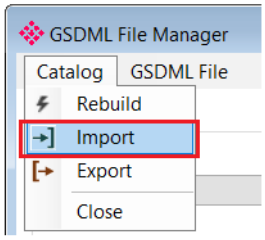



Figure 3.6 – GSDML Catalog importing

## 3.3 Creating a New Project

Before the user can configure the module, a new PLX50 Configuration Utility project must be created.

1 Under the *File* menu, select **NEW**. A PLX50 Configuration Utility Design Tool project will be created, showing the Project Explorer tree view.

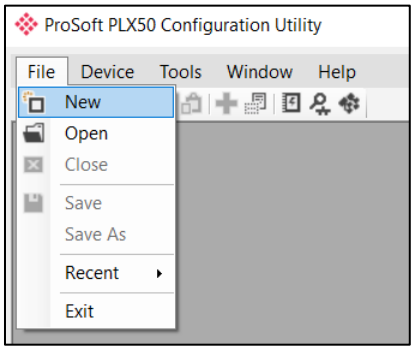



Figure 3.7 - Creating a new project

2 A new device can now be added by selecting **ADD** under the *Device* menu.

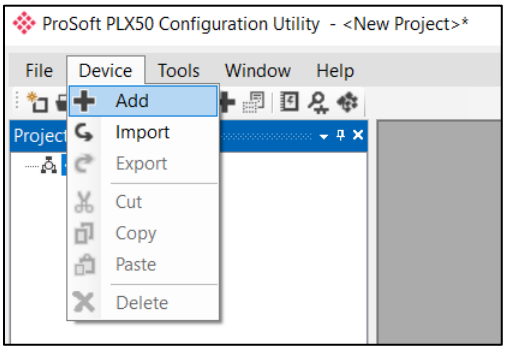



Figure 3.8 - Adding a new device

**3** In the *Add New Device* window select the **ILX56-PNC** and click the **OK** button.

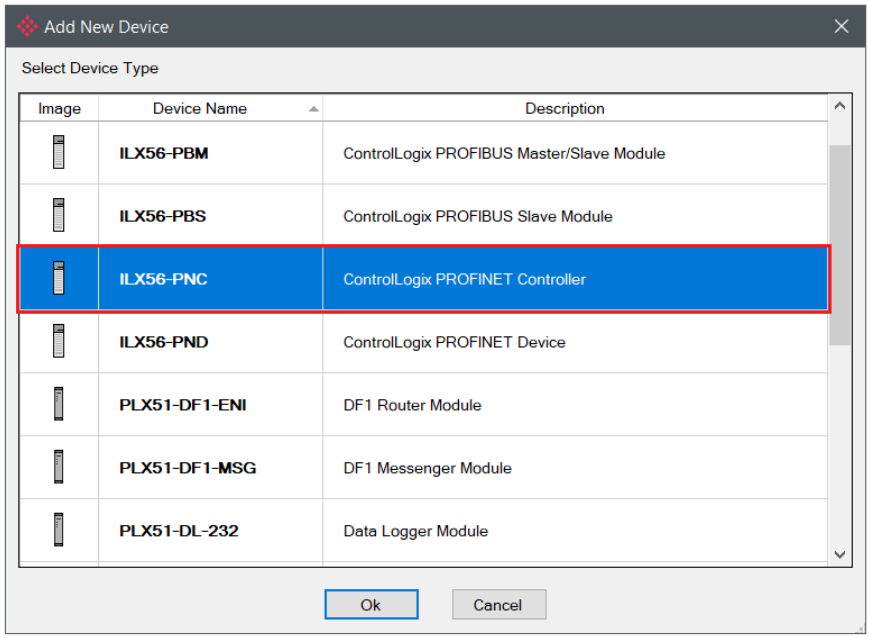



Figure 3.9 – Select ILX56-PNC

**4** The Configuration window for the new device will be opened. The device configuration window can be reopened by either double-clicking the module in the Project Explorer tree or right-clicking on the module and selecting **CONFIGURATION**.

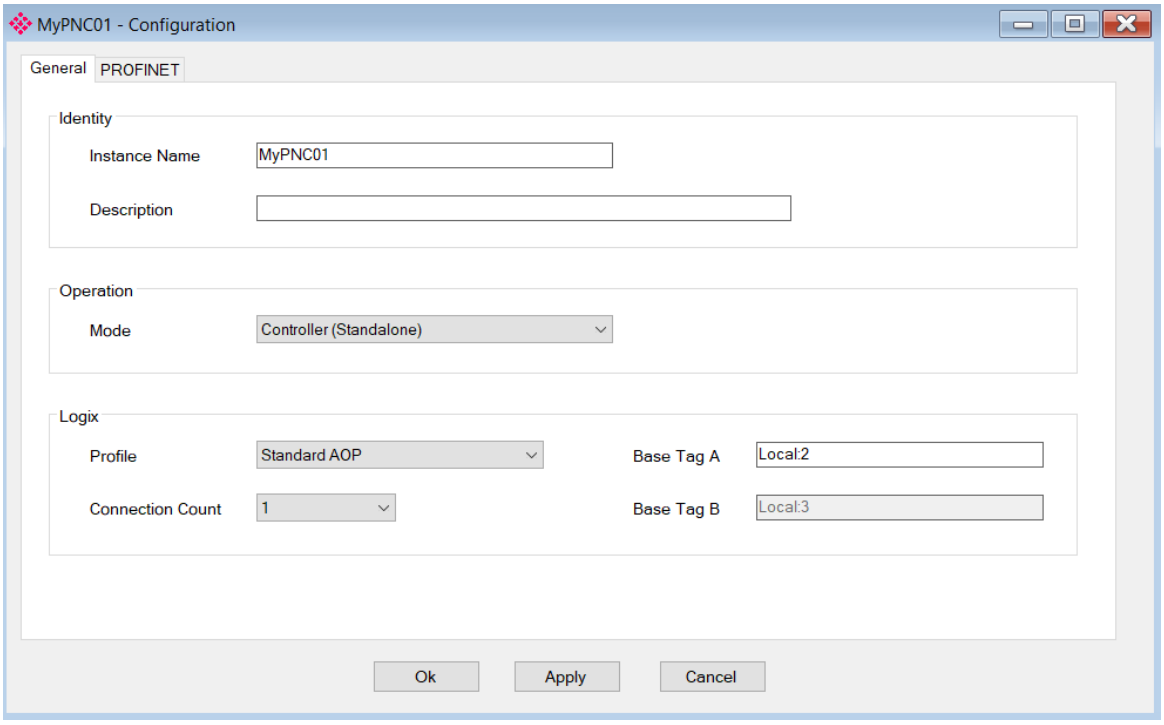



Figure 3.10 – ILX56-PNC configuration

## 3.4 ILX56-PNC Configuration

All ILX56-PNC configuration takes place within the PLX50 Configuration Utility environment.

**Note:** Refer to the additional information section for documentation and installation links for the ProSoft PLX50 Configuration Utility.

### 3.4.1 General

The *General* tab of the ILX56-PNC Configuration window is opened by either double-clicking on the module in the tree, or right-clicking the module and selecting **CONFIGURATION**.

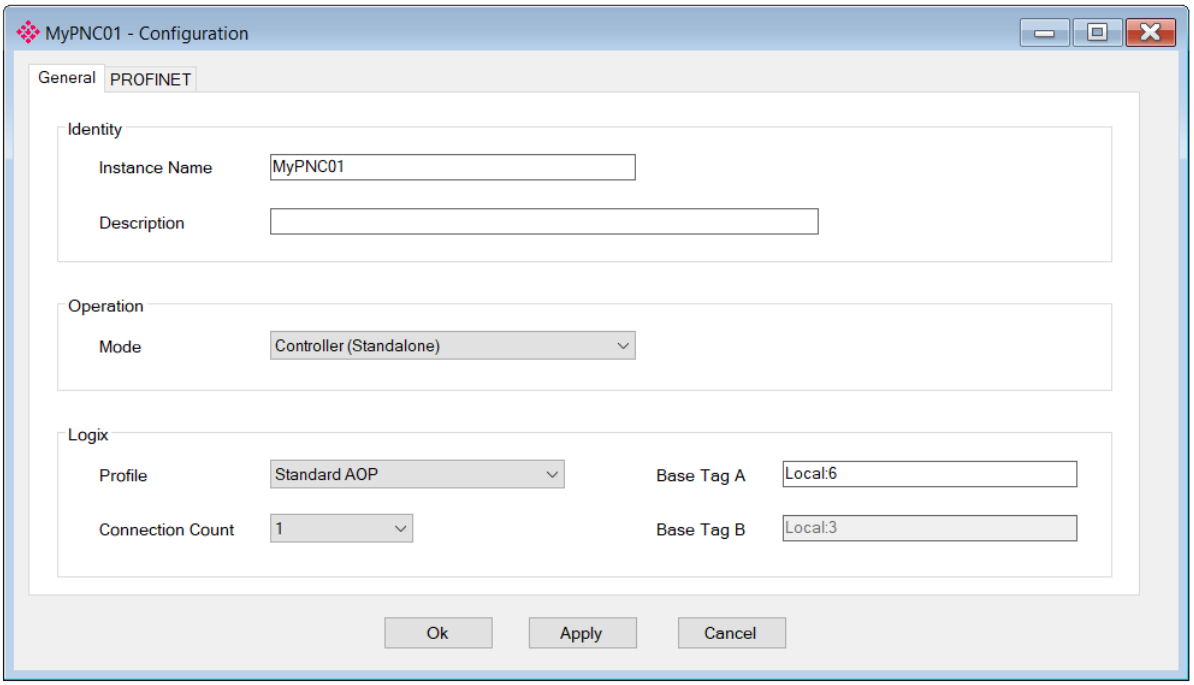



Figure 3.11 – ILX56-PNC General configuration

The General configuration consists of the following parameters:

| Parameter | Description |
|---|---|
| *Identity* | |
| Instance Name | User defined name to identify the ILX56-PNC module.<br><br>**Note**: This name must match the instance name assigned to the module in the Studio 5000 IO tree. |
| Description | Used to provide a more detailed description of the application for the module. |
| *Operation* | |
| Mode | The ILX56-PNC can operate in one of two modes:<br><br>**Controller (Standalone)**<br>The ILX56-PNC operates as a standalone Controller on the PROFINET network.<br><br>**Controller S2 Redundancy**<br>A pair of ILX56-PNC modules operate as redundant PROFINET Controllers for PROFINET devices that support S2 redundancy.<br><br>**Note**: Only devices that support PROFINET S2 Redundancy can be used for redundant IO. |
| *Logix* | |
| Profile | The Studio 5000 profile used to instantiate the ILX56-PNC module.<br><br>**Standard AOP**<br>This is the preferred profile which allows the user to configure between 1 and 11 connections.<br><br>**Generic Profile**<br>This option provides only a single connection and is required for older versions of Logix. |
| Connection Count | The number of class 1 CIP connection established between the ControlLogix CPU and the module. (1 to 11).<br><br>**Note:** This value must match that configured in the Logix IO tree. |
| Base Tag A<br>Base Tag B | This is the tagname of the ILX56-PNC used for the input and output assembly. For example, if the module is in the local slot connected to a Logix controller the base tag will be Local:x (where x is the slot number).<br>The base tagname is used when generating the Logix L5X file which will automatically map the required data.<br>In a Standalone configuration only Base Tag A is relevant.<br>In an S2 Redundant configuration, both Base Tag A and B will be required. |

Table 3.1 - General configuration parameters

### 3.4.2 PROFINET

The *PROFINET* tab in the Configuration window is opened by either double-clicking on the module icon in the tree, or by right-clicking on the module icon and selecting **CONFIGURATION**.

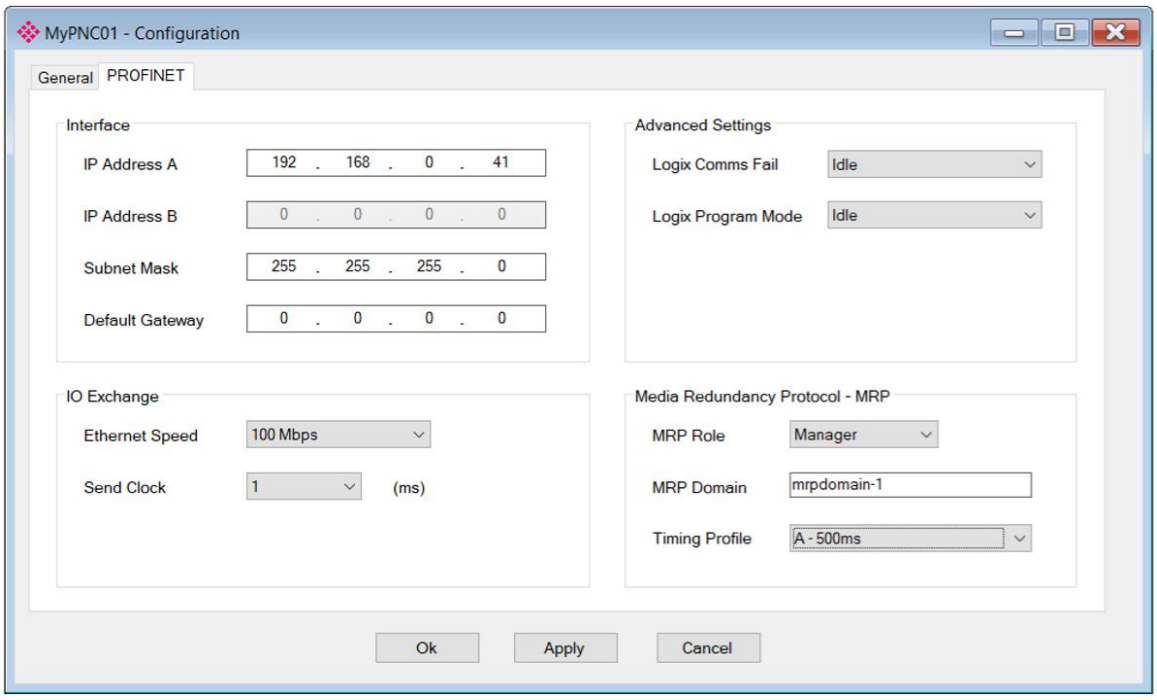



Figure 3.12 – ILX56-PNC PROFINET configuration

The PROFINET configuration consists of the following parameters:

| Parameter | Description |
|---|---|
| *Interface* | |
| IP Address A | The IP Address of the module on the PROFINET network.<br>In the case of S2 Redundancy, this is the IP Address of the A module. |
| IP Address B | When using S2 Redundancy, this is the IP Address of the B module on the PROFINET network.<br>This is disabled when Standalone Controller mode is used. |
| Subnet Mask | The subnet mask to be used by the module/s on the PROFINET network. |
| Default Gateway | The IP Address of the Default Gateway to be used by the module/s on the PROFINET network. The gateway allows the module to communicate with PROFINET devices that are not on the same subnet. |
| *I/O Exchange* | |
| Ethernet Speed | The anticipated Ethernet speed of the PROFINET network.<br>This parameter is used for network utilization calculation purposes. |
| Send Clock | The time period (milliseconds) between two consecutive RT intervals.<br>This period represents the minimum update time for all devices. Each PROFINET device's update time will be a (power of 2) multiple of the Send Clock period. |
| *Advanced Settings* | |
| Logix Comms Fail | Specifies the PROFINET Controller behavior when communication with Logix is lost.<br>Currently, only the **IDLE** value is supported. |

| | |
|---|---|
| Logix Program Mode | Specifies the PROFINET Controller behavior when the Logix controller is placed in PROGRAM mode. Currently, only the **IDLE** value is supported. |
| *Media Redundancy Protocol (MRP)* | |
| MRP Role | Sets the module's role in the MRP network management, either:<br><br>**Disabled**<br>Media redundancy is not enabled.<br><br>**Client**<br>Media redundancy is enabled, the module participates in the ring, but does not manage it.<br><br>**Manager**<br>Media redundancy is enabled, the module participates in the ring, and supervises it. |
| MRP Domain | The identifier for the logical MRP collection.<br>The controller (ILX56-PNC) and the devices in the MRP ring all must have the same MRP Domain configured. |
| Timing Profile | MRP timing profile to indicate how fast the MRP ring will recover from a fault.<br><br>**Note:** The faster the recovery time the more traffic there will be on the Ethernet network. |

Table 3.2 - PROFINET configuration parameters

**Note:** When changing which device is the MRP Manager, there may be a time when there is no configured MRP Manager. An unconfigured MRP Manager can cause an uncontrolled Ethernet ring that will create a network disturbance. The ring must first be broken by disconnecting one of the Ethernet ports, and only reconnected once the configuration process is complete.

## 3.5 Module Download

Once the ILX56-PNC configuration has been completed, it must be downloaded to the module. The *Connection Path* of the module must be configured before downloading.

**1** Right-click on the module and select the **CONNECTION PATH** option.

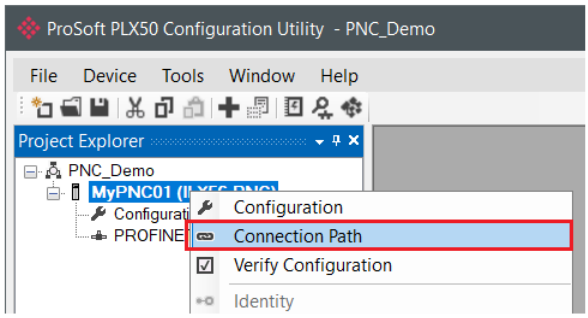



Figure 3.13 – Select Connection Path

**2** The current *Connection Path A* will be displayed. In the case of S2 Redundancy mode, the *Connection Path B* will also need to be configured. The new connection path can be entered manually or selected by using the *Target Browser*. To use the latter, select the **BROWSE** button.

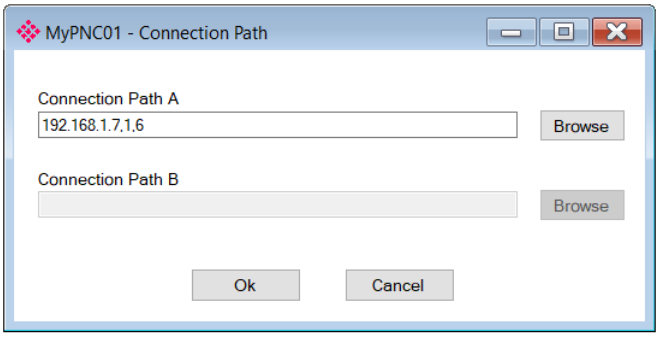



Figure 3.14 – Enter Connection Path

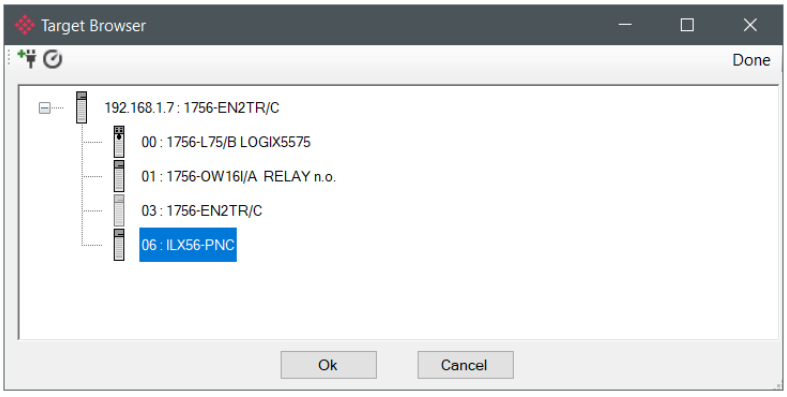



Figure 3.15 – Target Browser

3 The configured path will be used to connect to the module.

4 To initiate the download, right-click on the module and select the **DOWNLOAD** option.

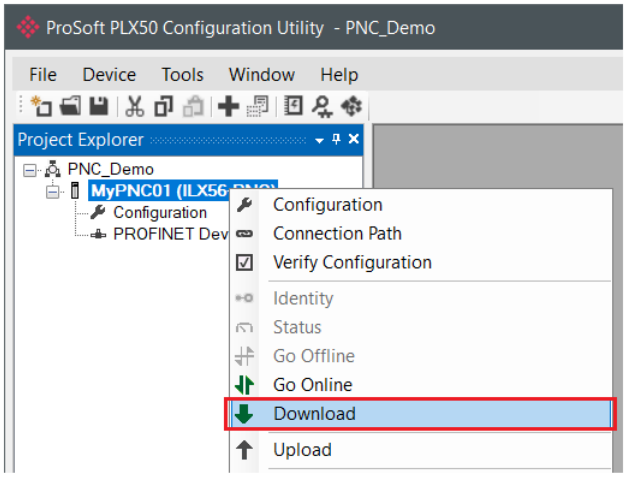



Figure 3.16 - Selecting Download

5 Once complete, the user will be notified that the download was successful.

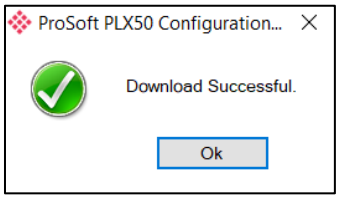



Figure 3.17 - Successful download

6 Within the PLX50 Configuration Utility the module will be in the *Online* state, indicated by a green circle around the module's icon. The module is now configured and operational.

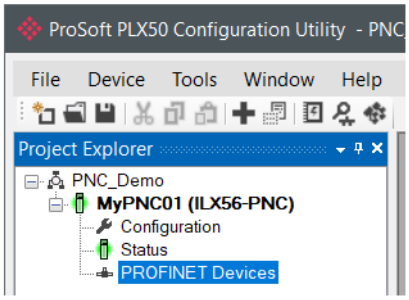



Figure 3.18 - Module online

## 3.6 Device DCP Discovery (Online)

Once online with the ILX56-PNC in the PLX50 Configuration Utility, the user will be able to scan the PROFINET network for devices.

PROFINET devices can be added in one of two ways:

- Using the online *DCP Discovery* method (described here), or
- Using the manual approach (described in the following section).

### 3.6.1 DCP Discovery

The device discovery can be found by selecting the *DCP Discovery* tab in the ILX56-PNC *Status* window.

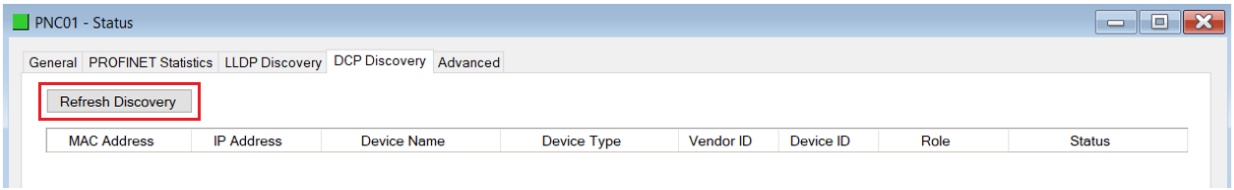



Figure 3.19 – Device Discovery

To refresh the device discovery list, click on the **REFRESH DISCOVERY** button. All discovered devices will be displayed in the list.

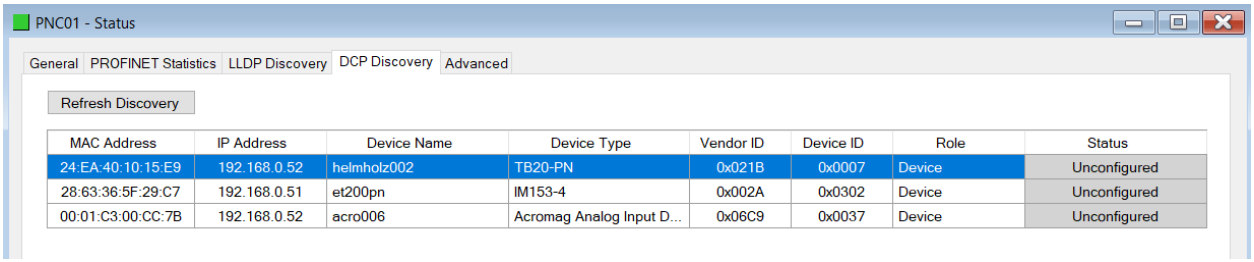



Figure 3.20 – DCP Discovery Result

If a device has been found and is not currently in the ILX56-PNC configured device list the device can be added in this window by right-clicking on the device and selecting the **ADD DEVICE** option.

**Note:** The associated GSDML file must first be registered before a device can be added to the ILX56-PNC configuration.

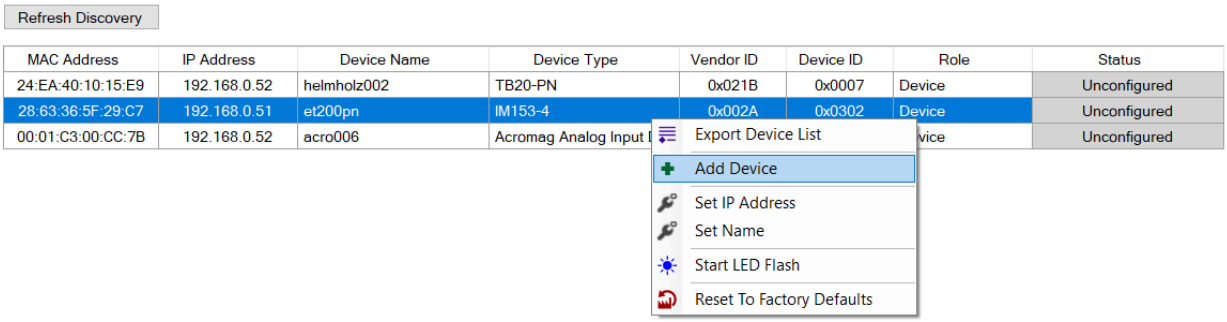



Figure 3.21 – Adding a discovered device

If the selected device has more than one matching GSDML file registered, the user will be prompted to select the GSDML file to be used.

Devices with configurable slots that support the identification of modules will be automatically added. When an identified module in a particular slot has a non-unique *Ident.*, then the user will be prompted to select from a list of matching modules.

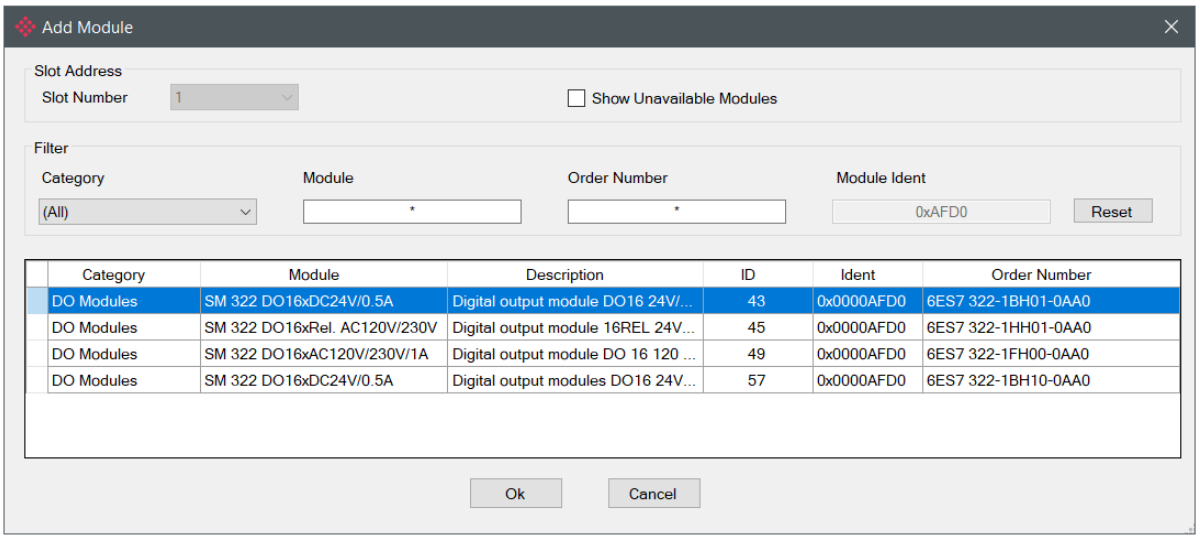



Figure 3.22 – Adding a discovered module

The resulting device configuration window will then be opened. See the subsequent section on Adding PROFINET Devices for more details.

### 3.6.2 DCP Discovery Functions

In addition to adding a device online, a number of other DCP functions are available via the *DCP Discovery* tab:

- Export Device List
- Set IP Address
- Set Name
- Start LED Flash
- Reset To Factory Defaults

#### 3.6.2.1 Export Device List

This function exports all the details of the DCP Discovery to a CSV (comma-seperated variable format) file.

#### 3.6.2.2 Set IP Address

This function allows the user to change the IP parameters of a connected device. When selected, the *Set Device IP Parameters* window opens.

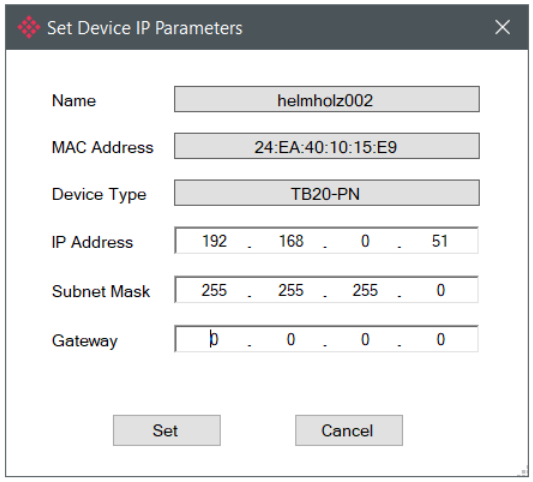



Figure 3.23 – Set Device IP Parameters

The device's new *IP Address*, *Subnet Mask*, and *Gateway* address can be configured. Clicking the **SET** button will cause these new parameters to be written to the device's non-volatile memory.

### 3.6.2.3 Set Name

This function allows the user to change the PROFINET Device Name of a connected device. When selected, the *Set Device Name* window opens.

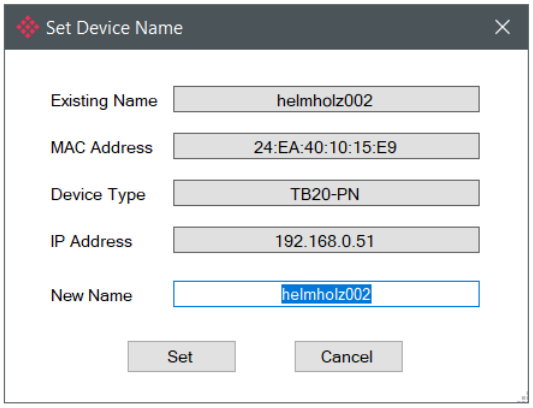



Figure 3.24 – Set Device Name

Clicking the **SET** button will cause the new Device Name to be written to the device's non-volatile memory.

### 3.6.2.4 Start LED Flash

This function will cause the connected device to flash all its LEDs for a few seconds. This allows the user to identify the physical device.

### 3.6.2.5 Reset To Factory Defaults

This function will cause the device to reset its current configuration and revert back to its factory default settings.

The user will be prompted to confirm the instruction before the Reset command is sent.

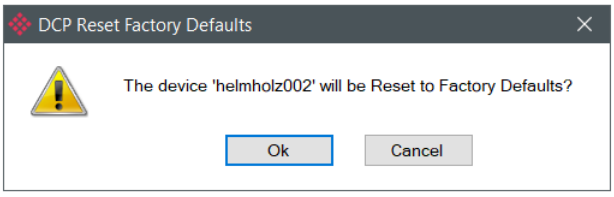



Figure 3.25 – Reset to Factory Defaults

## 3.7 Adding PROFINET Devices

In addition to adding PROFINET devices online, using the aforementioned *DCP Discovery* approach, devices can also be added manually.

To add a device, right-click on the **PROFINET DEVICES** item in the project tree and select the **ADD PROFINET DEVICE** option.

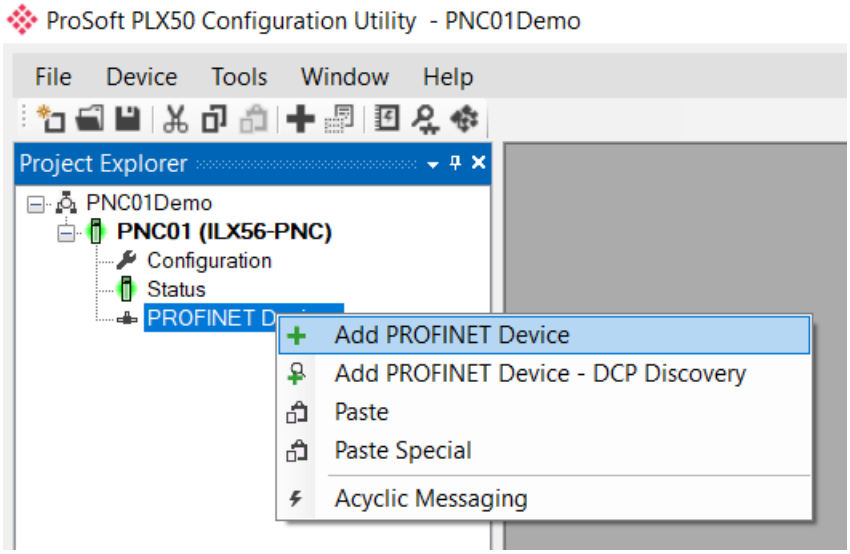



Figure 3.26 – Adding a PROFINET Device

The PROFINET GSDML Management window will open displaying all the available GSDML files and their associated devices. The selection can be narrowed by entering filter criteria for one or more of the following attributes:

- Vendor
- Description
- Ident.
- Order Number
- GSDML Filename

**Note:** The entered criteria can be removed by clicking on the **RESET** button.

**Note:** When entering filter criteria, it is recommended to use the wildcard character " * ", before and after the criteria text. Example: ***1234-GSK***

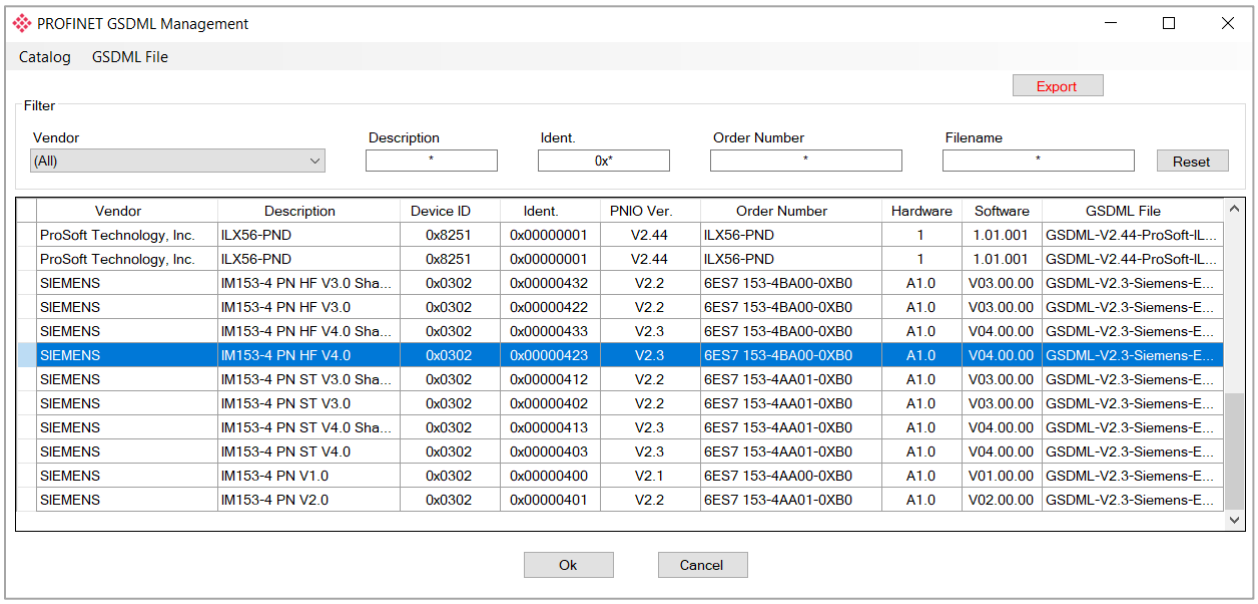



Figure 3.27 – Selecting a PROFINET Device

Once a device has been selected, click the **OK** button to continue the device instantiation process. The *Device Configuration* window will open.

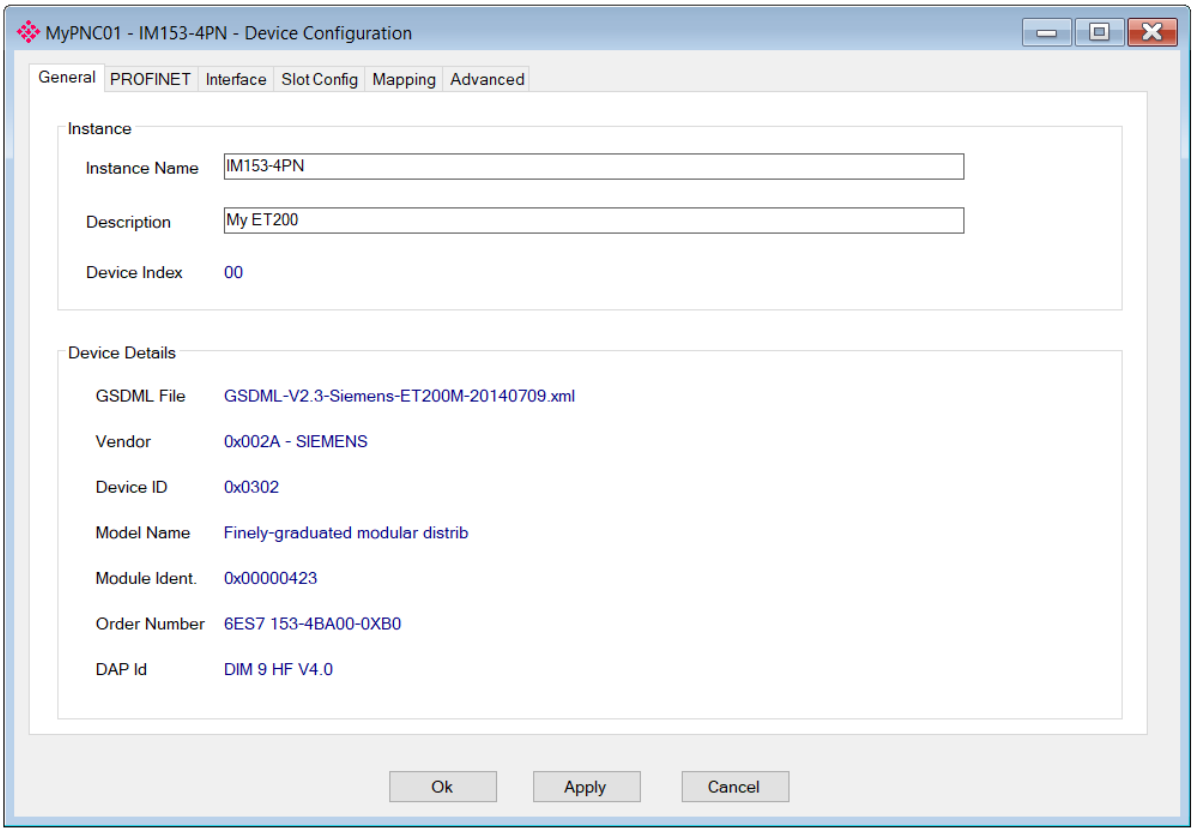



Figure 3.28 – PROFINET Device Added

### 3.7.1 General

The *General* tab contains the name, description, index, an details of the PROFINET device.

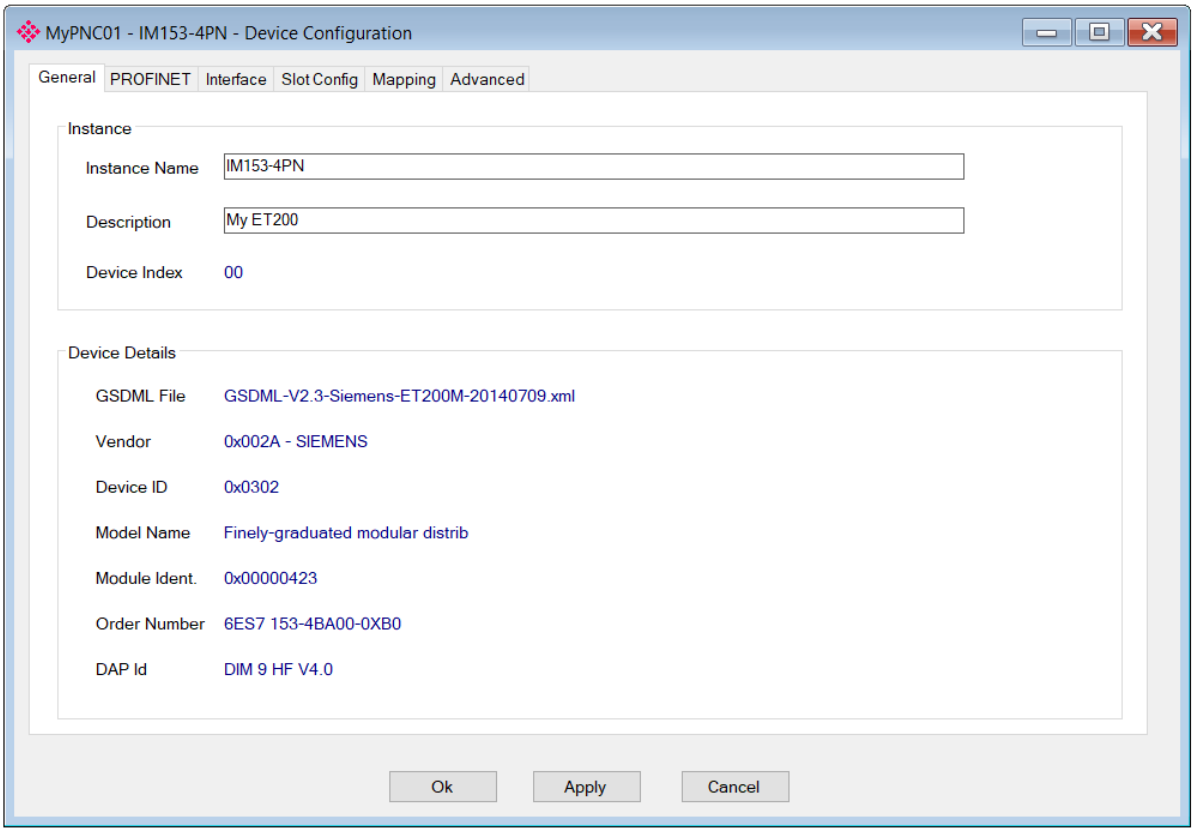



Figure 3.29 – Device General configuration parameters

The *General* configuration consists of the following parameters:

| Parameter | Description |
|---|---|
| *Instance* | |
| Instance Name | The device instance name which will be used to create the Tag names and UDTs in Logix.<br><br>**Note:** The PROFINET *Device Name* is synchronized to the *Instance Name* when the *Independent Device Name* option is not selected. |
| Description | A user defined description for the device. |
| Device Index | The Index (0 to 63) of the Device within the module's configuration. |

Table 3.3 – Device General configuration parameters

### 3.7.2 Device PROFINET Configuration

The PROFINET tab contains the general PROFINET configuration parameters.

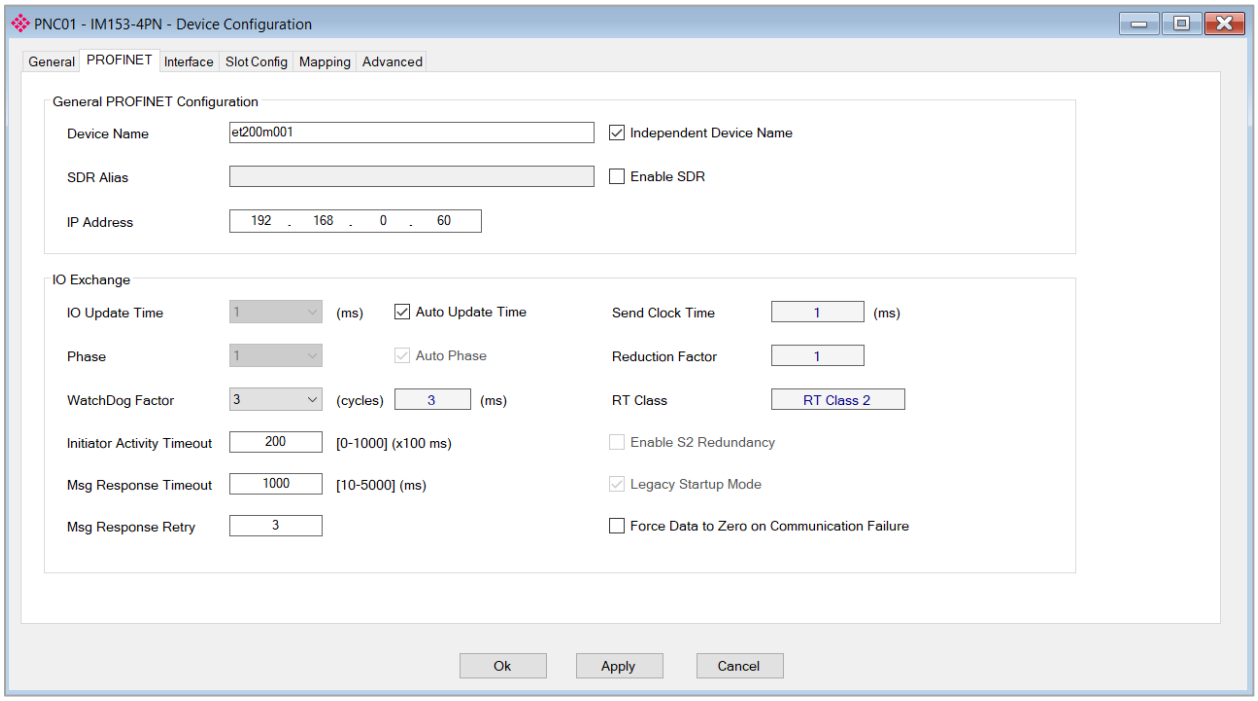



Figure 3.30 –Device PROFINET configuration parameters

The PROFINET configuration consists of the following parameters:

| Parameter | Description |
|---|---|
| *General PROFINET Configuration* | |
| Device Name | The name used to identify the device on the PROFINET network.<br><br>**Note:** This name will be synchronized with the *Instance Name* unless the *Independent Device Name* option is selected. |
| Independent Device Name | This option allows the PROFINET *Device Name* to be configured independently from the device *Instance Name*. |
| SDR Alias | The Simple Device Replacement Alias to be used for automatic Device Name assignment. |
| Enable SDR | Allows the automatic assignment of the Device Name and network parameters (e.g., IP address) for an IO device in case of device failure and replacement. The assignment makes use of the SDR Alias, typically provided by the Ethernet switch. |
| IP Address | The IP address of the PROFINET device. |
| *I/O Exchange* | |
| I/O Update Time | The rate (in milliseconds) at which IO data is exchanged with the device.<br>The selection is based on the ILX56-PNC's Send Clock ratio and the allowed Reduction Ratios in the device's GSDML file.<br><br>**Note:** If the *Auto Update Time* option is selected, then this will automatically be assigned. |
| Auto Update Time | Selecting this option will force the *IO Update Time* to a recommended value. |

| | |
|---|---|
| Phase | The Phase number, (or send clock cycle), where the IO exchange with the device will occur. The Phase is used to balance the network loading across the macro-cycle.<br><br>**Note:** When the *Auto Phase* option is selected, then the phase is automatically assigned to keep the send clocks as balanced as possible. |
| Auto Phase | Selecting this option will force the *Phase* to a recommended value. |
| WatchDog Factor | The number of consecutive *IO Update Time* periods (cycles) where no valid IO data is received from the device at which point the controller deems the device to be offline. |
| Initiator Activity Timeout | The number of milliseconds allowed before the first cyclic data is required from the PROFINET device, after cyclic communication connection establishment. |
| Send Clock Time | Displays the current ILX56-PNC's Send Clock Time. (Read Only). |
| Reduction Factor | The currently selected Clock Reduction Factor. (Read Only).<br>The *Reduction Factor* is based on the selection of *IO Update Time*. |
| Msg Response Timeout | The maximum amount of time the controller will wait for a reply from a device after sending a message request.<br><br>**Note:** Must be between 10 to 5000 ms. |
| Msg Response Retry | The maximum number of times the controller will retry a message request. |
| Enable S2 Redundancy | Enables S2-Redundancy. (See the S2 Redundancy section.)<br><br>**Note:** To enable S2 Redundancy, the PROFINET device must support it. |
| Legacy Startup Mode | The currently selected Connection Startup Mode based on the GSDML file. (Read Only). |
| Force Data to Zero on Communication Failure | When this option is selected, and a device is no longer exchanging IO data, then the input data will be forced to zero. |
| RT Class | The currently selected RT Class for the connection based on the GSDML file. (Read Only). |

Table 3.4 – Device PROFINET configuration parameters

### 3.7.3 Interface

The *Interface* tab contains the PROFINET device parameters.

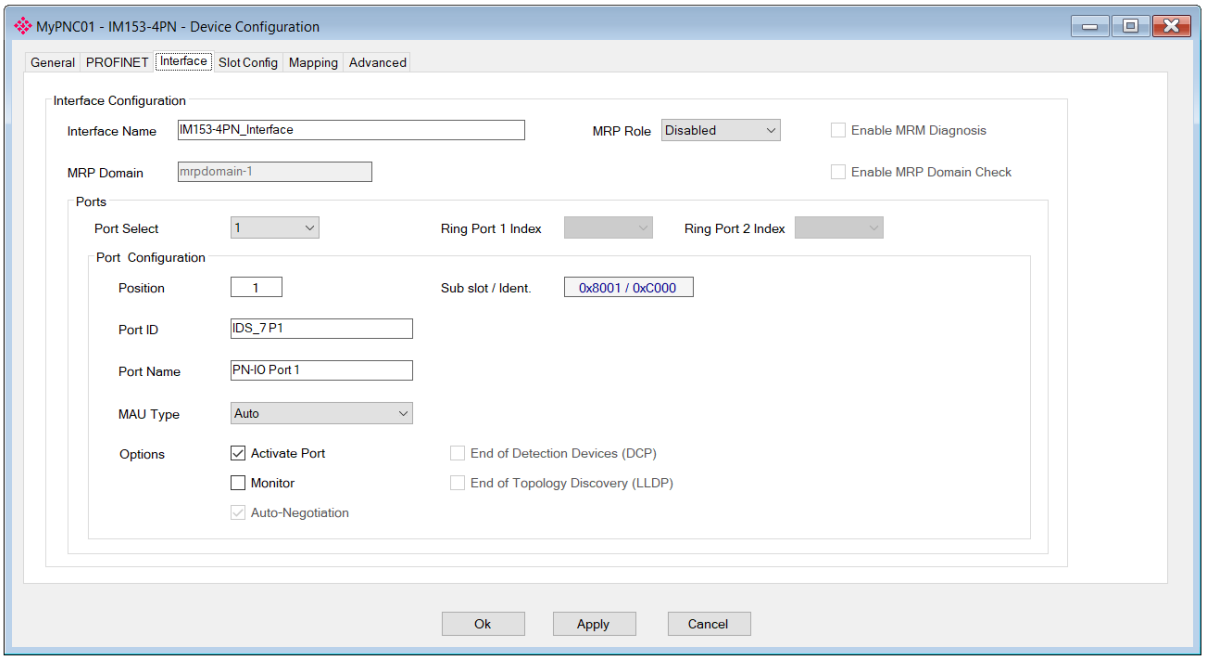



Figure 3.31 – Device Interface configuration parameters

The Interface configuration consists of the following parameters:

| Parameter | Description |
|---|---|
| *Interface Configuration* | |
| Interface Name | The user assigned name for the interface. |
| MRP Role | The Media Redundancy Protocol (MRP) Role of the device, either:<br><br>**Disabled:** The device is not located in an MRP Ethernet ring.<br><br>**Client:** The device is located in an MRP Ethernet ring, but is not a manager.<br><br>**Manager:** The device is located in an MRP Ethernet ring and has been assigned the manager role.<br><br>See the section on MRP for more information. |
| MRP Domain | The identifier for the logical MRP collection.<br>The controller (ILX56-PNC) and the devices in an MRP ring must all have the same MRP Domain configured. |
| Enable MRM Diagnosis | This option enables the device, when operating as a Media Redundancy Protocol Manager (MRM), to provide MRP diagnostics. |
| Enable MRP Domain Check | This option enables the device to check and report an inconsistent MRP Domain name. |
| *Ports* | |
| Port Select | This combo box allows the user to select between the different device ports.<br>Once a *Port* is selected, then all the items in the *Port Configuration* group will be displayed for that specific port. |

| | |
|---|---|
| Ring Port 1 Index<br>Ring Port 2 Index | Ring Port 1 and 2 Index is used to select which ports on the device will be used for the MRP ring.<br><br>**Note:** This is typically only relevant for devices with more than 2 ports. |
| *Port Configuration* | |
| Position | The selected port number. (Port Select) |
| Port ID | The ID assigned to the port. |
| Port Name | The user assigned name to the port. |
| MAU Type | The Media Attachment Unit Type selected for the port.<br>This typically sets the required speed (e.g. 10 / 100 Mb/s) an duplex of the port.<br>The options are based on the device's GDML file. |
| Sub slot / Ident. | The subslot and Identifier used to access the port object. |
| Activate Port | This option determines whether the port should be disabled or not.<br>The availability of the option depends on the device's GSDML file. |
| Monitor | This option determines whether the port should be monitored for a change in link status.<br>When selected the device will report a change in the ports link status.<br>The availability of the option depends on the device's GSDML file. |
| Auto-Negotiation | When selected, the port will be set to Auto-Negotiate, where the MAU automatically determines the best speed and duplex with the remote Ethernet device. |
| End of Detection Devices (DCP) | When this option is selected, then DCP Discovery frames are not forwarded through this port. |
| End of Topology Discovery (LLDP) | When this option is selected, then LLDP Discovery frames are not forwarded through this port. |

Table 3.5 – Device Interface configuration parameters

### 3.7.4 Slot Configuration

The *Slot Config* tab contains the module and sub-module slot configuration.

The device's GSDML file defines the available (Physical) slots, as well the "Plugging Rules" which specify which modules can be added to each slot, and whether they are:

- Fixed – (Cannot be deleted)
- Allowed – (Can be added / deleted)
- Used (added / deleted, Added by default)

When a device is instantiated, all the system and fixed modules and sub-modules are automatically added to the slot configuration.

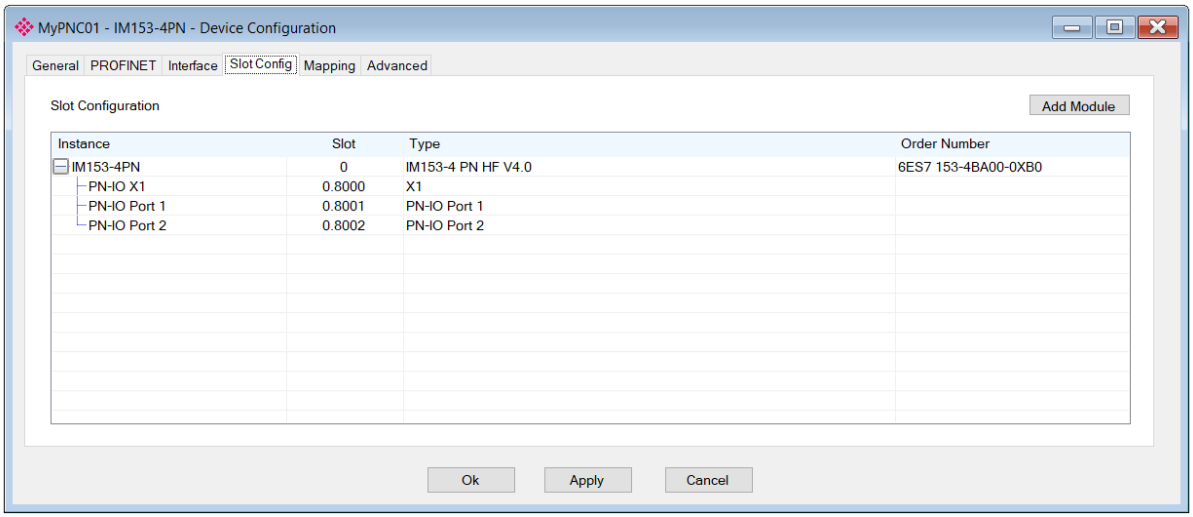



Figure 3.32 –Device Slot configuration

### 3.7.4.1 Add Module

To add a module, either click on the **ADD MODULE** button in the *Slot Config* tab, or right-click and select the **ADD MODULE** context menu option.

The *Add Module* window will open and list all the available modules from the GSDML file for the particular selected *Slot Number*.

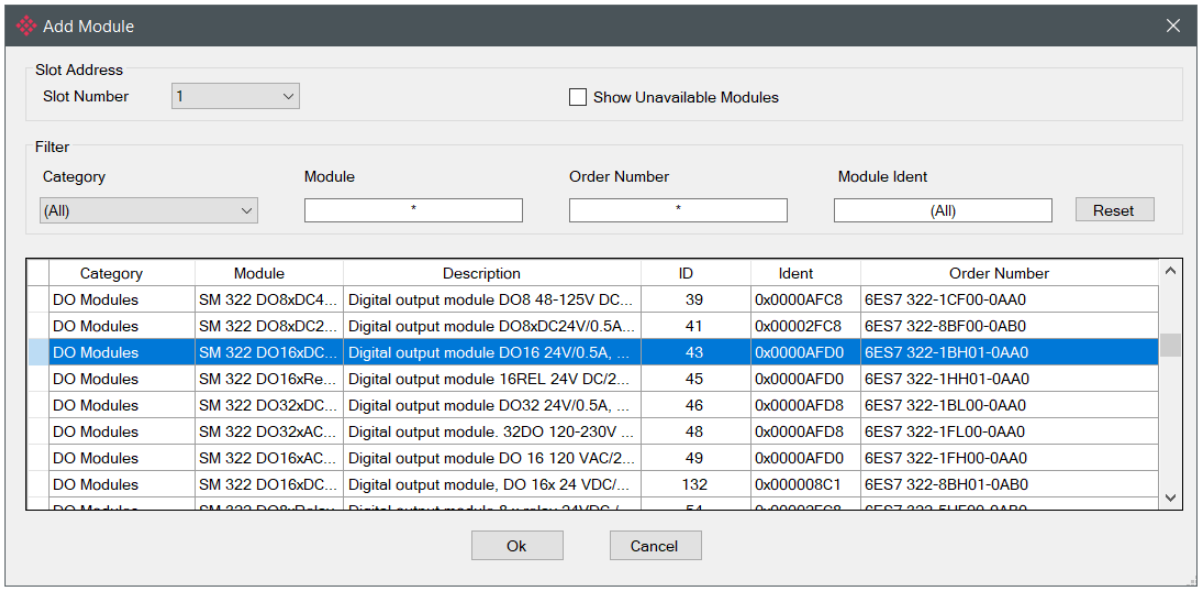



Figure 3.33 – Module Selection

**Note:** Changing the selected *Slot Number* may change the list of available modules, based on the GSDML Plugging Rules.

The module selection can be narrowed by entering filter criteria for one or more of the following attributes: *Category*, *Module*, *Order Number*, and *Module Ident*

**Note:** The entered criteria can be removed by clicking on the **RESET** button.

**Note:** When entering filter criteria, it is recommended to use the wildcard character " * ", before and after the criteria text. Example: ***321 DI4***

Once the required module has been selected, click the **OK** button. The selected module will be added to the Slot configuration.

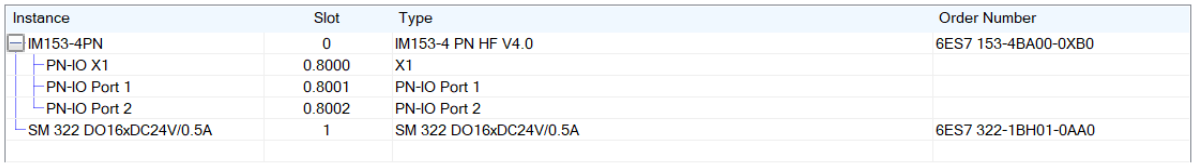



Figure 3.34 – Slot configuration

### 3.7.4.2 Configure Module

When a module has its associated configuration parameters, the parameters can be edited by right-clicking on the specific module and selecting the **CONFIGURE MODULE** menu option.

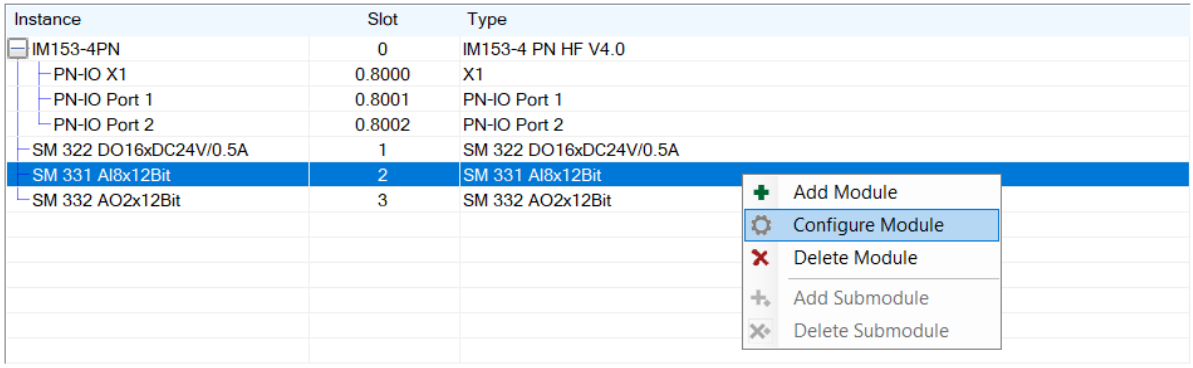



Figure 3.35 – Configure Module option

The *Parameter Editor* window will open. The list of parameters and their associated enumerated configuration options are derived from the GSDML file.

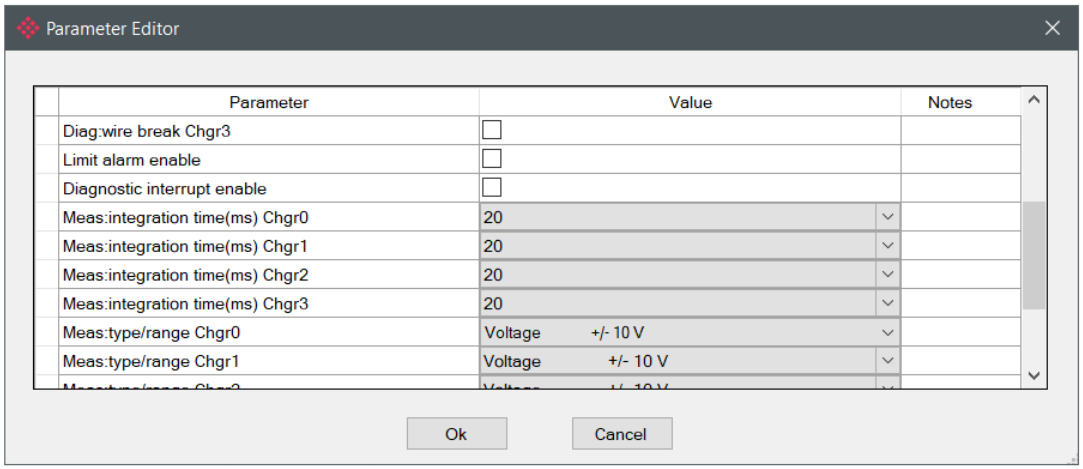



Figure 3.36 –Module Parameter Editor

Once the parameter configuration is complete, click the **OK** button to accept the changes.

### 3.7.4.3 Delete Module

To delete a module, right-click on the module and select the **DELETE MODULE** menu option.

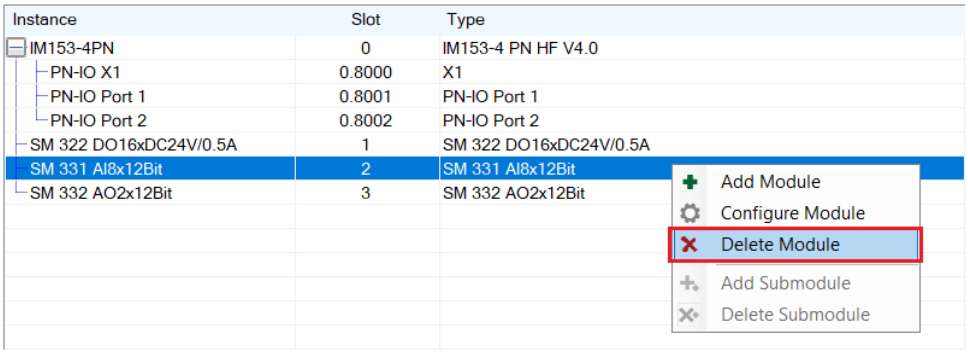



Figure 3.37 – Delete Module

### 3.7.4.4 Add Submodule

Some module's support submodules. To add a submodule to an existing module, right-click on the module and select the **ADD SUBMODULE** option.

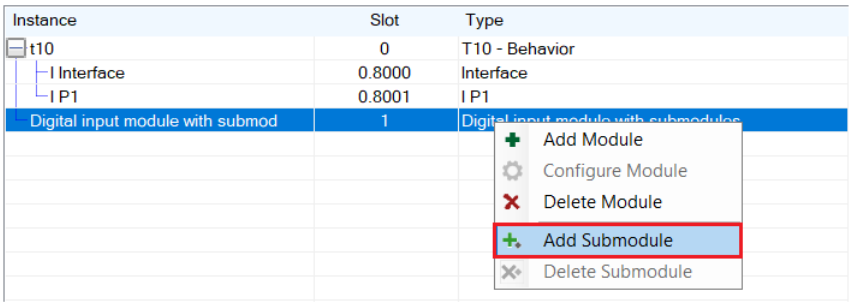



Figure 3.38 – Add Submodule

The *Add Submodule* selection window will open and list all the available submodules from the GSDML file, for the particular selected *Subslot Number*.

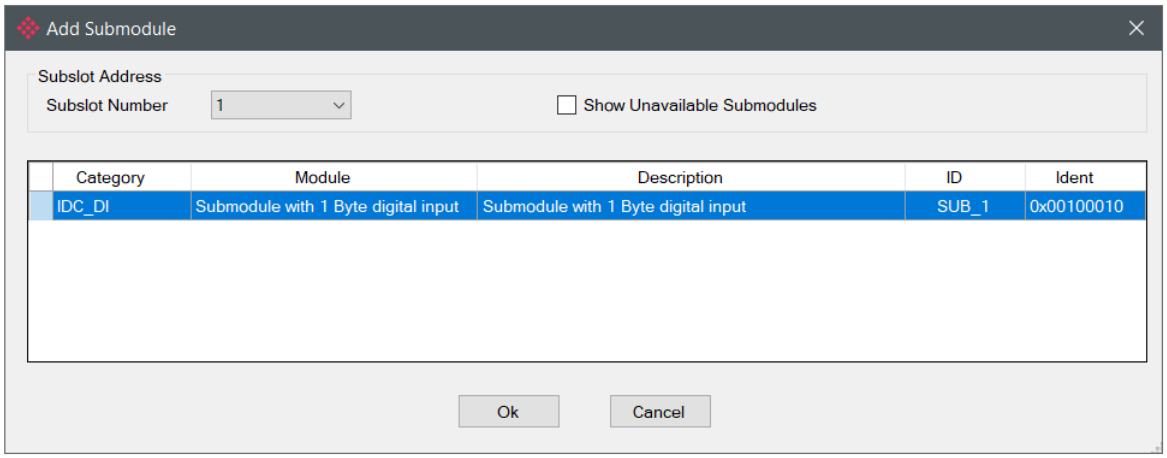



Figure 3.39 – Submodule Selection

**Note:** Changing the selected *Subslot Number* may change the list of available submodules, based on the GSDML Plugging Rules.

Once the required submodule has been selected, click the **OK** button. The selected submodule will be added to the Slot configuration.

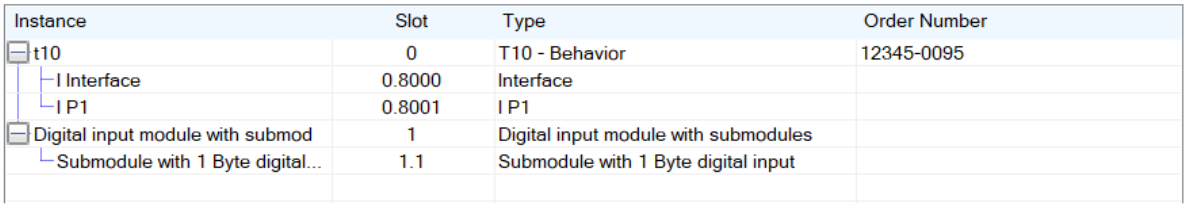



Figure 3.40 – Submodule in Slot configuration

### 3.7.4.5 Delete Submodule

To delete a submodule, right-click on the submodule and select the **DELETE SUBMODULE** menu option.

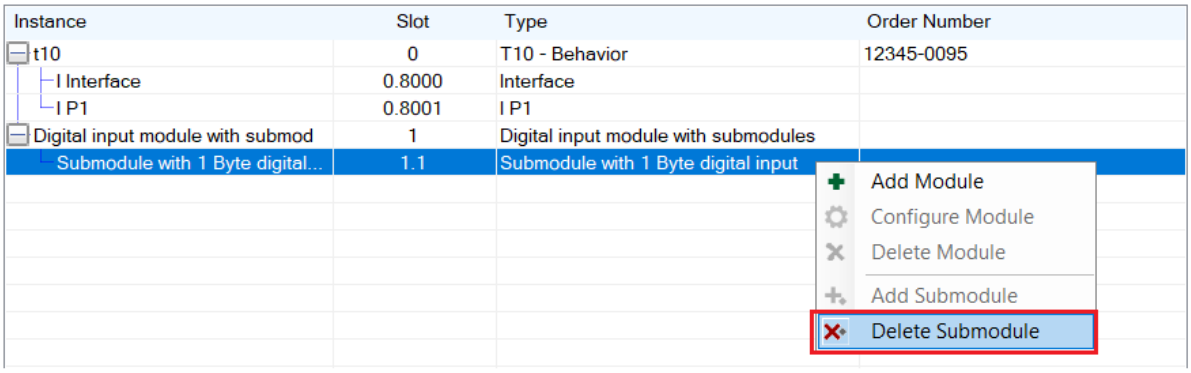



Figure 3.41 – Delete Submodule

### 3.7.5 Mapping

The *Mapping* tab displays the relationship between the PROFINET device's input and output data and the resulting tag UDT structure in Logix.

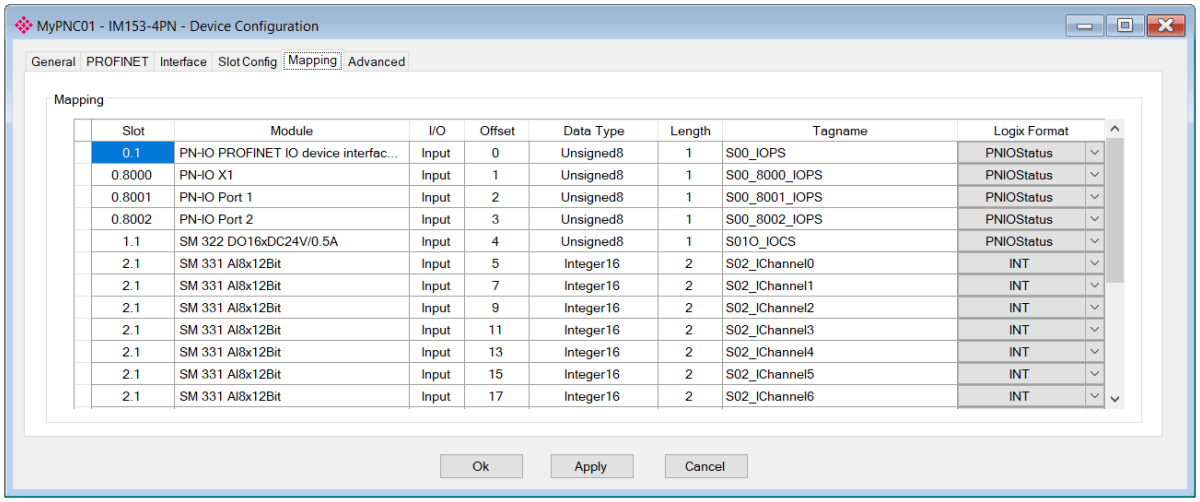



Figure 3.42 – Device Mapping configuration

The items in the Mapping configuration are automatically added and removed when a module/submodule is added or removed.

The mapping columns are fixed except for the *Tagname* and *Logix Format* fields that can be manipulated by the user.

The Mapping configuration table contains the following columns:

| Column | Description |
|---|---|
| Slot | The slot or sub-slot position of the module or submodule. (Read only) |
| Module | The name of the module or submodule. (Read only) |
| I/O | The direction of the data flow. (Read only)<br>**Input**: From device to controller<br>**Output**: From controller to device. |
| Offset | The byte offset in the PROFINET device data structure (Read only) |
| Data Type | The PROFINET data type. (Read only) |
| Length | The data length in bytes. (Read only) |
| Tagname | The user configurable Tagname for the data point.<br>This Tagname is used to generate the device specific UDT (user defined data type) that will be imported into Logix.<br><br>**Note:** The Tagname must conform to the requirements of Logix tagnames / UDT member names. (No spaces or extended characters.)<br><br>**Note:** Each Tagname must be unique across the entire PROFINET device. |

| | |
|---|---|
| Logix Format | The data format to be used for the Logix device specific UDT.<br>Depending on the corresponding PROFINET data type, the following options are available:<br>• None (The item is excluded from the Logix structure.)<br>• BOOL<br>• SINT<br>• INT<br>• DINT<br>• LINT<br>• REAL<br>• LREAL<br>• SINTArray<br>• PNIOStatus - A specific UDT to describe both the:<br>  ○ IOPS – Input Output Object Provider Status<br>  ○ IOCS – Input Output Object Consumer Status |

Table 3.6 – Device Mapping configuration columns

### 3.7.6 Advanced

The *Advanced* tab contains the language, CRC, and assembly parameters.

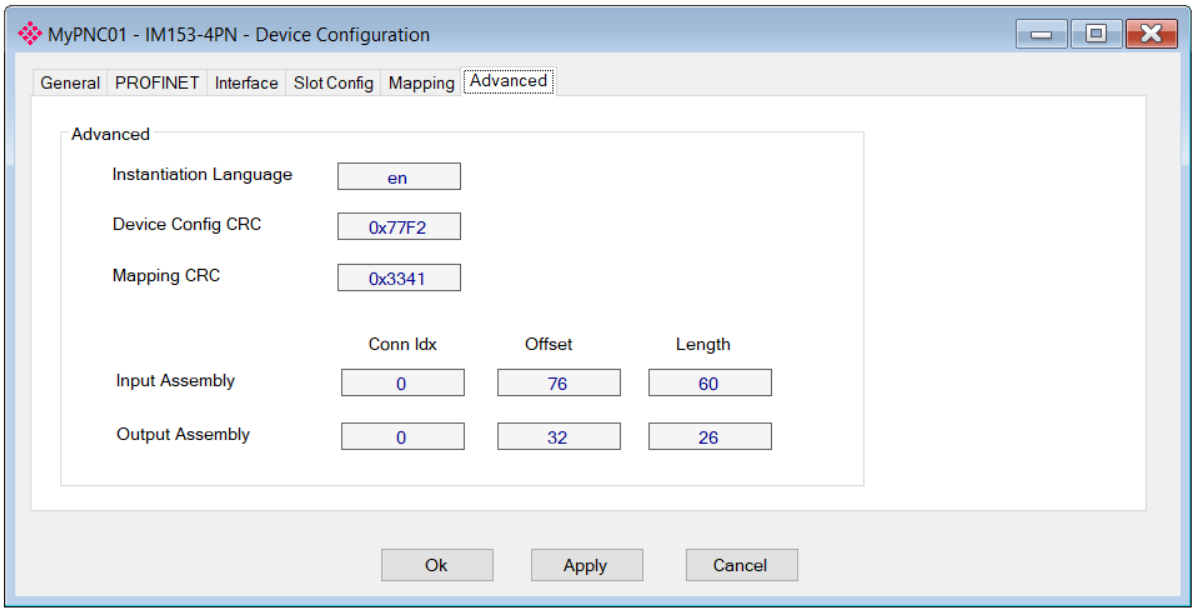



Figure 3.43 – Device Advanced configuration

The *Advanced* tab contains the following parameters:

| Parameter | Description |
|---|---|
| Instantiation Language | The language selected when the device was instantiated. |
| Device Config CRC | A checksum calculated on the entire device's configuration. |
| Mapping CRC | A checksum of the device configuration associated with data mapping. |
| *Input Assembly* | |
| Conn Idx | The ILX56-PNC's connection index where this device's input data starts. |
| Offset | The ILX56-PNC's connection offset where this device's input data starts. |
| Length | The total input assembly size (bytes) required by the device. |
| *Output Assembly* | |
| Conn Idx | The ILX56-PNC's connection index where this device's output data starts. |
| Offset | The ILX56-PNC's connection offset where this device's output data starts. |
| Length | The total output assembly size (bytes) required by the device. |

Table 3.7 – Device Advanced configuration parameters

## 3.8 Studio 5000 Configuration

There are two profile options for integrating the ILX56-PNC into Logix:

- Standard (ILX56-PNC) Add-On-Profile (AOP)
- Generic Profile (1756-Module)

**Note:** The minimum Studio 5000 version that can be used is V16. The preferred implementation makes use of an Add-On Profile (AOP) for the 1756 Backplane, which requires V30 and newer. Versions prior to V30 require the use of a Generic Profile.

**Note:** The choice of profile selected in Studio 5000 / RSLogix 5000 must match that configured in the PLX50 Configuration Utility.

### 3.8.1 Standard Add-On Profile

#### 3.8.1.1 Installing the Add-On Profile (AOP)

Before the ILX56-PNC module AOP can be added into the Logix I/O tree, it must first be installed on that system. The user will need to download the AOP from www.prosoft-technology.com. Once downloaded extract the zip file, run the *MPSetup.exe* file, and follow the on-screen instructions.

#### 3.8.1.2 Add Module to I/O Configuration

To add the AOP in the Logix IO Configuration (tree), right-click on the **1756 BACKPLANE** and select the **NEW MODULE** option.

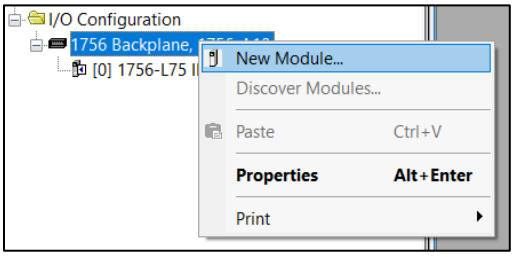



Figure 3.44 – Adding a New Module

The *Select Module Type* dialog will open. Enter the ILX56-PNC name into the catalog filter to find the ILX56-PNC AOP.

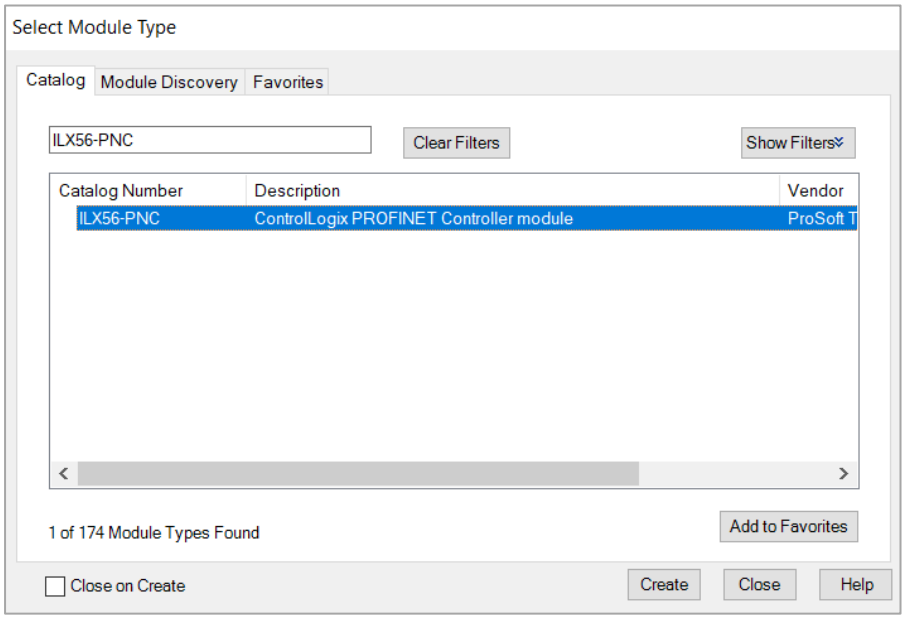



Figure 3.45 – Selecting the module

Select the ILX56-PNC and click **CREATE**. The *New Module* dialog will open, where the user must configure the module *Name* and *Slot* as a minimum to complete the instantiation.

**Note:** The module *Name* must match the *Instance Name* configured in the PLX50 Configuration Utility.

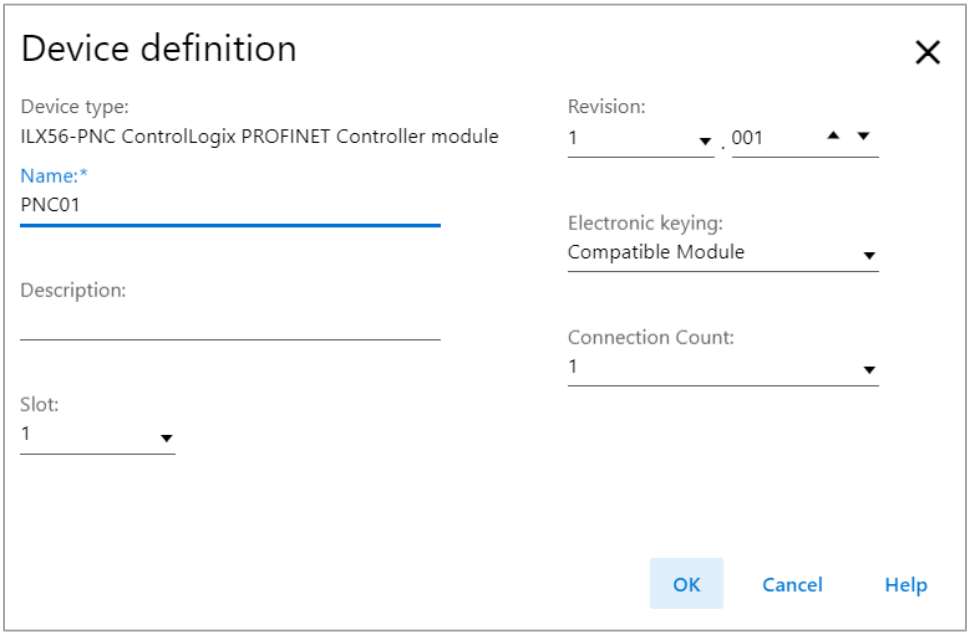



Figure 3.46 – Module instantiation

Once the instantiation is complete the module will appear in the Logix IO tree.

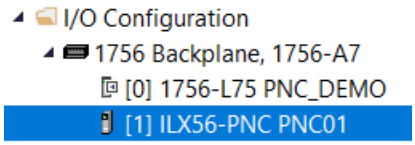



Figure 3.47 – Logix IO tree

The *Module Defined Data Types* will be automatically created during the instantiation process.

### 3.8.1.3 PLX50 Configuration Utility Project File

The ILX56-PNC AOP allows the user to save the PLX50 Configuration Utility project file in the AOP as well as launch PLX50 Configuration Utility from the AOP.

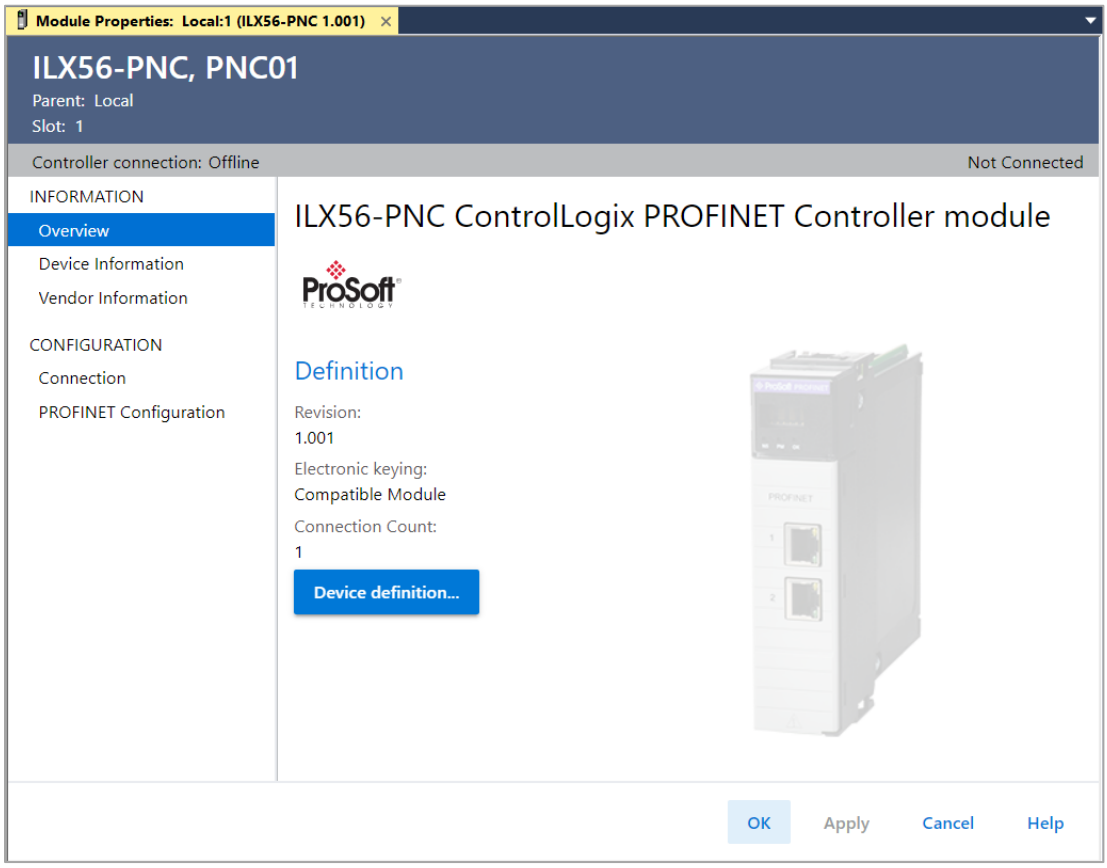



Figure 3.48 – AOP - PLX50 Configuration Utility

When no PLX50 Configuration Utility project has been defined, the user can *Browse* for an existing PLX50 Configuration Utility project. If no PLX50 Configuration Utility project has been created, the user can manually enter in the project file name in the *PLX50 Configuration Utility Project File* textbox and select the **LAUNCH PLX50 CONFIGURATION UTILITY** button.

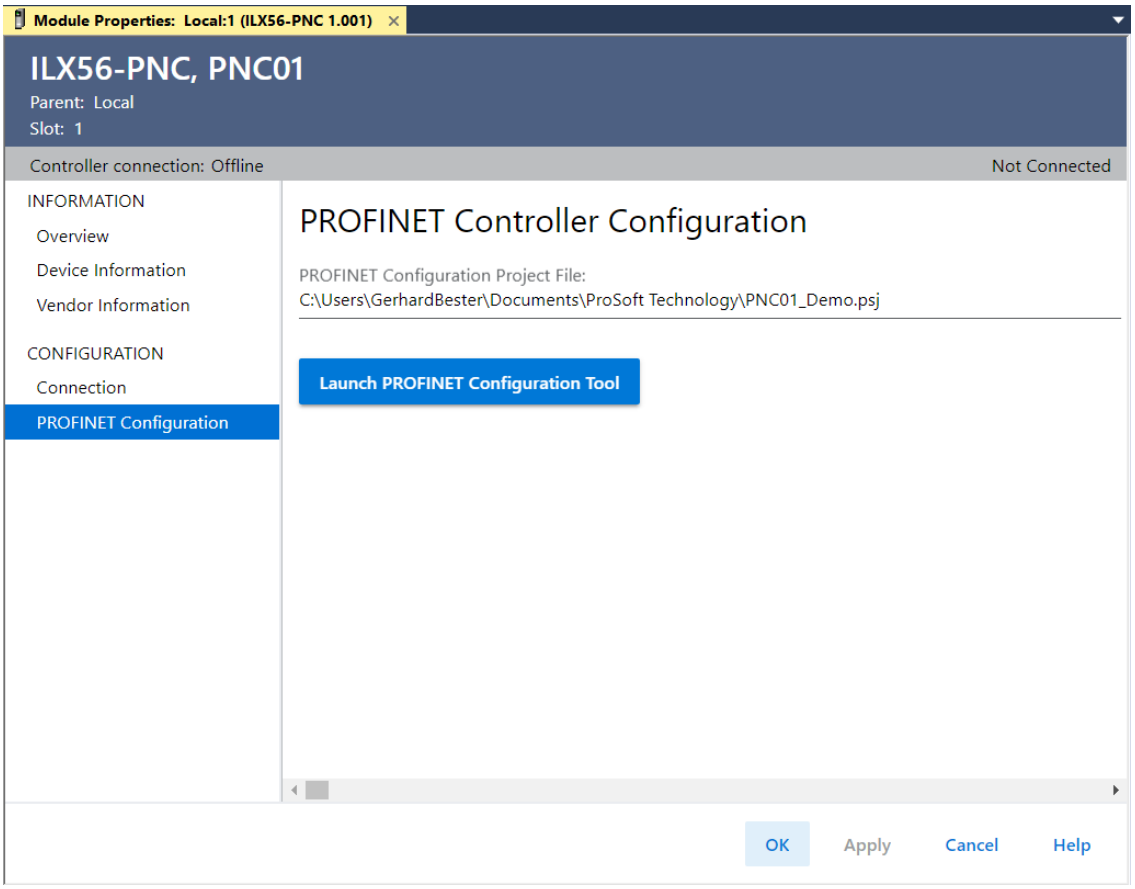



Figure 3.49 – AOP – Launch PLX50 Configuration Utility

**Note:** Once the file name has been entered, the user will need to click **APPLY** before the **LAUNCH PLX50 CONFIGURATION UTILITY** button will become available.

### 3.8.2 Generic Profile

For older versions of Studio 5000 / RSLogix 5000, the use of the *Generic Profile* approach is required.

To add the **Generic 1756-Module** profile in the Logix *IO Configuration* (tree), right-click **1756 BACKPLANE** and select the **NEW MODULE** option.

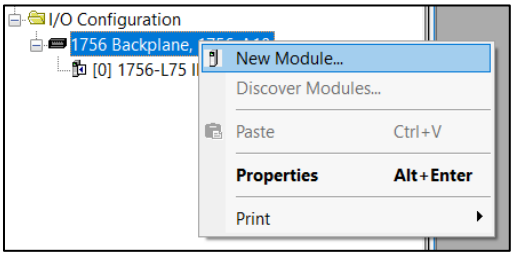



Figure 3.50 – Adding a New Module

The *Select Module Type* dialog will open. The *Module Type Category Filters* search field can be used search for **"Generic"** modules as shown in the following figure.

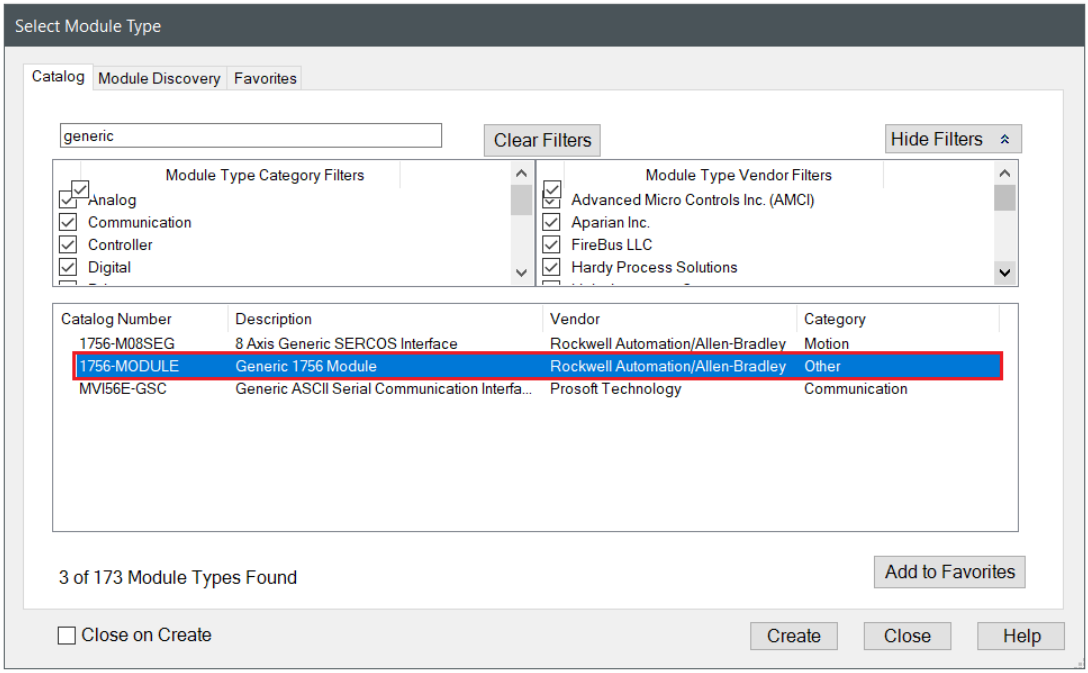



Figure 3.51 – Selecting the Generic module

Locate and select the **1756-MODULE** and click the **CREATE** button. The *New Module* dialog will open, where the user must configure the module *Name*, *Slot*, and *Connection Parameters* as a minimum to complete the instantiation.

**Note:** The module *Name* must match the *Instance Name* configured in the PLX50 Configuration Utility.

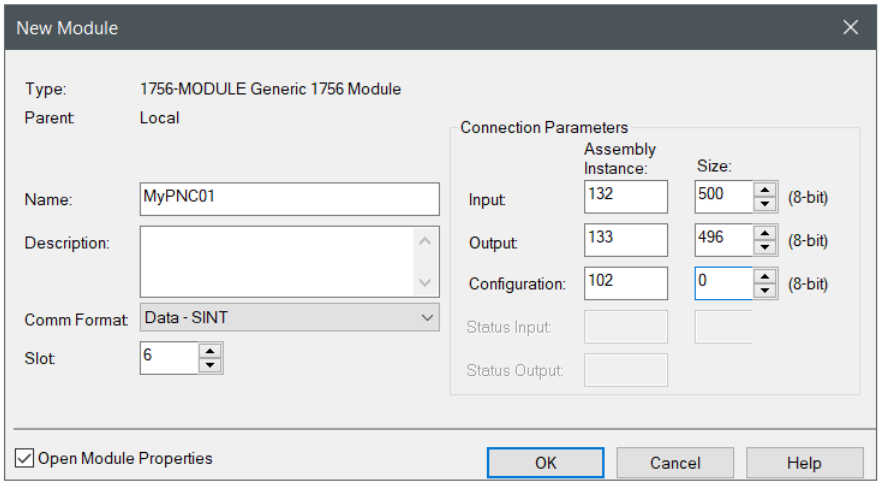



Figure 3.52 – Generic Module instantiation

The required *Connection Parameters* are as follows:

| Parameter | Description |
|---|---|
| Input Instance | 132 |
| Input Size | 500 (bytes) |
| Output Instance | 133 |
| Output Size | 496 (bytes) |
| Configuration Instance | 102 |
| Configuration Size | 0 (bytes) |

Table 3.8 – Generic Connection Parameters

Once the instantiation is complete the module will appear in the Logix IO tree.

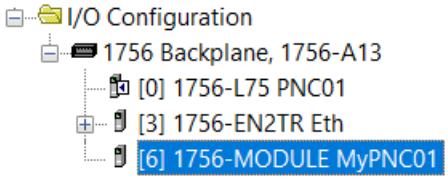



Figure 3.53 – Logix IO tree

## 3.9 Logix Mapping

The PLX50 Configuration Utility will generate the required UDTs and Routines to map the PROFINET input and output data. The user will need to generate the required Logix and UDTs by right-clicking on the module in the PLX50 Configuration Utility and selecting the **GENERATE LOGIX L5X** option.

**Note:** The user will need to ensure that the Logix Base Tag is correct for the generated Logix L5X code to work. The base tag will be the tag name for the module input and output assemblies in the Logix controller owning the module.

For example, if the ILX56-PNC is in the same local rack as the Logix controller owning it, the Logix Base Tag will be *Local:xx* (where *xx* is the slot number of the module). Below is an example where the ILX56-PNC is in slot 1 of the local rack connected to the Logix controller in the same rack.

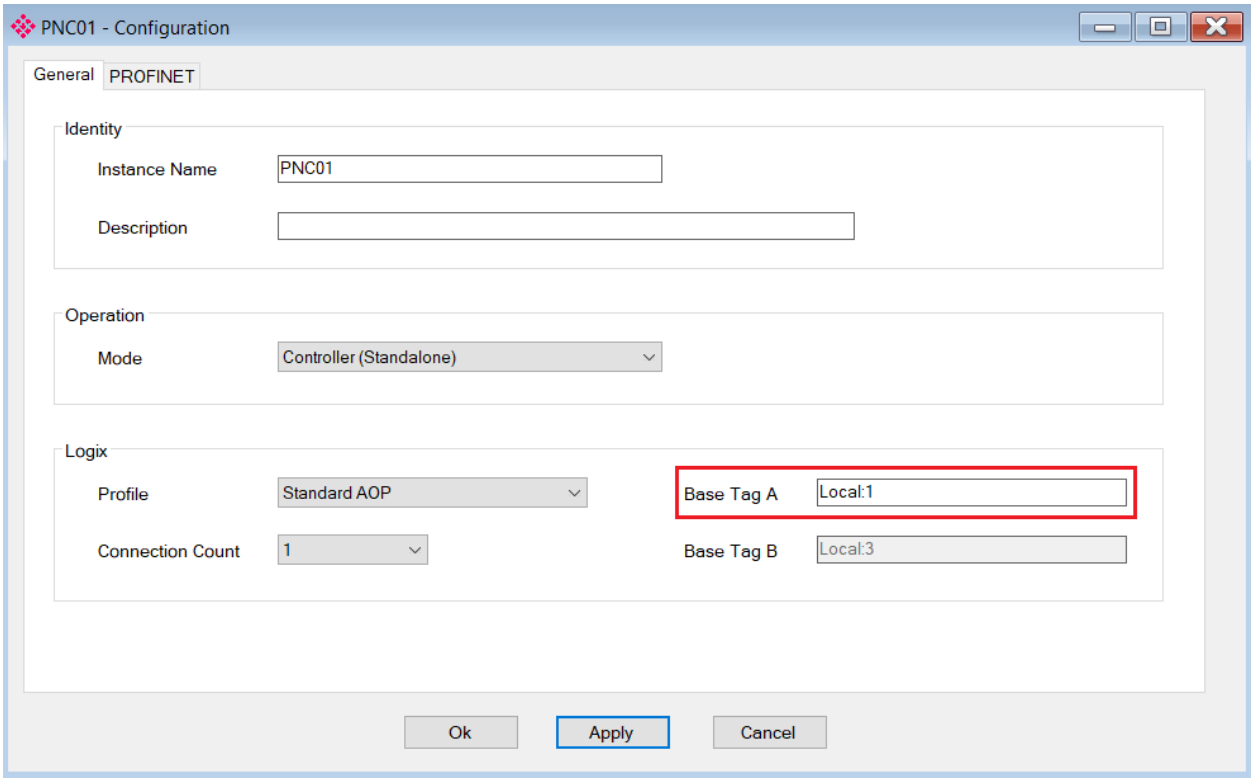



Figure 3.54 – Logix Base tag assignment in PLX50 Configuration Utility

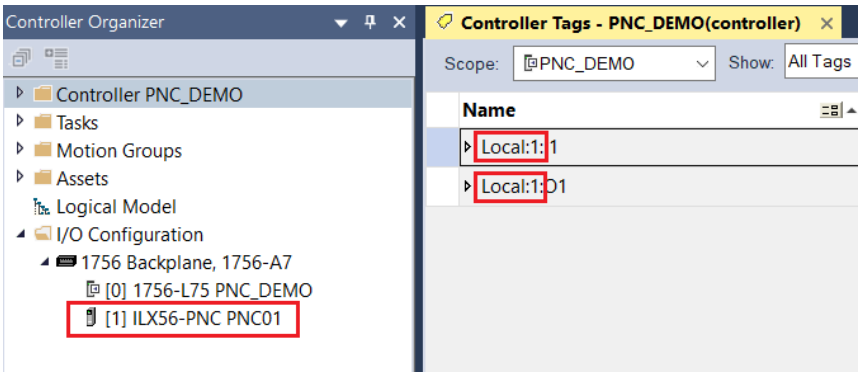



Figure 3.55 – Logix Base tag assignment in Studio 5000

If the module is in a remote rack, the user will need to enter the Logix Base Tag based on the name of the remote rack (see the example below):

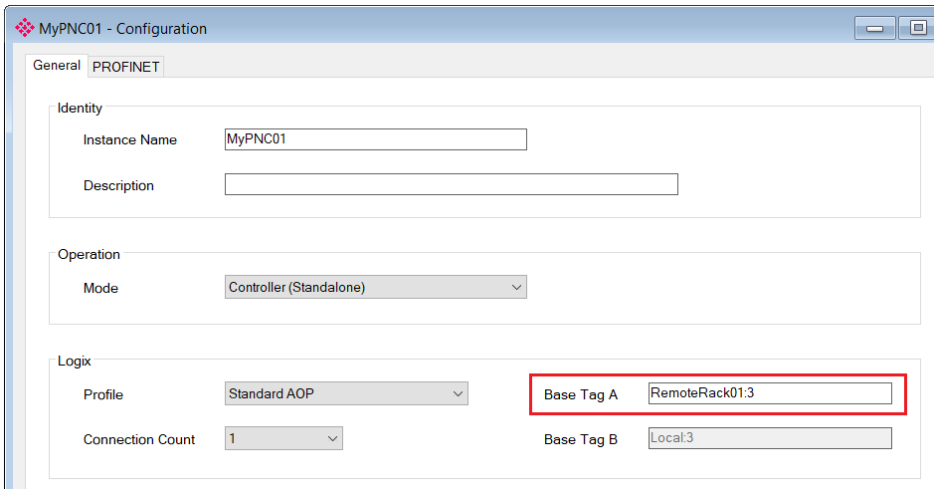



Figure 3.56 – Logix Base tag assignment in PLX50 Configuration Utility

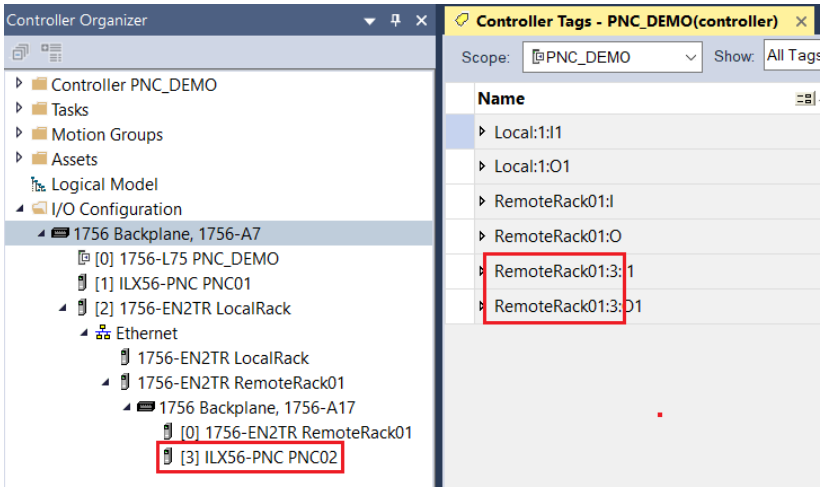



Figure 3.57 – Logix Base tag assignment in Studio 5000

To generate the mapping Logix L5X file, right-click on the ILX56-PNC module and select the **GENERATE LOGIX L5X** option.

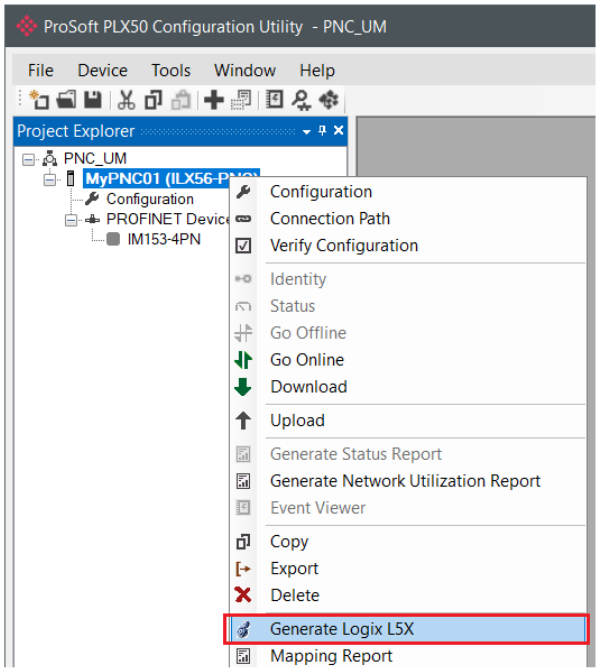



Figure 3.58 – Selecting Generate Logix L5X

The user will then be prompted to select a suitable file name and path for the L5X file.

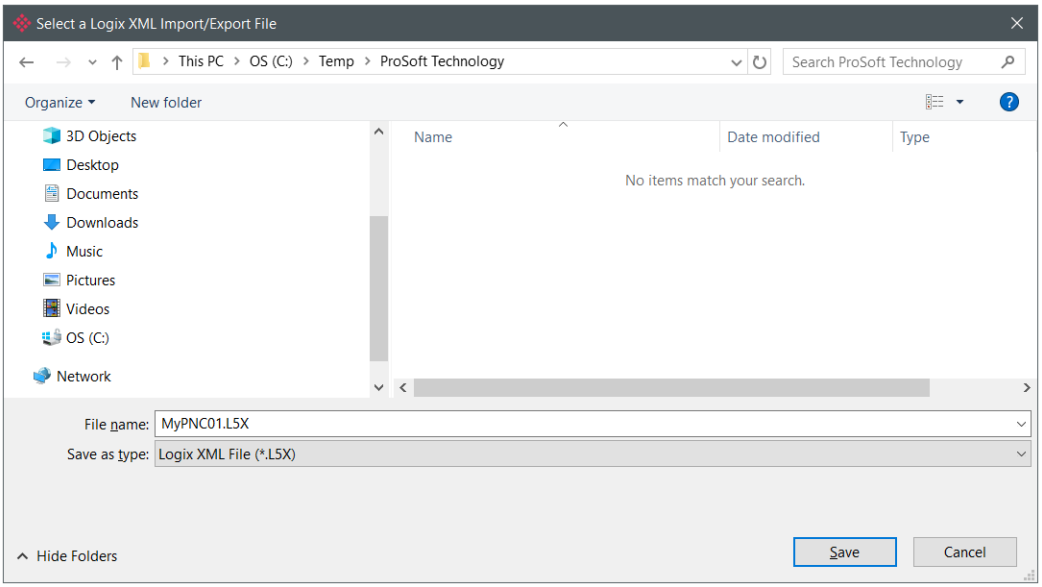



Figure 3.59 – Selecting the Logix L5X file name.

This L5X file can now be imported into the Studio 5000 project by right-clicking on a suitable **PROGRAM**, then **ADD** > **IMPORT ROUTINE**.

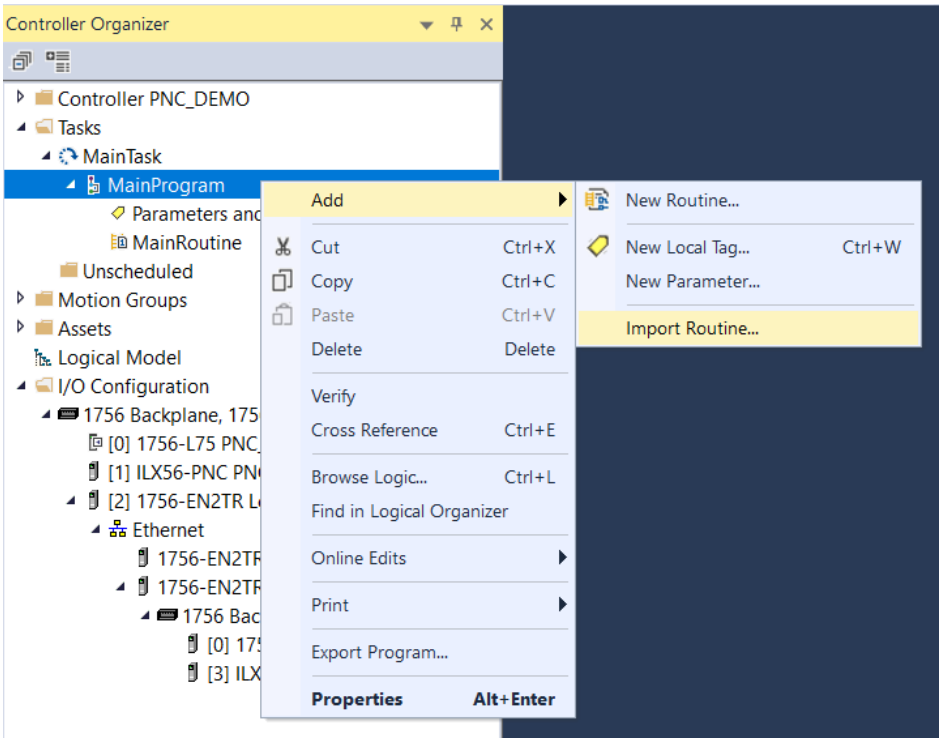



Figure 3.60 – Importing the L5X file into Studio 5000

In the file open dialog, select the previously created L5X file and press **OK**.

The import will create the following:

- Mapping Routine
- Multiple UDT (User-Defined Data Types)
- Multiple Controller Tags

Since the imported mapping routine is not a *Main Routine*, it will need to be called from the current *Main Routine*.


Figure 3.61 – Calling the mapping routine

The following shows an example of the items created by importing the L5X file.

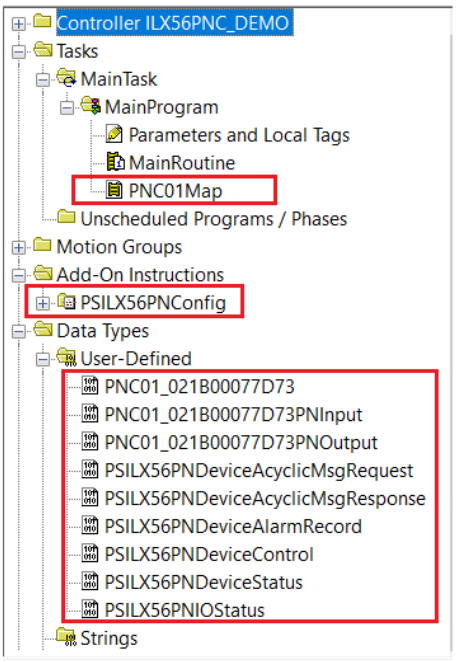



Figure 3.62 – Imported Logix Objects

A number of ILX56 specific (UDT) tags are created for both the ILX56-PNC Controller as well as the configured PROFINET devices. These structures are described in the following section.

For each PROFINET device, a ladder-logic rung is created to map the input/output data to and from the device to the Logix controller. The rung also includes an AOI to map the expected device IP address and device mapping (CRC) checksum. This enforces data integrity between the configuration in the ILX56-PNC and that which the Logix application is expecting.

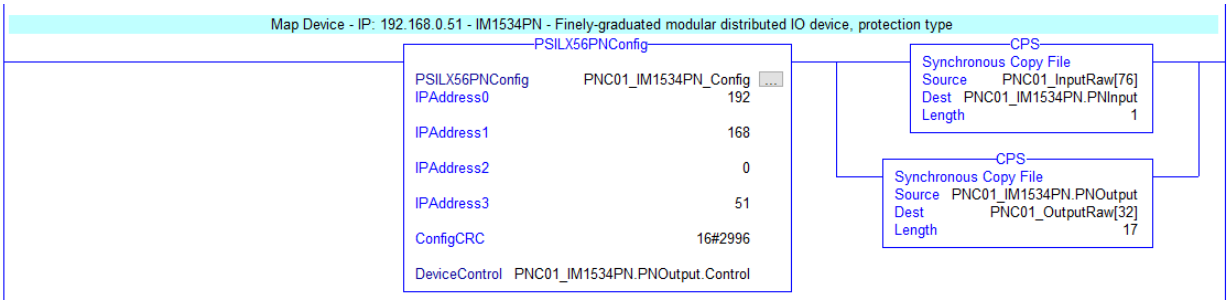



Figure 3.63 – Typical Device Mapping Rung.

# 4 SD Card

The ILX56-PNC supports an SD Card for disaster recovery. The SD Card can be pre-loaded with the required firmware and/or application configuration.

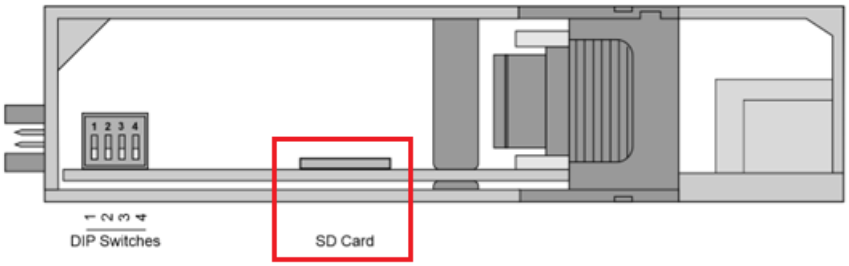



Figure 4.1 – Module Bottom View – SD Card Slot

**Note:** The user will need to ensure that the SD Card has been formatted for FAT32.

**Note:** All files must be copied into the root directory of the SD Card. The module will not use files located in folders.

## 4.1 Firmware

The user can copy the required firmware (download at www.prosoft-technology.com) onto the root directory of the SD Card.

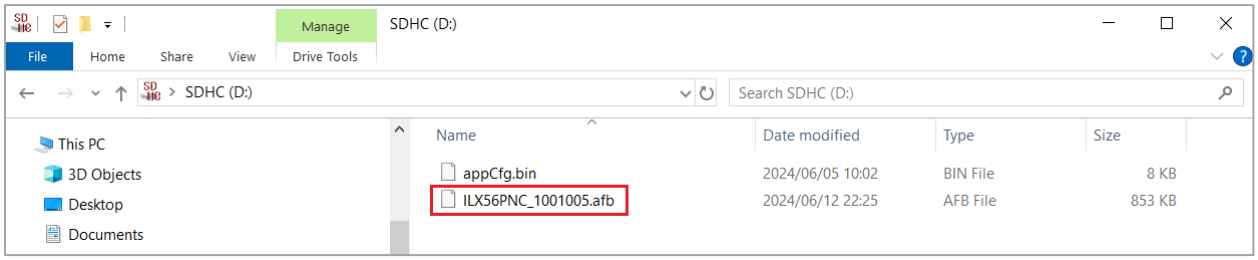



Figure 4.2 – SD Card – Firmware file

**Note:** The filename of the firmware file must not be changed. The specific module will use only the firmware that is valid (e.g. the ILX56-PNC will only use the PNC firmware file).

**Note:** If more than one firmware file with different firmware revisions of the same product is on the SD Card, it can cause the module to constantly firmware upgrade the module.

If a faulty module is replaced, the user can insert the SD Card with the firmware file into the new module. While the module is booting it can detect if the firmware on the replacement module is different from that on the SD Card. If yes, the firmware will either be upgraded or downgraded to the firmware revision on the SD Card.

## 4.2 Configuration

If a faulty module is replaced, the user can insert the SD Card with the configuration file into the new module. The new module will determine if the configuration on the SD Card is different than the currently loaded configuration (even when there is no configuration on the module). If different, the configuration on the SD Card will be downloaded into the module's NV memory before the module starts executing.

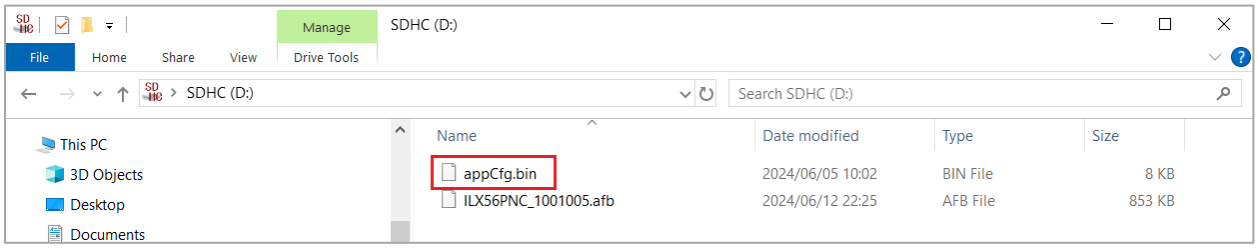



Figure 4.3 – SD Card – Configuration file

Once the user has created the necessary application configuration in the PLX50 Configuration Utility, the configuration can be exported to a file that can be used on the SD Card. The user can copy this exported file into the root directory of the SD Card.

### 4.2.1 Exporting the Configuration File

To export the configuration, right-click on the ILX56-PNC and select the **EXPORT CONFIGURATION FILE** option.

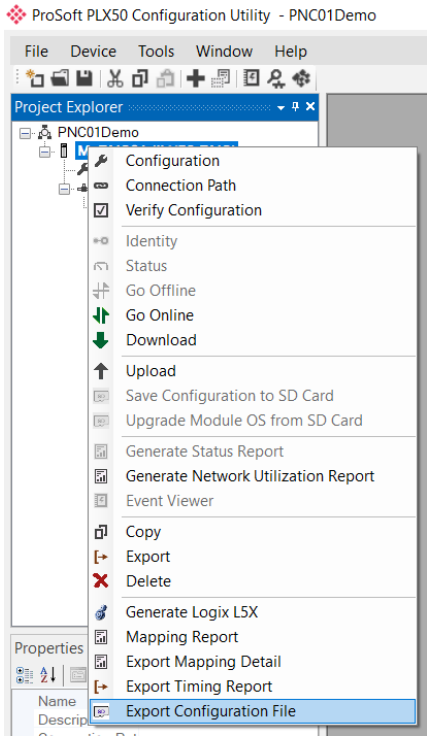



Figure 4.4 – Configuration Export for SD Card

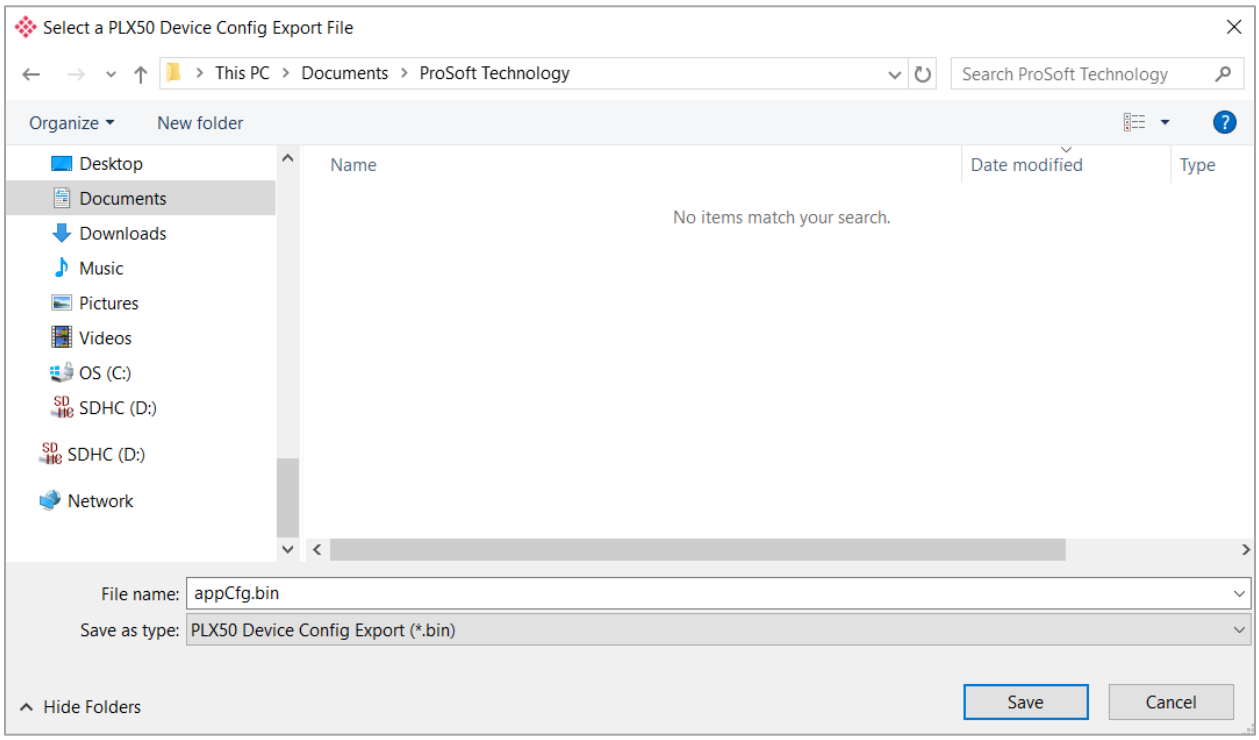



Figure 4.5 – Configuration Export for SD Card

**Note:** The filename of the configuration file must not be changed. The specific module will use only the configuration that is valid (e.g. the ILX56-PNC will only use the PNC configuration file).

**Note:** If more than one configuration file with different configuration signatures of the same product is on the SD Card, then only the last configuration will be used.

# 5 Operation

## 5.1 Logix Operation

When the ILX56-PNC has been configured for Logix communication, it will exchange data with a Logix controller by adding the ILX56-PNC in the IO tree and establishing a Class 1 connection.

Once the ILX56-PNC and Logix controller have been configured, the ILX56-PNC will start exchanging data with the PROFINET devices.

**Note:** The module input and output assembly of each connection will be an undecorated array of bytes. The imported Logix routine (generated by PLX50 Configuration Utility) will copy this data between the decorated tags (UDT) and the input and output assemblies.

### 5.1.1 PNC Controller Status

The controller Status tag displays the status of the PROFINET Controller and other ILX56-PNC module related diagnostics.

| Name | Value | Style | Data Type |
|---|---|---|---|
| Local:1:I1 | {...} | | PS:ILX56_PNC_InStatus:I:0 |
| Local:1:I1.ConnectionFaulted | 0 | Decimal | BOOL |
| Local:1:I1.ControllerStatus | 0 | Decimal | DINT |
| Local:1:I1.ConfigValid | 0 | Decimal | BOOL |
| Local:1:I1.Owned | 0 | Decimal | BOOL |
| Local:1:I1.EthernetPort1 | 0 | Decimal | BOOL |
| Local:1:I1.EthernetPort2 | 0 | Decimal | BOOL |
| Local:1:I1.PROFINETNetworkError | 0 | Decimal | BOOL |
| Local:1:I1.PROFINETDeviceError | 0 | Decimal | BOOL |
| Local:1:I1.PROFINETOffline | 0 | Decimal | BOOL |
| Local:1:I1.PROFINETIdle | 0 | Decimal | BOOL |
| Local:1:I1.PROFINETStop | 0 | Decimal | BOOL |
| Local:1:I1.PROFINETRun | 0 | Decimal | BOOL |
| Local:1:I1.ControllerMode | 0 | Decimal | BOOL |
| Local:1:I1.RedundancyEnabled | 0 | Decimal | BOOL |
| Local:1:I1.ModuleRedundancyConfigMismatch | 0 | Decimal | BOOL |
| Local:1:I1.SDCard | 0 | Decimal | BOOL |
| Local:1:I1.ConfigCRC | 16#0000 | Hex | INT |
| Local:1:I1.DeviceLiveList | {...} | | PS_ILX56_PNC_DeviceList_S... |
| Local:1:I1.DeviceDataExchangeActive | {...} | | PS_ILX56_PNC_DeviceList_S... |
| Local:1:I1.DeviceAlarmPendingFlags | {...} | | PS_ILX56_PNC_DeviceList_S... |
| Local:1:I1.ModuleIPAddress | {...} | Decimal | INT[4] |
| Local:1:I1.MRPState | 0 | Decimal | SINT |

Figure 5.1 – Logix Controller Status tag

The items contained within the controller status structure are as follows:

| Tag | Description |
|---|---|
| ConnectionFaulted | Indicates if a connection fault has been detected.<br>**1** – Connection fault<br>**0** – No connection fault |
| Module Status | Indicates the status of the module. It reflects the status on all Bool data types in the following Controller Tags. |
| ConfigValid | Configuration has been downloaded to the ILX56-PNC and is being executed.<br>**1** – ILX56-PNC has been successfully configured.<br>**0** – ILX56-PNC is not configured. |
| Owned | Indicates if the ILX56-PNC is owned by a Logix Controller with a connection count matching that configured in PLX50 Configuration Utility.<br>**1** – ILX56-PNC is connected.<br>**0** – ILX56-PNC is not connected. |
| EthernetPort1 | Indicates the link status of the first Ethernet port (Port 0).<br>**1** – Active Ethernet link<br>**0** – No Ethernet link |
| EthernetPort2 | Indicates the link status of the second Ethernet port (Port 1).<br>**1** – Active Ethernet link<br>**0** – No Ethernet link |
| PROFINETNetworkError | The PROFINET network is not operating correctly.<br>**1** – No IO devices are exchanging data<br>**0** – At least one IO device is exchanging data |
| PROFINETDeviceError | At least one IO device has a communication issue (e.g. offline, not exchanging process data, etc.)<br>**1** – At least one IO device is not exchanging data<br>**0** – All PN IO devices are exchanging data |
| PROFINETOffline | The PROFINET network is Offline and the ILX56-PNC will not communicate on the network.<br>**1** – PROFINET state is OFFLINE.<br>**0** – PROFINET state is **not** OFFLINE. |
| PROFINETIdle | The PROFINET network is running in Idle mode, the ILX56-PNC is communicating on the network, but it will not exchange any process data with IO devices.<br>**1** – PROFINET state is IDLE.<br>**0** – PROFINET state is **not** IDLE. |
| PROFINETStop | The PROFINET network is in Stop mode, and the ILX56-PNC is communicating with IO devices on the network, but with the data being sent from the ILX56-PNC flagged as non-valid.<br>**1** – PROFINET state is STOPPED.<br>**0** – PROFINET state is **not** STOPPED. |
| PROFINETRun | The PROFINET network is running, and the ILX56-PNC is communicating with IO devices on the network.<br>**1** – PROFINET state is RUN.<br>**0** – PROFINET state is **not** RUN. |
| ControllerMode | The connected Logix controller is in RUN mode.<br>**1** – RUN mode<br>**0** – PROGRAM / FAULT mode |
| RedundancyEnabled | Indicated the module has been configured for S2 Redundancy.<br>**1** – S2 Redundancy Enabled<br>**0** – S2 Redundancy Disabled (Standalone) |
| ModuleRedundancyConfigMismatch | Indicates that the two ILX56-PNC modules, (in an S2 Redundant pair) have differing configurations.<br>**1** – Configurations do not match |

| | |
|---|---|
| | **0** – Configurations match |
| *SDCard* | Indicates if an SD Card is installed.<br>**1** – SD Card detected<br>**0** – No SD Card |
| ConfigCRC | The signature of the configuration currently executing on the module. |
| DeviceLiveList | Indicates the devices that are online on the local PROFINET network. Each bit represents a device. When the specific bit is set '**1**' then the device is online and when the bit is off '**0**' the device is **not** on the PROFINET network.<br>Bit 0 – Device Index 0 Online<br>Bit 1 – Device Index 1 Online<br>…….<br>Bit 63 – Device Index 63 Online |
| DeviceDataExchangeActive | Indicates the devices that are online and exchanging cyclic data on the PROFINET network. Each bit represents a device. When the specific bit is set '**1**' then the device is online and exchanging data and when the bit is off '**0**' the device is **not** exchanging data.<br>Bit 0 – Device Index 0 Exchanging Data<br>Bit 1 – Device Index 1 Exchanging Data<br>…….<br>Bit 63 – Device Index 63 Exchanging Data |
| DeviceAlarmPendingFlags | Indicates the devices that have an alarm pending on the local PROFINET network. Each bit represents a device. When the specific bit is set '**1**' then the device has an alarm pending that must be unloaded and when the bit is off '**0**' the device does **not** have an alarm pending.<br>Bit 0 – Device Index 0 Alarm Pending<br>Bit 1 – Device Index 1 Alarm Pending<br>…….<br>Bit 63 – Device Index 63 Alarm Pending |
| ModuleIPAddress | Indicates the IP address of the ILX56-PNC controller. |
| MRPState | Indicates the MRP state of the controller:<br>**0** – Disabled<br>**1** – Open Ring<br>**2** – Closed Ring |

Table 5.1 – Logix Controller Status tag

### 5.1.2 PNC Control

The user will need to set the PROFINET Operating mode from the ILX56-PNC Logix output assembly in the Logix controller.

| Name | Value | Style | Data Type |
|---|---|---|---|
| Local:1:O1 | {...} | | PS:ILX56_PNC_OutControl:O:0 |
| Local:1:O1.ControllerStateOverride | 0 | Decimal | INT |
| Local:1:O1.PartnerConfigCRC | 16#0000 | Hex | INT |
| Local:1:O1.DeviceDisable | {...} | | PS_ILX56_PNC_DeviceList_Struct:IO:0 |
| Local:1:O1.SystemTime | DT#1970-01-01-02:00:00.000_000(UTC+02:00) | Date/Time | LINT |

Figure 5.2 – Logix Controller Control tag

| Tag | Description |
|---|---|
| ControllerStateOverride | This tag is used to set the override the normal state of the PROFINET controller.<br>**0** – Normal (No Override)<br>**1** – Set PROFINET network state to IDLE<br>**2** – Set PROFINET network state to STOP |
| PartnerConfigCRC | Used to transfer the configuration (CRC) checksum between the two ILX56-PNC controllers in a S2 Redundant pair.<br><br>**Note:** This should be controlled by the dedicated RedundancyController AOI only. |
| DeviceDisable | These bits disable devices on the PROFINET network for data exchange. Each bit represents a device. When the specific bit is set '**1**' then the device will **not** enter data exchange and when the bit is off '**0**' the device will enter cyclic data exchange.<br>Bit 0 – Device 0 is disabled for data exchange<br>Bit 1 – Device 1 is disabled for data exchange<br>…….<br>Bit 63 – Device 63 is disabled for data exchange |
| SystemTime | The system time in UTC. |

Table 5.2 – Logix Controller Control tag

The user will be able to see if there are any faults (e.g. configured device not found) by viewing the LEDs of the ILX56-PNC (see the *LEDs* section for more details), by going online with the module in the PLX50 Configuration Utility and viewing the ILX56-PNC Master and Device Diagnostics, or by viewing the input assembly of the ILX56-PNC in Logix.

### 5.1.3 Device Status and Input Data Exchange

The cyclic data is exchanged with Logix using the Class 1 Logix connection.

The device-specific (input) tag contains all device status and input data transferred from the device to the ILX56-PNC controller.

| Name | Value | Style | Data Type | Description |
|---|---|---|---|---|
| PNC01_IM1534PN | {...} | | PNC01_002A03022996 | |
| PNC01_IM1534PN.PNInput | {...} | | PNC01_002A03022996PNInput | |
| PNC01_IM1534PN.PNInput.Status | {...} | | PSILX56PNDeviceStatus | |
| PNC01_IM1534PN.PNInput.Status.Online | 0 | Decimal | BOOL | Device Online (0=Offline, 1=Online) |
| PNC01_IM1534PN.PNInput.Status.DataExchangeActive | 0 | Decimal | BOOL | Data Exchange Active (0=Inactive, 1=Active) |
| PNC01_IM1534PN.PNInput.Status.IdentMismatch | 0 | Decimal | BOOL | Device Identity Mismatch (0=Ok, 1=Mismatch) |
| PNC01_IM1534PN.PNInput.Status.DisabledByOutputAssembly | 0 | Decimal | BOOL | Disabled by Output (0=Enabled, 1=Disabled) |
| PNC01_IM1534PN.PNInput.Status.DeviceError | 0 | Decimal | BOOL | Profibus Device Error (0=Ok, 1=Error) |
| PNC01_IM1534PN.PNInput.Status.AlarmPending | 0 | Decimal | BOOL | Alarm Pending (0=Not Pending, 1=Pending) |
| PNC01_IM1534PN.PNInput.Status.OutputAssemblyIPAddrMismatch | 0 | Decimal | BOOL | Station IP Address Mismatch (0=Ok, 1=Mismatch) |
| PNC01_IM1534PN.PNInput.Status.MappingCRCMismatch | 0 | Decimal | BOOL | Mapping Checksum Mismatch (0=Ok, 1=Mismatch) |
| PNC01_IM1534PN.PNInput.Status.PrimaryConnection | 0 | Decimal | BOOL | Primary Conneciton (0=S2 Standby, 1=Primary) |
| PNC01_IM1534PN.PNInput.Status.DeviceIPAddrMismatch | 0 | Decimal | BOOL | Device IP Address Mismatch (0=Ok, 1=Mismatch) |
| PNC01_IM1534PN.PNInput.Status.ParameterWriteFail | 0 | Decimal | BOOL | Parameter Write Fail (0=All Ok, 1=At least one failed) |
| PNC01_IM1534PN.PNInput.Status.ModuleMismatch | 0 | Decimal | BOOL | Module Configuration Mismatch (0=Ok, 1=Mismatch) |
| PNC01_IM1534PN.PNInput.Status.IPAddress | {...} | Decimal | INT[4] | Device IP Address |
| PNC01_IM1534PN.PNInput.Status.DeviceMappingCRC | 16#0000 | Hex | INT | Mapping checksum |
| PNC01_IM1534PN.PNInput.Status.DeviceIndex | 0 | Decimal | SINT | Device Index |

Figure 5.3 – Device Specific tag (Input)

| Parameter | Description |
|---|---|
| *Status* | |
| Online | This bit indicates if the device is online on the PROFINET network.<br>**1** – Device is online<br>**0** – Device is not online |
| DataExchangeActive | This bit indicates if the device is configured and exchanging data on the PROFINET network.<br>**1** – Device is active and exchanging data<br>**0** – Device is not exchanging data<br>The user must ensure that all application code making use of data from a device first checks that the *DataExchangeActive* bit is 1. |
| IdentMismatch | The device configured in the PLX50 Configuration Utility and the device at the configured IP address do not match.<br>**1** – Online device Ident does not match configured device<br>**0** – Online device and configured device ident match |
| DisabledByOutputAssembly | This bit indicates that the device has been Disabled for data exchange in the ILX56-PNC device disable control bits.<br>**1** – Device has been disabled for data exchange<br>**0** – Device has been enabled for data exchange |
| DeviceError | This bit indicates an error with the device.<br>**1** – Device has an error.<br>**0** – Device has no error.<br><br>**Note:** This Error flag is transient and will clear once the error condition has been rectified. |
| AlarmPending | Indicates the device has an alarm pending on the local PROFINET network. When the specific bit is set '**1**' then the device has an alarm pending that must be unloaded and when the bit is off '**0**' the device does not have an alarm pending.<br>**0** – The device has no alarm pending<br>**1** – The device has an alarm pending |

| | |
|---|---|
| OutputAssemblyIPAddrMismatch | This bit indicates that there is a mismatch between the actual PROFINET device IP address and the expected Logix mapping IP address.<br>**0** – IP address matches<br>**1** – IP address mismatch |
| MappingCRCMismatch | If there is a mismatch in the mapping between Logix and the ILX56-PNC it can result in data appearing in the incorrect location which means the user can be sending incorrect data to a device which can have unpredicted results.<br>**0** – The mapping for the output data is correct.<br>**1** – There is a mapping mismatch in the output data. |
| PrimaryConnection | When using S2 Redundancy, both controllers will connect to the device. The first connection will be the “Primary” connection, and the second connection will be the “S2 Standby” connection.<br>In the case of an output device, only the output data in the Primary connection will be used.<br>**0** – Standby (S2)<br>**1** – Primary |
| DeviceIPAddrMismatch | The configuration name and IP address for this device does not match the actual name and IP address on the PROFINET network.<br>**0** – Ok (normal)<br>**1** – Mismatch |
| ParameterWriteFail | One or more of the parameters written to the device prior to establishing the cyclic exchange failed.<br>**0** – No failures (Ok)<br>**1** – Parameter Write Fail |
| ModuleMismatch | One or more of the configured modules in the PROFINET device does not match the configuration or is missing.<br>**0** – Modules Match (Ok)<br>**1** – Mismatch |
| IPAddress | The configured IP address of the device. |
| DeviceMappingCRC | The checksum of the Mapping for the specific device. |
| DeviceIndex | The index reference number of the PROFINET device. This is used when looking at the Live List, DataExchange List, and Alarm List in the Master Status, as well as when doing the Alarm unloading. |

Table 5.3 – Device Input tags

### 5.1.4 Device Control and Output Data Exchange

The device-specific (output) tag contains all device control and output data transferred from the ILX56-PNC controller to the device.

| Name | Value | Style | Data Type | Description |
|---|---|---|---|---|
| PNC01_IM1534PN | {...} | | PNC01_002A03022996 | |
| PNC01_IM1534PN.PNInput | {...} | | PNC01_002A03022996PNInput | |
| PNC01_IM1534PN.PNOutput | {...} | | PNC01_002A03022996PNOutput | |
| PNC01_IM1534PN.PNOutput.Control | {...} | | PSILX56PNDeviceControl | |
| PNC01_IM1534PN.PNOutput.Control.IPAddress | {...} | Decimal | INT[4] | Device IP Address |
| PNC01_IM1534PN.PNOutput.Control.DeviceMappingCRC | 16#0000 | Hex | INT | Mapping Checksum |
| PNC01_IM1534PN.PNOutput.S02_Outputs | 0 | Decimal | SINT | |
| PNC01_IM1534PN.PNOutput.S02O_IOPS | {...} | | PSILX56PNIOStatus | |

Figure 5.4 –Device Specific tag (Output)

| Parameter | Description |
|---|---|
| *Control* | |
| IPAddress | The device's IP address set by the Logix mapping code. |
| DeviceMappingCRC | The checksum of the mapping that was applied by the generated Logix code used to verify if the mapping being used is valid. |

Table 5.4 – Device Output tags

### 5.1.5 IO Data Status (IOPS / IOCS)

Contained within the device's input and output configuration specific data will be a number of IOPS (Input Output Object Provider Status) and IOCS (Input Output Object Consumer Status) objects. There are typically one of these per device module.

The IOPS provides information on the status of the produced data.

The IOCS provides information on the status of the consumed data.

Exposing these items to the Logix application code allows not only the monitoring of the status of input data, but also allows the application to control the status of the data being sent to the output devices.

In a typical data exchange with an **output** device, as shown below, the controller sends the output data and the IOPS. The IOPS can be controlled by the application code, perhaps flagging the data as bad under certain conditions which in turn could cause the output device to a fail-safe condition. The application code can also monitor the IOCS for confirmation that the device received the latest data.

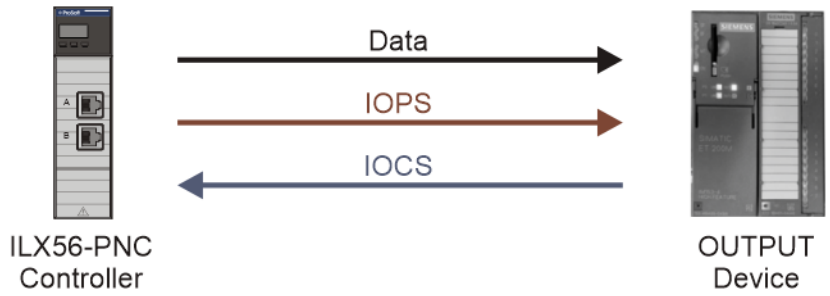



Figure 5.5 – Typical Output Device Data Exchange

In a typical data exchange with an **input** device, as shown below, the device sends the output data and the IOPS to the controller. The application code can use the IOPS to determine the quality of the data provide. Although the IOCS is returned from the controller to device, **this is taken care of automatically by the ILX56-PNC** and does therefore not appear in the mapping.

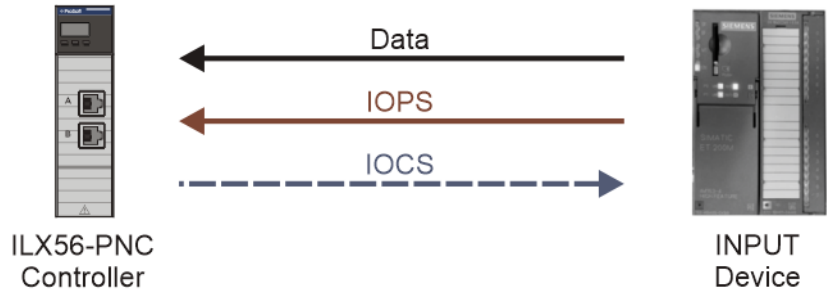



Figure 5.6 – Typical Input Device Data Exchange

Both the IOPS and IOCS are represented in the Logix structures using a common UDT structure, which expands the typically 1 byte status to a more Logix readable structure.

| Name | Value | Style | Data Type | Description |
|---|---|---|---|---|
| PNC01_IM1534PN.PNInput.S00_IOPS | {...} | | PSILX56PNIOStatus | |
| PNC01_IM1534PN.PNInput.S00_IOPS.DataBad | 0 | Decimal | BOOL | Data Bad |
| PNC01_IM1534PN.PNInput.S00_IOPS.BadDetectedBySubslot | 0 | Decimal | BOOL | Bad Status Detected by SubSlot |
| PNC01_IM1534PN.PNInput.S00_IOPS.BadDetectedBySlot | 0 | Decimal | BOOL | Bad Status Detected by Slot |
| PNC01_IM1534PN.PNInput.S00_IOPS.BadDetectedByIODevice | 0 | Decimal | BOOL | Bad Status Detected by IO Device |
| PNC01_IM1534PN.PNInput.S00_IOPS.BadDetectedByIOController | 0 | Decimal | BOOL | Bad Status Detected by Io Controller |
| PNC01_IM1534PN.PNInput.S00_IOPS.AdditionalOctet | 0 | Decimal | BOOL | Additional Octet Available |
| PNC01_IM1534PN.PNInput.S00_IOPS.NoModule | 0 | Decimal | BOOL | No Module |
| PNC01_IM1534PN.PNInput.S00_IOPS.WrongModule | 0 | Decimal | BOOL | Wrong Module |
| PNC01_IM1534PN.PNInput.S00_IOPS.ModuleSubstitute | 0 | Decimal | BOOL | Module Substitute |
| PNC01_IM1534PN.PNInput.S00_IOPS.NoSubModule | 0 | Decimal | BOOL | No Submodule |
| PNC01_IM1534PN.PNInput.S00_IOPS.WrongSubModule | 0 | Decimal | BOOL | Wrong Submodule |
| PNC01_IM1534PN.PNInput.S00_IOPS.SubModuleSubstitute | 0 | Decimal | BOOL | Submodule Substitute |
| PNC01_IM1534PN.PNInput.S00_IOPS.Octet1 | 0 | Decimal | SINT | Additional IO Status Octet |

Figure 5.7 – IO Data Status Specific tag

The IO Data Status structure comprises the following:

| Parameter | Description |
|---|---|
| *Status* | |
| DataBad | Indicates the Data is bad.<br>**0** – Data is good<br>**1** – Data is bad |
| BadDetectedBySubslot | Indicates that the bad data is being flagged at the Subslot level. |
| BadDetectedBySlot | Indicates that the bad data is being flagged at the Slot level. |
| BadDetectedByIODevice | Indicates that the bad data is being flagged at the IO Device level. |
| BadDetectedByIOController | Indicates that the bad data is being flagged at the IO Controller level. |
| AdditionalOctet | Indicates that an additional octet is available. |
| NoModule | A missing module is detected. |
| WrongModule | An incorrect module is detected. (Different from the configuration.) |
| ModuleSubstitute | A substitute module is detected. (Different from the configuration, but sufficiently compatible to continue.) |
| NoSubModule | A missing submodule is detected. |
| WrongSubModule | An incorrect submodule is detected. (Different from the configuration.) |
| SubModuleSubstitute | A substitute submodule is detected. (Different from the configuration, but sufficiently compatible to continue.) |
| *Additional Data* | |
| Octet1 | Additional status information |

Table 5.5 – IO Data Status Specific tag

### 5.1.6 Device Alarm Unloading

The ILX56-PNC supports managing and unloading of PROFINET alarms generated by PROFINET devices. The ILX56-PNC can buffer up to 10 alarms per PROFINET device. The buffered alarms can be view in the PLX50 Configuration Utility Device Status page. See the *Alarms* section for more information regarding alarm viewing.

**Note:** The alarms viewed in PLX50 Configuration Utility is only viewing the buffered alarms that the ILX56-PNC has received from specific PROFINET devices. The alarms will not be unloaded when viewing as alarms are unloaded in Logix.

The *AlarmsPending* status bit in the Device Status (in Logix) can be used to determine if there are alarms that need to be unloaded from the ILX56-PNC module. Once this bit is set, the user can execute a Logix MSG instruction to unload the pending alarm. The *AlarmPending* status bit will be cleared once all buffered alarms have been unloaded.

| Name | Value | Style | Data Type | Description |
|---|---|---|---|---|
| PNC01_IM1534PN | {...} | | PNC01_002A03022... | |
| PNC01_IM1534PN.PNInput | {...} | | PNC01_002A03022... | |
| PNC01_IM1534PN.PNInput.Status | {...} | | PSILX56PNDeviceS... | |
| PNC01_IM1534PN.PNInput.Status.Online | 0 | Decimal | BOOL | Device Online (0=Offline, 1=Online) |
| PNC01_IM1534PN.PNInput.Status.DataExchangeActive | 0 | Decimal | BOOL | Data Exchange Active (0=Inactive, 1=Active) |
| PNC01_IM1534PN.PNInput.Status.IdentMismatch | 0 | Decimal | BOOL | Device Identity Mismatch (0=Ok, 1=Mismatch) |
| PNC01_IM1534PN.PNInput.Status.DisabledByOutputAssembly | 0 | Decimal | BOOL | Disabled by Output (0=Enabled, 1=Disabled) |
| PNC01_IM1534PN.PNInput.Status.DeviceError | 0 | Decimal | BOOL | Profibus Device Error (0=Ok, 1=Error) |
| PNC01_IM1534PN.PNInput.Status.AlarmPending | 0 | Decimal | BOOL | Alarm Pending (0=Not Pending, 1=Pending) |
| PNC01_IM1534PN.PNInput.Status.OutputAssemblyIPAddrMismatch | 0 | Decimal | BOOL | Station IP Address Mismatch (0=Ok, 1=Mismatch) |
| PNC01_IM1534PN.PNInput.Status.MappingCRCMismatch | 0 | Decimal | BOOL | Mapping Checksum Mismatch (0=Ok, 1=Mismatch) |
| PNC01_IM1534PN.PNInput.Status.PrimaryConnection | 0 | Decimal | BOOL | Primary Conneciton (0=S2 Standby, 1=Primary) |
| PNC01_IM1534PN.PNInput.Status.DeviceIPAddrMismatch | 0 | Decimal | BOOL | Device IP Address Mismatch (0=Ok, 1=Mismatch) |
| PNC01_IM1534PN.PNInput.Status.ParameterWriteFail | 0 | Decimal | BOOL | Parameter Write Fail (0=All Ok, 1=At least one failed) |
| PNC01_IM1534PN.PNInput.Status.ModuleMismatch | 0 | Decimal | BOOL | Module Configuration Mismatch (0=Ok, 1=Mismatch) |
| PNC01_IM1534PN.PNInput.Status.IPAddress | {...} | Decimal | INT[4] | Device IP Address |
| PNC01_IM1534PN.PNInput.Status.DeviceMappingCRC | 16#0000 | Hex | INT | Mapping checksum |
| PNC01_IM1534PN.PNInput.Status.DeviceIndex | 0 | Decimal | SINT | Device Index |

Figure 5.8 – Alarm Pending Indicator

**Note:** When the user generates the L5X Logix import file from the PLX50 Configuration Utility, the UDT for alarm unloading will also be generated.

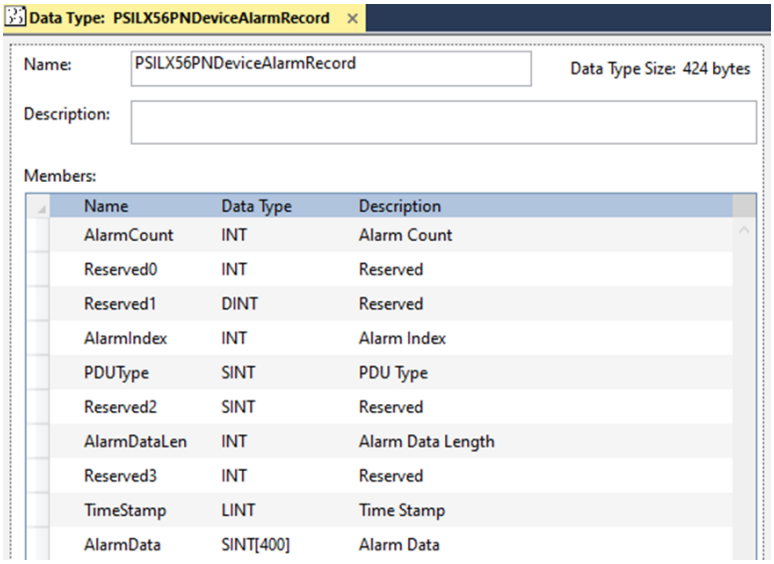



Figure 5.9 – Alarm Unload UDT Structure

#### 5.1.6.1 CIP Message

| Parameter | Description |
|---|---|
| Service Code | 0x7E (Hex) |
| Class | 0x501 (Hex) |
| Instance | 1 |
| Attribute | N/A |
| Request Data Length | 2 |
| Response Data Length | 24 to 424 |

Table 5.6 – Alarm Unloading CIP Message

##### 5.1.6.1.1 Request Data

| Parameter | Data Type | Description |
|---|---|---|
| DeviceIndex | INT | The index of the PROFINET device from which the alarm must be unloaded.<br><br>**Note:** The Device Index is shown in the Device Status Tag in Logix. |

Table 5.7 – Alarm Unloading CIP Message Request

#### 5.1.6.1.2 Response Data

| Parameter | Data Type | Description |
|---|---|---|
| AlarmCount | INT | Number of alarms in the payload. Currently this will always be 1. |
| AlarmIndex | INT | The index number of the alarm. Every time an alarm is buffered, the index count is increased and rolls over at 65535. |
| PduType | SINT | Packet type<br><br>**Bit 0 – 3: Type**<br>1 – RTA DATA<br>2 – RTA NACK<br>3 – RTA ACK<br>4 – RTA ERROR<br><br>**Bit 4 – 7: Version**<br>Version 1 or Version 2 of the protocol. |
| AlarmDataLen | INT | The length of the Alarm Data |
| TimeStamp | LINT | The timestamp when the alarm occurred. |
| AlarmData | SINT[ ] | Alarm Data |

Table 5.8 – Alarm Unloading CIP Message Response

## 5.1.7 Explicit Acyclic Messaging

The ILX56-PNC supports explicit acyclic messaging to PROFINET devices via either, unconnected messaging (UCMM) or Class 3 connected messaging. The ILX56-PNC can buffer up to 10 acyclic messages at a time. The details of the message are as follows:

### 5.1.7.1 CIP Message

| Parameter | Description |
|---|---|
| Service Code | 0x75 (Hex) |
| Class | 0x501 (Hex) |
| Instance | 1 |
| Attribute | N/A |
| Request Data Length | 28 to 500 |
| Response Data Length | 6 to 500 |

Table 5.9 – Explicit Acyclic CIP Message

#### 5.1.7.1.1 Request Data

| Parameter | Data Type | Description |
|---|---|---|
| IPAddress | INT[4] | The IP address of the target device. |
| Function | SINT | The function to be performed.<br>**0** – Read<br>**1** – Write<br>**2** – Read Implicit |
| Reserved | SINT[3] | Reserved |
| VendorID | INT | The Vendor ID of the target device. Required only for Read Implicit. |
| DeviceID | INT | The Device ID of the target device. Required only for Read Implicit. |
| API | DINT | The target API for the message. (Typically, 0). |
| Slot | INT | The target Slot number. |
| SubSlot | INT | The target Subslot number.<br>Set to 0 for communication to a Slot. |
| Index | INT | The target parameter Index. |
| DataLength | INT | For Write functions:<br>The length of the following request data.<br>For Read & Read Implicit functions:<br>The maximum length of the response data. |
| Data | SINT[] | Request Data. |

Table 5.10 – Explicit Acyclic CIP Message Request

#### 5.1.7.1.2 Response Data

| Parameter | Data Type | Description |
|---|---|---|
| Status | DINT | The returned status of the acyclic request.<br>Byte 0: Error Code<br>Byte 1: Error Decode<br>Byte 2: Error Code 1<br>Byte 3: Error Code 2<br><br>**Note:** See the Appendix for information regarding the error codes. |
| Data Length | INT | The length of the data returned. |
| Data | SINT[ ] | The data from the Read / Read Implicit request.<br>The number of bytes will be equal to the Data Length in the response. |

Table 5.11 – Explicit Acyclic CIP Message Response

**Note:** The Explicit Acyclic Request and Response UDTs are automatically included in the L5X export (Generate Logix L5X), and are named as follows:

PSILX56PNDeviceAcyclicMsgRequest

PSILX56PNDeviceAcyclicMsgResponse

## 5.2 Acyclic Messaging Utility

The PLX50 Configuration Utility provides a utility to initiate explicit acyclic messages to a PROFINET device via the ILX56-PNC. The messaging Actions are *Read*, *Write*, or *Read Implicit*. To open this utility, right-click on a PROFINET device and select the **ACYCLIC MESSAGING** option.

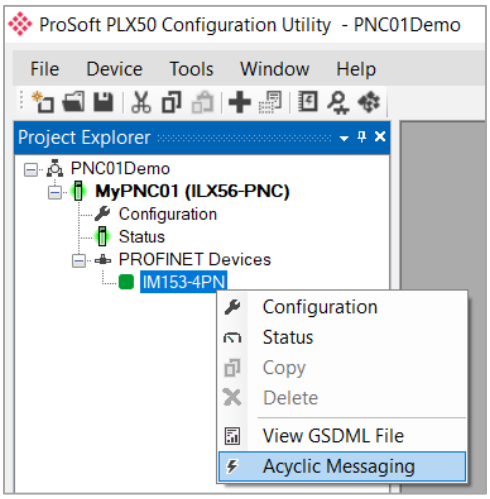



Figure 5.10 – Acyclic Messaging Option

Use the *Action* drop-down to select the type of explicit message. Depending on the type selected, various other parameter controls will become available. Once the parameters have been entered, click the **EXECUTE** button to initiate the explicit exchange.

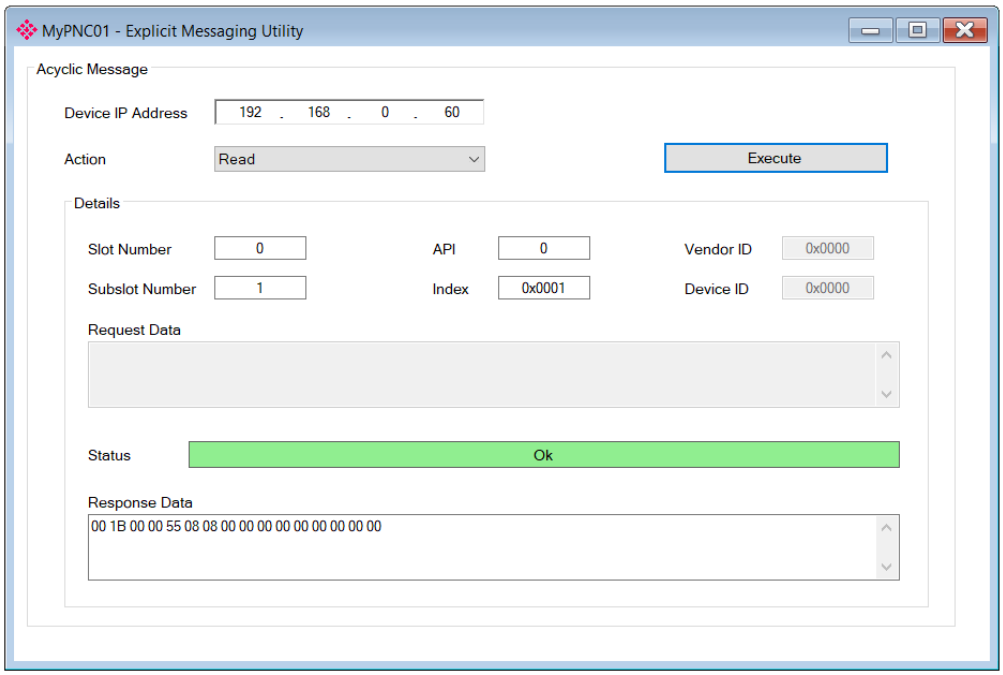



Figure 5.11 – Acyclic Messaging example

# 6 Firmware Upgrade

The ILX56-PNC allows the user to upgrade the module firmware in the field by using the PLX50 Configuration Utility.

In the PLX50 Configuration Utility go to the *Tools* menu and select the **DEVICEFLASH** option.

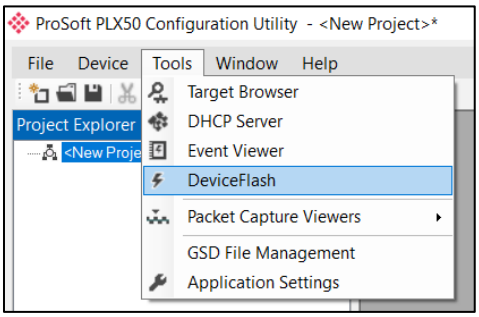



Figure 6.1 - DeviceFlash Tool

The user will need to select the appropriate AFB binary file to upgrade the ILX56-PNC firmware then click **OPEN**.

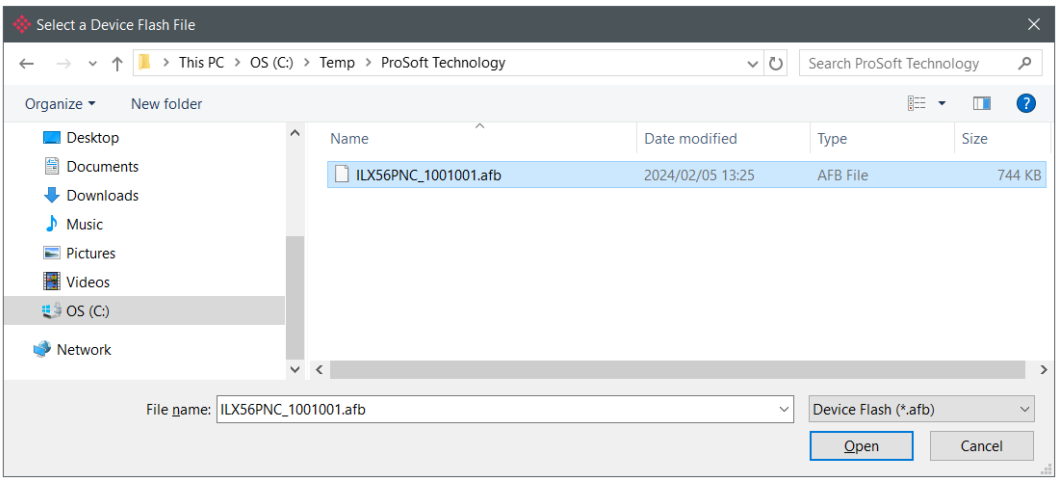



Figure 6.2 - Select the AFB binary

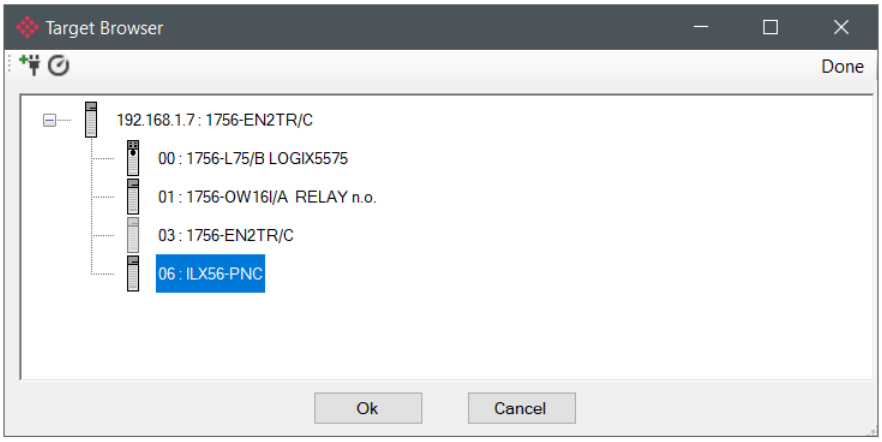



Figure 6.3 - Select the correct ILX56-PNC module

Once the firmware upgrade is complete, the *Device Flash* dialog will provide the user with the details of the updated module.

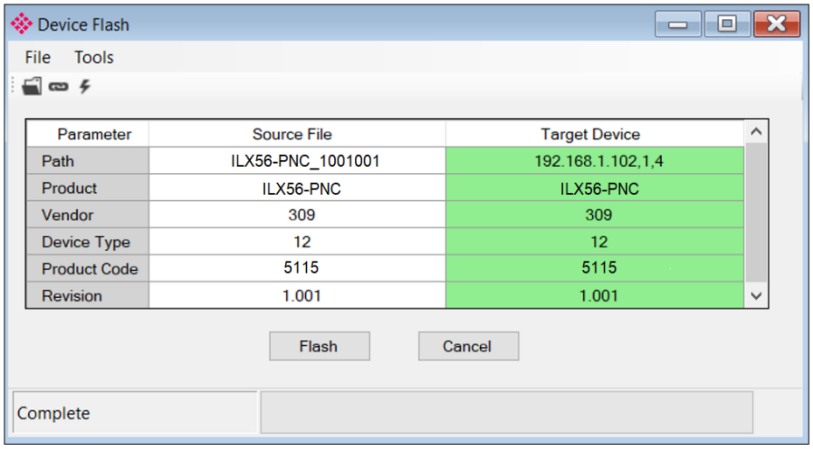



Figure 6.4 – ILX56-PNC successfully updated.

**Note:** The ILX56-PNC firmware is digitally signed so the user will only be able to flash the ILX56-PNC with authorized firmware.

**Note:** After the firmware upgrade process is complete, the module must be power cycled.

# 7 Media Redundancy Protocol (MRP)

Media Redundancy Protocol (MRP) allows PROFINET devices to be connected in an Ethernet ring topology which provides protection against single-cable-fault communication failures.

An MRP ring consists of multiple MRP clients and a single MRP manager. The manager monitors the integrity of the ring by sending Test Frames out one port and expects them to appear on the other port. When the ring is healthy the manager blocks all traffic transfer between its ports.

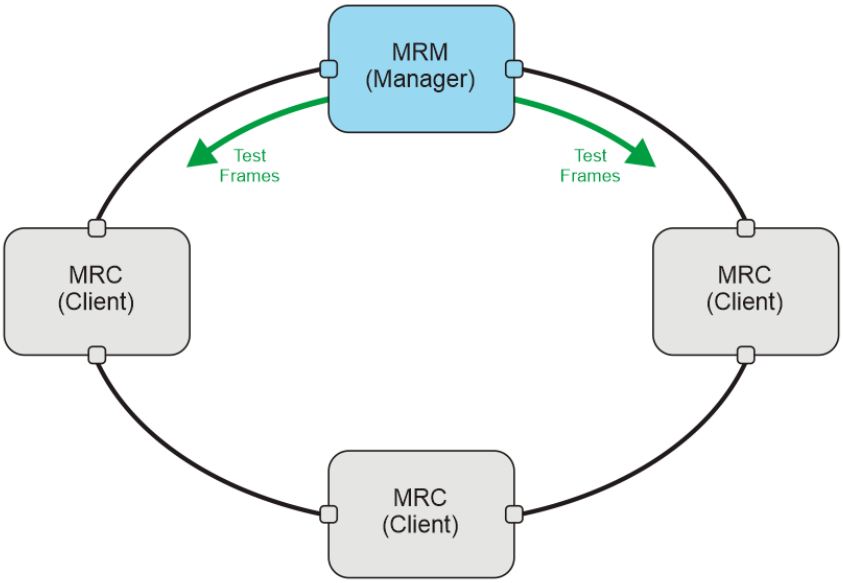



Figure 7.1 – MRP Ring

If the ring is broken (due to a cable failure or disconnection) then the MRP manager has to notify the other client devices in the ring that there is a failure and then switch its own ports to a line topology, that is, passing packets between its own ports.

This process typically takes a few milliseconds, without the cyclic data exchange between the controller and devices being adversely affected.

## 7.1 Basic Rules

All devices in a ring must comply with the following:

1) All devices must support MRP and have MRP enabled.
2) One device must be configured as an MRP Manager (MRM), and all the other devices must be configured as MRP Clients (MRC).
3) All devices must be configured with the same MRP Domain.
4) Devices must be connected to the ring using their two configured ring ports.
5) All partner ports must have the same configuration.

**Note:** When commissioning an MRP ring ensure that all devices have been correctly configured before closing the ring. Failure to do so may cause a complete network failure and prevent further configuration of some, or all, of the devices.

**Note:** The IO Update Time and WatchDog Factor for each device must be configured such that the MRP fault recovery will not result in the cyclic connection timing out.

**Note:** When changing which device is the MRP Manager, there may be a time when there is no configured MRP Manager. An unconfigured MRP Manager can cause an uncontrolled Ethernet ring that will create a network disturbance. The ring must first be broken by disconnecting one of the Ethernet ports, and only reconnected once the configuration process is complete.

# 8 S2 Redundancy

The ILX56-PNC module supports PROFINET S2 Redundancy. This strategy makes use of a pair of identically configured ILX56-PNC controllers active on the same PROFINET network.

For a PROFINET device to participate in the S2 Redundancy strategy, its NAP (Network Access Point) must be capable of supporting multiple connections. In S2 Redundancy, both ILX56-PNC controllers establish connections to the PROFINET device. The first controller to connect will be given a Primary connection status, while the second controller to connect will be given a Standby (S2) connection status. Both connections transfer valid input data from the device to the controller.

Only the output data in the Primary connection is used by the device, the output data in the Standby connection is ignored. Should the Primary connection be interrupted for any reason, then the Standby connection will be upgraded to Primary status.

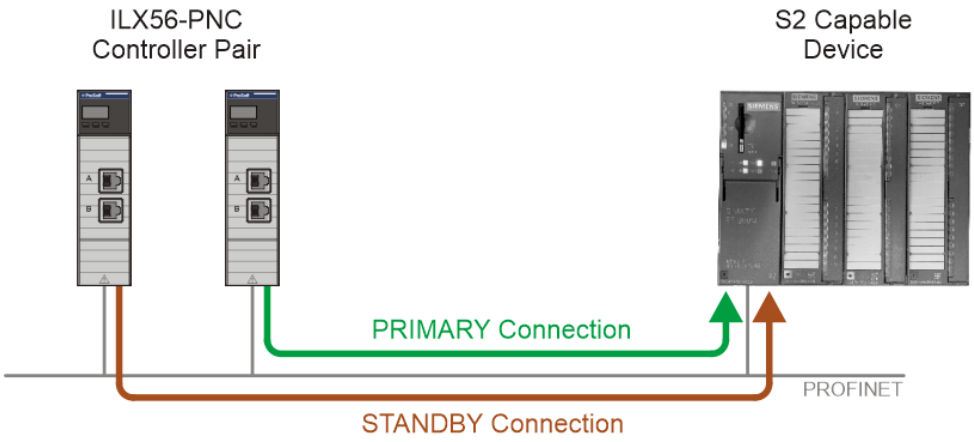



Figure 8.1 – S2 Redundancy

**Note:** It is possible to mix S2 capable and non-capable devices on the same PROFINET network. However, no redundant functionality will be afforded to the non-S2-capable devices.

## 8.1 Configuration

The ILX56-PNC configuration for S2 Redundancy is similar to that of the Standalone with the following important differences.

### 8.1.1 Controller Configuration - General

In the *General* tab of the ILX56-PNC *Configuration* dialog, the *Mode* must be set to **CONTROLLER S2 REDUNDANCY**.

The *Base Tag B* parameter must be configured to reflect the correct chassis and slot number.

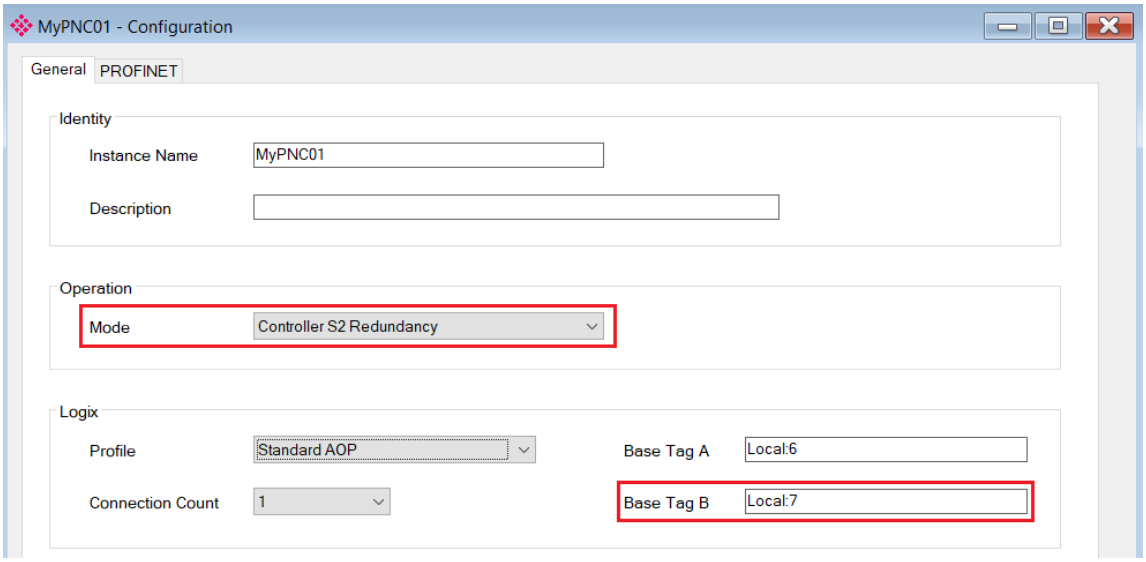



Figure 8.2 – S2 Redundancy – General configuration

In the *PROFINET* tab, the IP Address of the second ILX56-PNC must be configured in *IP Address B*.

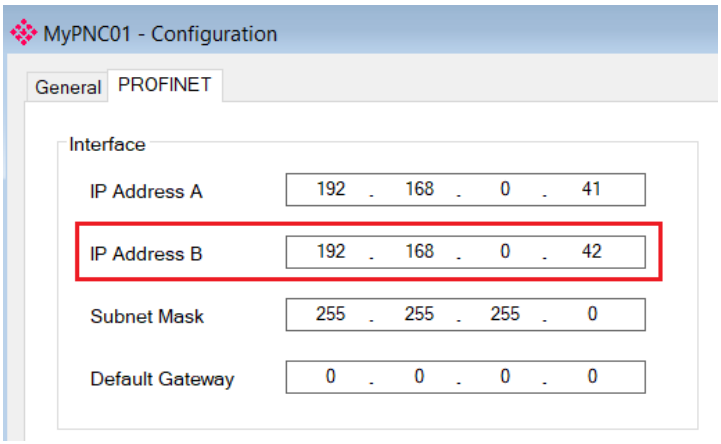



Figure 8.3 – S2 Redundancy – PROFINET configuration

### 8.1.2 Device Configuration

For each device participating in S2 Redundancy, the **ENABLE S2 REDUNDANCY** option must be selected in the *PROFINET* tab.

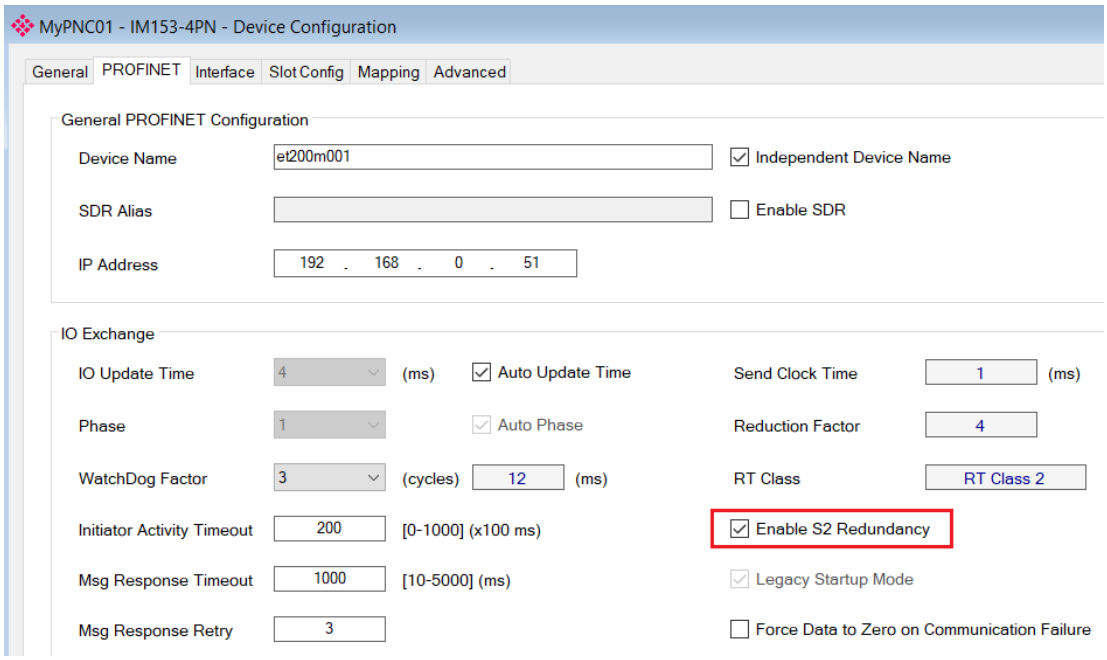



Figure 8.4 – S2 Redundancy – Device configuration

### 8.1.3 Module Download

Before the configuration can be downloaded to both ILX56-PNC modules, the connection paths must be configured.

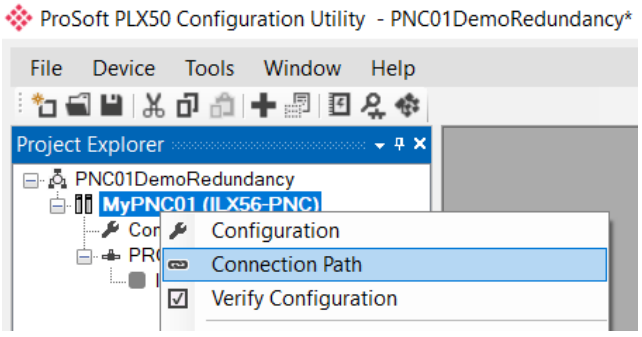



Figure 8.5 – S2 Redundancy – Select Conneciton Path

The connection paths can be either entered manually, or by using the Target Browser.

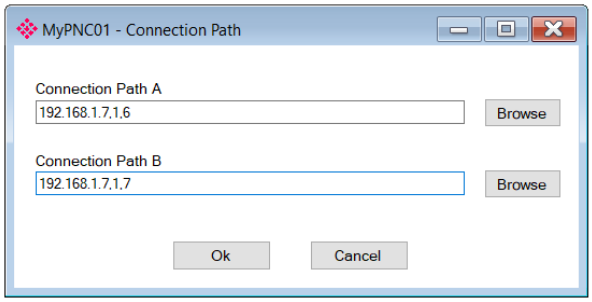



Figure 8.6 – S2 Redundancy – Connection Paths

When selecting the **DOWNLOAD** option, the configuration will be downloaded to both ILX56-PNC modules.

### 8.1.4 Logix Configuration

The Logix configuration in Studio 5000 requires both the ILX56-PNC modules to be instantiated.

It is important that the *Instance Names* match that of the *Instance Name* provided in the PLX50 Configuration Utility, with an "**A**" and "**B**" suffix.

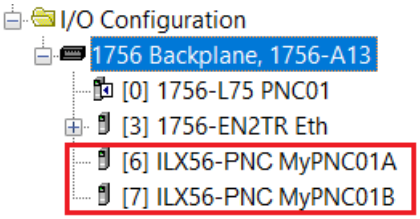



Figure 8.7 – S2 Redundancy – Logix IO Configuration

In the PLX50 Configuration Utility, select the **GENERATE LOGIX L5X** option to generate the required mapping code. This L5X file can then be imported into the Studio 5000 project. Although the mapping code is similar to that generated in a Standalone mode system, there are some differences, particularly for the S2 Redundant devices.

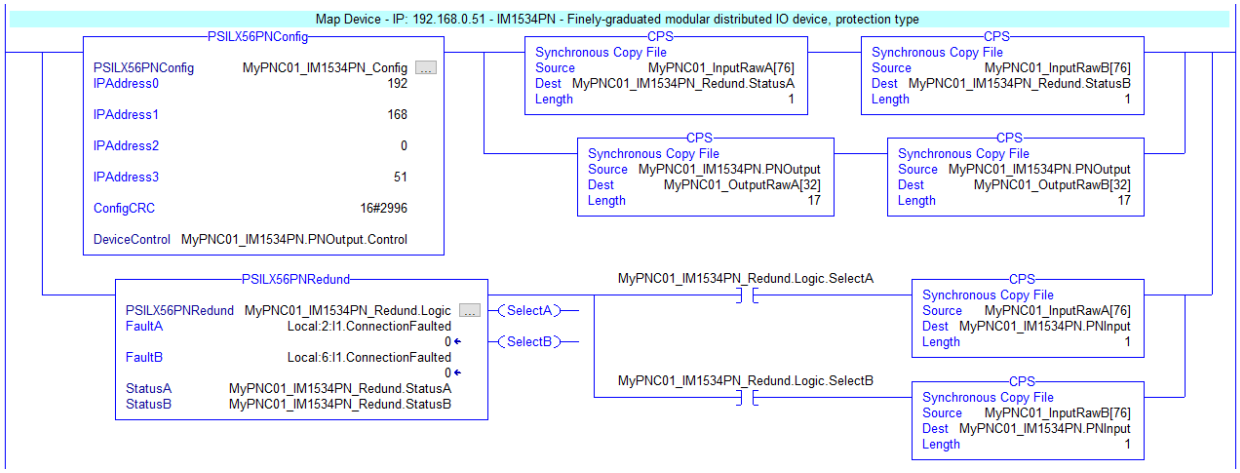



Figure 8.8 – S2 Redundancy – Example Device mapping

# 9 Diagnostics

## 9.1 LEDs

The module provides 3 diagnostic LEDs and a 4-character alpha-numeric LED display for diagnostics purposes as shown in the front view figure below.

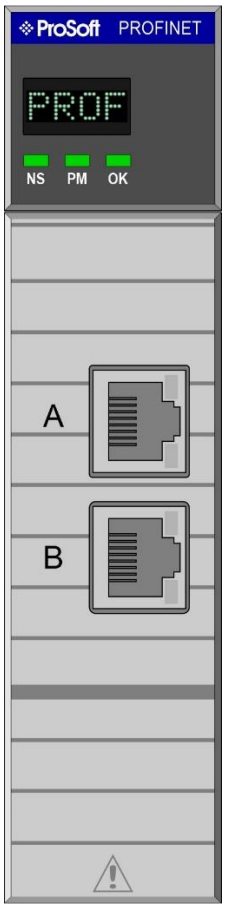



Figure 9.1 - ILX56-PNC LEDs

A description of each LED is given in the table below.

| LED | Description |
|---|---|
| Ok | The module LED will provide information regarding the system-level operation of the module.<br><br>**Flashing Red** – The module is not operating correctly. For example, if the module application firmware has been corrupted or there is a hardware fault the module will have a red Module LED.<br>**Flashing Green** – The module has booted and is running correctly without any application configuration loaded.<br>**Solid Green** – The module has booted and is running correctly with application configuration loaded. |
| PM | This LED will indicate the PROFINET operating state.<br><br>**Flashing Red** – The PROFINET network is in IDLE mode.<br>**Flashing Green** – The PROFINET network is in STOP mode.<br>**Solid Green** – The PROFINET network is in RUN mode.<br>**Solid Red** – The PROFINET network is OFFLINE, because the module has not been configured. |
| NS | This LED indicates the status of the PROFINET network.<br><br>**Off** – No communication on the PROFINET network.<br>**Solid Red** – There are network communication errors (none of the configured devices are online).<br>**Flashing Red** – No devices are exchanging data due to device errors or devices being disabled.<br>**Flashing Green** – Some devices are exchanging data on the PROFINET network.<br>**Solid Green** – There are no network communication or device errors (**NOTE:** if no devices have been configured, then the NS LED will also be solid green). |

Table 9.1 - Module LED operation

A description of each alphanumeric display message is given in the table below.

| LED Text | Description |
|---|---|
| *TEST* | The module is busy testing all hardware during bootup. |
| *OK* | The module has successfully booted, and all hardware testing has passed. |
| *Stop Mode* | The PROFINET network is in STOP operational mode. |
| *Run Mode* | The PROFINET network is in RUN operational mode. |
| *Idle Mode* | The PROFINET network is in IDLE operational mode. |
| *Offline Mode* | The PROFINET network is in OFFLINE operational mode. |
| *IP x.x.x.x* | The IP address of the local ILX56-PNC module. |
| *Devices in Error* | Certain devices on the PROFINET network are in an error state. |
| *Devices not Exchanging Data* | All the configured devices on the PROFINET network are exchanging data with the PROFINET controller. |
| *No Devices Online* | None of the configured PROFINET devices are online on the PROFINET network. |
| *Redundant Controller* | The local ILX56-PNC is part of a redundant PROFINET Master pair. |
| *No Config Loaded* | No configuration has been loaded onto the ILX56-PNC. |

Table 9.2 - Module LED operation

The module LED will also display the instance name of the module configured in PLX50 Configuration Utility.

## 9.1 Module Status Monitoring

The ILX56-PNC provides a range of statistics that assists with module operation, maintenance, and fault finding. The statistics can be accessed in full by the PLX50 Configuration Utility.

To view the module's status in the PLX50 Configuration Utility environment, the ILX56-PNC must be online. If the module is not already Online (following a recent configuration download), then right-click on the module and select the **GO ONLINE** option.

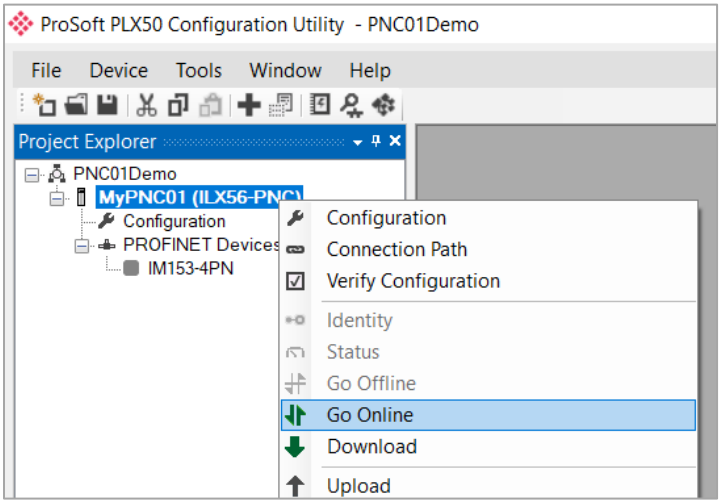



Figure 9.2 - Selecting to Go Online

The Online mode is indicated by the green circle behind the module in the Project Explorer tree.

### 9.1.1 ILX56-PNC

The Status monitoring window can be opened by either double-clicking on the *Status* item in the Project Explorer tree, or by right-clicking on the module and selecting **STATUS**.

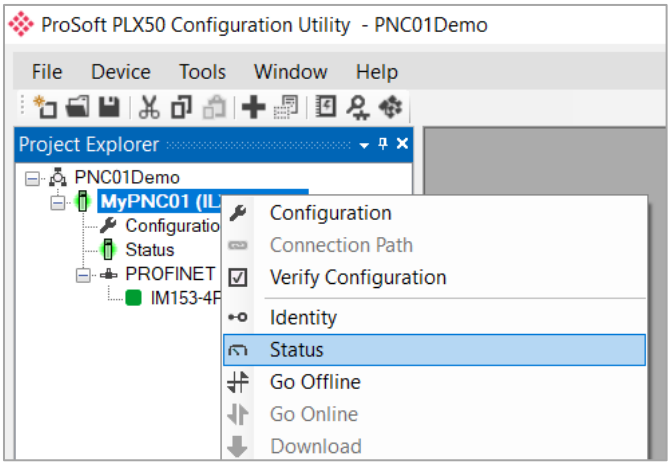



Figure 9.3 - Selecting ILX56-PNC Online Status monitoring

The status window contains multiple tabs to display the current status of the module.

### 9.1.1.1 General

The *General* tab displays the following general parameters:

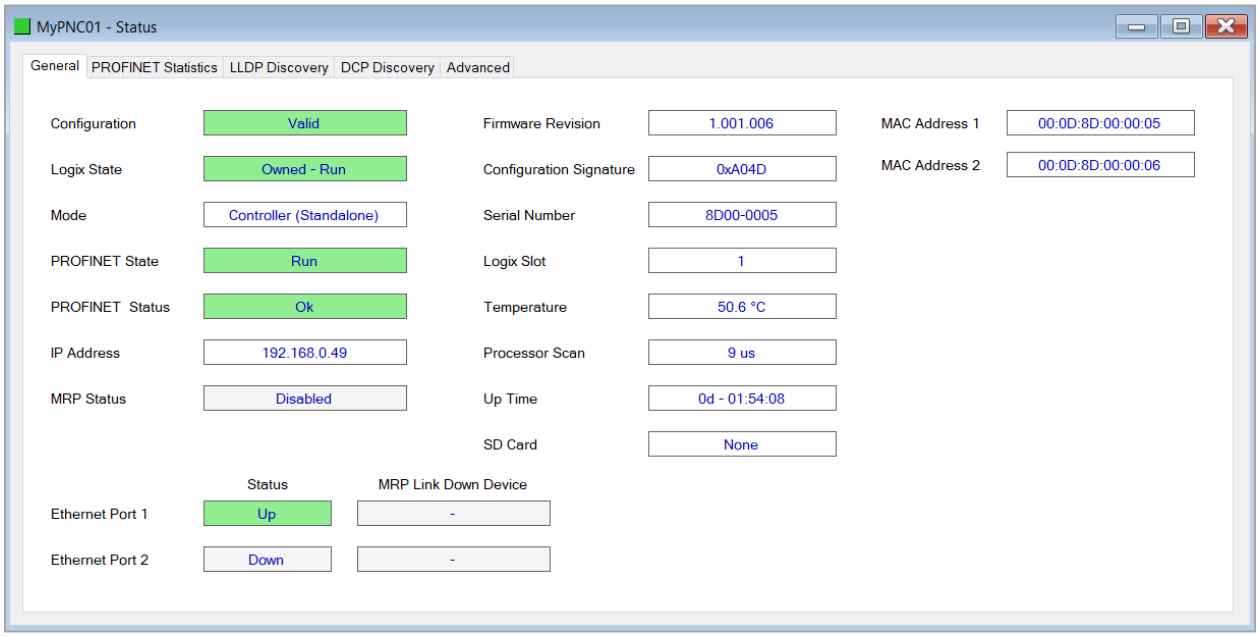



Figure 9.4 – ILX56-PNC Status monitoring - General

| Parameter | Description |
|---|---|
| Configuration | Indicates if the downloaded configuration is valid and executing.<br><br>**Valid** – Configuration is valid.<br>**Not Valid** – Configuration is blank or corrupt. |
| Logix State | Indicates if the module is currently owned (Class 1) by a Logix controller and the state of the controller:<br><br>**Not Owned** – Logic controller not connected.<br>**Owned - Run** – Controller is connected and in RUN mode<br>**Owned Program** – Controller is connected and in PROGRAM, FAULT, or TEST mode. |
| Mode | This is the mode of operation of the module. The following states can be returned:<br><br>**Controller (Standalone)** – In this mode the ILX56-PNC is the standalone controller on the PROFINET network.<br>**Controller S2 Redundancy** – In this mode a pair of ILX56-PNC modules both act as controllers on the PROFINET network.<br><br>See the section on *S2 Redundancy* for more information. |

| | |
|---|---|
| PROFINET State | This is the operational state of the PROFINET network. The following states can be returned:<br><br>**Offline** – The PROFINET network is offline, and the ILX56-PNC will not communicate on the network.<br>**Idle** – The PROFINET network is running in Idle mode, the ILX56-PNC is communicating on the network, but it will not exchange any process data with IO devices.<br>**Stop** – The PROFINET network is in Stop mode, and the ILX56-PNC is communicating with IO devices on the network, but with the data being sent from the ILX56-PNC flagged as non-valid.<br>**Run** – The PROFINET network is running, and the ILX56-PNC is communicating with IO devices on the network. |
| PROFINET Status | Status of the PROFINET network:<br><br>**Ok** – No PROFINET errors.<br>**Network Error** – PROFINET network issue detected.<br>**Device Error** – One or more PROFINET devices not communicating. |
| IP Address | The IP address of the ILX56-PNC. |
| MRP Status | The current MRP status:<br><br>**Disabled** – MRP is disabled.<br>**Open Ring** – The MRP ring is open.<br>**Closed Ring** – The MRP ring is closed. |
| Firmware Revision | The application firmware revision currently executing. |
| Configuration Signature | The signature of the configuration currently executing on the module. |
| Serial Number | Displays the module's serial number. |
| Logix Slot | The current slot in which the module resides of the ControlLogix rack. |
| Temperature | The internal temperature of the module. |
| Processor Scan | The amount of time (microseconds) taken by the module's processor in the last scan. |
| Up Time | Indicates the elapsed time since the module was powered-up. |
| SD Card | Indicates if a SD Card has been inserted into the module. |
| MAC Address 1 & 2 | The MAC Addresses assigned to the PROFINET interface. |
| *Ethernet Ports 1 & 2* | |
| Status | The current link status of the Ethernet port:<br><br>**Up** – Port has an active Ethernet link.<br>**Down** – Port has no Ethernet link. |
| MRP Link Down Device | The suspected device at which the MRP ring has been broken.<br>Only applicable when MRP is enabled. |

Table 9.3 - Parameters displayed in the Status Monitoring – General Tab

### 9.1.1.2 PROFINET Statistics

The *PROFINET Statistics* tab displays the following general parameters:

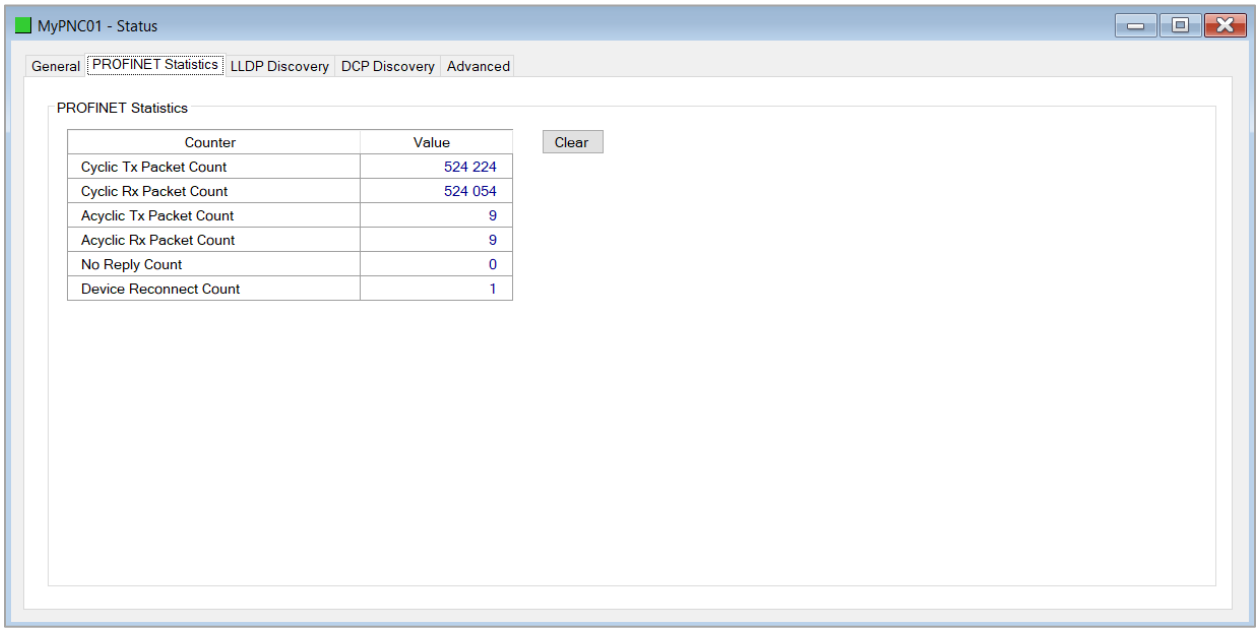



Figure 9.5 – ILX56-PNC Status monitoring – PROFINET Statistics

| Parameter | Description |
|---|---|
| Cyclic Tx Packet Count | The number of cyclic PROFINET packets transmitted. |
| Cyclic Rx Packet Count | The number of cyclic PROFINET packets received. |
| Acyclic Tx Packet Count | The number of acyclic PROFINET packets transmitted. |
| Acyclic Rx Packet Count | The number of acyclic PROFINET packets received. |
| No Reply Count | The number of ILX56-PNC PROFINET requests where the device did not respond. |
| Device Reconnect Count | The number of device connection requests sent. |

Table 9.4 - Parameters displayed in the Status Monitoring – General Statistics Tab

### 9.1.1.3 LLDP Discovery

The *LLDP Discovery* tab displays a list of all the devices on the network discovered using LLDP (Link Layer Discovery Protocol).

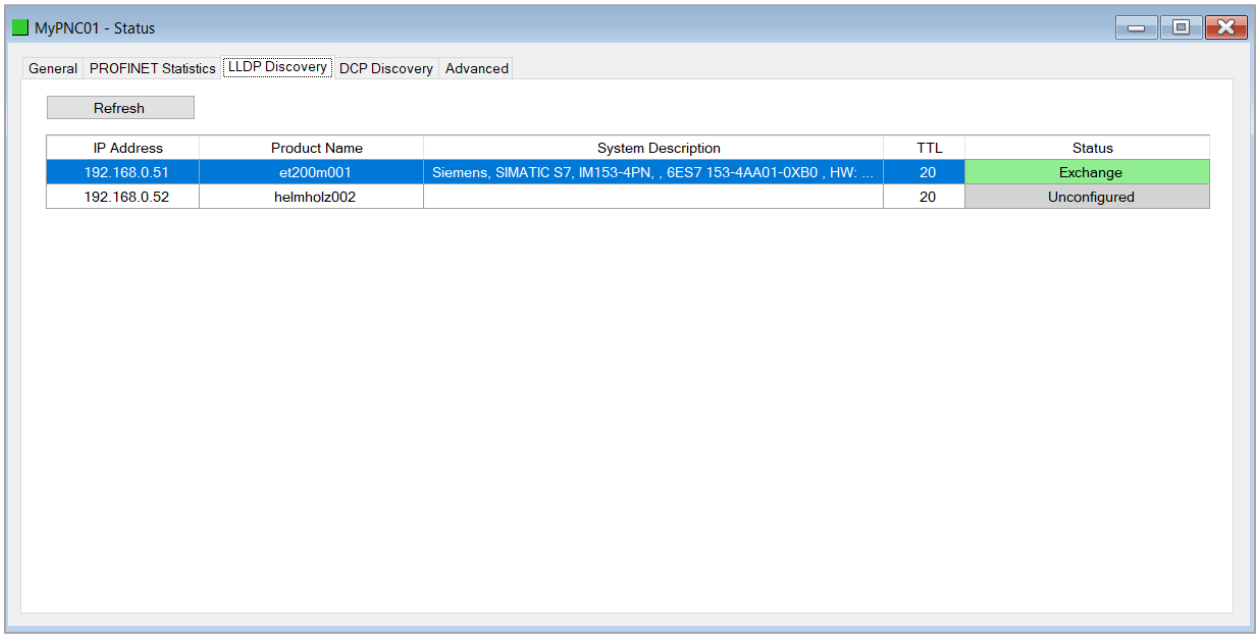



Figure 9.6 – ILX56-PNC Status monitoring – LLDP Discovery

The LLDP Discovery list will display the following for each device:

| Parameter | Description |
|---|---|
| IP Address | The device's IP address. |
| Product Name | The device's reported Product Name. |
| System Description | The device's reported System Description. |
| TTL | The device's reported Time-To-Live. The amount of time, or hops, before a packet is deemed to be stale and is discarded. |
| Status | The PROFINET controller's connection status to the device.<br><br>**Unconfigured** – The device is not in the controller's configuration.<br>**Configured** – The device is configured but not online.<br>**Online – No Data** – The device is online but is not exchanging data.<br>**Exchange** – The device is online and exchanging data.<br>**IP Configured – Name Mismatch** – There exists a device in the configuration with this IP address, but it has a different Device Name.<br>**Name configured, IP Address Mismatch** – There exists a device in the configuration with this Device Name, but it has a different IP Address. |

Table 9.5 - Parameters displayed in the Status Monitoring – LLDP Discovery

### 9.1.1.4 DCP Discovery

The *DCP Discovery* tab displays a list of all devices on the network discovered using DCP (Discovery and Configuration Protocol). To refresh the *DCP Discovery* list, click the **REFRESH DISCOVERY** button.

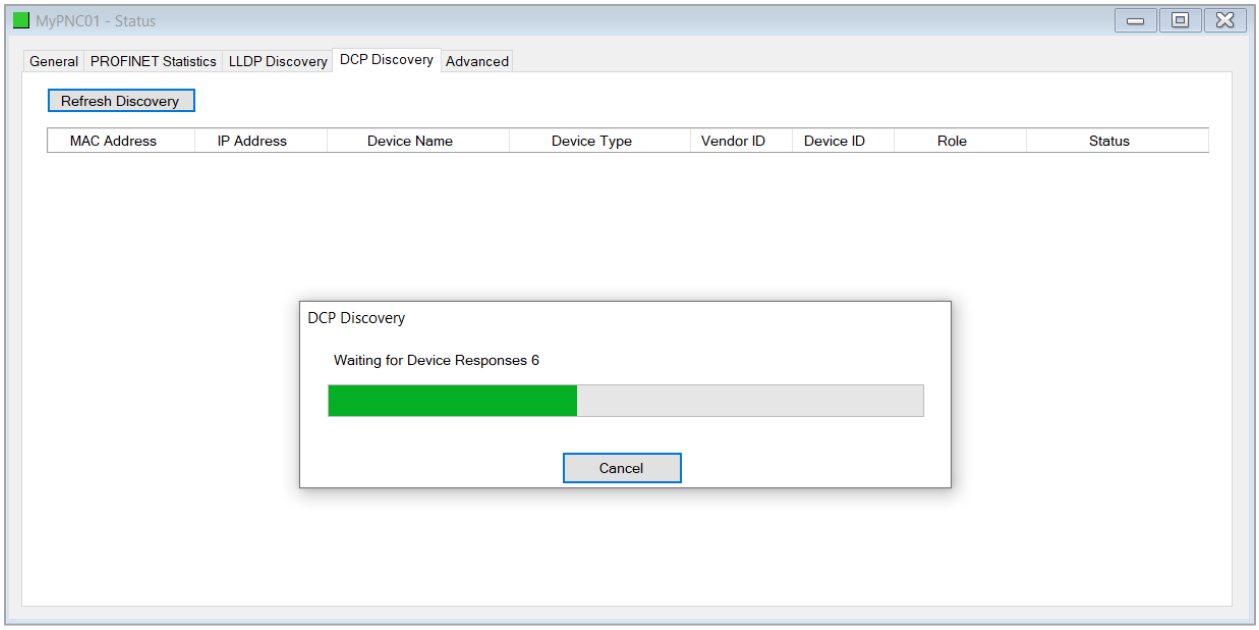



Figure 9.7 – ILX56-PNC Status monitoring – Refresh DCP Discovery

After a few seconds, the DCP Discovery list will be displayed.

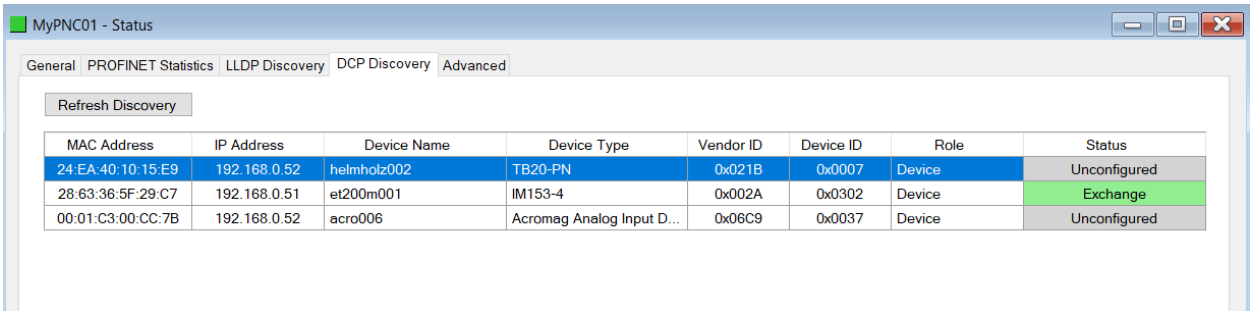



Figure 9.8 – ILX56-PNC Status monitoring – DCP Discovery

The DCP Discovery list will display the following for each device:

| Parameter | Description |
|---|---|
| MAC Address | The device's MAC address. |
| IP Address | The device's IP address. |
| Device Name | The device's reported Device Name. |
| Device Type | The device's reported Device Type. |
| Vendor ID | The device's reported PROFINET Vendor ID. |
| Device ID | The device's reported PROFINET Device ID. |
| Role | The device's role:<br><br>Device<br>Controller<br>Supervisor |
| Status | The PROFINET controller's connection status to the device.<br><br>**Unconfigured** – The device is not in the controller's configuration.<br>**Configured** – The device is configured but not online.<br>**Online – No Data** – The device is online but is not exchanging data.<br>**Exchange** – The device is online and exchanging data.<br>**IP Configured – Name Mismatch** – There exists a device in the configuration with this IP address, but it has a different Device Name.<br>**Name configured, IP Address Mismatch** – There exists a device in the configuration with this Device Name, but it has a different IP Address. |

Table 9.6 - Parameters displayed in the Status Monitoring – DCP Discovery

### 9.1.1.5 Advanced

The *Advanced* tab displays various internal and low-level, diagnostics of the ILX56-PNC.

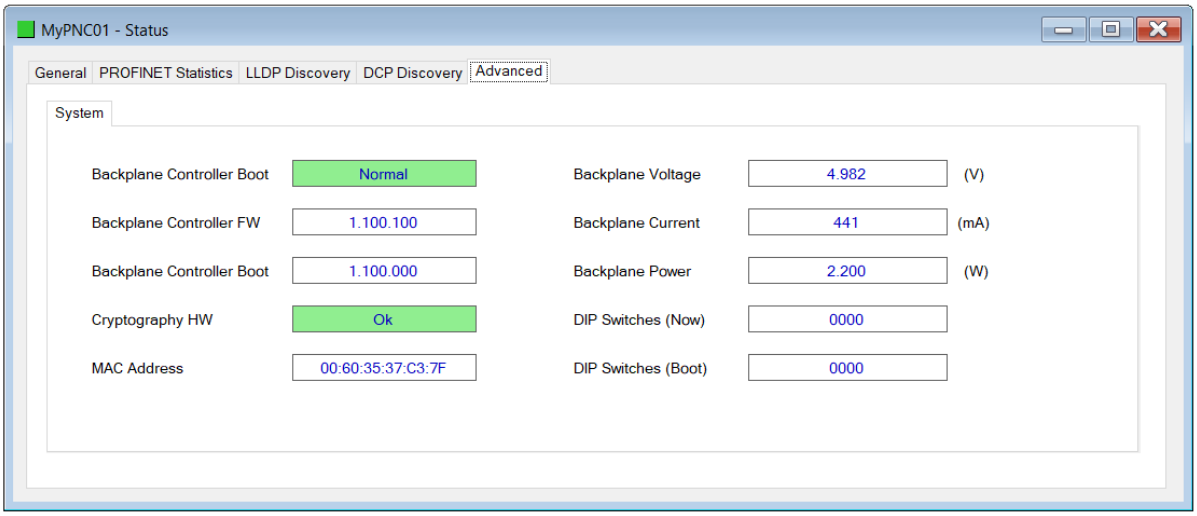



Figure 9.9 – ILX56-PNC Status monitoring – Advanced Tab

| Parameter | Description |
|---|---|
| Backplane Controller Boot | The boot-up status of the backplane controller. |
| Backplane Controller FW | The firmware revision of the backplane controller. |
| Backplane Controller Boot | The bootloader version of the backplane controller. |
| Cryptography HW | The communication status to the cryptography processor. |
| MAC Address | The primary module MAC address. |
| Backplane Voltage | The measured backplane voltage. |
| Backplane Current | The measure backplane current in mA. |
| Backplane Power | The calculated backplane power consumption in W. |
| DIP Switch (Now) | The current status of the DIP switches. |
| DIP Switch (Boot) | The status of the DIP switches at Boot-up. |

Table 9.7 - Parameters displayed in the Status Monitoring – Advanced Tab

### 9.1.2 Device Status

The Status monitoring window of each PROFINET device connected to the ILX56-PNC can be opened by right-clicking on the specific device in the PLX50 Configuration Utility project tree and selecting the **STATUS** option.

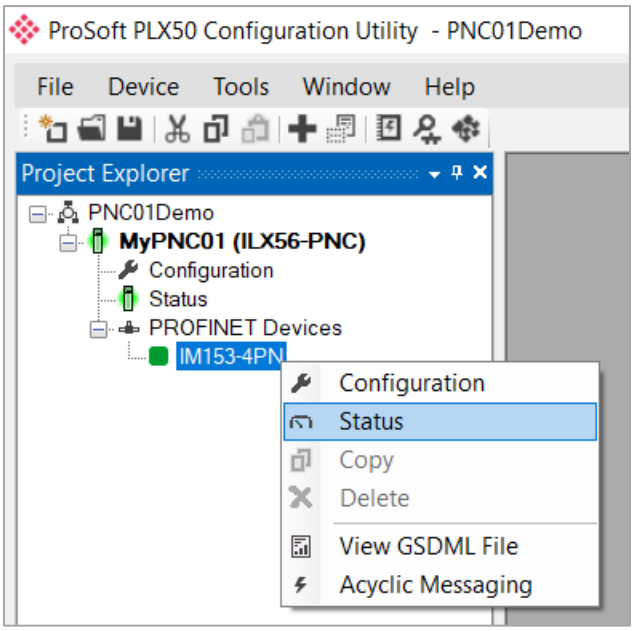



Figure 9.10 - Selecting device online Status

The device status window contains multiple tabs to display the current status of the selected device.

### 9.1.2.1 General

The *General* tab displays the following general parameters:

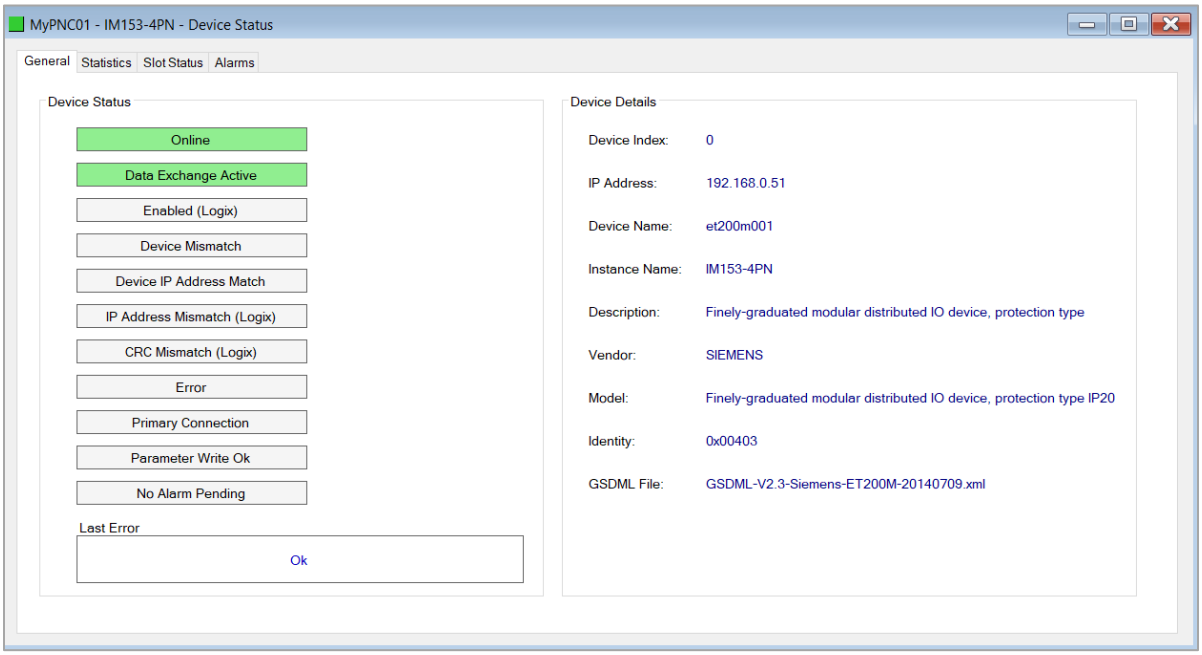



Figure 9.11 – Device Status monitoring - General

| Parameter | Description |
|---|---|
| Device Status | The current status of the device:<br><br>**Online** – The device is online.<br>**Offline** – The device is offline.<br><br>**Data Exchange Active** – The device is exchanging cyclic data with the ILX56-PNC.<br>**Data Exchange Inactive** – The device is not exchanging cyclic data with the ILX56-PNC.<br><br>**Disabled (Logix)** – The device has been disabled for cyclic data exchange by the Logix controller using the ILX56-PNC output assembly.<br>**Enabled (Logix)** – The device has been enabled for cyclic data exchange by the Logix controller using the ILX56-PNC output assembly.<br><br>**Device GSDML Mismatch** – The device configured in the PLX50 Configuration Utility and the device online at the specific IP address do not match.<br>**Device GSDML Match** – The device configured in the PLX50 Configuration Utility matches the device online at the specific IP address.<br><br>**IP Address Mismatch (Logix)** – The IP address entered from the Logix controller using the ILX56-PNC output assembly does not match the IP Address of the configured device.<br>**IP Address Match (Logix)** – The IP address entered from the Logix controller using the ILX56-PNC output assembly matches the IP Address of the configured device. |

| | |
|---|---|
| | **CRC Mismatch (Logix)** – Indicates the mapping from the Logix controller does not match the configured mapping in the ILX56-PNC.<br>**CRC Match (Logix)** – Indicates the mapping from the Logix controller matches the configured mapping in the ILX56-PNC.<br><br>**Error** – Device Error flag, which can be one of the following:<br>• The device connection was closed<br>• Device rejected the Parameter End command<br>• One or more of the received device's IOPS or IOCS is bad.<br>• There is a slot / sub-slot mismatch<br>**No Error** – No Device Error.<br><br>**Primary Connection** – The device is connected with a Primary connection.<br>**Standby Connection** – The device is connected with a Standby (S2) connection. Normal when using S2 Redundancy.<br><br>**Parameter Write Ok** – All the parameters written to the device prior to establishing the cyclic exchange were successful.<br>**Parameter Write Fail** – One or more of the parameters written to the device prior to establishing the cyclic exchange failed.<br>The description of the Error will be displayed in the Last Error text box.<br><br>**Alarm Pending** – Indicates the device has an alarm pending on the local PROFINET network.<br>**No Alarm Pending** – Indicates the device does not have an alarm pending on the local PROFINET network.<br><br>**Last Error** – Displays the last received connection error or parameter write error. |
| IP Address | The configured IP address for the device. |
| Device Name | The PROFINET Device Name. |
| Instance Name | The configured instance name for the device. |
| Description | The description of the device from the GSDML file. |
| Vendor | The Vendor of the device from the GSDML file. |
| Model | The Model name of the device from the GSDML file. |
| Identity | The Identity of the device from the GSDML file. |
| GSDML File | The GSDML file used for the configuration. |

Table 9.8 - Device Status Monitoring – General Tab

### 9.1.2.2 Statistics

The *Statistics* tab displays the following general parameters:

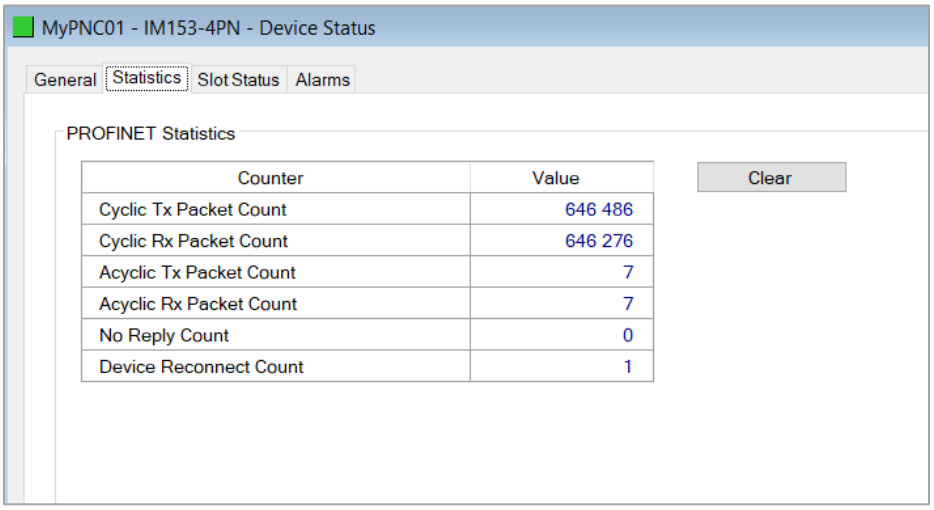



Figure 9.12 – Device Status monitoring – Statistics

| Parameter | Description |
|---|---|
| Cyclic Tx Packet Count | The number of cyclic PROFINET packets transmitted to this device. |
| Cyclic Rx Packet Count | The number of cyclic PROFINET packets received from this device. |
| Acyclic Tx Packet Count | The number of acyclic PROFINET packets transmitted to this device. |
| Acyclic Rx Packet Count | The number of acyclic PROFINET packets received from this device. |
| No Reply Count | The number of ILX56-PNC PROFINET requests where this device did not respond. |
| Device Reconnect Count | The number of device connection requests sent to this device. |

Table 9.9 - Device Status Monitoring – Statistics tab

### 9.1.2.3 Slot Status

The *Slot Status* tab displays the following parameters:

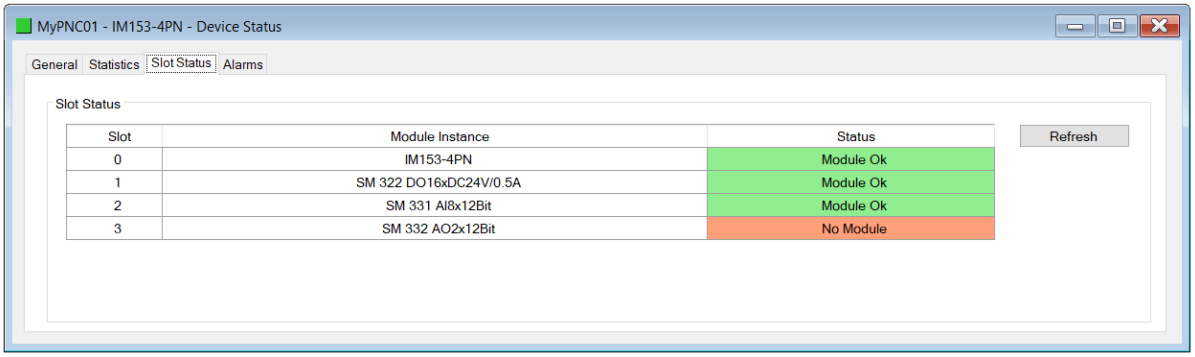



Figure 9.13 – Device Status Monitoring – Slot Status

| Parameter | Description |
|---|---|
| Slot | The slot number and subslot number if applicable. |
| Module Instance | The instance name of the module configured for that slot. |
| Status | The status reported by the device for that slot:<br><br>**No Module** – No module is detected in that slot. (Different from the configuration.)<br>**Wrong Module** – An incorrect module is detected in that slot. (Different from the configuration.)<br>**Module Substitute** – A substitute module is detected in that slot. Different from the configuration, but sufficiently compatible to continue.<br>**No Submodule** – No submodule is detected in that subslot. (Different from the configuration.)<br>**Wrong Submodule** – An incorrect submodule is detected in that subslot. (Different from the configuration.)<br>**Submodule Substitute** – A substitute submodule is detected. Different from the configuration, but sufficiently compatible to continue. |

Table 9.10 - Device Status Monitoring – Slot Status Parameters

### 9.1.2.4 Alarms

The *Alarms* tab displays the following parameters:

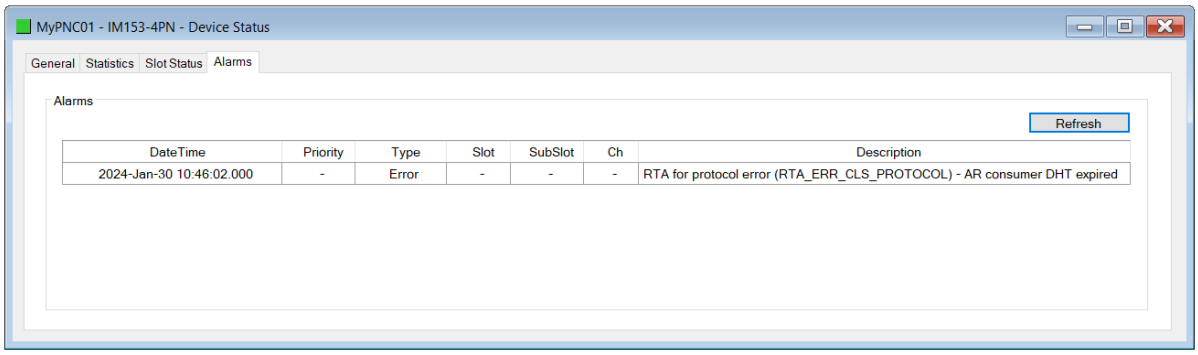



Figure 9.14 – Device Status monitoring – Alarms

| Parameter | Description |
|---|---|
| DateTime | The Date and Time when the alarm occurred. |
| Priority | Will indicate the priority of the alarm. An alarm can have a high or low priority. |
| Type | The type of alarm that has occurred (e.g., pull or plug alarm, or process alarm, etc.). |
| Slot | The slot that generated the alarm. |
| Subslot | The sub-slot that generated the alarm. |
| Ch | The channel that generated the alarm. |
| Description | A description of what type of alarm has occurred. |

Table 9.11 - Device Status Monitoring – Alarm Parameters

**Note:** The alarms viewed in PLX50 Configuration Utility is only viewing the buffered alarms that the ILX56-PNC has received from specific PROFINET devices. The alarms will not be unloaded when viewing as alarms are unloaded in Logix.

## 9.2 Module Event Log

The ILX56-PNC module logs various diagnostic records to an internal event log. These logs are stored in non-volatile memory and can be displayed using the PLX50 Configuration Utility. To view them in the PLX50 Configuration Utility, select the **EVENT VIEWER** option.

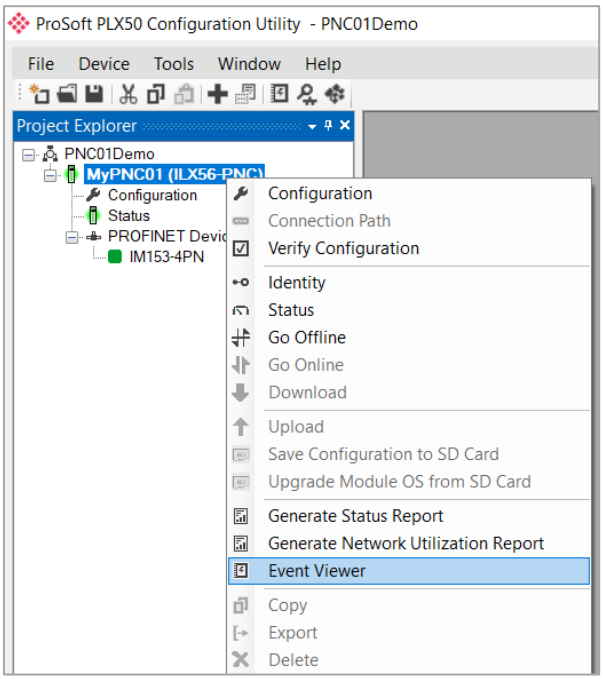



Figure 9.15. - Selecting the module Event Log

The *Event Viewer* window will open and automatically read all the events from the module. The log entries are sorted with the latest record at the top. Custom sorting is achieved by double-clicking on the column headings.

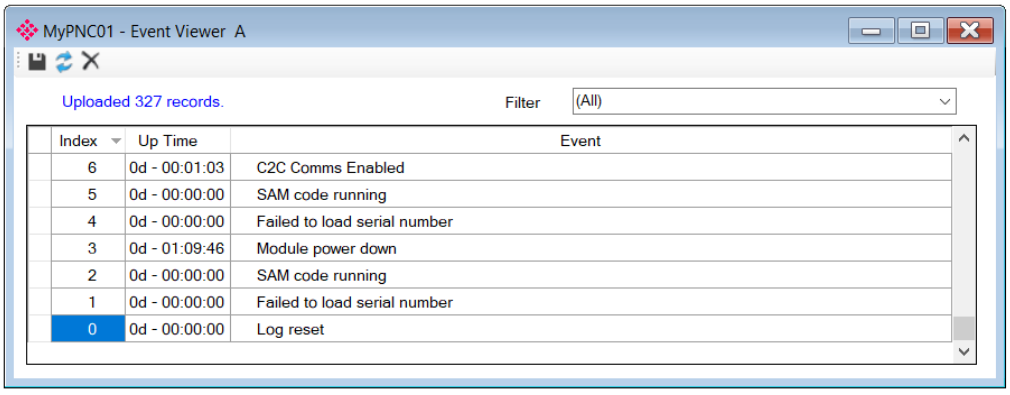



Figure 9.16. – Module Event Log

The log can also be stored to a file for future analysis, by clicking the **SAVE** button in the tool menu. To view previously saved files, use the *Event Log Viewer* option under the *Tools* menu.

# 10 Technical Specifications

## 10.1 Electrical

| Specification | Description |
|---|---|
| Backplane Current Load | 600 mA @ 5 VDC<br>2 mA @ 24 VDC |
| Enclosure rating | IP20, NEMA/UL Open Type |
| Temperature | 0°C to 60°C (32°F to 140°F)<br>ILX56-PNC-CC: -25°C to 70°C (-13°F to 158°F) |
| Earth connection | Yes, terminal based |
| Emissions | IEC61000-6-4 |
| ESD Immunity | EN 61000-4-2 |
| Radiated RF Immunity | IEC 61000-4-3 |
| EFT/B Immunity | EFT: IEC 61000-4-4 |
| Surge Immunity | Surge: IEC 61000-4-5 |
| Conducted RF Immunity | IEC 61000-4-6 |

Table 10.1 - Electrical specification

## 10.2 PROFINET

| Specification | Description |
|---|---|
| PROFINET Controller | Supported |
| Maximum PROFINET device count (Real Time comms) | 64 |
| DCP functions supported | Network Scan<br>PROFINET name assign<br>PROFINET IP address assign<br>Device LED flash (for location)<br>Device Reset |
| Media Redundancy Protocol (MRP) | Client Supported<br>Manager Supported |
| PROFINET Conformance Level | B |
| S2 Redundancy | Supported |
| Device Alarm Management | Supported |

Table 10.2 - PROFINET specification

## 10.3 ControlLogix

| Specification | Description |
|---|---|
| Class 1 Connections | Maximum 11 x Class 1 connections supported. |
| Minimum Requested Packet Interval (RPI) | 2ms for connection count <= 4.<br>10ms for connection count > 4. |
| UCMM Acyclic Messaging | Supported |
| Class 3 Acyclic Messaging | Supported |

Table 10.3 - ControlLogix specification

## 10.4 Certifications

Please visit our website: www.prosoft-technology.com

# 11 Appendix

## 11.1 PROFINET Response Error Codes

The response status consists of four error codes:

- *ErrorCode*
- *ErrorDecode*
- *ErrorCode1*
- *ErrorCode2*

The definition of *ErrorCode1* and *ErrorCode2* will depend on the values of *ErrorCode* and *ErrorDecode*.

**Note:** There are many error code definitions, this section will only provide details relevant to Explicit Acyclic Messaging.

| Error Code | Error Decode | Error Code 1 | Error Code 2 | Group | Error |
|---|---|---|---|---|---|
| 0x81 | 0x80 | 0xA0 | - | PNIO | Application - Read Error |
| 0x81 | 0x80 | 0xA1 | - | PNIO | Application - Write Error |
| 0x81 | 0x80 | 0xA2 | - | PNIO | Application - Module Failure |
| 0x81 | 0x80 | 0xA7 | - | PNIO | Application - Busy |
| 0x81 | 0x80 | 0xA8 | - | PNIO | Application - Version Conflict |
| 0x81 | 0x80 | 0xA9 | - | PNIO | Application - Feature Not Supported |
| 0x81 | 0x80 | 0xB0 | - | PNIO | Access - Invalid Index |
| 0x81 | 0x80 | 0xB1 | - | PNIO | Access - Write Length Error |
| 0x81 | 0x80 | 0xB2 | - | PNIO | Access - Invalid Slot / Subslot |
| 0x81 | 0x80 | 0xB3 | - | PNIO | Access - Type Conflict |
| 0x81 | 0x80 | 0xB4 | - | PNIO | Access - Invalid Area / API |
| 0x81 | 0x80 | 0xB5 | - | PNIO | Access - State Conflict |
| 0x81 | 0x80 | 0xB6 | - | PNIO | Access - Access Denied |
| 0x81 | 0x80 | 0xB7 | - | PNIO | Access - Invalid Range |
| 0x81 | 0x80 | 0xB8 | - | PNIO | Access - Invalid Parameter |
| 0x81 | 0x80 | 0xB9 | - | PNIO | Access - Invalid Type |
| 0x81 | 0x80 | 0xBA | - | PNIO | Access - Backup |
| 0x81 | 0x80 | 0xC0 | - | PNIO | Resource - Read Constraint Conflict |
| 0x81 | 0x80 | 0xC1 | - | PNIO | Resource - Write Constraint Conflict |
| 0x81 | 0x80 | 0xC2 | - | PNIO | Resource - Resource Busy |
| 0x81 | 0x80 | 0xC3 | - | PNIO | Resource - Resource Unavailable |
| 0xDE | 0x80 | 0xA0 | - | IOD Read | Application - Read Error |
| 0xDE | 0x80 | 0xA1 | - | IOD Read | Application - Write Error |

| Error Code | Error Decode | Error Code 1 | Error Code 2 | Group | Error |
|---|---|---|---|---|---|
| 0xDE | 0x80 | 0xA2 | - | IOD Read | Application - Module Failure |
| 0xDE | 0x80 | 0xA7 | - | IOD Read | Application - Busy |
| 0xDE | 0x80 | 0xA8 | - | IOD Read | Application - Version Conflict |
| 0xDE | 0x80 | 0xA9 | - | IOD Read | Application - Feature Not Supported |
| 0xDE | 0x80 | 0xB0 | - | IOD Read | Access - Invalid Index |
| 0xDE | 0x80 | 0xB1 | - | IOD Read | Access - Write Length Error |
| 0xDE | 0x80 | 0xB2 | - | IOD Read | Access - Invalid Slot / Subslot |
| 0xDE | 0x80 | 0xB3 | - | IOD Read | Access - Type Conflict |
| 0xDE | 0x80 | 0xB4 | - | IOD Read | Access - Invalid Area / API |
| 0xDE | 0x80 | 0xB5 | - | IOD Read | Access - State Conflict |
| 0xDE | 0x80 | 0xB6 | - | IOD Read | Access - Access Denied |
| 0xDE | 0x80 | 0xB7 | - | IOD Read | Access - Invalid Range |
| 0xDE | 0x80 | 0xB8 | - | IOD Read | Access - Invalid Parameter |
| 0xDE | 0x80 | 0xB9 | - | IOD Read | Access - Invalid Type |
| 0xDE | 0x80 | 0xBA | - | IOD Read | Access - Backup |
| 0xDE | 0x80 | 0xC0 | - | IOD Read | Resource - Read Constraint Conflict |
| 0xDE | 0x80 | 0xC1 | - | IOD Read | Resource - Write Constraint Conflict |
| 0xDE | 0x80 | 0xC2 | - | IOD Read | Resource - Resource Busy |
| 0xDE | 0x80 | 0xC3 | - | IOD Read | Resource - Resource Unavailable |
| 0xDF | 0x80 | 0xA0 | - | IOD Write | Application - Read Error |
| 0xDF | 0x80 | 0xA1 | - | IOD Write | Application - Write Error |
| 0xDF | 0x80 | 0xA2 | - | IOD Write | Application - Module Failure |
| 0xDF | 0x80 | 0xA7 | - | IOD Write | Application - Busy |
| 0xDF | 0x80 | 0xA8 | - | IOD Write | Application - Version Conflict |
| 0xDF | 0x80 | 0xA9 | - | IOD Write | Application - Feature Not Supported |
| 0xDF | 0x80 | 0xB0 | - | IOD Write | Access - Invalid Index |
| 0xDF | 0x80 | 0xB1 | - | IOD Write | Access - Write Length Error |
| 0xDF | 0x80 | 0xB2 | - | IOD Write | Access - Invalid Slot / Subslot |
| 0xDF | 0x80 | 0xB3 | - | IOD Write | Access - Type Conflict |
| 0xDF | 0x80 | 0xB4 | - | IOD Write | Access - Invalid Area / API |
| 0xDF | 0x80 | 0xB5 | - | IOD Write | Access - State Conflict |
| 0xDF | 0x80 | 0xB6 | - | IOD Write | Access - Access Denied |
| 0xDF | 0x80 | 0xB7 | - | IOD Write | Access - Invalid Range |
| 0xDF | 0x80 | 0xB8 | - | IOD Write | Access - Invalid Parameter |
| 0xDF | 0x80 | 0xB9 | - | IOD Write | Access - Invalid Type |
| 0xDF | 0x80 | 0xBA | - | IOD Write | Access - Backup |
| 0xDF | 0x80 | 0xC0 | - | IOD Write | Resource - Read Constraint Conflict |
| 0xDF | 0x80 | 0xC1 | - | IOD Write | Resource - Write Constraint Conflict |
| 0xDF | 0x80 | 0xC2 | - | IOD Write | Resource - Resource Busy |
| 0xDF | 0x80 | 0xC3 | - | IOD Write | Resource - Resource Unavailable |

Table 11.1 - Error Response codes

# 12 ILX56-PNC ET200M QuickStart

This chapter covers the configuration of the ILX56-PNC as a PROFINET Master to communicate with an SIEMENS SIMATIC ET200M PROFINET Slave.

## 12.1 GSDML File Management Tool

### 12.1.1 Installation

Download the ProSoft PLX50 Configuration Utility from www.prosoft-technology.com.

Run the *PLX50 Configuration Utility Setup.msi* to install the software. Follow the Setup Wizard to complete the installing process.

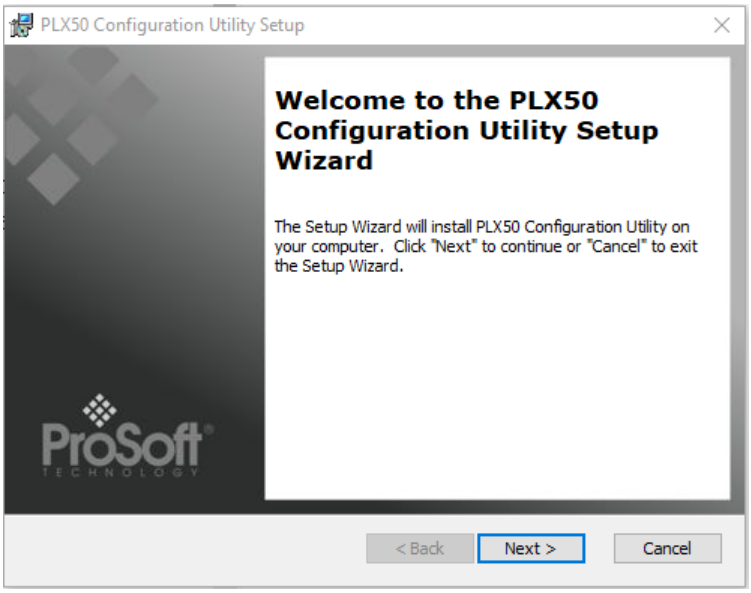



Figure 12.1 – Installation Setup Window

### 12.1.2 Configuration

The GSDML File Management Tool is opened by selecting **GSDML FILE MANAGEMENT** under the *Tools* menu in the PLX50 Configuration Utility.

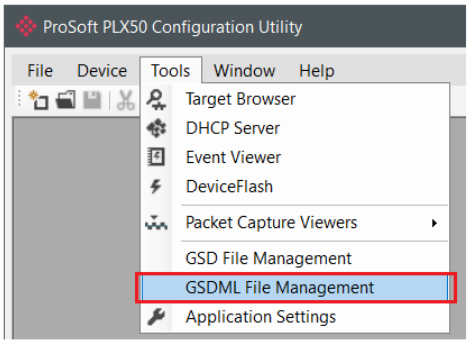



Figure 12.2 – Launch GSDML File Management

Once the tool has been opened, a list of registered PROFINET devices using their GSDML files are displayed.

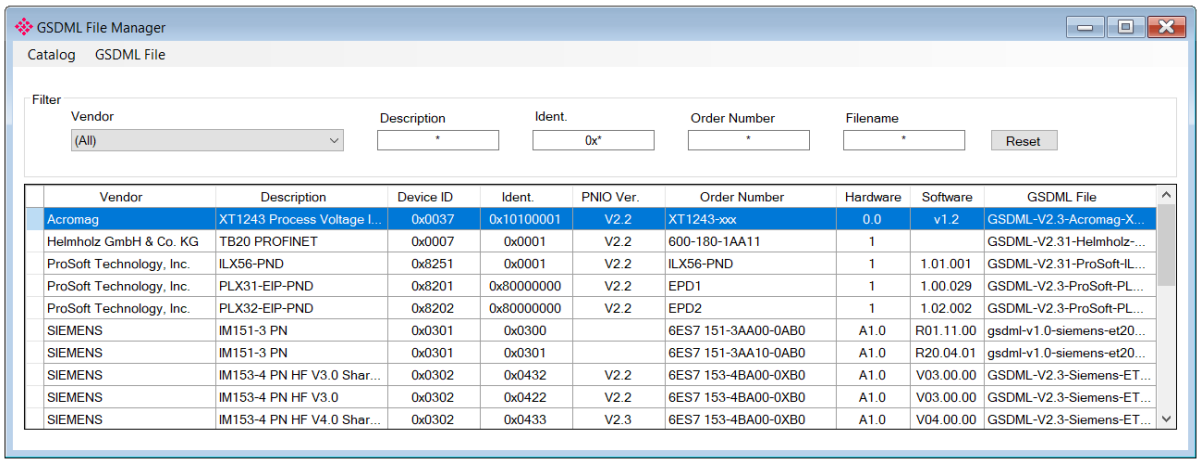



Figure 12.3 – GSDML File Manager

To add a GSDML file, the user will need to click the **ADD** option under the *GSDML File* menu.

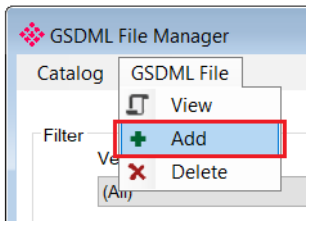



Figure 12.4 – Add GSDML File

Select the GSDML file and click **OPEN**.

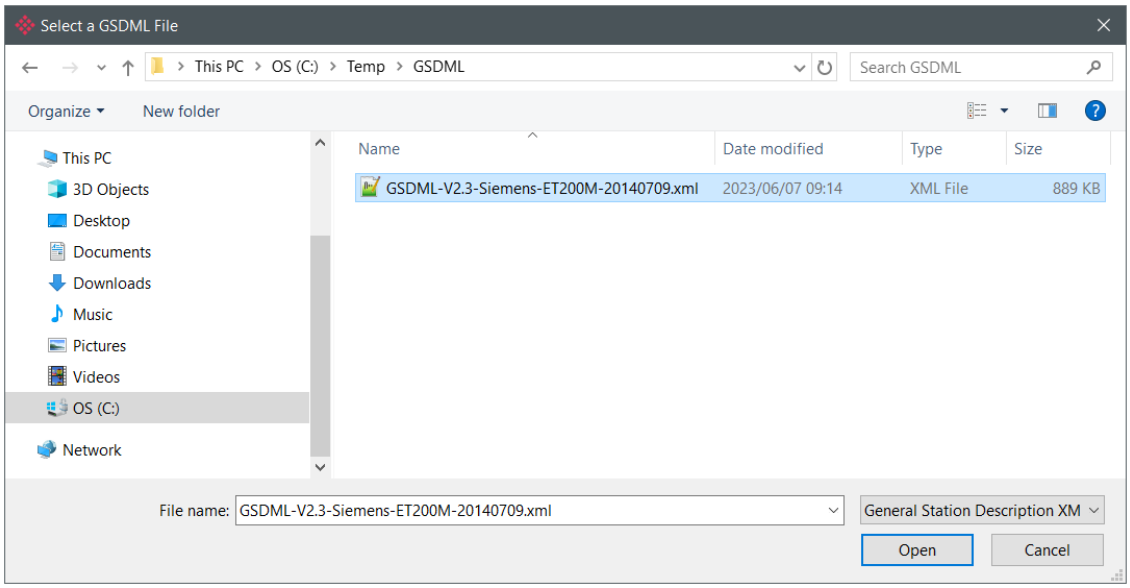



Figure 12.5 – Select GSDML File

Once the file has been selected, the GSDML File Management tool will add the device to the device list and recompile the GSDML catalog.

## 12.2 Creating a New Project

**Note:** If the project was started from Studio 5000 Add-On Profile (AOP), this section can be skipped.

Before configuring the module, a new PLX50 Configuration Utility project must be created. Under the *File* menu, select **NEW**.

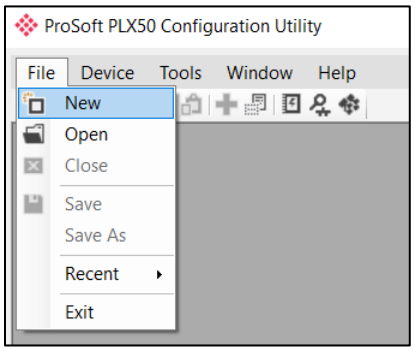



Figure 12.6 – Create New PLX50CU project

A PLX50 Configuration Utility Design Tool project will be created, showing the Project Explorer tree view. A new device can be added by selecting **ADD** under the *Device* menu.

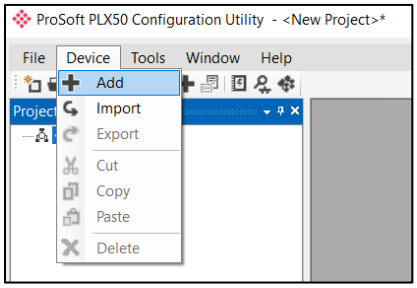



Figure 12.7 – Add new module

In the *Add New Device* window, select the **ILX56-PNC** and click the **OK** button.

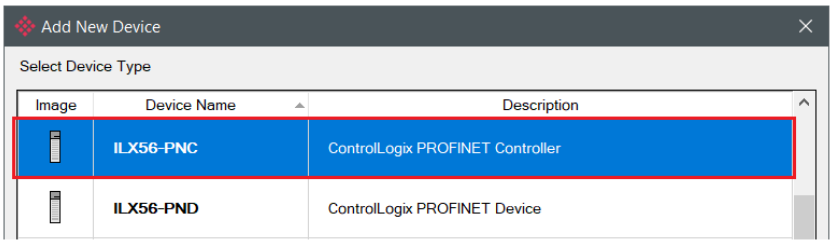



Figure 12.8 – Select ILX56-PNC

The device will appear in the Project Explorer tree with its configuration window opened.

### 12.2.1 PNC Configuration

Navigate to the *General* tab to update the *Instance Name* and *Base Tag*.

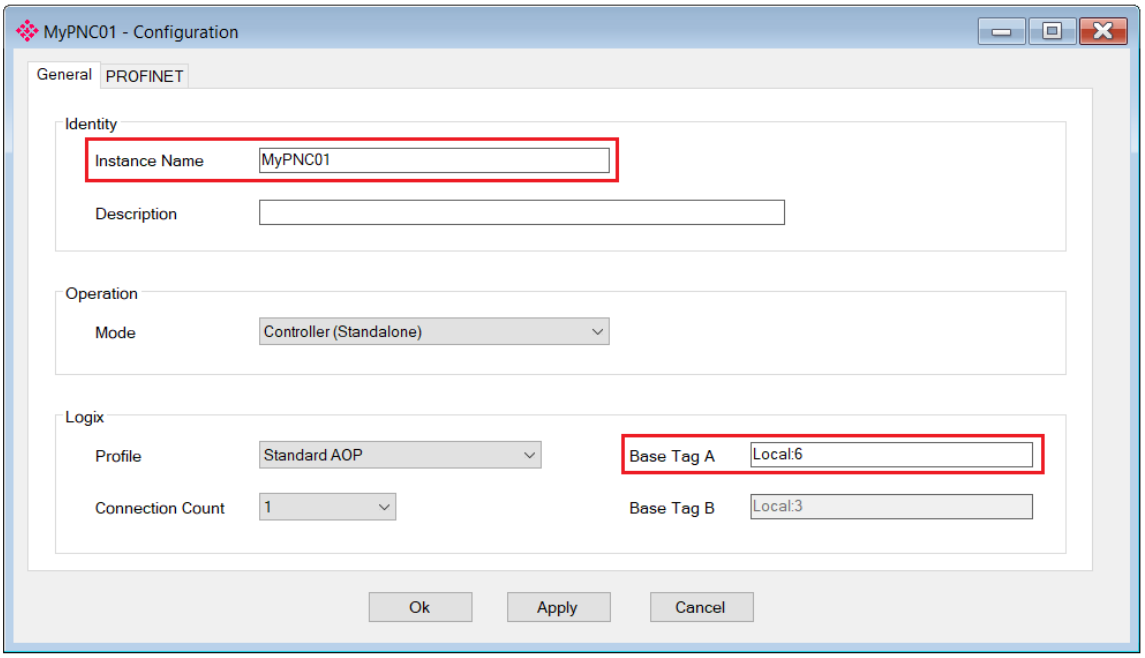



Figure 12.9 – General tab

Navigate to the *PROFINET* tab to update the *IP Address* of the PROFINET network.

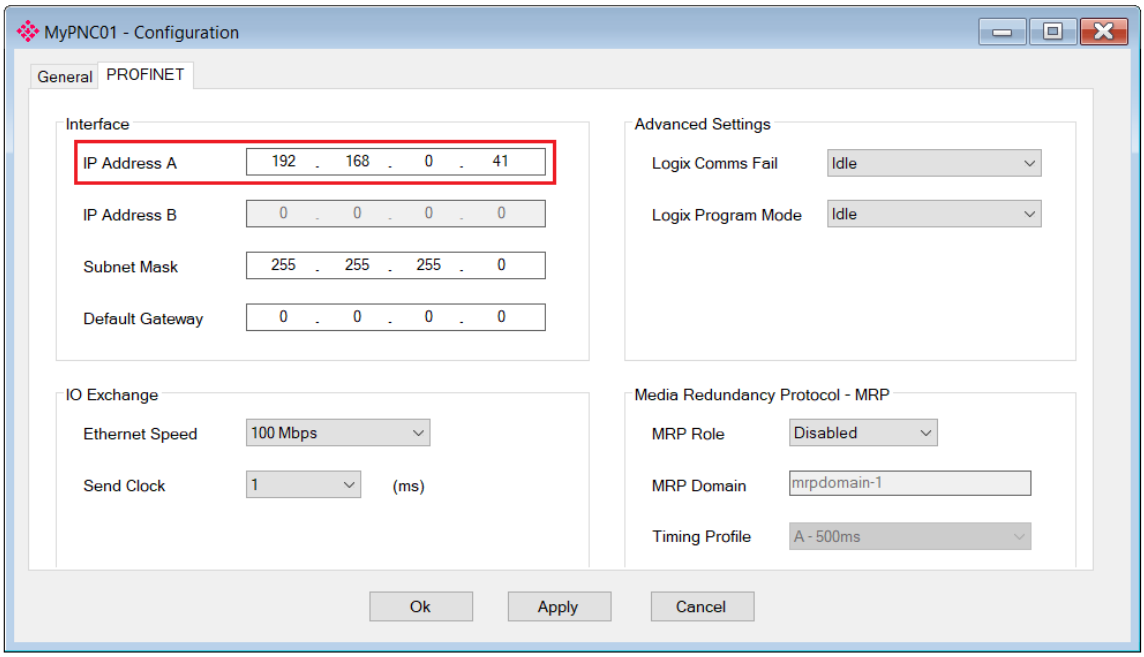



Figure 12.10 – PROFINET tab

Then click **OK**.

## 12.3 Adding a PROFINET Device

The user will need to add each PROFINET device to the ILX56-PNC. To configure each PROFINET device, right-click on the *PROFINET Devices* item in the tree and select **ADD PROFINET DEVICE**.

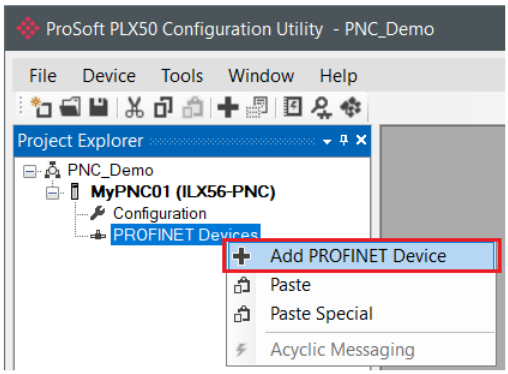



Figure 12.11 – Add new PROFINET device

Once the tool has been opened, a list of registered PROFINET devices using their GSDML files is displayed.

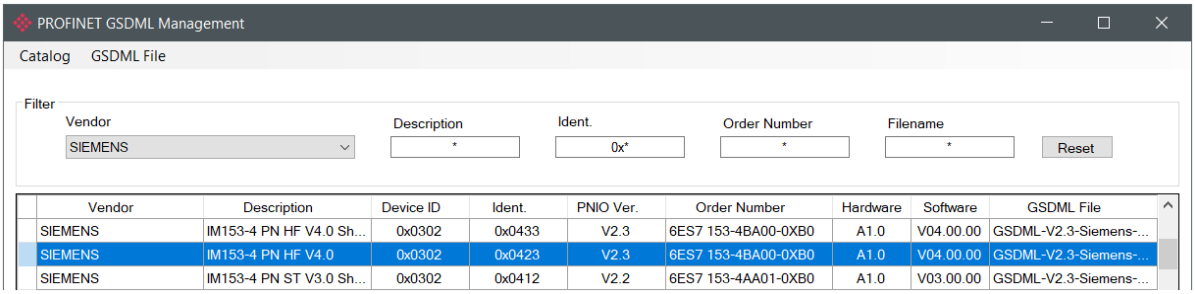



Figure 12.12 – Select device from GSDML catalog

Select the GSDML file of the device to add to the project. Once the device has been added, the *General* tab of the *Configuration* window will be opened. The device will be added to the first open PROFINET Station Address.

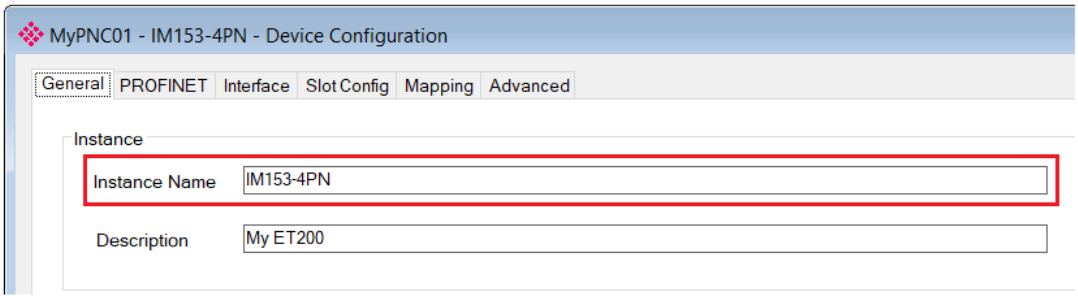



Figure 12.13 – Enter device instance name

Navigate to *PROFINET* Configuration tab to assign the *Device Name* and *IP Address*.

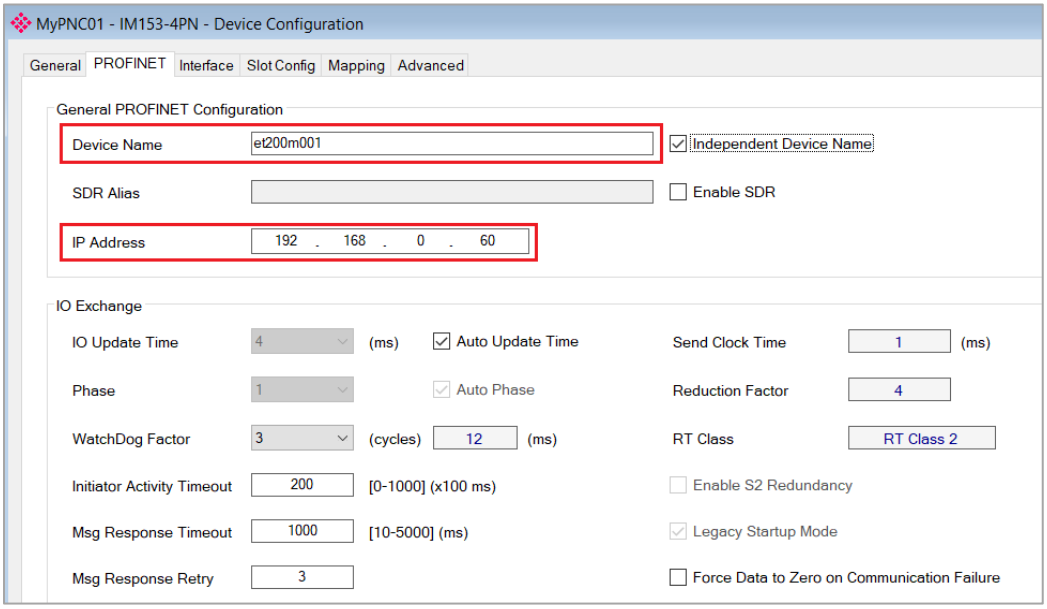



Figure 12.14 – Enter PROFINET device name and IP address

Navigate to the *Slot Configuration* tab. Click **ADD MODULE**.

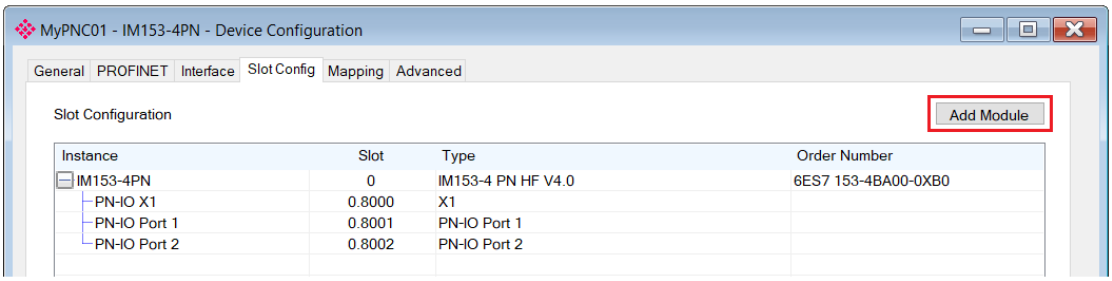



Figure 12.15 – Add module to PROFINET device

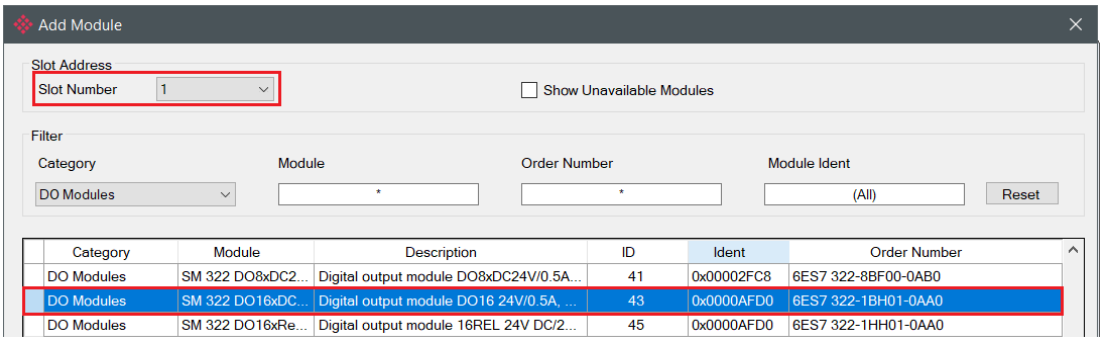



Figure 12.16 – Select the module to add to the selected slot

Add the appropriate modules and click the **OK** button. The ET200M Slave device is now configured in the ProSoft PLX50 Configuration Utility.

## 12.4 Downloading the Configuration to the ILX56-PNC

Establish a connection path for each module. In the PLX50 Configuration Utility, right-click on the device and select **CONNECTION PATH**.

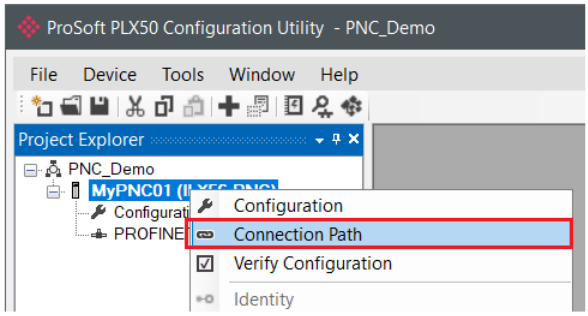



Figure 12.17 – Select Connection Path

Select *Browse* to launch the target browser.

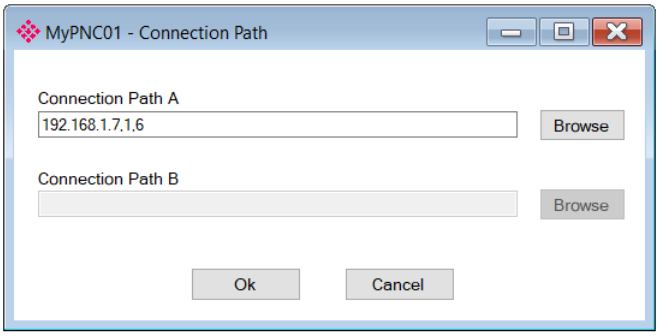



Figure 12.18 – Connection path

Navigate to the ILX56-PNC and click **OK**.

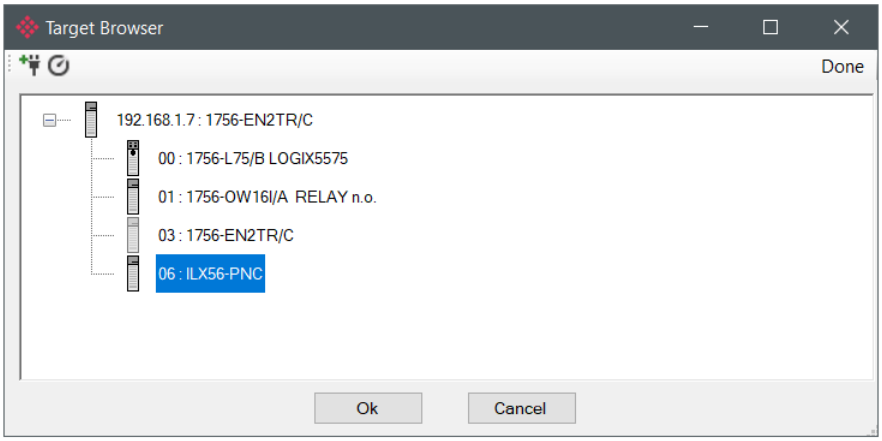



Figure 12.19 – Browse to ILX56-PNC in Target Browser and select the ILX56-PNC

The Connection path will copy to *Connection Path A*. Click **OK**.

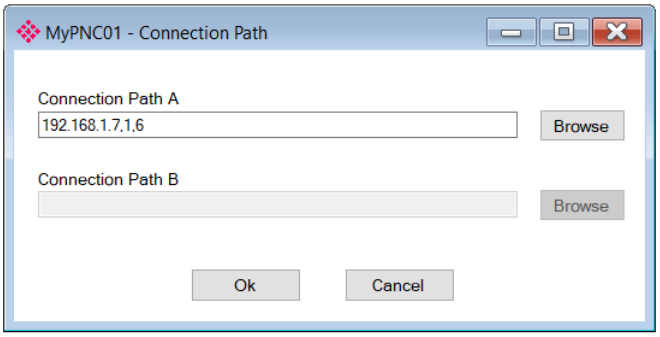



Figure 12.20 – Connection Path A

To download the device configuration, right-click on the ILX56-PNC and select **DOWNLOAD**.

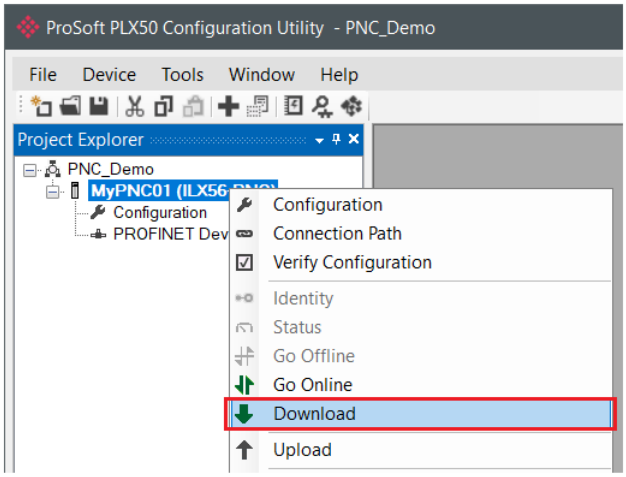



Figure 12.21 – Download PLX50CU configuration to the ILX56-PNC

The PLX50 Configuration Utility device configuration is complete.

## 12.5 ControlLogix Configuration

The user will need to generate the required Logix and UDTs by right-clicking on the module in the PLX50 Configuration Utility and selecting the **GENERATE LOGIX L5X** option.

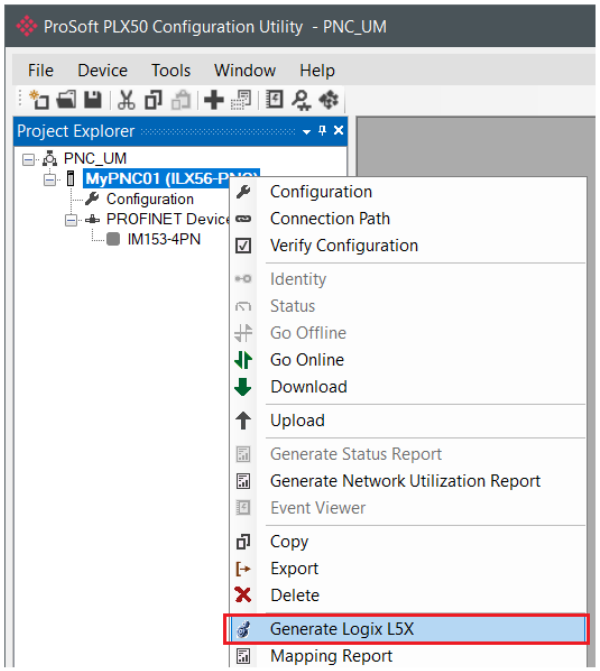



Figure 12.22 – Generate Logix L5X file

Select a suitable file name and path for the L5X file.

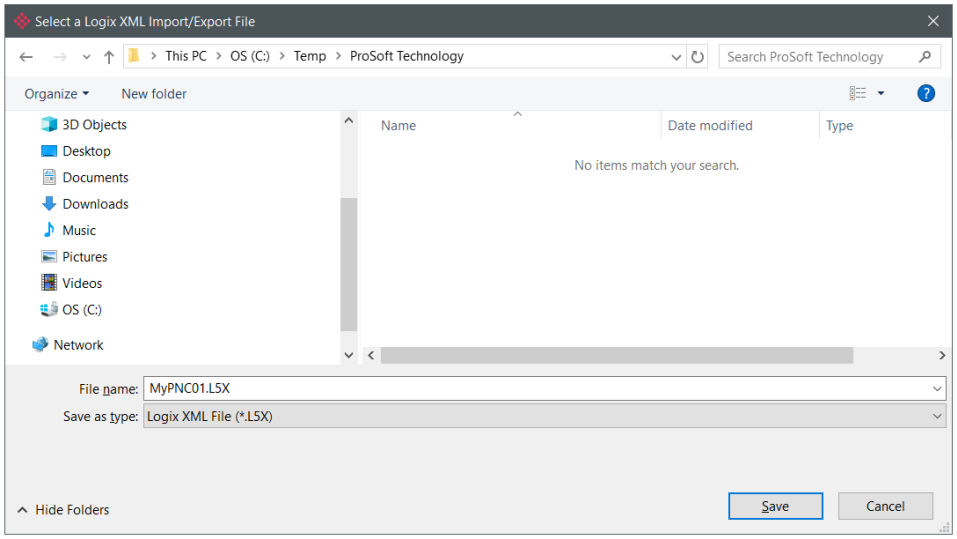



Figure 12.23 – Select folder for Logix L5X file

The L5X file can now be imported into the Studio 5000 project by right-clicking on a suitable *Program* and selecting **ADD** > **IMPORT ROUTINE**.

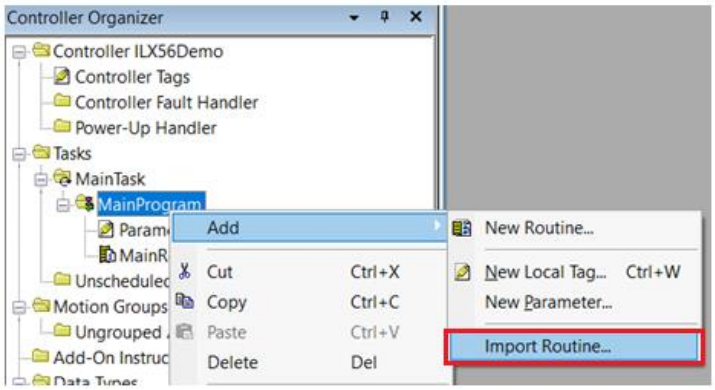



Figure 12.24 – Import Logix L5X file into Studio5000

In the *File Open* dialog, select the L5X file and accept the import by pressing **Ok**.

The import will create the following:

- Mapping Routine
- Multiple UDT (User-Defined Data Types)
- Multiple Controller Tags

Since the imported mapping routine is not a Main Routine, it will need to be called from the current Main Routine.

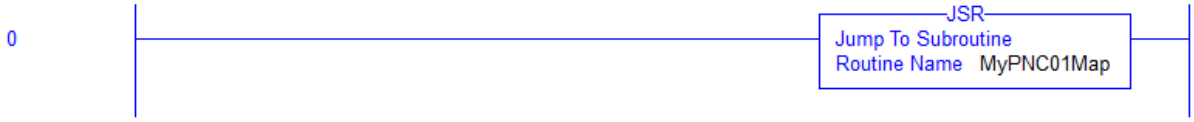



Figure 12.25 – Add Jump Routine to Main Routine

The PROFINET device icon changes to green during successful data exchange.

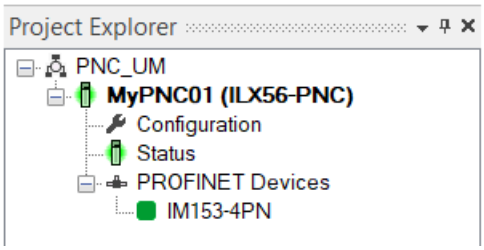



Figure 12.26 – PROFINET device online and exchanging data

## 12.6 Cyclic Data

### ET200M

To write cyclic data to the ET200M device, navigate to the appropriate controller tags and enter the bits to energize in the output module.

| Name | Value | Style | Data Type |
|---|---|---|---|
| MyPNC01_IM1534PN | {...} | | MyPNC01_002A0302C8F1 |
| MyPNC01_IM1534PN.PNInput | {...} | | MyPNC01_002A0302C8F1PNInput |
| MyPNC01_IM1534PN.PNOutput | {...} | | MyPNC01_002A0302C8F1PNOutput |
| MyPNC01_IM1534PN.PNOutput.Control | {...} | | PSILX56PNDeviceControl |
| MyPNC01_IM1534PN.PNOutput.S01_Outputs | {...} | Decimal | SINT[2] |
| MyPNC01_IM1534PN.PNOutput.S01_Outputs[0] | 0 | Decimal | SINT |
| MyPNC01_IM1534PN.PNOutput.S01_Outputs[0].0 | 0 | Decimal | BOOL |
| MyPNC01_IM1534PN.PNOutput.S01_Outputs[0].1 | 0 | Decimal | BOOL |
| MyPNC01_IM1534PN.PNOutput.S01_Outputs[0].2 | 0 | Decimal | BOOL |
| MyPNC01_IM1534PN.PNOutput.S01_Outputs[0].3 | 0 | Decimal | BOOL |

Figure 12.27 – Writing data to the ET200M

# 13 Support, Service, and Warranty

## 13.1 Contacting Technical Support

ProSoft Technology, Inc. is committed to providing the most efficient and effective support possible. Before calling, please gather the following information to assist in expediting this process:

1. Product Version Number
2. System architecture
3. Network details

If the issue is hardware related, we will also need information regarding:

1. Module configuration and associated ladder files, if any
2. Module operation and any unusual behavior
3. Configuration/Debug status information
4. LED patterns
5. Details about the interfaced serial, Ethernet or Fieldbus devices

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|---|---|
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For additional ProSoft Technology contacts in your area, please see:
www.prosoft-technology.com/About-Us/Contact-Us

## 13.2 Warranty Information

For details regarding ProSoft Technology's legal terms and conditions, please see:
www.prosoft-technology.com/ProSoft-Technology-Legal-Terms-and-Conditions

For Return Material Authorization information, please see:
www.prosoft-technology.com/RMA