ProSoft TECHNOLOGY

Where Automation Connects.

PLX51-PBM

PROFIBUS DP Master/Slave to EtherNet/IP™ Gateway

August 29, 2019
v1.0

USER MANUAL

CONTENTS

1. PREFACE

1.1. INTRODUCTION

This manual describes the installation, operation, and diagnostics of the PLX51-PBM PROFIBUS DPV0/DPV1 Master/Slave module. The module will hereafter be collectively referred to as PLX51-PBM.

The PLX51-PBM allows you to interface PROFIBUS DP to EtherNet/IP™.

The PLX51-PBM can operate as a PROFIBUS DPV0/DPV1 Master or multiple PROFIBUS DPV0/DPV1 Slaves. This allows EtherNet/IP devices (e.g. Rockwell Logix platform) to exchange process, alarming, and diagnostic data with PROFIBUS DP devices, as well as provide parameterization and asset management of slave devices using Device Type Managers (DTMs).

The PLX51-PBM slave feature can operate only as one or more PROFIBUS DPV0/DPV1 Slaves. This allows EtherNet/IP devices to exchange process, alarming, and diagnostic data with other PROFIBUS DP Master(s).

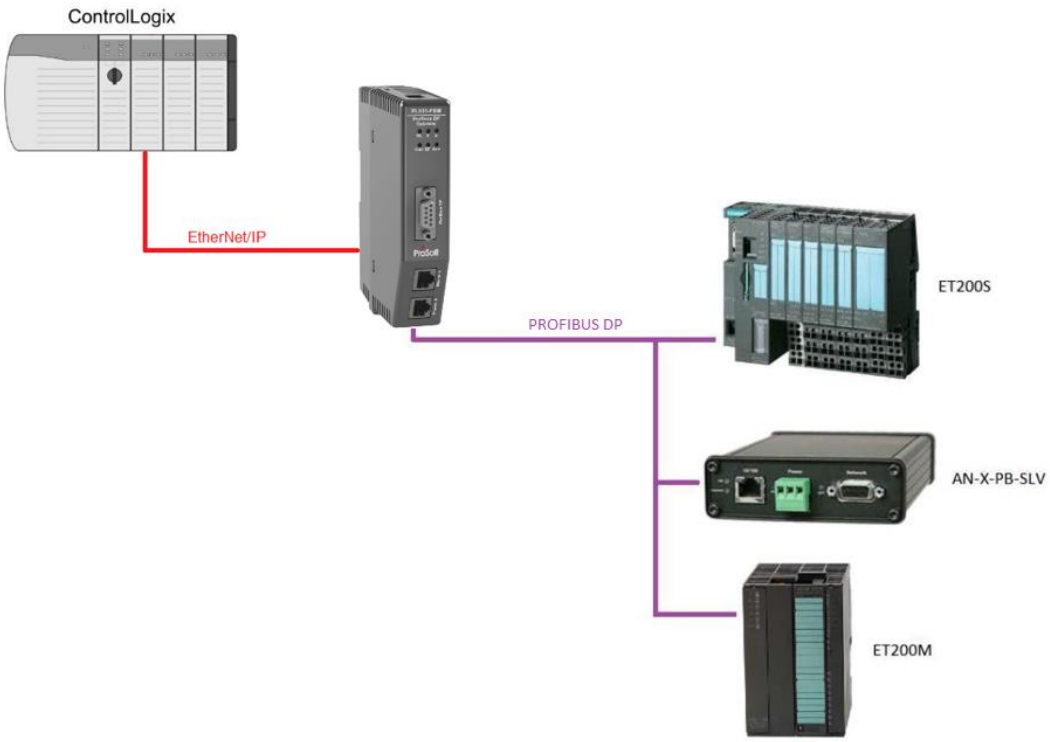


Figure 1.1 – PLX51-PBM Typical PROFIBUS Master Architecture

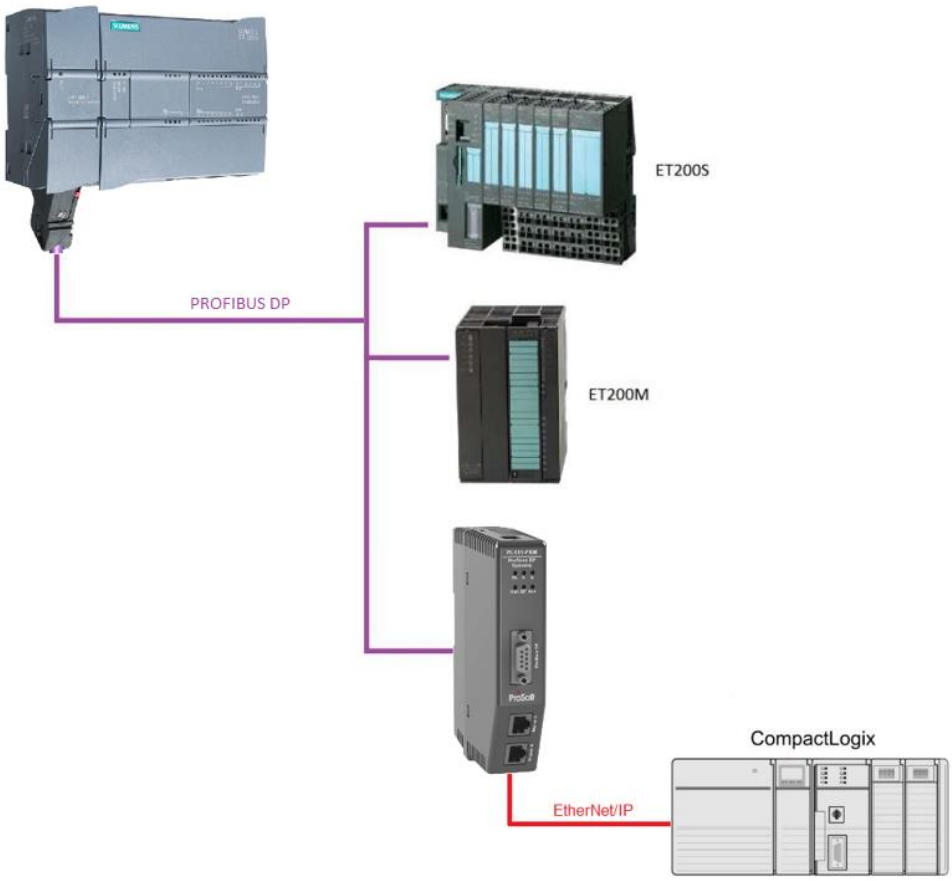


Figure 1.2 – PLX51-PBM Typical PROFIBUS Slave Architecture

1.2. FEATURES

The PLX51-PBM can be set to operate as either a PROFIBUS DP Master or Slave.

The PLX51-PBM has two Ethernet ports allowing for either a Linear or Ring (Device Level Ring – DLR) Ethernet topology. The Ethernet ports can also be set up for port mirroring allowing for better fault analysis.

The PLX51-PBM can synchronize to an NTP Server, allowing for automatic time synchronization. The PLX51-PBM also supports an onboard non-volatile event log for improved fault finding.

PLX51-PBM as a PROFIBUS Master
The PLX51-PBM can exchange process data (DPV0) with up to 125 PROFIBUS DP slave devices, providing up to 1536 cyclic bytes input and 1536 bytes output data. The data is formatted into the engineering units for use in a Logix platform by using the automatically generated mapping imports for Logix User Defined Data Types (UDTs).

The PLX51-PBM also provides DPV1 communication allowing you to exchange DPV1 Class 1 and Class 2 data with each slave device. The PLX51-PBM Gateway DTM can be used to configure and parameterize each slave device using Device Type Manager (DTM) technology.

From a Logix controller, the PLX51-PBM allows you to monitor and extract DPV1 alarms from each slave device on the connected PROFIBUS DP fieldbus.

PLX51-PBM as a PROFIBUS Slave
The PLX51-PBM can also be configured to emulate up to 10 PROFIBUS slave devices, providing up to 1536 bytes of Input and Output Cyclic I/O data between EtherNet/IP devices and a PROFIBUS DP master. Each slave device emulated by the PLX51-PBM can be configured to provide DPV0 data exchange with a PROFIBUS Master on the network.

The data is formatted into the engineering units for use in a Logix platform by using the automatically generated mapping imports for Logix User Defined Data Types (UDTs).

Each emulated slave can also be configured to exchange DPV1 Class 1 data by mapping Logix tags for the relevant DPV1 data exchange. Each emulated slave is able to provide DPV1 alarming for the PROFIBUS Master.

The PLX51-PBM provides a range of statistics and tools to provide a detailed diagnostic overview of each emulated slave which speeds up fault finding. The PLX50 Configuration Utility allows you to perform a PROFIBUS DP packet capture of the running Fieldbus which can be used to analyze the bus behaviour and packets received. The PLX51-PBM also provides global and device specific statistics.

1.3. ARCHITECTURE

The figure below provides an example of a typical network setup for a PLX51-PBM PROFIBUS Master architecture using an EtherNet/IP interface.

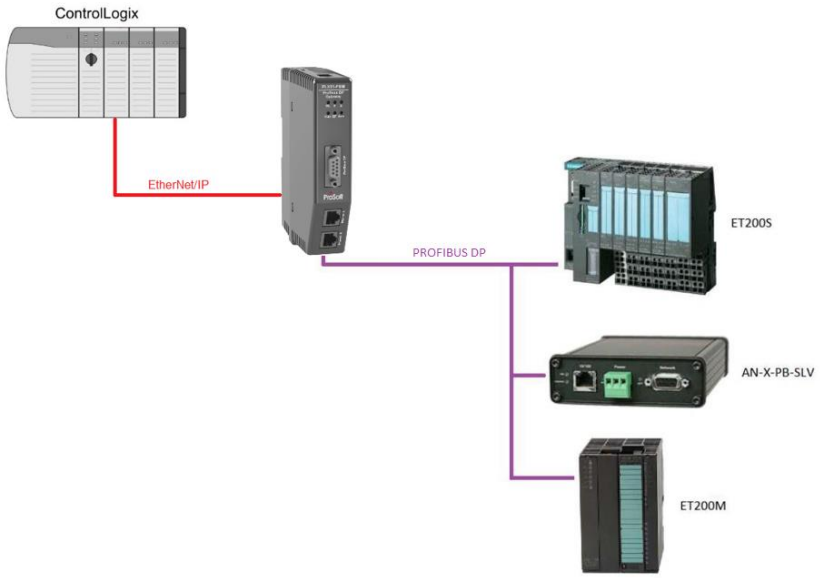


Figure 1.3 – PLX51-PBM PROFIBUS Master to EtherNet/IP architecture

The figure below provide an example of the typical network setup for a PLX51-PBM PROFIBUS Slave architecture using an EtherNet/IP interface.

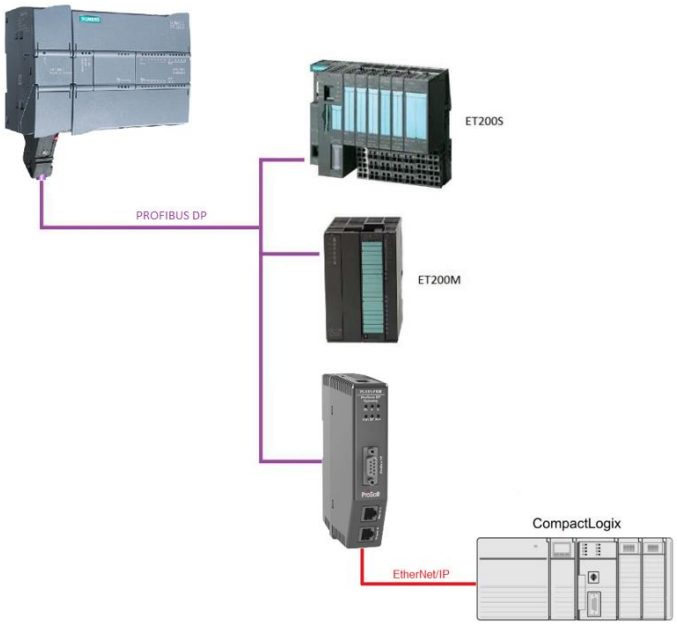


Figure 1.4 – PLX51-PBM PROFIBUS Slave to EtherNet/IP architecture

1.4. ADDITIONAL INFORMATION

The following documents contain additional information that can assist you with installation and operation.

Resource	Link
PLX50 Configuration Utility Installation	www.prosoft-technology.com
PLX51-PBM User Manual PLX51-PBM 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, use either of the following:

Resource	Link
Contact Us link	www.prosoft-technology.com
Support email	support@prosoft-technology.com

Table 1.2 – Support Details

2. INSTALLATION

2.1. MODULE LAYOUT

The PLX51-PBM has one RS485 PROFIBUS DP port as well as two Ethernet. The Ethernet cable must be wired according to industry standards, which can be found in the Additional Information section of this document.

The module provides six diagnostic LEDs, as shown in the front view figure below. These LEDs are used to provide information regarding the module system operation, the Ethernet interface, and the PROFIBUS network status.

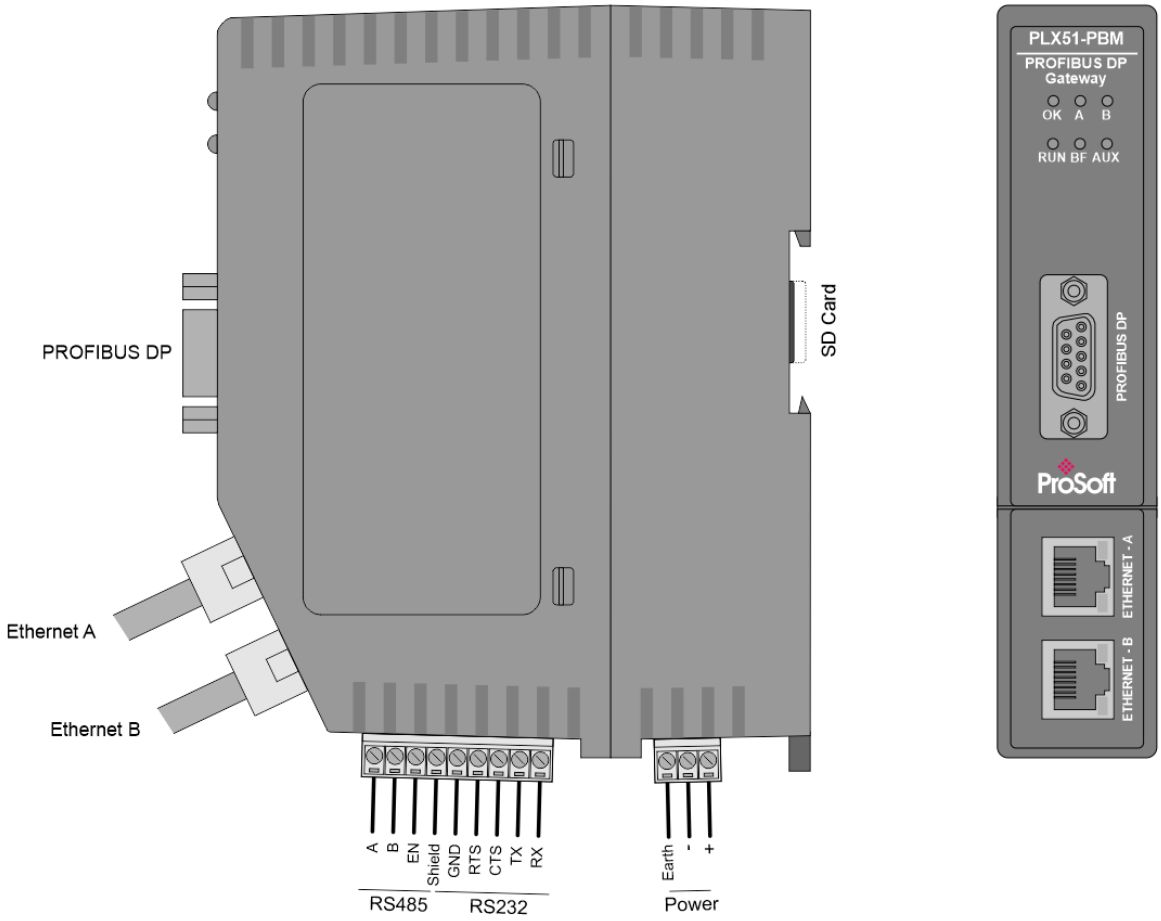


Figure 2.1 – PLX51-PBM Side and Front view

At the bottom of the PLX51-PBM module, there is one 3-way power connector.

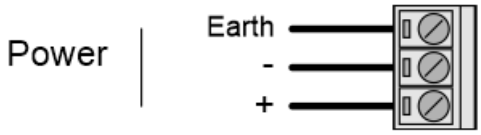


Figure 2.2 – PLX51-PBM Power connector

The PLX51-PBM has an input voltage range of 10 to 36 VDC, applied to the module via the power connector. The power connector also provides an Earth connection for the PLX51-PBM.

NOTE: It is recommended to always have a good clean earth connected to the module via the Earth connector on the power connector.

At the back of the module, there is slot for a SD memory card. The module provides four DIP switches at the top of the enclosure as shown in the top view figure below.

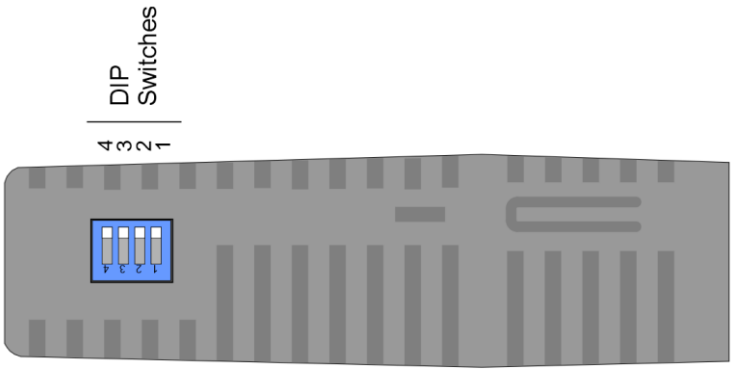


Figure 2.3 – PLX51-PBM Top view

DIP Switch	Description
DIP 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 2	This forces the module into DHCP mode which is useful when you have forgotten the IP address of the module.
DIP 3	This is used to lock the configuration from being overwritten by the PLX50 Configuration Utility. When set, the PLX50 Configuration Utility will not be able to download to the PLX51-PBM module.
DIP 4	When this is set, a module reboot will set the module Ethernet IP address to 192.168.1.100 and network mask 255.255.255.0. You can then switch the DIP switch off and assign the module a static IP address if needed.

Table 2.1. - DIP Switch Settings

2.2. MODULE MOUNTING

The PLX51-PBM provides a DIN rail clip to mount onto a 35mm DIN rail.

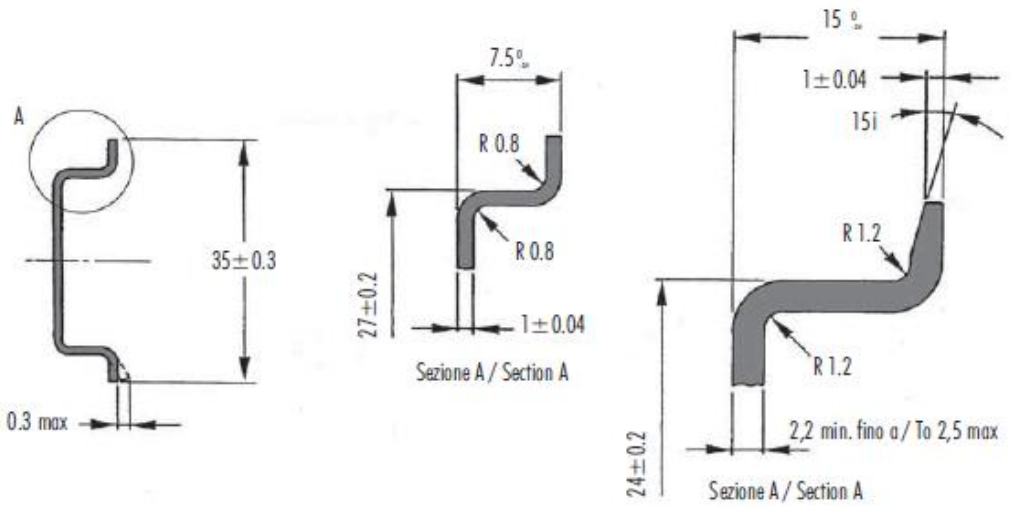


Figure 2.4 - DIN rail specification

The DIN rail clip is mounted at the back of the module as shown in the figure below. Use a flat screw driver to pull the clip downward. Once the module is mounted onto the DIN rail, the clip must be pushed upwards to lock the module onto the DIN rail.

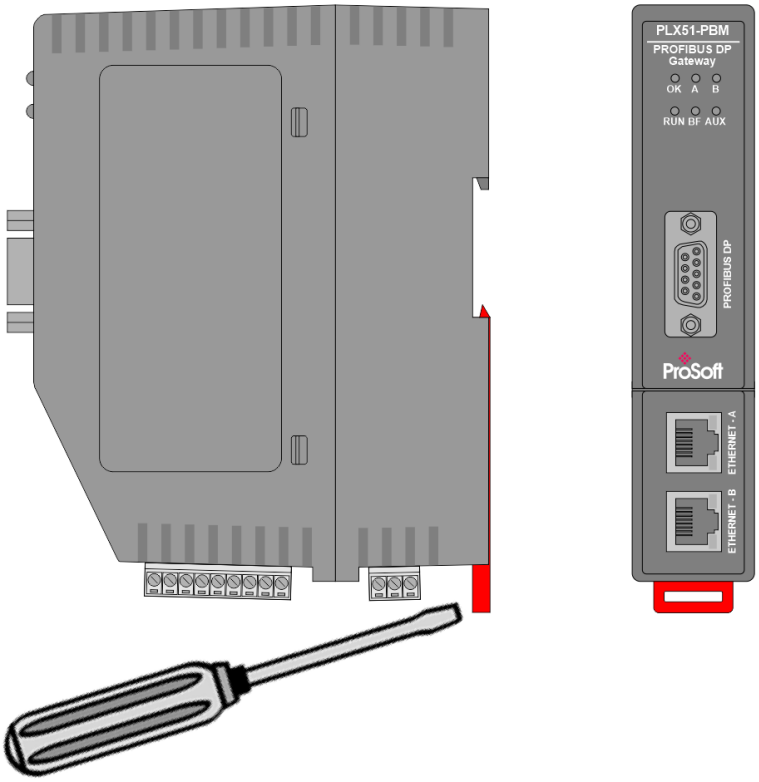


Figure 2.5 - DIN rail mouting

2.3. PROFIBUS DP PORT (RS485)

The PROFIBUS DP port uses a female DB9 connector. This provides connection for the communication conductors, cable shielding, and +5Vdc output power.

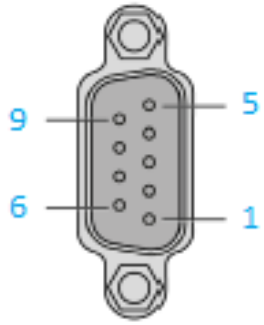


Figure 2.6 – PLX51-PBM PROFIBUS DP (RS485) DB9 connector

Pin	Signal	Description
1	-	Not connected
2	-	Not connected
3	RxD/TxD-P	Data received and transmit (+)
4	CNTR-P	Control signal to repeater (+)
5	DGND	Reference potential for +5Vdc
6	VP	+5Vdc for terminating resistors (active termination)
7	-	Not connected
8	RxD/TxD-N	Data received and transmit (-)
9	-	Not connected

Table 2.2 – DB 9 Connector layout

3. SETUP

3.1. INSTALLING THE CONFIGURATION SOFTWARE

All PLX51-PBM network setup and configuration 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. NETWORK PARAMETERS

The PLX51-PBM has DHCP (Dynamic Host Configuration Protocol) enabled as factory default. Thus, a DHCP server must be used to provide the module with the required network parameters (IP address, subnet mask, etc.). There are a number of DHCP utilities available, however it is recommended that the DHCP server in the PLX50 Configuration Utility is used.

Within the PLX50 Configuration Utility environment, the DHCP server can be found under the *Tools* menu.

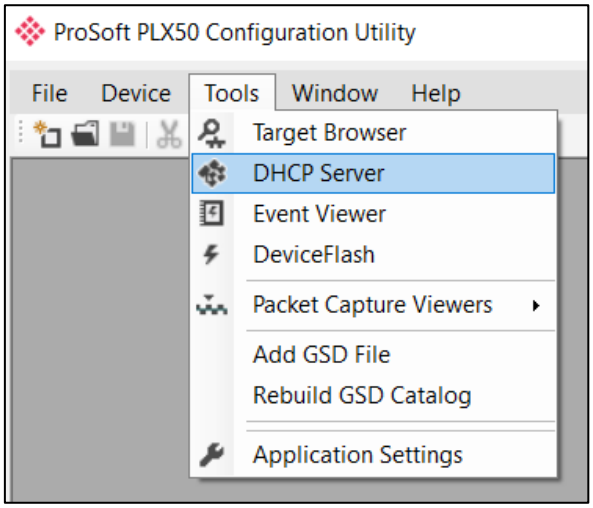


Figure 3.2. - Selecting DHCP Server

Once opened, the DHCP server listens on all available network adapters for DHCP requests and display their corresponding MAC addresses.

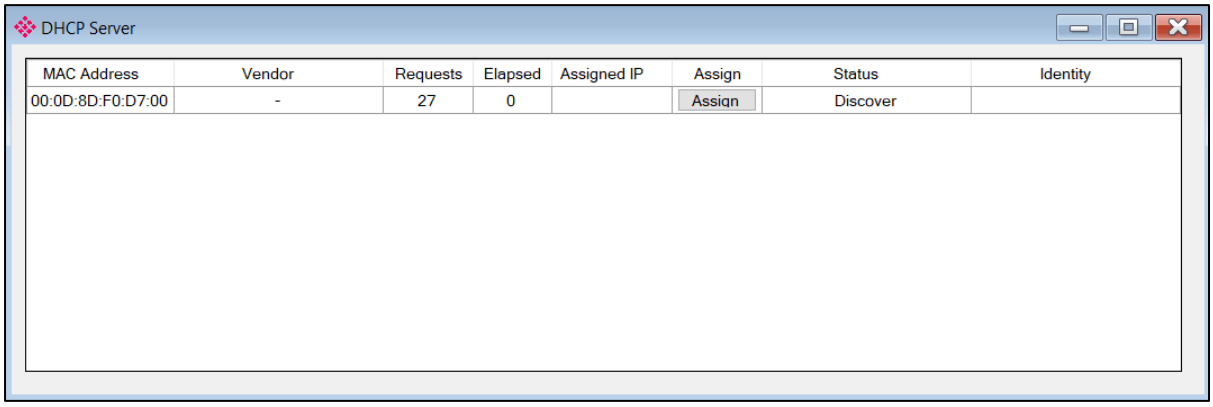


Figure 3.3. - DHCP Server

NOTE: If the DHCP requests are not displayed in the DHCP Server, it may be due to the local PC's firewall. During installation, the necessary firewall rules are automatically created for the Windows firewall. Another possibility is that another DHCP Server is operational on the network and it has assigned the IP address.

To assign an IP address, click on the corresponding **ASSIGN** button. The *Assign IP Address for MAC* window opens.

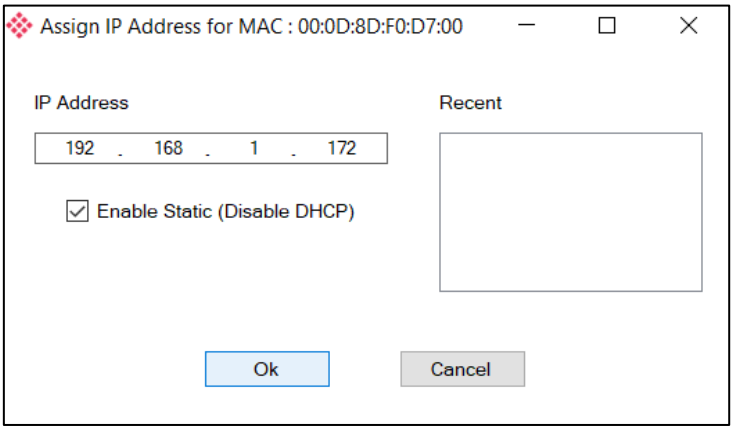


Figure 3.4. - Assigning IP Address for MAC

The required IP address can be either entered, or a recently used IP address can be selected by clicking on an item in the *Recent* list.

If the *Enable Static* checkbox is checked, the IP address will be set to static after the IP assignment, thereby disabling future DHCP requests.

Once you click **OK**, the DHCP server will automatically assign the IP address to the module and then read the Identity object product name from the device.

The successful assignment of the IP address by the device is indicated by the green background of the associated row.

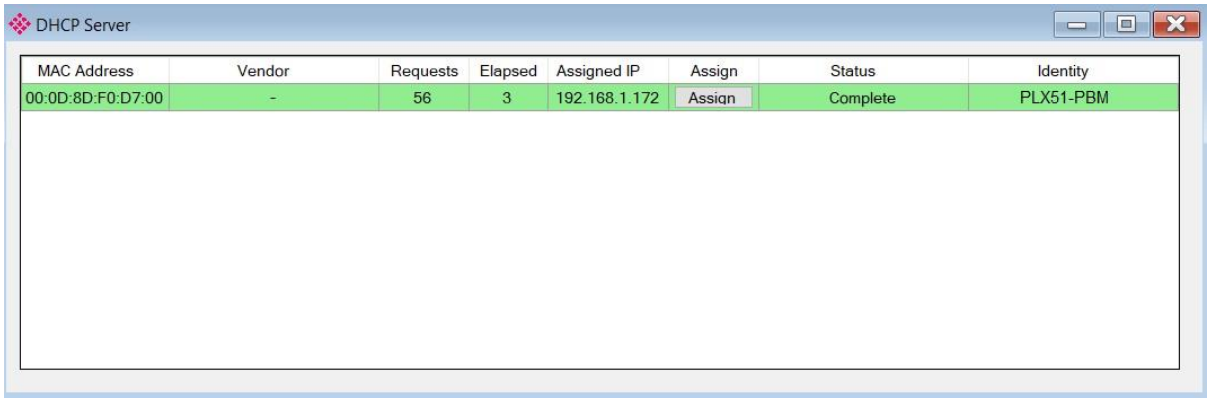


Figure 3.5. - Successful IP address assignment

It is possible to force the PLX51-PBM back into DHCP mode by powering up the device with DIP switch 2 set to the **On** position.

A new IP address can then be assigned by repeating the previous steps.

NOTE: It is important to return DIP switch 2 back to **Off** position, to avoid the module returning to a DHCP mode after the power is cycled again.

In addition to the setting the IP address, a number of other network parameters can be set during the DHCP process. These settings can be viewed and edited in the PLX50 Configuration Utility *Application Settings*, in the *DHCP Server* tab.

Once the DHCP process is complete, the network settings can be set using the *Ethernet Port Configuration* via the *Target Browser*.

The *Target Browser* can be accessed under the *Tools* menu.

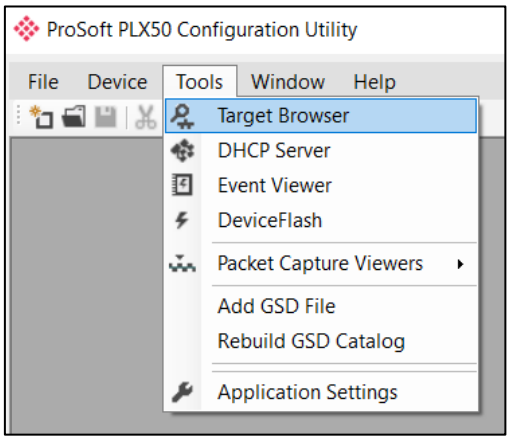


Figure 3.6. - Selecting the Target Browser

The *Target Browser* automatically scans the Ethernet network for EtherNet/IP devices.

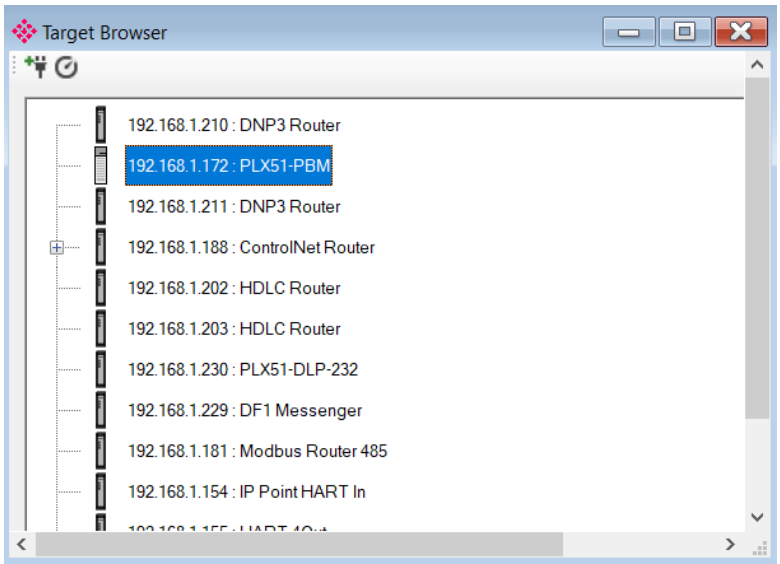


Figure 3.7. - Target Browser

Right-clicking on a device, reveals the context menu, including the *Port Configuration* option.

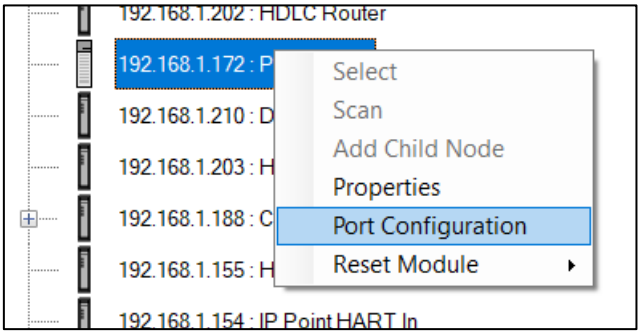


Figure 3.8. - Selecting Port Configuration

The Ethernet port configuration parameters can be modified using the *Ethernet Port Configuration* window.

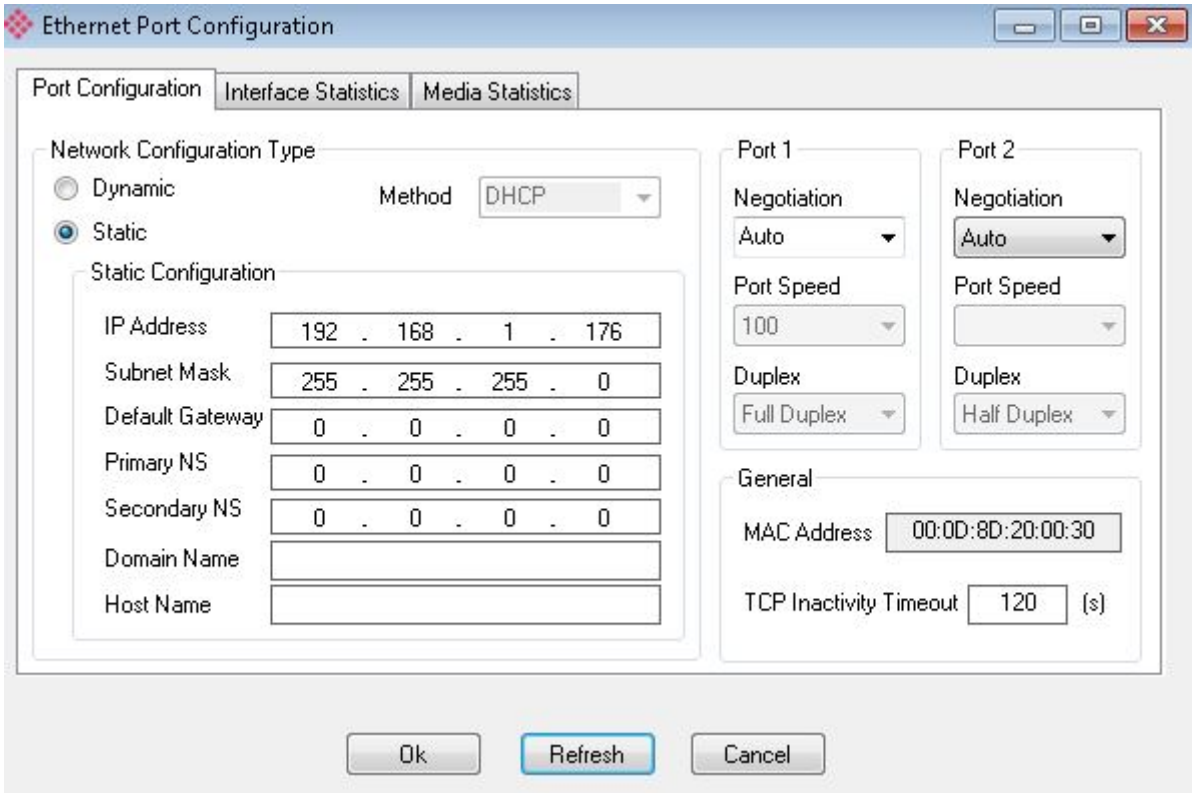


Figure 3.9. - Port Configuration

Alternatively, these parameters can be modified using Rockwell Automation's RSLinx software.

3.3. GSD FILE MANAGEMENT

Each PROFIBUS device has a GSD file that is required to provide information needed to configure the device for data exchange. The PLX50 Configuration Utility manages the GSD library which is used for adding devices to the PLX51-PBM.

1 The GSD File Management Tool is opened by selecting *GSD File Management* under the *Tool* menu in the configuration utility.

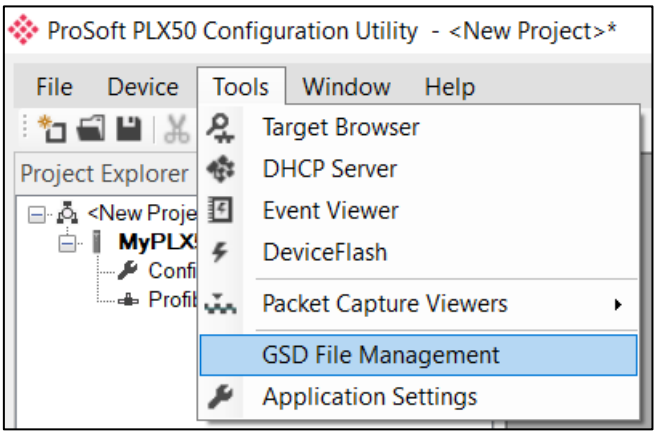
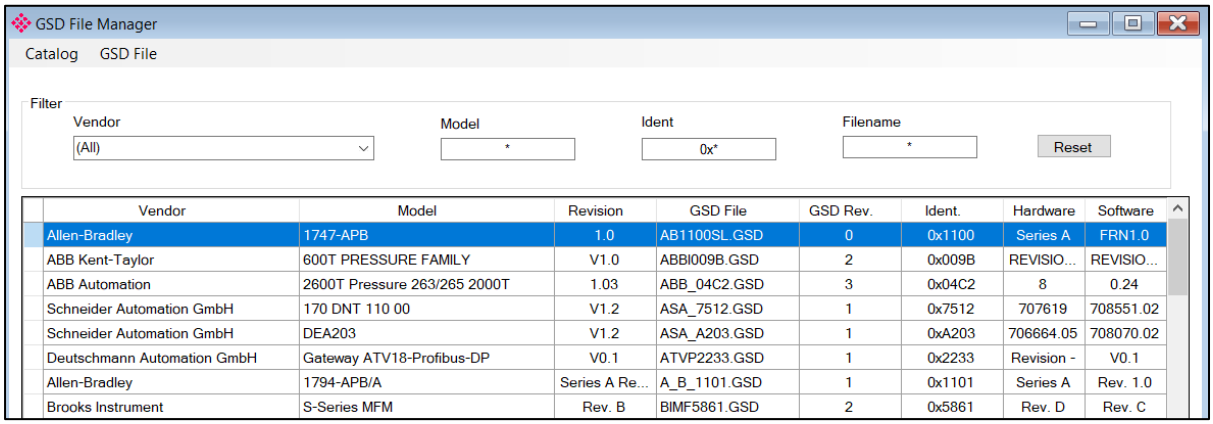


Figure 3.10 – Launching the GSD File Management Tool

2 Once the tool opens, a list of registered slave devices are displayed, using their GSD files.



Vendor	Model	Revision	GSD File	GSD Rev.	Ident.	Hardware	Software
Allen-Bradley	1747-APB	1.0	AB1100SL.GSD	0	0x1100	Series A	FRN1.0
ABB Kent-Taylor	600T PRESSURE FAMILY	V1.0	ABBI009B.GSD	2	0x009B	REVISIO...	REVISIO...
ABB Automation	2600T Pressure 263/265 2000T	1.03	ABB_04C2.GSD	3	0x04C2	8	0.24
Schneider Automation GmbH	170 DNT 110 00	V1.2	ASA_7512.GSD	1	0x7512	707619	708551.02
Schneider Automation GmbH	DEA203	V1.2	ASA_A203.GSD	1	0xA203	706664.05	708070.02
Deutschmann Automation GmbH	Gateway ATV18-Profibus-DP	V0.1	ATVP2233.GSD	1	0x2233	Revision -	V0.1
Allen-Bradley	1794-APB/A	Series A Re...	A_B_1101.GSD	1	0x1101	Series A	Rev. 1.0
Brooks Instrument	S-Series MFM	Rev. B	BIMF5861.GSD	2	0x5861	Rev. D	Rev. C

Figure 3.11 – GSD File Management Tool

3 To add a GSD file, select the *Add* option under the *GSD File* menu.

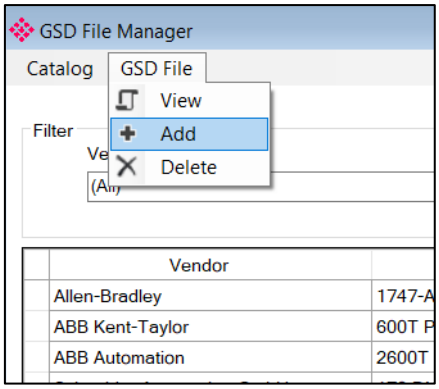


Figure 3.12 – GSD File Adding

4 Select the required GSD file and click **OPEN.**

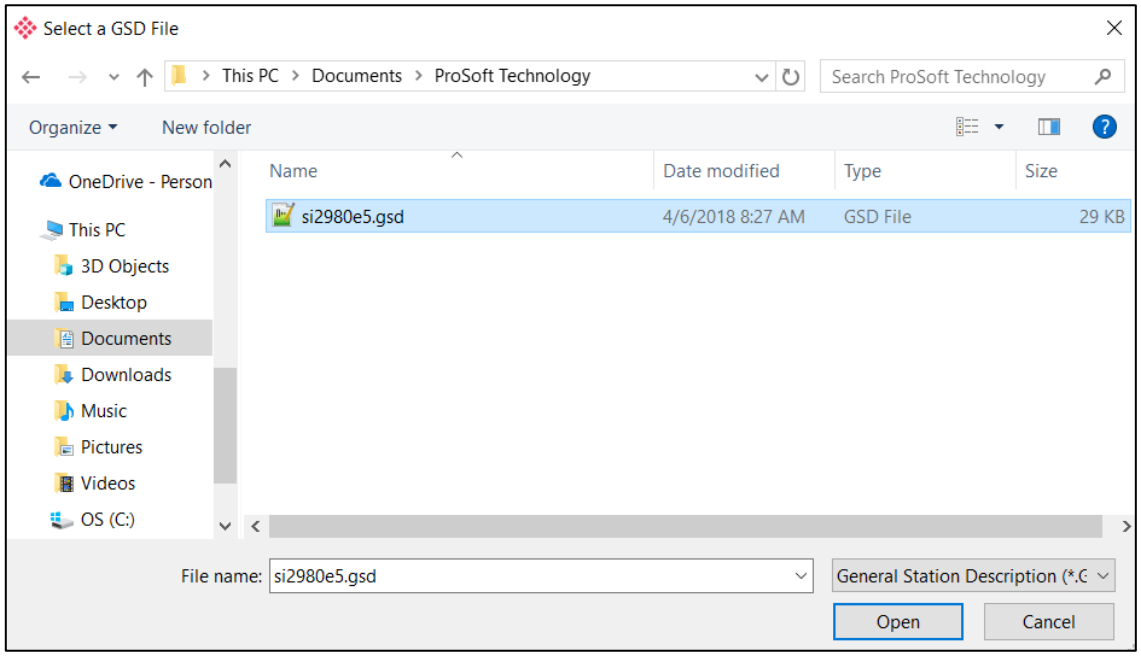


Figure 3.13 – Adding GSD File

5 Once the file has been selected, the GSD File Management tool adds the slave device to the device list and recompile the GSD catalog.

A GSD catalog can be exported from another PLX50 Configuration Utility by exporting the GSD catalog from one PLX50 Configuration Utility, and importing it in another. This is done by selecting either *Import* or *Export* under the *Catalog* menu as shown below:

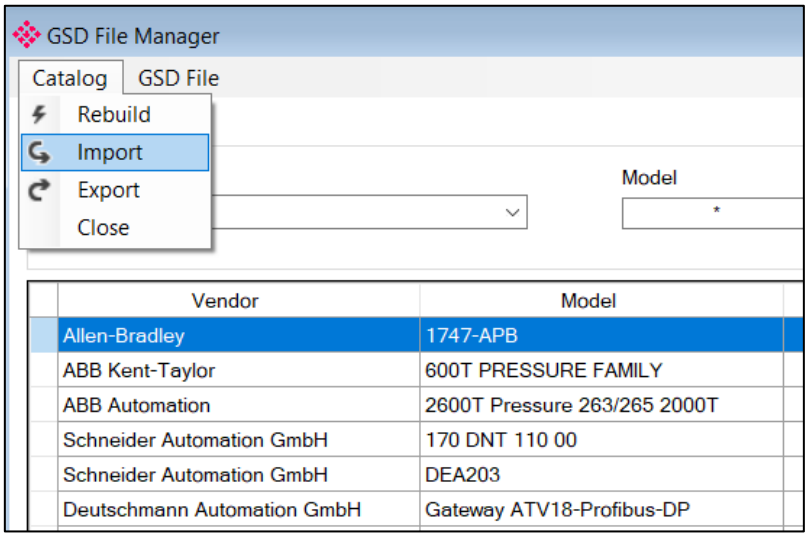


Figure 3.14 – GSD Catalog import/export

3.4. CREATING A NEW PROJECT

1 Before you configure the module, a new PLX50 Configuration Utility project must be created. Under the *File* menu, select **New.**

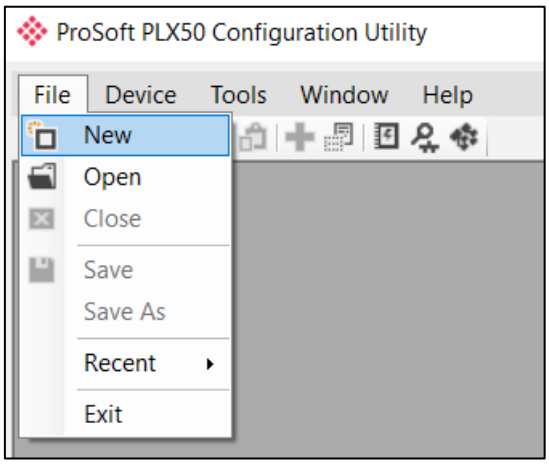


Figure 3.15 - Creating a new project

2 A PLX50 Configuration Utility Design Tool project is created, showing the *Project Explorer* tree view. To save the project use the **Save** option under the *File* menu.

3 A new device can now be added by selecting **Add** under the *Device* menu.

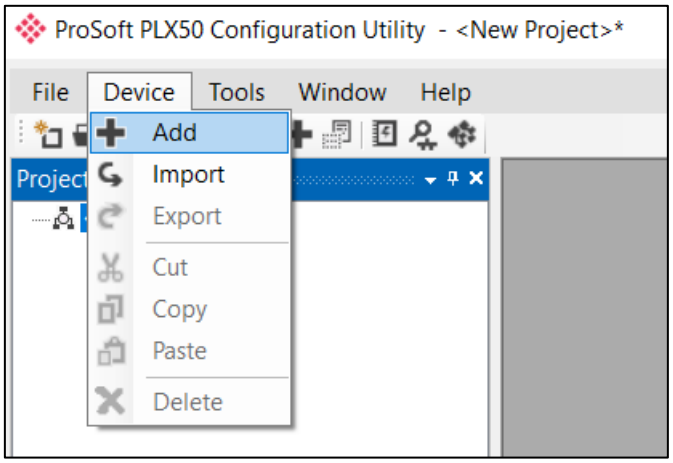


Figure 3.16 - Adding a new device

4 In the *Add New Device* window, the PLX51-PBM and click the **Ok** button.

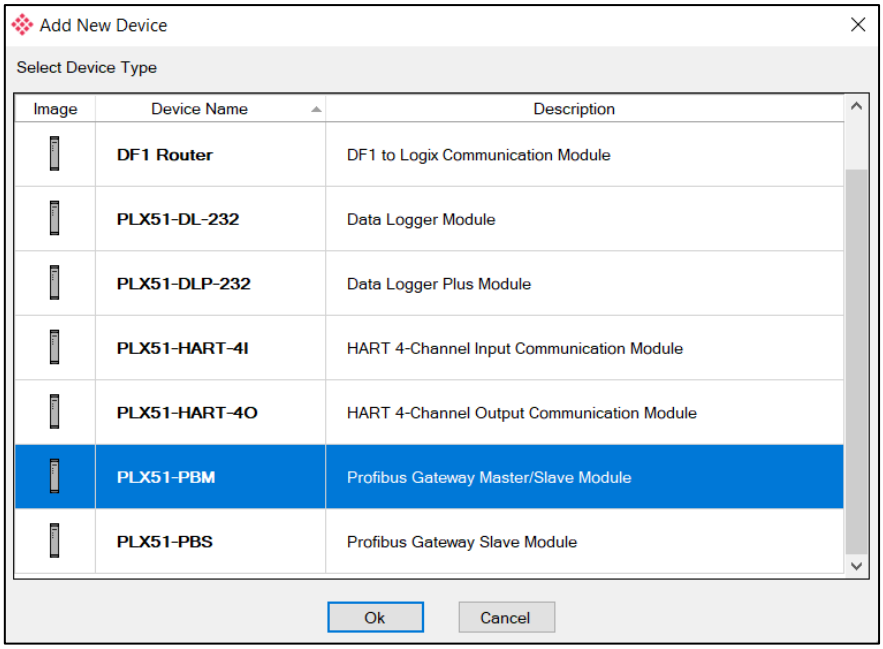


Figure 3.17 – PLX51-PBM

5 The device appears in the *Project Explorer* tree and its configuration window opened.

The device configuration can be reopened by double-clicking the module in the *Project Explorer* tree, or right-clicking the module and selecting *Configuration*.

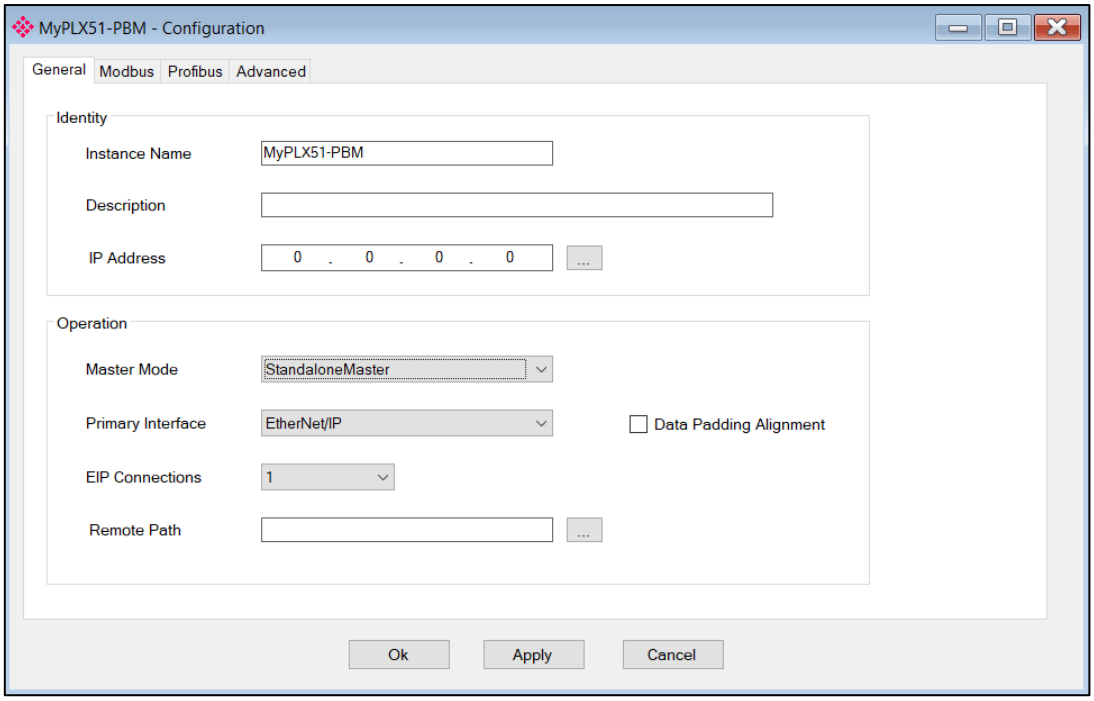


Figure 3.18 – PLX51-PBM configuration

3.5. PLX51-PBM PARAMETERS

The PLX51-PBM parameters are configured by the PLX50 Configuration Utility.

Refer to the Additional Information section for documentation and installation links for ProSoft's PLX50 Configuration Utility.

3.5.1. GENERAL

The PLX51-PBM General configuration is opened by either double-clicking on the module in the tree, or right-clicking the module and selecting *Configuration*.

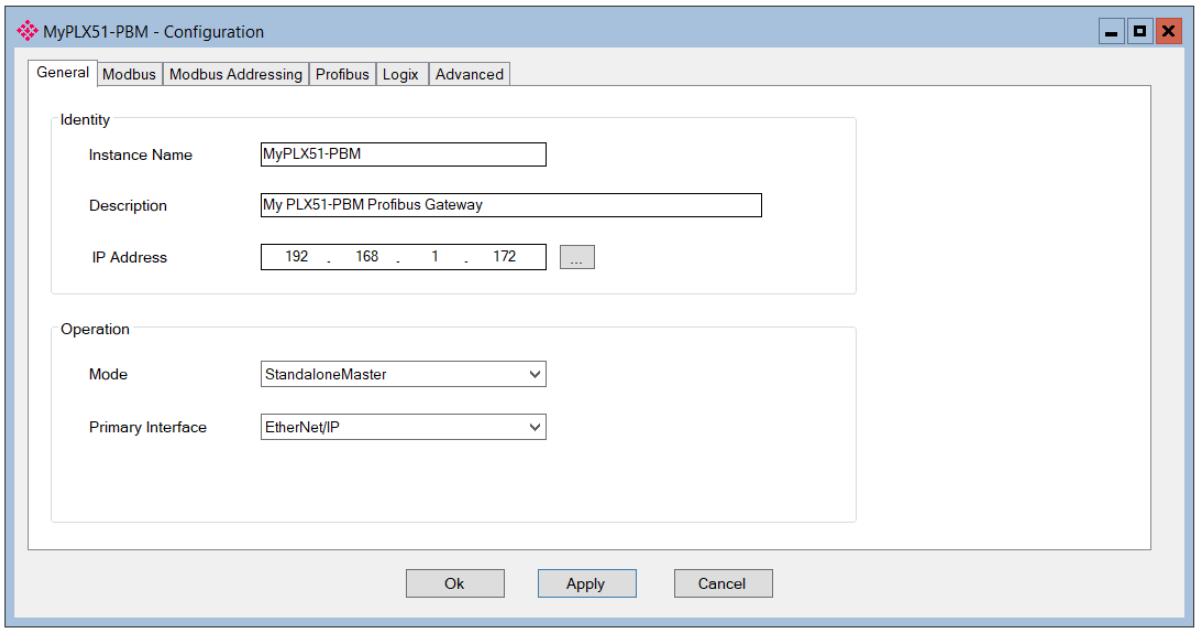


Figure 3.19 – PLX51-PBM General configuration

The General configuration consists of the following parameters:

Parameter	Description
Instance Name	This parameter is a user defined name to identify between various PLX51-PBM modules.
Description	This parameter is used to provide a more detailed description of the application for the module.
IP Address	The IP address of the module.
Mode	The PLX51-PBM can operate in one of three modes: **Quiet** This mode allows you to connect the PLX51-PBM to an active bus and run a DP packet capture. In this mode, the PLX51-PBM will not communicate on the DP Bus, but rather only listen. **Standalone Master** In this mode, the PLX51-PBM is the DP Master on the PROFIBUS network. **Slave** In this mode, the PLX51-PBM will emulate multiple PROFIBUS Slave devices.
Primary Interface	This is the network the PLX51-PBM will interface the PROFIBUS network. • EtherNet/IP (Logix)

Table 3.1 - General configuration parameters

3.5.2. PROFIBUS – MASTER MODE

The PLX51-PBM PROFIBUS configuration is opened by either double-clicking on the module in the tree, or right-clicking the module and selecting *Configuration*. Then select the **PROFIBUS** tab.

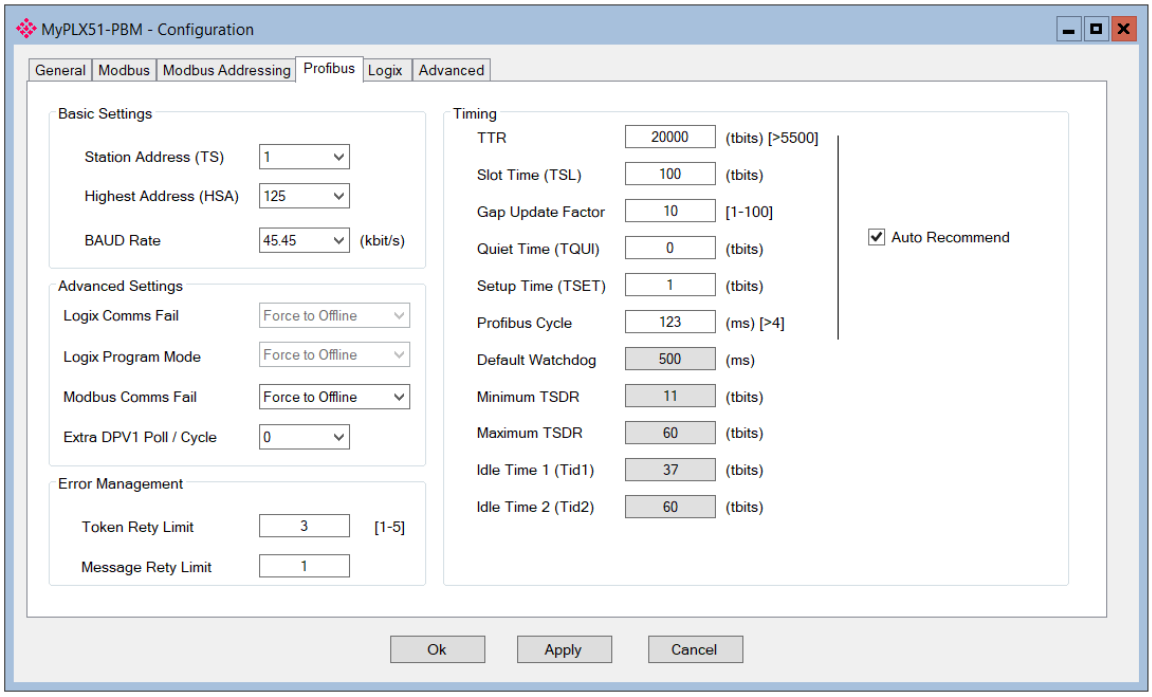


Figure 3.20 – PLX51-PBM PROFIBUS configuration – Master mode

The PROFIBUS configuration consists of the following parameters:

Parameter	Description
	Basic Settings
Station Address (TS)	**PROFIBUS Station Address** for the PLX51-PBM module. TS should be unique on the PROFIBUS network, it should also be less-than or equal to the HSA below: Min: 0 Max: 126 Default: 1
Highest Address (HSA)	**Highest Station Address**. This is the highest station address of the active stations (masters). Passive stations (slaves) can have a higher address than the HSA. A low HSA is better for PROFIBUS performance. Min: 1 Max: 126 Default: 126
Baud Rate	**Baud Rate** (in Kbps) of the PROFIBUS network: 9.6, 19.2, 45.45, 93.75, 187.5, 500, 1500, 3000, 6000 or 12000 Kbps. The baud rate should be supported by all slaves in the configuration. The baud rate should be selected depending on the cable length, see chapter "***PROFIBUS DP***".

Advanced Settings	
Logix Comms Fail	Specifies the PROFIBUS Master behavior when losing communication with Logix, either: • Force to Offline • Force to Clear
Logix Program Mode	Specifies the PROFIBUS Master behavior when Logix is set in *Program* mode, either: • Force to Offline • Force to Clear
Extra DPV1 Poll / Cycle	The number of additional DPV1 Polls (Class 2) per PROFIBUS Cycle. Increasing this parameter results in faster Asset Management DTM updates.
Error Management	
Token Retry Limit	**Token Retry Limit** is the number of times that a PROFIBUS Master tries to pass the token before deciding that a station is not there. Value must be in the following range: Min: 0 Max: 15 Default: 3
Message Retry Limit	**Message Retry Limit** is the number of telegram repetitions if the address doesn't react. Value must be in the following range: Min: 0 Max: 15 Default: 1
Timing	
TTR	**Target Rotation Time** indicates the maximum time available for a token circulation (time for PROFIBUS token to be passed to another master and be back). It takes in account the number of slaves with their IO size (data exchanges telegram), different telegrams needed and their duration times (FDL status, global control, pass token), all mandatory timing with respect to the PROFIBUS standard (time slot, min and max Tsdr, Tqui, Tset, …) and a safety margin which allows bandwidth for acyclic messages (DPV1, …). Min: 0 Max: 16777215
Slot Time (TSL)	**Slot Time** (in tbits) is the maximum time the PLX51-PBM will wait, after the transmission of a request, for the reception of the first byte (Tchar) of an answer. (It allows detecting a timeout.) It can be increased when repeaters are used in the PROFIBUS network topology. The value must respect the rule: Min: 37 Max: 16383
Gap Update Factor	**Gap Update Factor:** The range of addresses between 2 consecutive active stations is called GAP. This GAP is submitted to a cyclic check during which the system identifies the station condition (not ready, ready or passive). Min: 1 Max: 100
Quiet Time (TQUI)	**Quiet time** (in tbits) is the time that a station may need to switch from sending to receiving. It must respect the rule: TQUI < MIN_TSDR Min: 0 Max: 255

Setup Time (TSET)	**Setup Time** (in tbits) is the reaction time on an event. Calculation of TSET must respect the rule: Min: 1 Max: 494
PROFIBUS Cycle	**PROFIBUS Cycle** (in ms) (read/Write) field defines the cyclic time the master will respect between two IO Data Exchange sequences. This parameter can be increased when the PROFIBUS network load does not allow the processing of acyclic requests.
Auto Recommend	When enabled, all timing parameters will be updated with recommended calculations when clicking **Ok** or **Apply**. **NOTE:** When the BAUD Rate is changed, **all** PROFIBUS timing parameters will be updated irrespective of the Auto Recommend check-box selection.
Default Watchdog (Read-Only)	**Default Devices Watchdog** (in ms) value defines the watchdog value assigned by default to all devices in the configuration.
Min TSDR (Read-Only)	**Smallest Station** (in tbits) is the minimum time that a PROFIBUS DP slave must wait before it may answer. It must respect the rule: TQUI < MIN_TSDR Min: 11 Max: 1023
Max TSDR (Read-Only)	**Largest Station** (in tbits) is the maximum time that a PROFIBUS DP slave may take in order to answer. Calculation of MAX_TSDR must respect the rule: Min: 37 Max: 65525
Idle Time 1 (Tid1) (Read-Only)	**Time Idle1** (in tbits) is the time between the acknowledgement frame or token frame reception and the transmission of the next frame. Tid1 = Max(Tsyn+Tsm, MIN_TSDR) with Tsyn= 33 Tsm= 2 + 2* TSET + TQUI
Idle Time 2 (Tid2) (Read-Only)	**Time Idel2** (in tbits) is the time between the transmission of an unconfirmed packet and the transmission of the next packet. Tid2 = Max (Tsyn+Tsm, MAX_TSDR) with Tsyn= 33 Tsm= 2 + 2* TSET + TQUI

Table 3.2 - PROFIBUS configuration parameters

NOTE: When the BAUD Rate is changed, **all** the PROFIBUS timing parameters will change to the default values for that specific BAUD Rate.

3.5.3. PROFIBUS – SLAVE MODE

The PLX51-PBM PROFIBUS configuration is opened by either double-clicking on the module in the tree, or right-clicking the module and selecting *Configuration*. Then select the **PROFIBUS** tab.

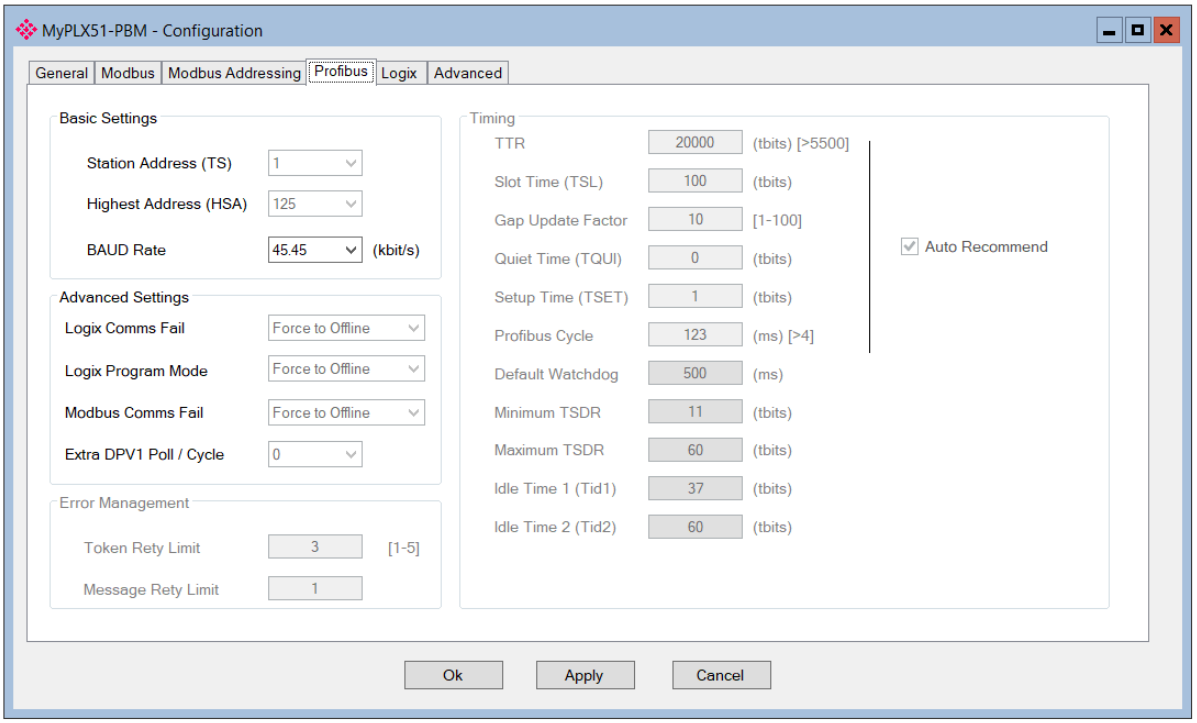


Figure 3.21 – PLX51-PBM PROFIBUS configuration – Slave mode

The PROFIBUS configuration consists of the following parameters:

Parameter	Description
BAUD Rate	**Baud Rate** (in Kbps) of the PROFIBUS network: 9.6, 19.2, 45.45, 93.75, 187.5, 500, 1500, 3000, 6000 or 12000 Kbps. The baud rate should be selected depending on the cable length, see chapter "***PROFIBUS DP***"

Table 3.3 - PROFIBUS configuration parameters – Slave Mode

3.5.4. LOGIX

This section is used when the *Primary Interface* is set to *EtherNet/IP*.

The PLX51-PBM Logix configuration is opened by either double-clicking on the module in the tree, or right-clicking the module and selecting *Configuration*. Then select the **Logix** tab.

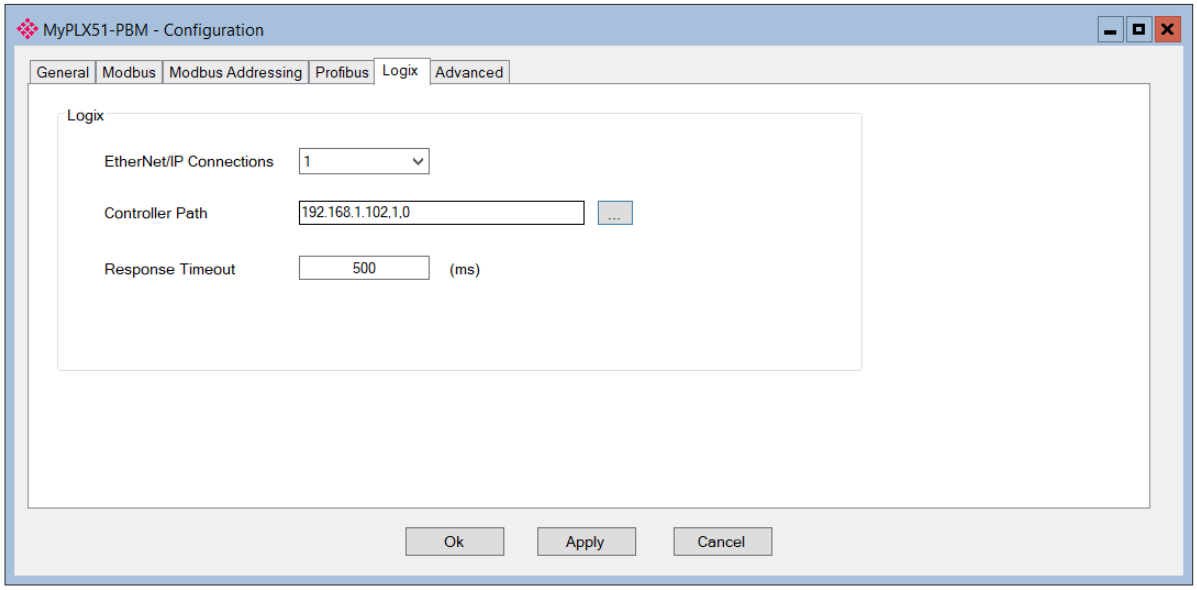


Figure 3.22 – PLX51-PBM Logix configuration

The Logix configuration consists of the following parameters:

Parameter	Description
EtherNet/IP Connections	The number of EtherNet/IP (CIP) Connections to be used in the exchange with Logix (1 to 4). Note, this value must match that configured in the Logix IO tree.
Controller Path	This is the CIP path to the Logix controller. In PROFIBUS Slave Mode, this path will be used for the Class 3 data exchanges for DPV1 objects and alarms. **Note:** This path can be either entered manually, or configured using the *Target Browser*.
Response Timeout	The maximum time (ms) allowed for a Class 3 response from the Logix controller. Default: 5000 ms.

Table 3.4 - Logix configuration parameters

To browse to a controller path, select the **Browse…** button to open the *Target Browser*. Then select a Logix controller and click **Ok**. The path updates automatically.

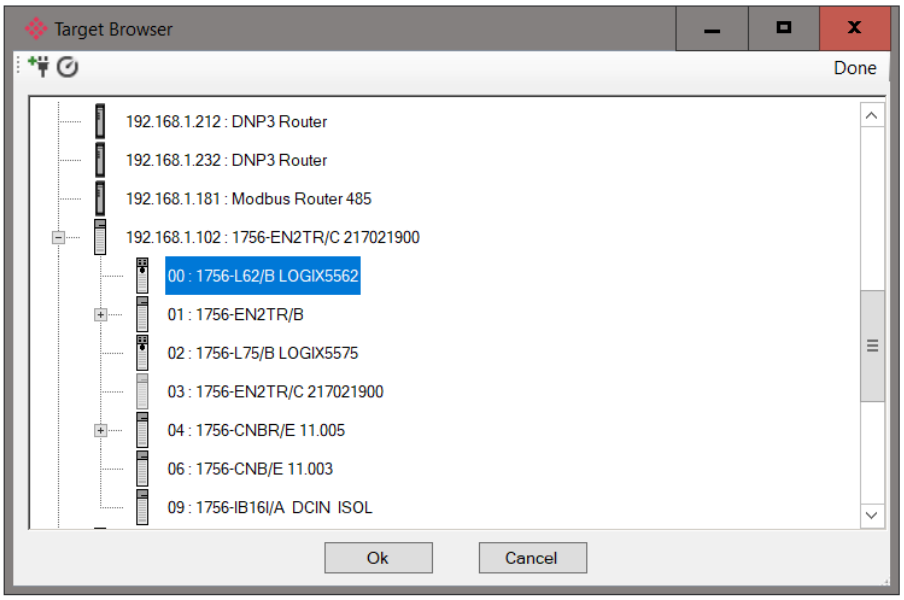


Figure 3.23 – Target Browser – Selecting Logix controller

3.5.5. ADVANCED

The PLX51-PBM Advanced configuration is opened by either double-clicking on the module in the tree, or right-clicking the module and selecting *Configuration*. Then select the **Advanced** tab.

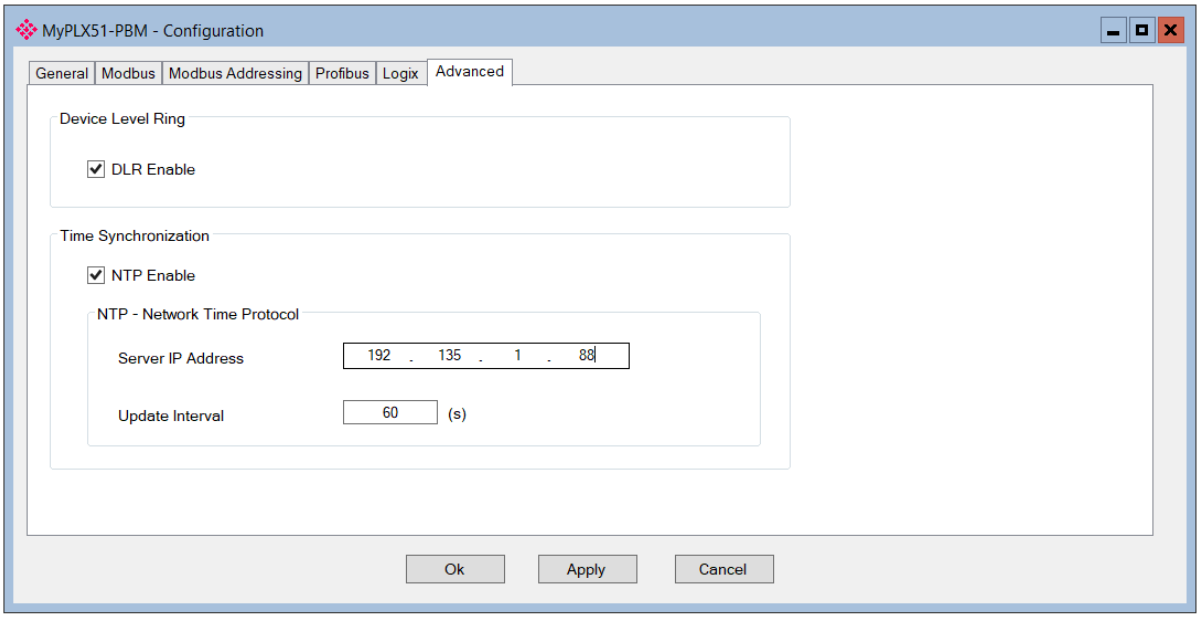


Figure 3.24 – PLX51-PBM Advanced configuration

The Advanced configuration consists of the following parameters:

Parameter	Description
DLR Enable	This must be set to enable *Device Level Ring* operation when the PLX51-PBM is operating in an Ethernet DLR.
NTP Enable	The PLX51-PBM can synchronize its onboard clock to an NTP Server by enabling NTP.
NTP – Server IP Address	This setting is the IP address of the NTP Server which will be used as a time source.
NTP – Update Interval	This setting is the updated interval (in seconds) that the PLX51-PBM will request time from the NTP Server.

Table 3.5 - Advanced configuration parameters

3.6. MODULE DOWNLOAD

Once the PLX51-PBM configuration is complete, it must be downloaded to the module. The configured IP address of the module is used to connect to the module.

1 To initiate the download, right-click on the module and select the **Download** option.

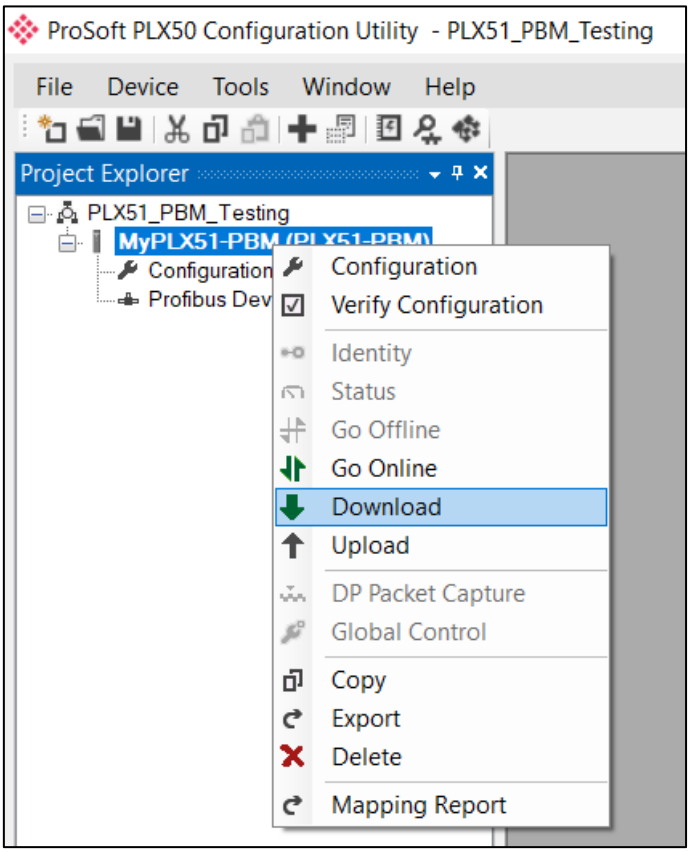


Figure 3.25 - Selecting Download

2 Once complete, you will be notified that the download was successful.

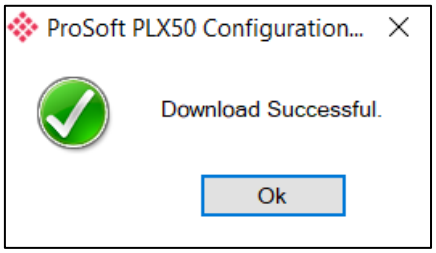


Figure 3.26 - Successful download

3 Within the PLX50 Configuration Utility environment, the module will be in the *Online* state, indicated by the green circle around the module icon. The module is now configured and will start operating immediately.

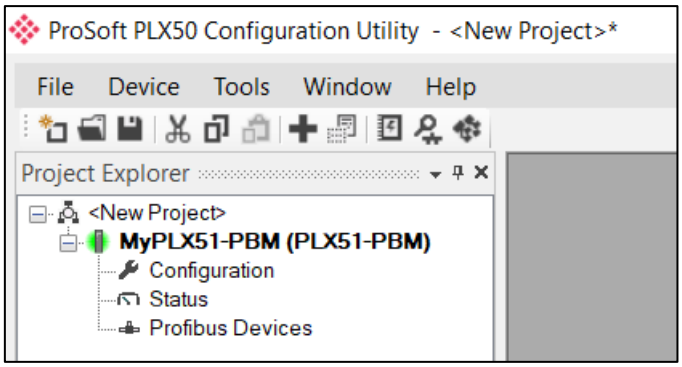


Figure 3.27 - Module online

3.7. DEVICE DISCOVERY (ONLINE) – MASTER MODE

Once online with the PLX51-PBM in the PLX50 Configuration Utility, you will be able to scan the PROFIBUS network for slave devices.

NOTE: If the incorrect PROFIBUS parameters have been configured (e.g. BAUD rate) it will result in the PLX51-PBM not seeing any slave devices on the PROFIBUS network.

3.7.1. DISCOVERY

1 The slave device discovery can be found by selecting the *Discovered Nodes* tab in the PLX51-PBM *Status* window.

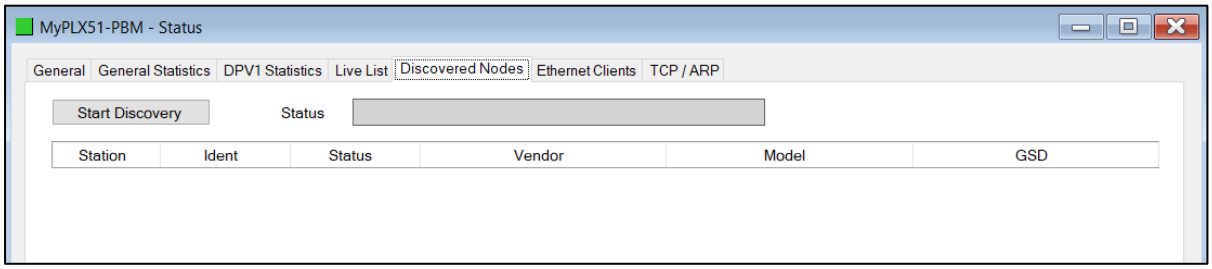


Figure 3.28 –Device Discovery

2 To start a new device discovery, click the **START DISCOVERY** button. Once the scan is complete, the detected slave devices are listed.

NOTE: The time to scan the bus depends on the BAUD Rate selected. The higher the BAUD rate, the faster the bus discovery scan time.

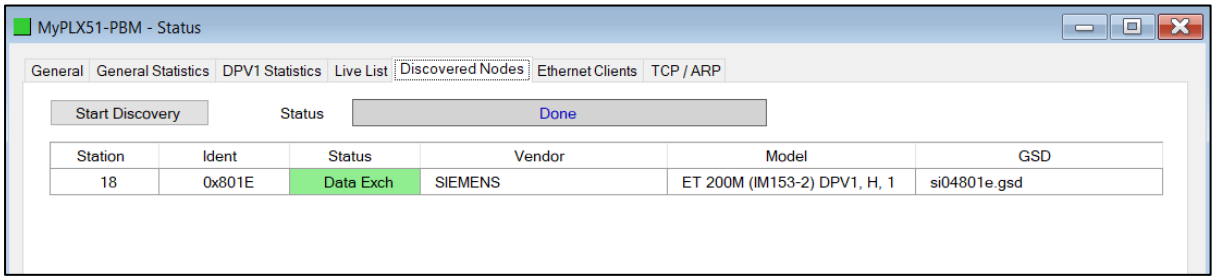


Figure 3.29 –Devices Found

3 If a device has been found not currently in the PLX51-PBM configured device list, you will be able to add the device from this window by right-clicking on the device and selecting *Add Device*.

NOTE: The GSD file will need registered before a device can be added to the PLX51-PBM configuration.

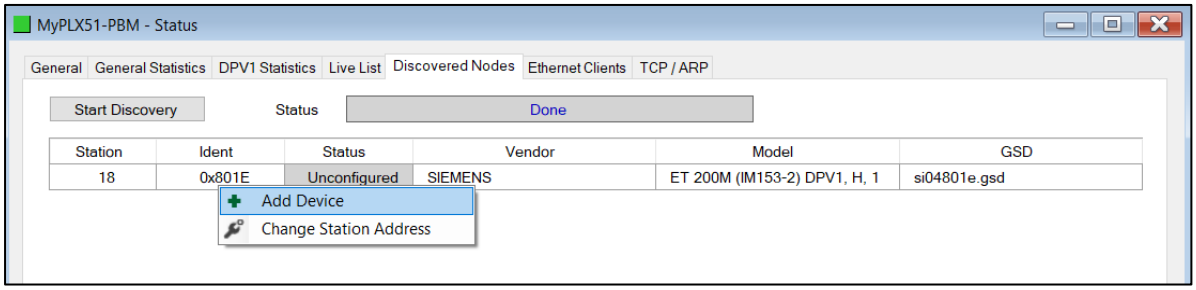


Figure 3.30 – Adding discovered Field Devices

4 Select the GSD file to add the device to the PLX51-PBM configured device list.

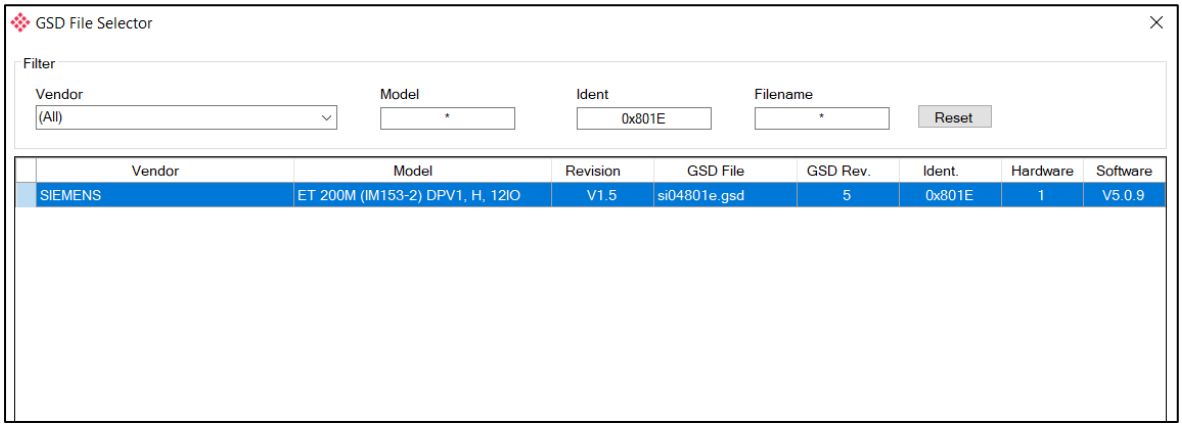


Figure 3.31 – Selecting the GSD for the slave device

5 Once the devices have been configured (as well as the correct mapping is in Logix), the devices will show up as exchanging data.

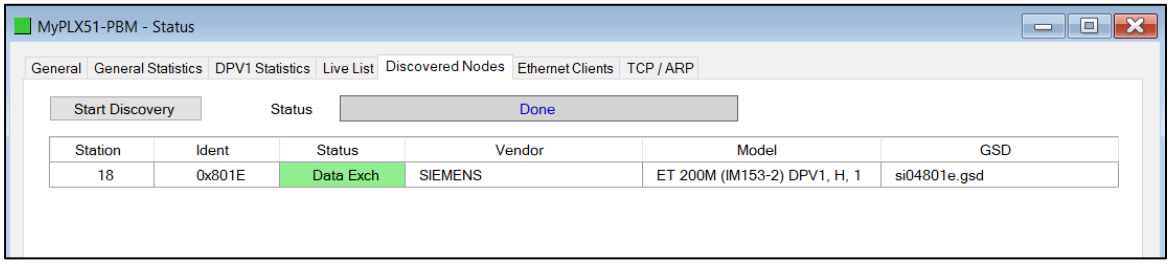


Figure 3.32 – Discovering running devices

3.7.2. Device Station Address Change

Certain devices can be set up to allow remotely changing of the station address. Devices with this option set general defaults to station address 126.

1 You can change the station address of a device (if the device is correctly set up) by right-clicking on the device in the *Discovery* list and selecting *Change Station Address*.

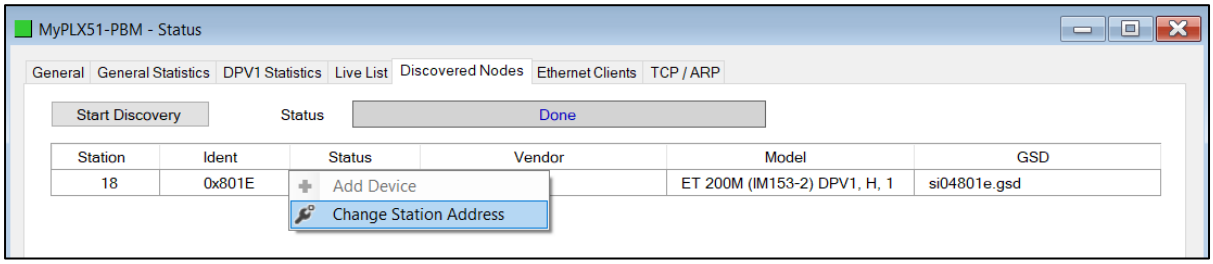


Figure 3.33 – Changing Station Address

2 Select the new station address for the device. Click the **Set** button.

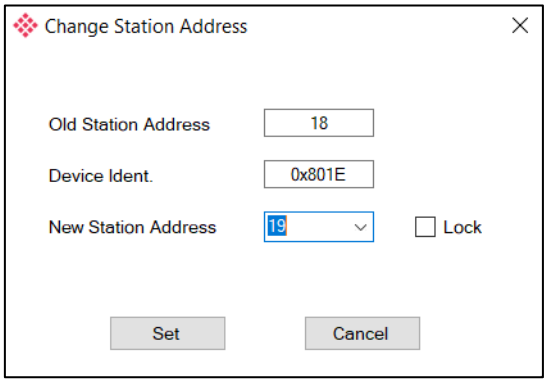


Figure 3.34 – Changing the Station Address.

3 Once the request has been sent, you can either start a new network discovery to confirm the address has changed or monitor the Livelist (see the *Diagnostics* section).

NOTE: The amount of time for the device to appear at the new station address is device-dependant. In the Livelist, there is a period where both node addresses show up while the original station address is timing out.

NOTE: If the station address is set to an address that is already present on the DP network, it will result in communication failure of both devices.

NOTE: Generally, the device will need to be in the correct state before it will accept a command to change its station address (i.e. must not be in data exchange state).

3.8. ADDING PROFIBUS DP DEVICES – MASTER MODE

1 Add each PROFIBUS device to the PLX51-PBM by right-clicking on *PROFIBUS Devices* in the tree and selecting *Add PROFIBUS Device*.

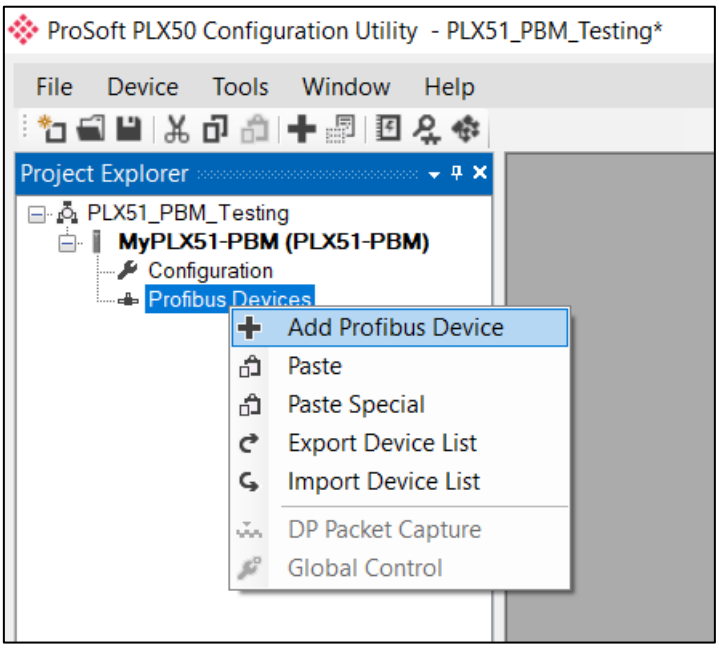


Figure 3.35 – Adding a PROFIBUS Field Device

2 Select the device to be added to the PLX51-PBM. This is done by selecting the device from the *GSD File Selector* and click **OK**.

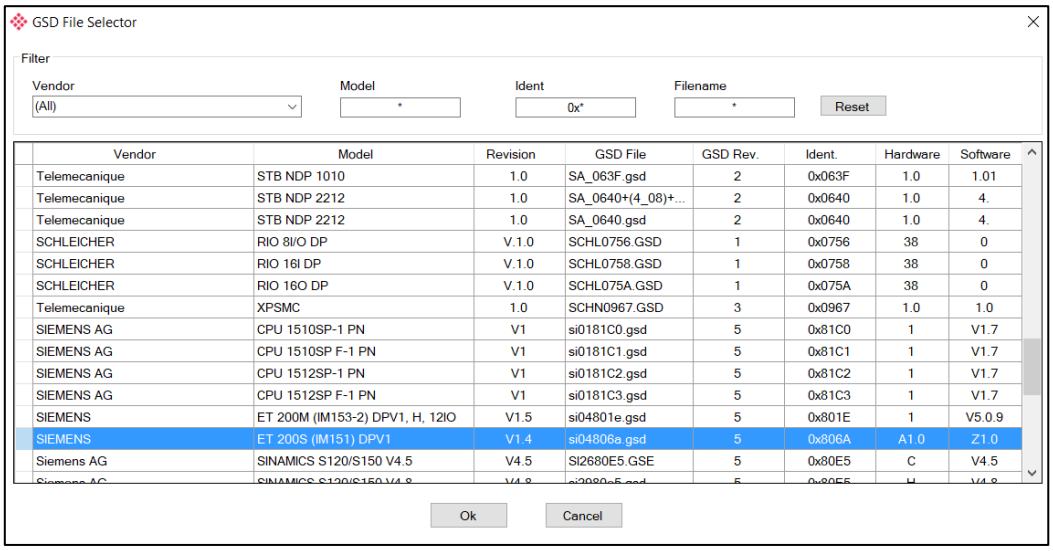


Figure 3.36 – Selecting a PROFIBUS Field Device

3 Once the device has been added, the *General Configuration* page opens and the device is added at the first open PROFIBUS Station Address.

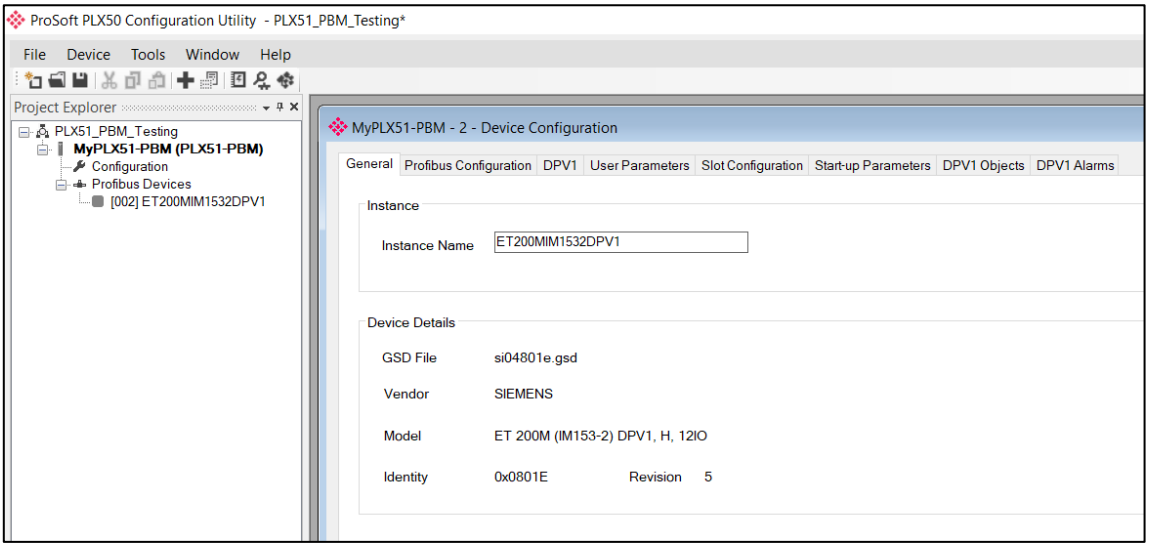


Figure 3.37 – PROFIBUS Field Device Added

3.8.1. GENERAL

The *Device Configuration* is opened by either double-clicking on the slave device in the tree, or right-clicking the slave device and selecting *Configuration*.

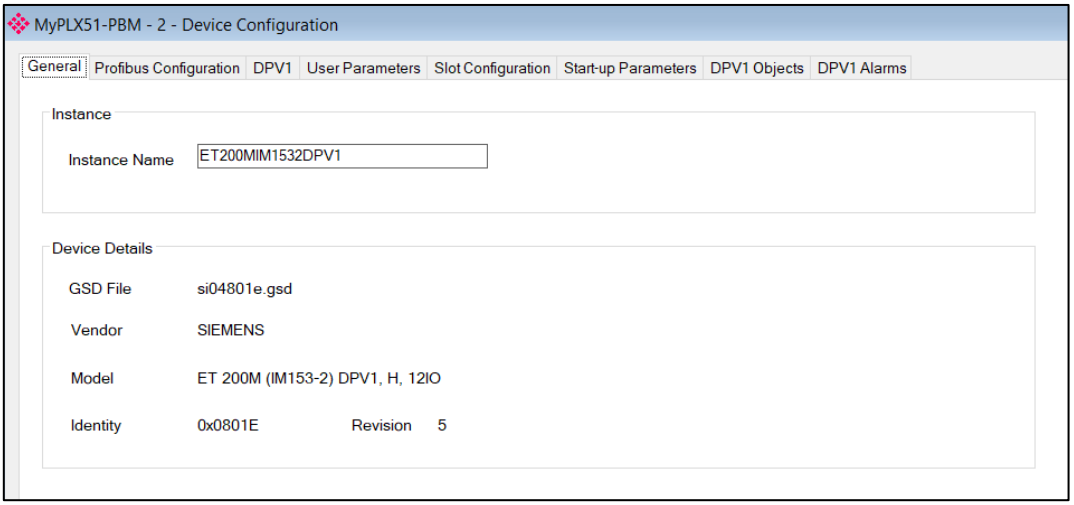


Figure 3.38 – General configuration parameters

The General configuration consists of the following parameters:

Parameter	Description
Instance Name	The device instance name which will be used to create the Tag names and UDTs in Logix.

Table 3.6 –Device General configuration parameters

3.8.2. PROFIBUS CONFIGURATION

The PROFIBUS configuration is opened by either double-clicking on the slave device in the tree, or right-clicking the slave device and selecting *Configuration*. Then select the **Profibus Configuration** tab.

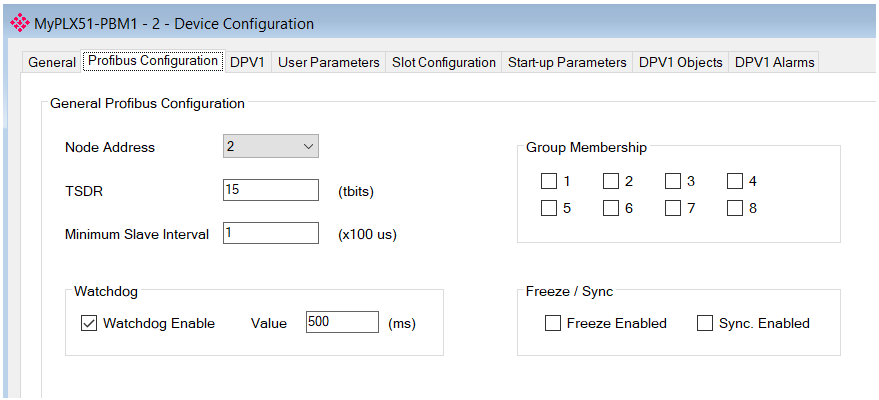


Figure 3.39 – Field Device PROFIBUS configuration parameters

The PROFIBUS configuration consists of the following parameters:

Parameter	Description
Node Address	This is the station address configured for the added device. This is the address the PLX51-PBM will use to look for and configure the device for Data Exchange.
TSDR	This parameter is the minimum time that a PROFIBUS-DP slave must wait before it responds. It must respect the rule: Min: 11 Max: 1023 Default: 11
Minimum Slave Interval	This is the minimal time that the PROFIBUS must wait between two I/O data exchanges with this device. The default value proposed comes from the GSD File. Min: 1 Max: 65535
Watchdog Enable	Enables the watchdog for the slave device data exchange. The slave device monitors the data exchange rate (PROFIBUS Cycle) and it must be less than the Watchdog Value else the slave device will change back into an unconfigured state.
Watchdog Value	Used to monitor cyclic communication and must be significantly higher than the time required for one PROFIBUS cycle. If a slave does not receive a request frame for a period of time longer than the watchdog time, it will revert to its initial, power-up state and cyclic communication will have to be reestablished. The minimum and default values are defined by the PLX51-PBM Default Watchdog setting in the PLX51-PBM PROFIBUS configuration.
Group Membership	Specifies which groups the slave belongs to. A slave can be in multiple groups at a time (from 1 through 8). Groups are used by the master when it sends a Sync or Freeze command. PROFIBUS Group checkboxes are enabled when *Sync Mode* or *Freeze Mode* checkboxes are checked.
Freeze Enabled	User data transmission Synchronization control commands enable the synchronization of inputs. Freeze Mode field is unchecked by default.
Sync Enabled	User data transmission Synchronization control commands enable the synchronization of outputs. Sync Mode is unchecked by default.

Table 3.7 – Field Device PROFIBUS configuration parameters

3.8.3. DPV1

The slave device DPV1 configuration is opened by either double-clicking on the slave device in the tree, or right-clicking the slave device and selecting *Configuration*. Then select the **DPV1** tab.

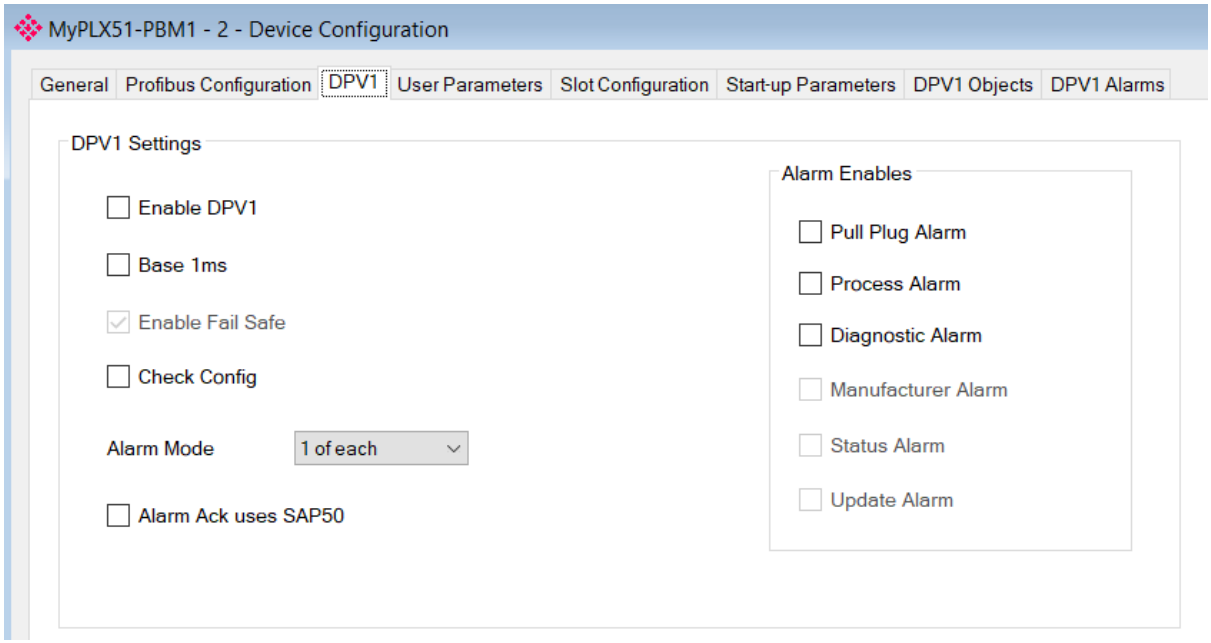


Figure 3.40 – DPV1 configuration parameters

The DPV1 configuration consists of the following parameters:

Parameter	Description
Enable DPV1	Indicates if the slave supports DPV1 Class 1 access (read and write) or alarms. **If the device does not support these DPV1 services, this parameter must be unchecked**. The default value is based on the information provided by the GSD File.
Base 1ms	Indicates if the device should use the 1ms base time for watchdog time calculation. See the "**PROFIBUS Settings**" chapter for watchdog time calculation. By default, the field is unchecked which sets the watchdog base to 10 ms. **Note**: The watchdog value is always shown in the configuration panel in ms regardless of this time base setting.
Enable Fail Safe	The Fail Safe mode determines the behavior of the DP Slave outputs when the PROFIBUS Master is in CLEAR state: • If the slave is configured to be Fail Safe mode and supports this feature, then it will apply its own fallback value (the Master sends outputs with 0 length data). • If not, the Master sends output data at 0. If this feature is supported by the device, the check box must be checked. **If the device does not support it, this parameter must be unchecked**. The default value is based on the information provided by the GSD File.
Check Config	This parameter defines the reaction to the reception of configuration data. If the check box is not set, the check is as described in EN 50170. If the check box is set, the check is made according to a specific user definition. By default, the field is unchecked.
Alarm Mode	This parameter specifies the maximum number of possible active alarms for the device.
Alarm Ack uses SAP50	This parameter forces the PLX51-PBM to use Service Access Point (SAP) 50 to acknowledge alarms.
Alarm Enables	Enables specific alarms for the slave device to report. The available alarms are only available if specified in the device's GSD file: • Pull Plug Alarm • Process Alarm • Diagnostic Alarm • Manufacturer Alarm • Status Alarm • Update Alarm

Table 3.8 – DPV1 configuration parameters

3.8.4. User Parameters

The *User Parameters* configuration is opened by either double-clicking on the slave device in the tree, or right-clicking the slave device and selecting *Configuration*. Then select the **User Parameters** tab.

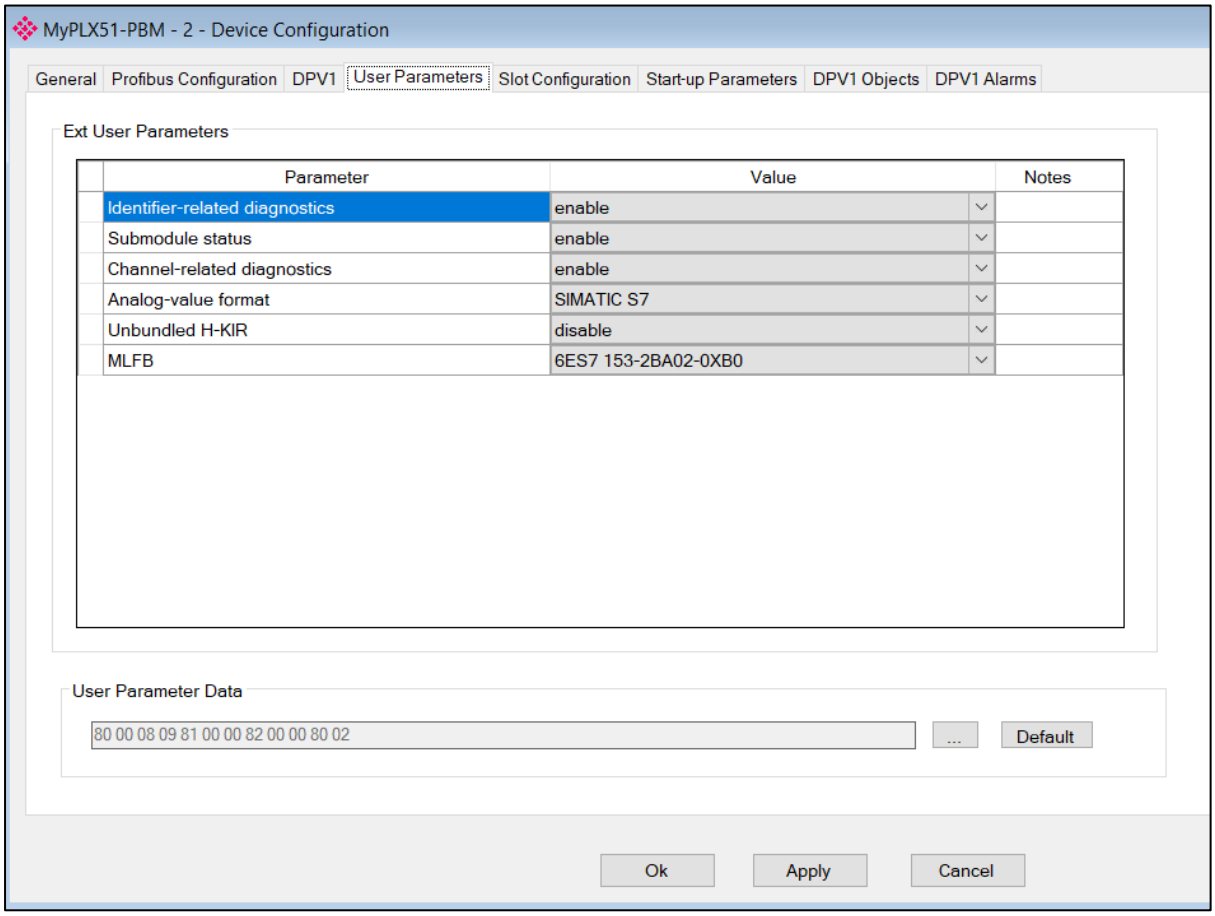


Figure 3.41 – Device User Parameter configuration parameters

The *User Parameters* configuration consists of the device-specific user configuration. This is extracted from the device GSD file and can be used to configure its parameters. When one of the parameters is changed, the *User Parameters* data is updated, which is sent to the device in the *Set Parameter* telegram.

3.8.5. SLOT CONFIGURATION

Each slave device can have multiple slots configured. A slot can be a placeholder for a process variable or a placeholder for a specific piece of hardware. In the example below, the added PROFIBUS slave device is an I/O adapter that can have multiple additional I/O modules, which will be represented as additional slots.

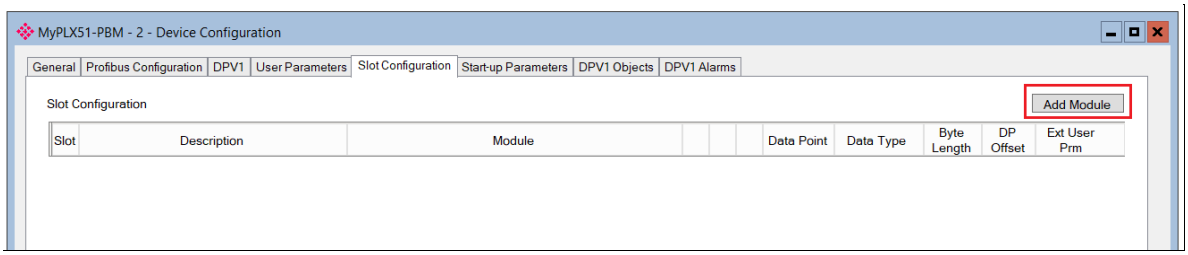


Figure 3.42 – Field Device Slot Configuration

1 To add a module, click the **ADD MODULE** button. The *Add Module* window lists the available modules from the GSD file.

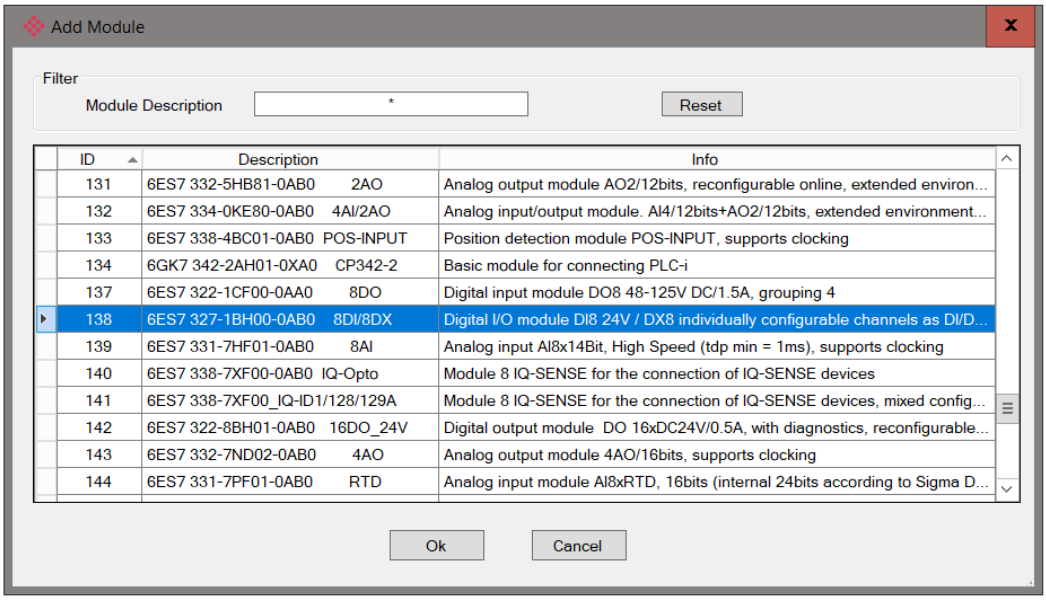


Figure 3.43 – Module Selection

2 The *Module Description* filter can be used to easily locate the required module. Once the module has been selected, click the **OK** button.

3 The module is added to the *Slot Configuration*.

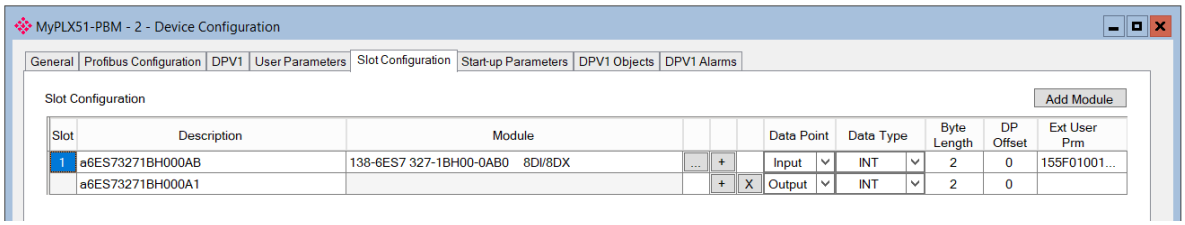


Figure 3.44 – Slot configuration – (Logix)

SLOT CONFIGURATION - MODULES

Each added module can consist of one or more Data Points. In the example below, the module has two Data Points; one Input and one Output.

The description of each is based on the module name (from GSD file), but can be edited. When using Logix, the *Description* is used to create the member of the device-specific UDTs. Therefore, no illegal Logix characters are permitted. It is also important that these descriptions are unique within a device.

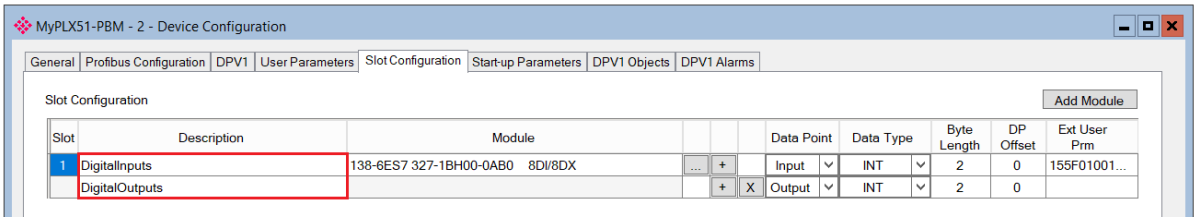


Figure 3.45 – Slot descriptions

Some modules provide module-specific *User Parameters* to further configure the module.

1 These parameters can be accessed by either clicking on the Configure **(…)** button or by right-clicking on the Module and selecting the *Configure Module* option in the context menu.

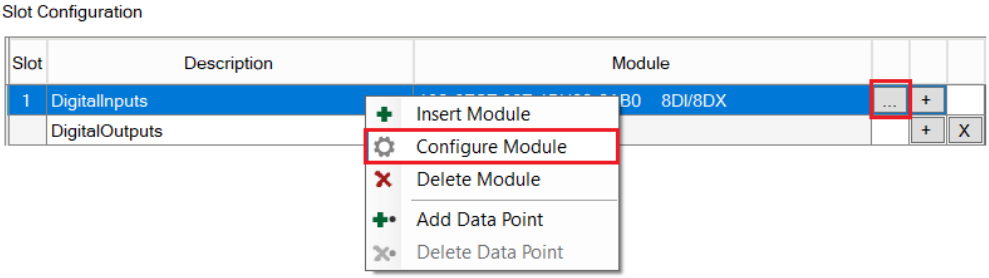


Figure 3.46 – Accessing Module-Specific User Parameters

2 The *Module User Parameter Editor* window opens. The parameters and their enumerated options are derived from the GSD file.

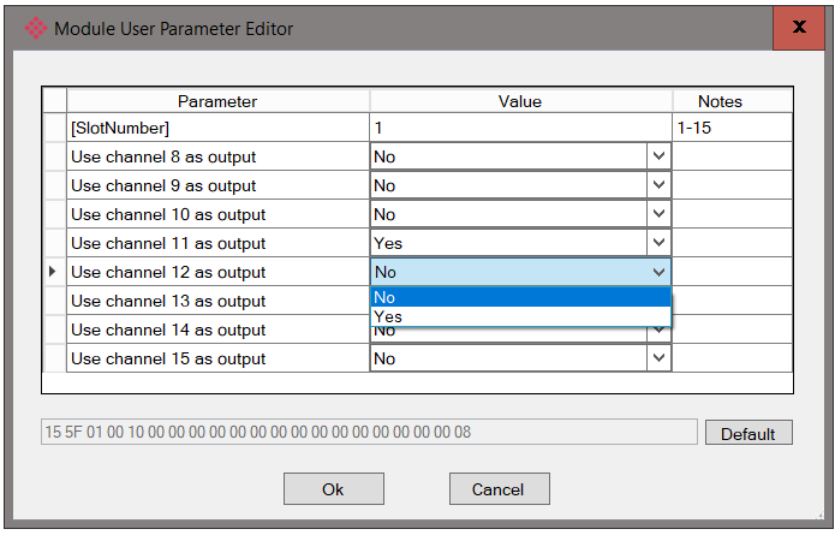


Figure 3.47 – Device Slot configuration additional parameters

3 Once the slot parameters have been updated, click **OK**. This updates the *Extended User Parameters* and return to the *Slot Configuration* page.

When adding a slot, the data format and size defaults to that of the selected module in the GSD file. Depending on the GSD file, the default configuration may not be preferred and can be changed.

DATA POINTS

Formatting the modules data can be achieved by a combination of adding or removing Data Points and changing the Data Type of each.

Data Points can be added by either right-clicking on the module and selecting ***Add Data Point*** or by clicking on the "**+**" button.

Data Points can be removed by either right-clicking on the module and selecting ***Delete Data Point*** or by clicking on the "**X**" button.

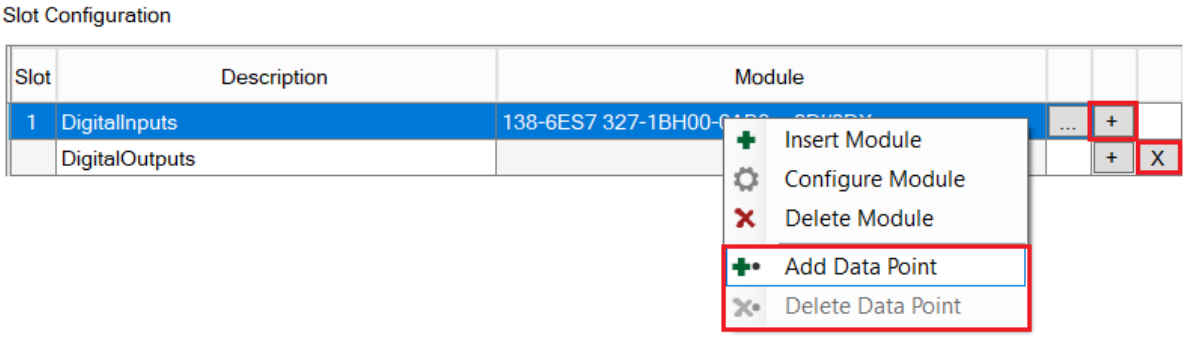


Figure 3.48 – Adding / Removing Data Points

NOTE: Each module must contain at least one Data Point.

After adding a new Data Point, the following should be configured:

- Description
- Data Point Type (Input, Output, None)
- Data Type
- Byte Length

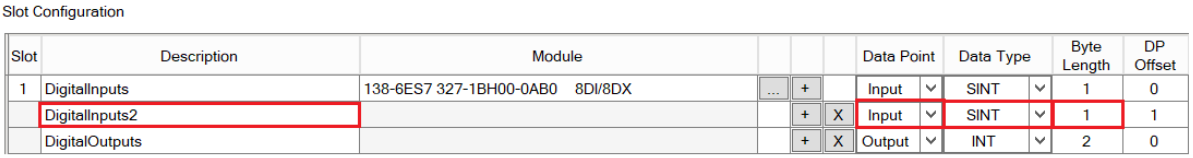


Figure 3.49 – Configuring Data Points

After updating the *Data Type*, the *Byte Length* is set to match the selected *Data Type*. By modifying the *Byte Length* thereafter, an array of that *Data Type* can be configured. It is important that the *Byte Length* is always a multiple of the base *Data Length*.

Data Type	Byte Length MUST be a multiple of:
BOOL	1
SINT	1
INT	2
DINT	4
REAL	4

Table 3.9 – Data Type – Byte Length Restrictions

NOTE: It is critical that the configured *Byte Length* be a multiple of the base *Data Type*.

NOTE: It is critical that the total sum of input and output bytes (of all the Data Points) match that required by the slave device. If not, this could cause unexpected results.

NOTE: The DP (Byte) Offset for each Data Point is automatically calculated.

SLOT CONFIGURATION – LOGIX SPECIFIC

When using Logix as the Primary Interface, the PROFIBUS Data Points are packed and padded to match a device-specific UDT. All the Inputs are collated together, then all the Outputs.

NOTE: It is important that the Data Point Descriptions do not contain any illegal characters and are not duplicated within a device. Failing to do so will create errors when generating and importing the mapping .L5X into Studio 5000.

Slot Configuration

Slot	Description	Module				Data Point	Data Type	Byte Length	DP Offset	Ext User Prm
1	DigitalInputs	138-6ES7 327-1BH00-0AB0 8DI/8DX	...	+		Input	INT	2	0	155F01001...
	DigitalOutputs			+	X	Output	INT	2	0	

Figure 3.50 – Slot configuration – Logix Example

3.8.6. START-UP PARAMETERS

Each slave device can have a set of start-up parameters associated with it. These are updated once Data Exchange is active using DPV1 Class 1 messaging. Thus, you can have specific parameters that must be updated after the device is initialized for data exchange, which simplifies device replacement.

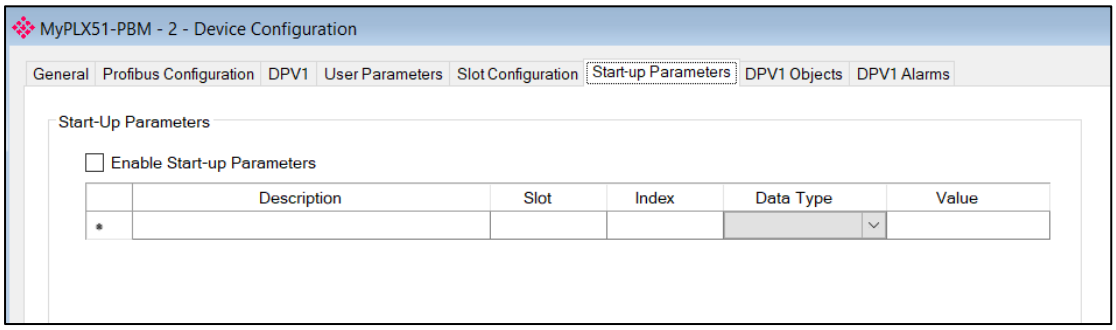


Figure 3.51 – Start-up Parameters

Enable the start-up parameters by selecting the *Enable Start-Up Parameters* checkbox. Then enter the required start-up parameters, as shown in the example below.

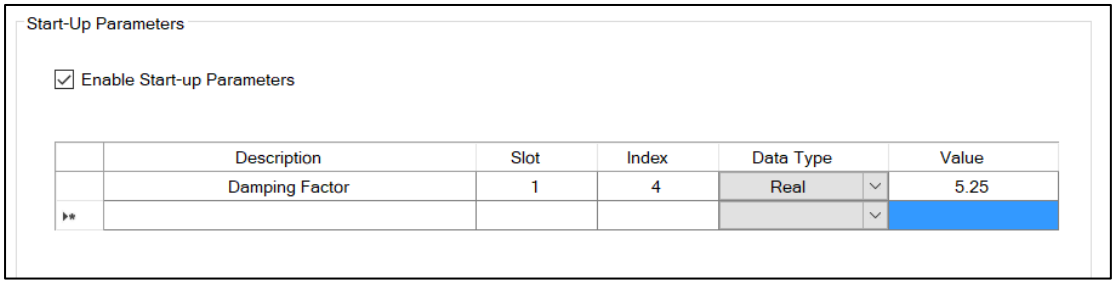


Figure 3.52 – Start-up Parameters Example

Once the slave device has been successfully parameterized and configured for Data Exchange, the PLX51-PBM updates one parameter at a time for each slave device.

3.9. ADDING PROFIBUS DP DEVICES – SLAVE MODE

Adding PROFIBUS devices to the PLX51-PBM is done by right-clicking on *PROFIBUS Devices* in the tree and selecting **ADD PROFIBUS DEVICE**.

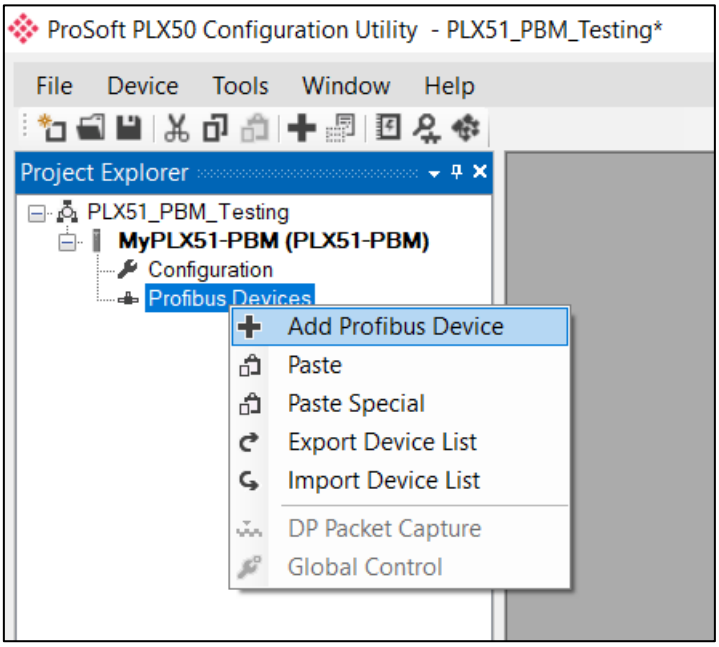


Figure 3.53 – Adding a PROFIBUS Field Device

When adding a PROFIBUS Device in Slave Mode, a static PLX51-PBM GSD file is automatically applied.

Module	GSD Filename
PLX51-PBM	PSFTS10FE.GSD

Table 3.10 – Slave GSD Files

3.9.1. GENERAL

The PLX51-PBM slave feature *Device Configuration* window is opened by either double-clicking on the slave device in the tree, or right-clicking the slave device and selecting *Configuration*.

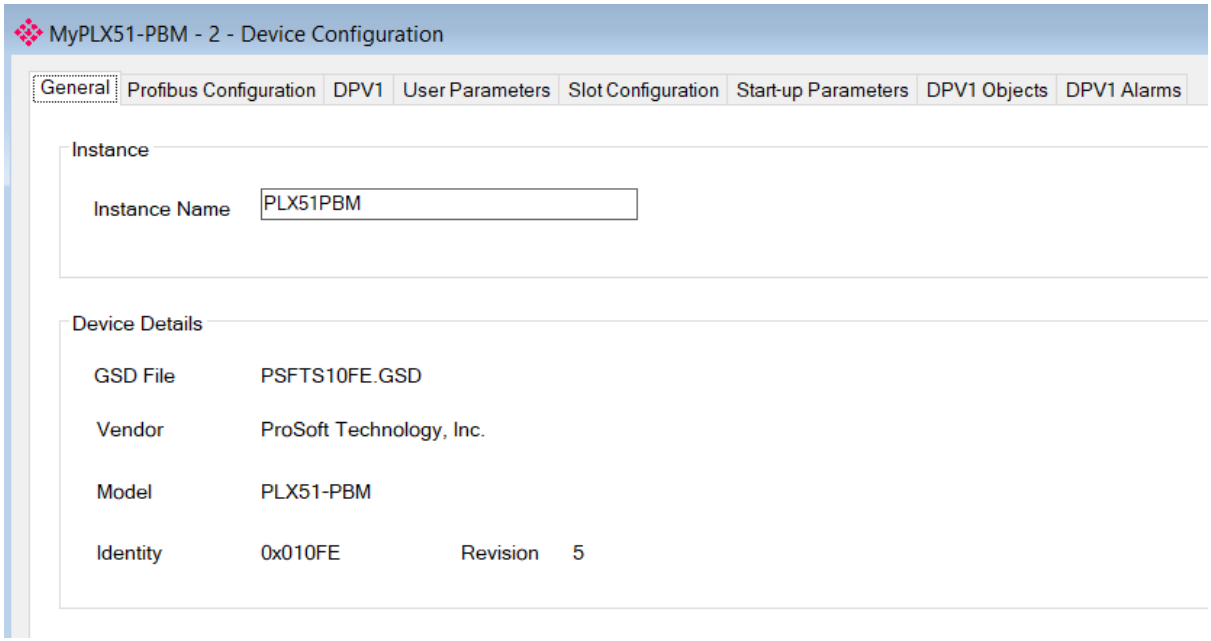


Figure 3.54 – General parameters

The General configuration consists of the following parameters:

Parameter	Description
Instance Name	The device instance name which will be used to create the Tag names and UDTs in Logix.

Table 3.11 –Device General configuration parameters

3.9.2. PROFIBUS CONFIGURATION

The PLX51-PBM slave feature PROFIBUS Configuration is opened by either double-clicking on the slave device in the tree, or right-clicking the slave device and selecting *Configuration*. Then select the **Profibus Configuration** tab.

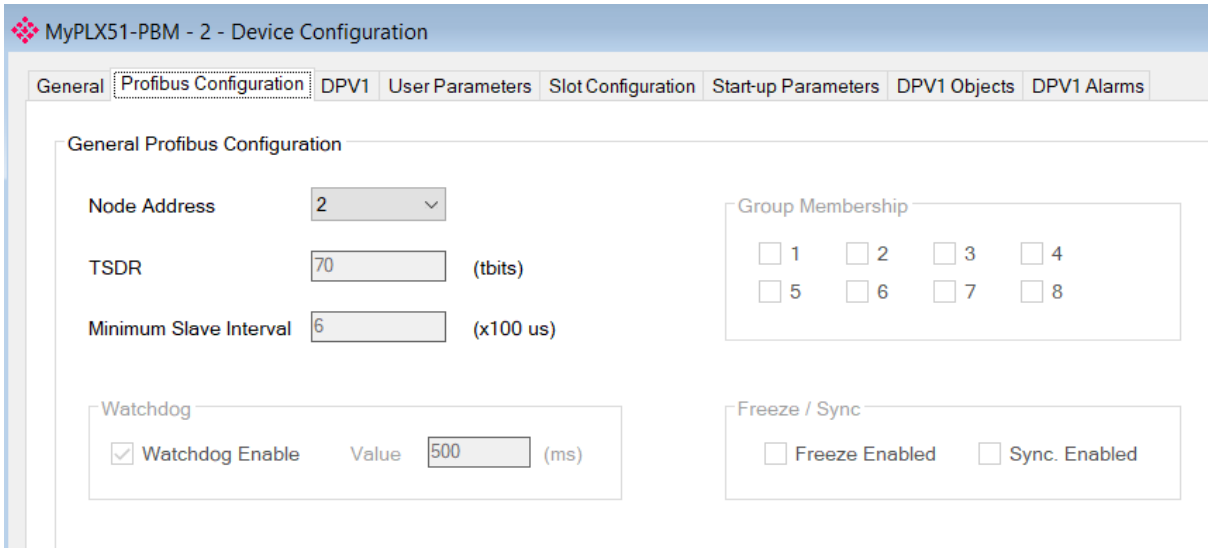


Figure 3.55 – PROFIBUS Configuration parameters

The PROFIBUS configuration consists of the following parameters:

Parameter	Description
Node Address	This is the station address configured for the added device. This is the address the PLX51-PBM will use to look for and configure the device for Data Exchange.
TSDR	N/A
Minimum Slave Interval	N/A
Watchdog Enable	N/A
Watchdog Value	N/A
Group Membership	N/A

Table 3.12 – PROFIBUS configuration parameters

3.9.3. DPV1

The PLX51-PBM slave feature DPV1 configuration is opened by either double-clicking on the slave device in the tree, or right-clicking the slave device and selecting *Configuration*. Then select the **DPV1** tab.

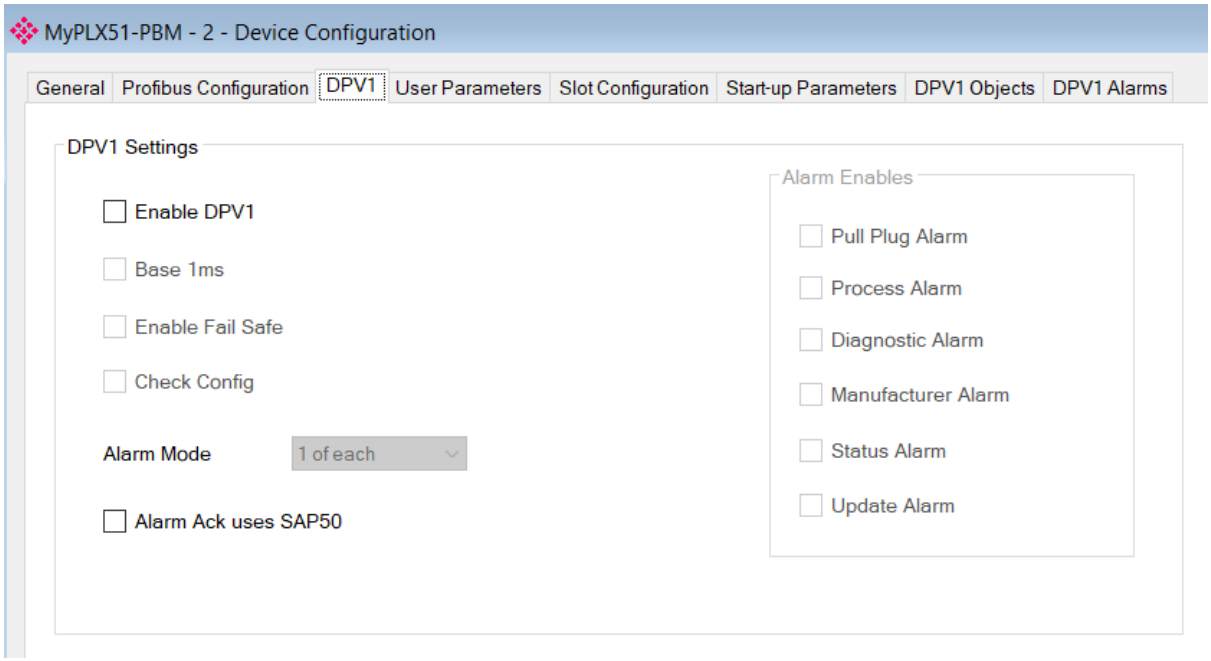


Figure 3.56 – DPV1 parameters

The DPV1 configuration consists of the following parameters:

Parameter	Description
Enable DPV1	Indicates if the slave supports DPV1 Class 1 access (read and write) or alarms. **If the device does not support these DPV1 services, this parameter must be unchecked**. The default value is based on the information provided by the GSD File.
Base 1ms	N/A
Enable Fail Safe	N/A
Check Config	N/A
Alarm Mode	N/A
Alarm Ack uses SAP50	This will force the PLX51-PBM to use Service Access Point (SAP) 50 to acknowledge alarms.
Alarm Enables	N/A

Table 3.13 – DPV1 configuration parameters

3.9.4. SLOT CONFIGURATION

The PLX51-PBM slave feature Slot configuration is the same as the Master Mode. See section 3.8.5.

3.9.5. DPV1 OBJECTS

The PLX51-PBM slave feature *DPV1 Objects* configuration window is opened by either double-clicking on the slave device in the tree, or right-clicking the slave device and selecting *Configuration*. Then select the **DPV1 Objects** tab.

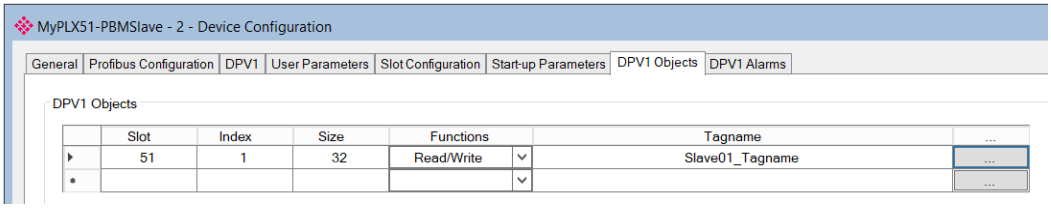


Figure 3.57 – Device DPV1 Objects parameters – Logix

The DPV1 configuration consists of the following parameters:

Parameter	Description
Slot	The Slot number to which the PROFIBUS DP transaction will be directed.
Index	The Index number to which the PROFIBUS DP transaction will be directed.
Size	The size (bytes) of the transaction.
Functions	The Functions supported by the Slave device for this object: • Read • Write • Read/Write
Tagname	The Logix Tagname where the data will be read / written.

Table 3.14 – Device DPV1 Objects configuration parameters

The Logix Tagname can be either entered manually or selected using the Logix Tag Browser by clicking on the Browse button **(…)** adjacent to the Tagname.

NOTE: The Logix controller path must be correctly set for the tags to display in the browser.

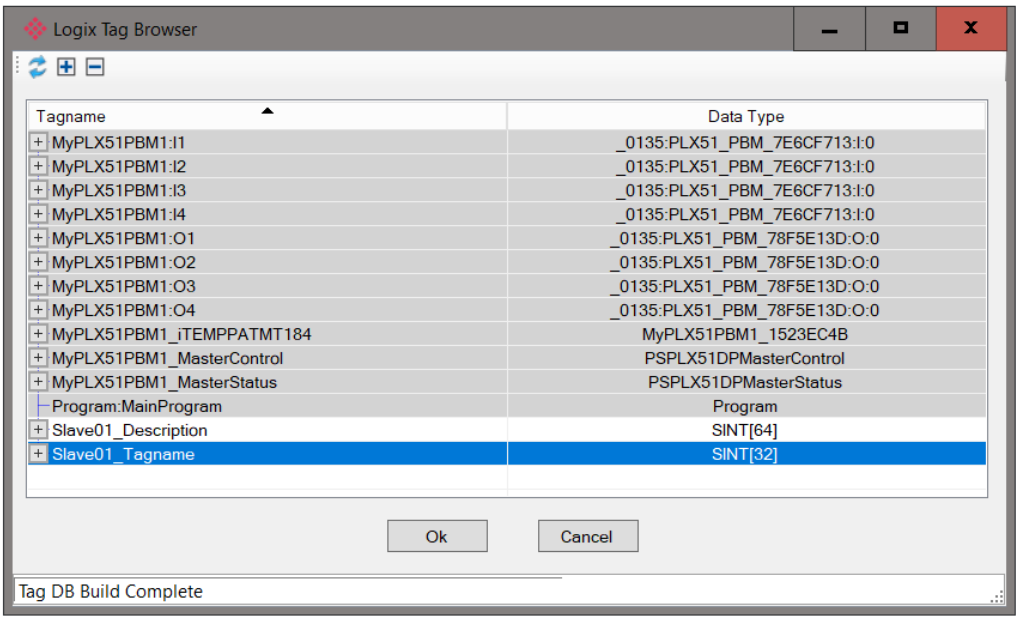


Figure 3.58 – Device DPV1 Objects Tag Browsing

3.9.6. DPV1 ALARMS

The PLX51-PBM slave feature *DPV1 Alarms* window is opened by either double-clicking on the slave device in the tree, or right-clicking the slave device and selecting *Configuration*. Then select the **DPV1 Alarms** tab.

NOTE: The *Size* of the DPV1 Alarm **must** be greater than 4 or the alarm triggering will not execute.

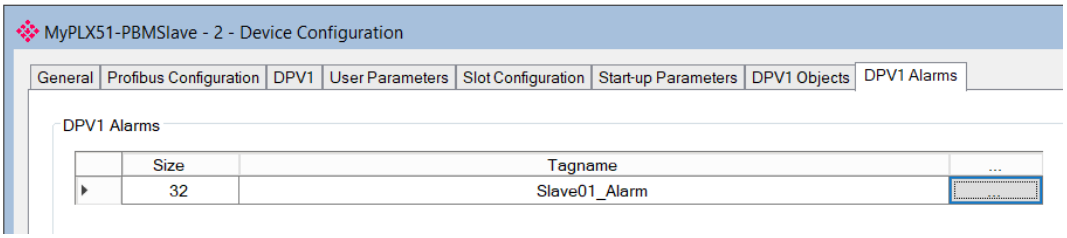


Figure 3.59 – PV1 Alarms parameters (Logix)

The DPV1 configuration consists of the following parameters:

Parameter	Description
Size	The size (bytes) of the Alarm object.
Tagname	The Logix Tagname from where the alarm data will be read. (Logix Only)

Table 3.15 – Device DPV1 Alarms configuration parameters

NOTE: The DP Master connected to the PLX51-PBM (in slave mode) will be able to configure the following alarms:

- Diagnostic Alarm
- Process Alarm
- Pull Plug Alarm
- Status Alarm
- Update Alarm
- Manufacturer Specific Alarm

3.10. LOGIX CONFIGURATION

The PLX51-PBM can be easily integrated with Allen-Bradley Logix family of controllers. Integration with the Logix family in Studio5000 makes use of the EDS Add-On-Profile (AOP) or a Generic Module Profile.

3.10.1. EDS AOP (LOGIX V21+)

Before the module can be added to the tree, the PLX51-PBM's EDS file must be registered.

Using RSLinx, the EDS file can be uploaded from the device. The EDS file can also be downloaded from the product web page at www.prosoft-technology.com. The EDS file is then registered manually using the *EDS Hardware Installation Tool* shortcut under the *Tools* menu in Studio 5000.

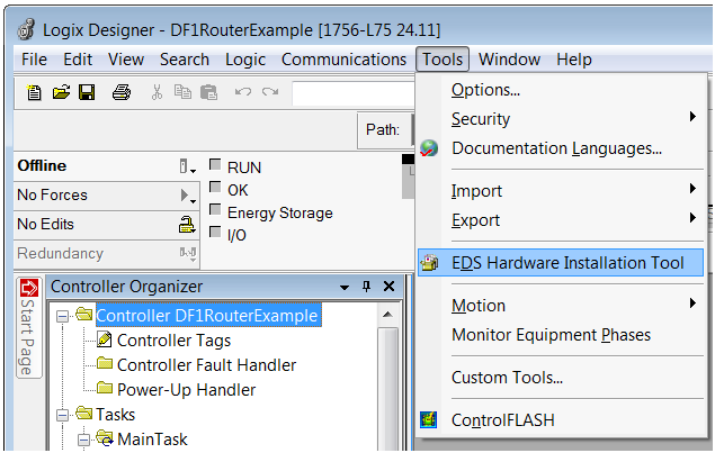


Figure 3.60 - EDS Hardware Installation Utility

After the EDS file has been registered, the PLX51-PBM can be added to the Logix I/O tree in Studio 5000.

1 Under a suitable Ethernet bridge module in the tree, select the Ethernet network, right-click and select the **NEW MODULE** option.

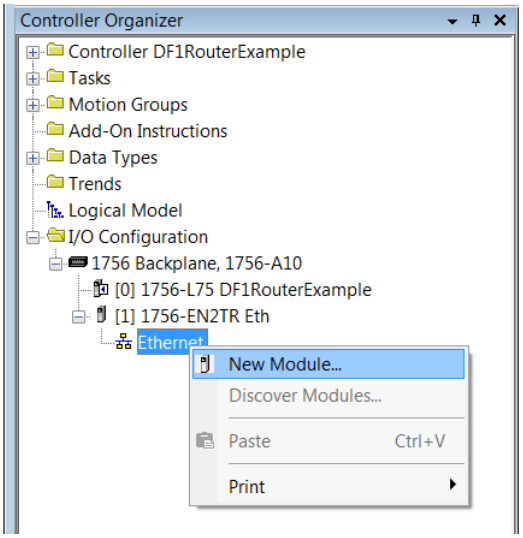


Figure 3.61 – Adding a module

2 The *Select Module Type* window opens. To easily search for the module, use the *Vendor* filter to select only the ProSoft Technology modules as shown in the figure below.

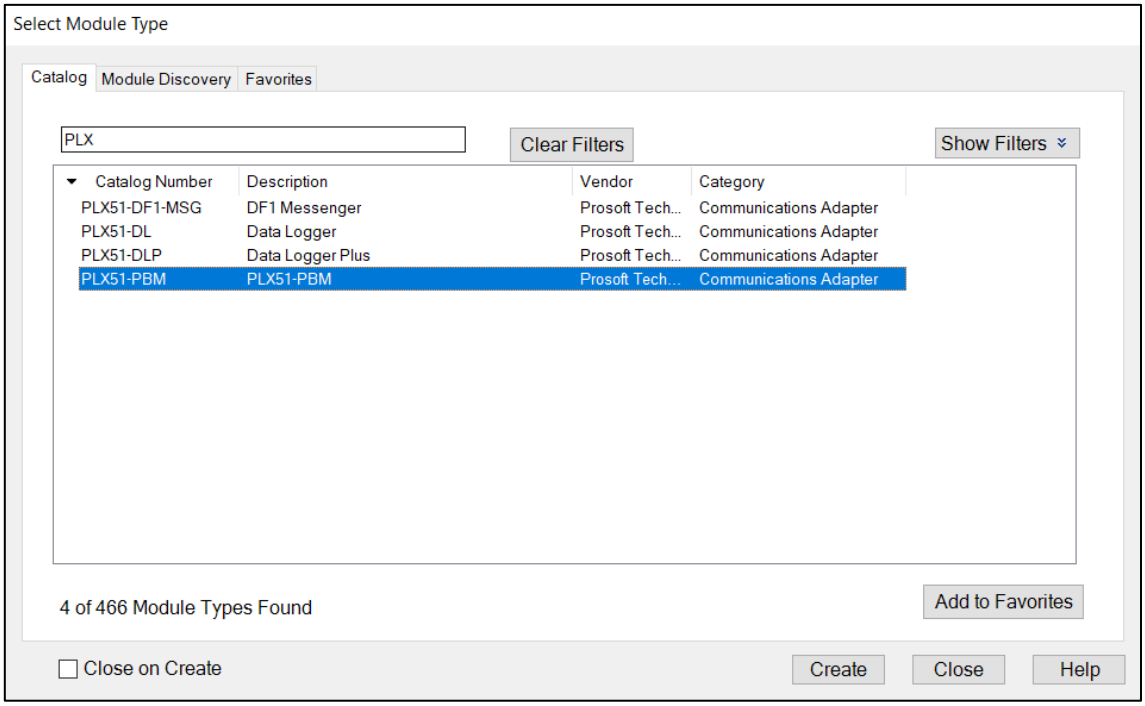


Figure 3.62 – Selecting the module

3 Locate and select the **PLX51-PBM** module and click the **CREATE** button. The *New Module* window opens, where you must specify the *Name* and *IP address* to complete the instantiation.

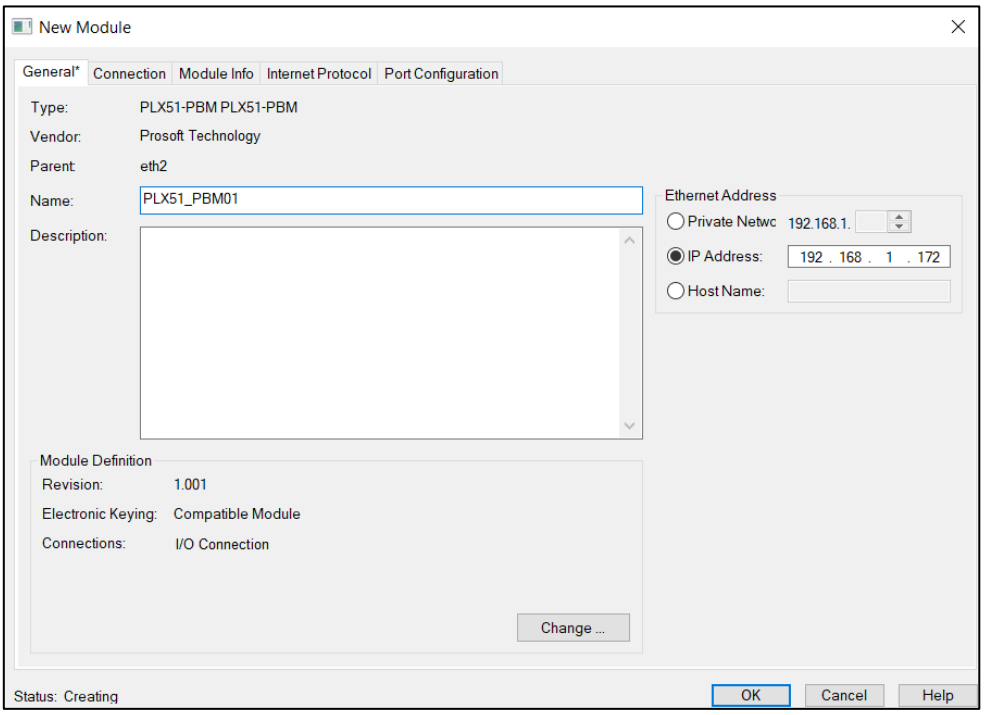


Figure 3.63 – Module instantiation

4 Once the instantiation is complete, the module appears in the Logix I/O tree.

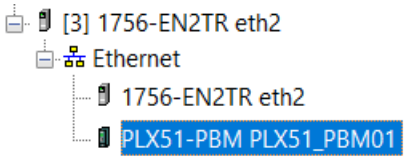


Figure 3.64 – Logix IO tree

5 The Module Defined Data Types are automatically created during the instantiation process. These data types provide meaningful structures to the module data. An excerpt of the Input Image is shown in the following figure.

PLX51_PBM01:I1	_0135:PLX51_PBM_7E6CF7...		Read/Write
PLX51_PBM01:I1.ConnectionFaulted	BOOL		Read/Write
PLX51_PBM01:I1.Data	SINT[500]		Read/Write
PLX51_PBM01:O1	_0135:PLX51_PBM_78F5E1...		Read/Write
PLX51_PBM01:I2	_0135:PLX51_PBM_7E6CF7...		Read/Write
PLX51_PBM01:O2	_0135:PLX51_PBM_78F5E1...		Read/Write
PLX51_PBM01:I3	_0135:PLX51_PBM_7E6CF7...		Read/Write
PLX51_PBM01:O3	_0135:PLX51_PBM_78F5E1...		Read/Write
PLX51_PBM01:I4	_0135:PLX51_PBM_7E6CF7...		Read/Write
PLX51_PBM01:O4	_0135:PLX51_PBM_78F5E1...		Read/Write

Figure 3.65 – Module Defined Data Type

3.10.2. Generic Module Profile (Logix Pre-v21)

NOTE: When using a Generic Module Profile, you will need to modify the code generated by the PLX50 Configuration Utility (see Logix Mapping) to match the single connection profile. To do this, you must remove the connection number from the *Source* and *Destination* tag in the copy blocks (as shown in the example below).

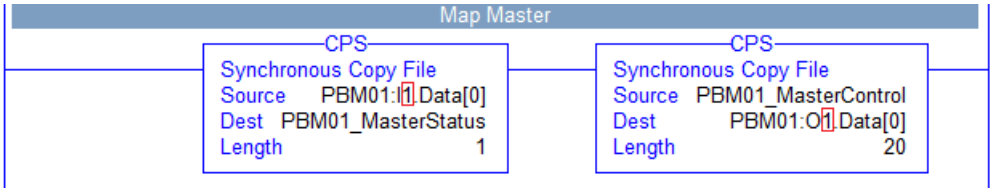


Figure 3.66 – Generated Logix Routine from PLX50 Configuration Utility (highlight connection number)

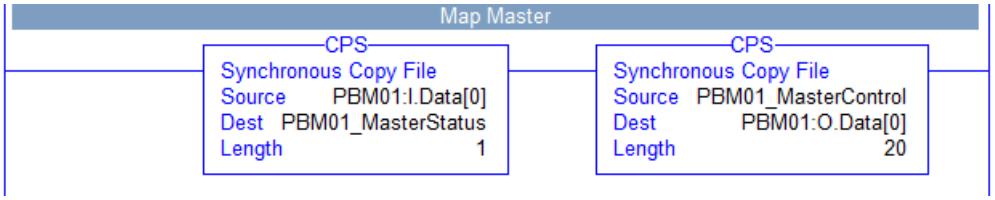


Figure 3.67 – Modified Logix Routine from PLX50 Configuration Utility for Generic Module Profile

1 When using Logix versions prior to version 21, the PLX51-PBM module must be added to the RSLogix 5000 I/O tree as a *Generic Ethernet Module*. This is achieved by right-clicking on the Ethernet Bridge in the RSLogix 5000 and selecting *New Module*. Select *ETHERNET-MODULE* and click **Ok**.

NOTE: See the next section for importing the configuration (.L5X).

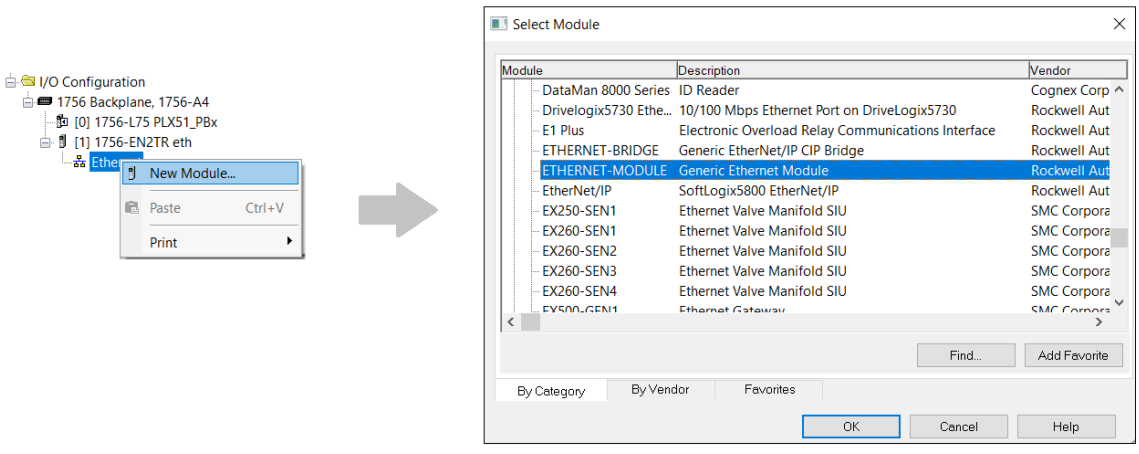


Figure 3.68 – Adding a Generic Ethernet Module in RSLogix 5000

2 Enter the *IP address*, *Input*, *Output*, and *Configuration* parameters of the PLX51-PBM.

The required connection parameters for the PLX51-PBM module are shown below:

Connection Parameter	Assembly Instance	Size
Input	132	500 (8-bit)
Output	133	496 (8-bit)
Configuration	102	0 (8-bit)

Table 3.16 - RSLogix class 1 connection parameters for the PLX51-PBM module

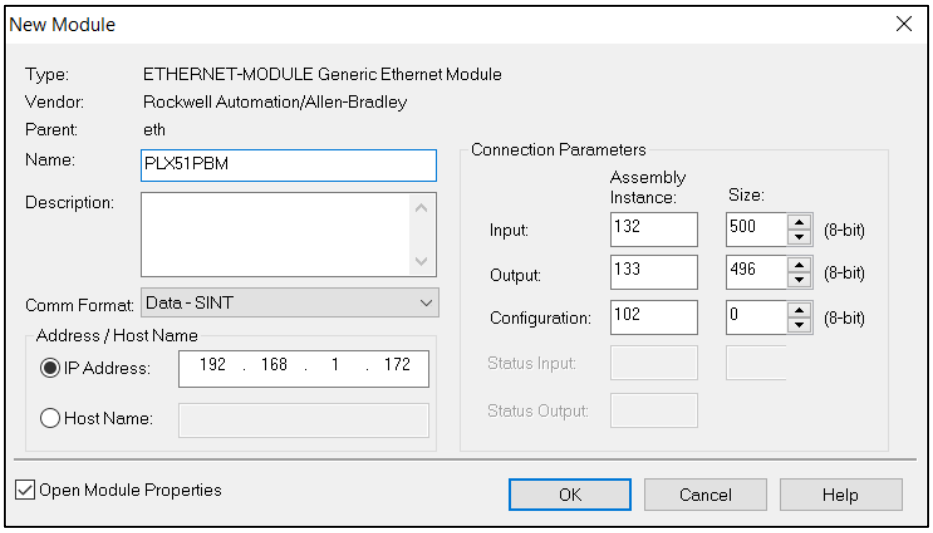


Figure 3.69 - General module properties for PLX51-PBM

3 In the *Connection* tab of the *Module Properties* window, enter the *Requested Packet Interval (RPI)*. This is the rate at which the input and output assemblies are exchanged in milliseconds. Refer to the Technical Specification section for further details on the limits of the RPI.

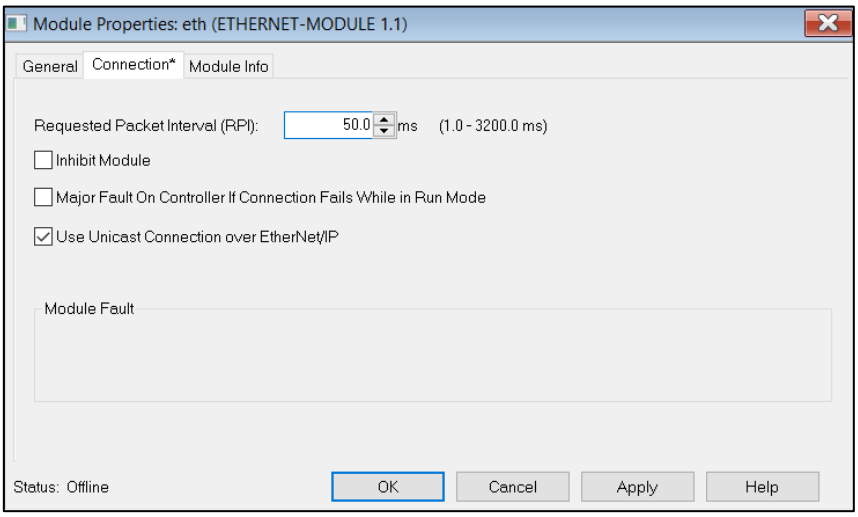


Figure 3.70 - Connection module properties in RSLogix 5000

4 Once the PLX51-PBM has been added to the RSLogix 5000 I/O tree, the Logix controller is ready to connect to the PLX51-PBM with a Class 1 connection.

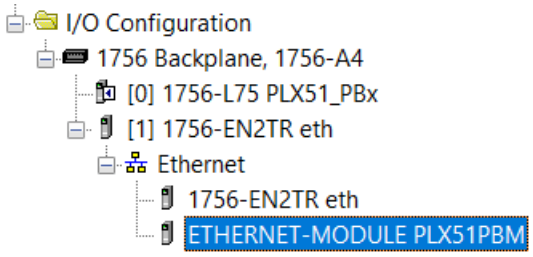


Figure 3.71 – RSLogix 5000 I/O module tree

3.10.3. MULTI-CONNECTION

The PLX51-PBM supports up to four Class 1 (cyclic data exchange) connections. This allows for more field device connections per PLX51-PBM because more data can be exchanged between the Logix controller and the PLX51-PBM.

NOTE: This only applies when you have implemented the PLX51-PBM into Logix using an EDS AOP. When using a Generic Module Profile in Logix (pre-Logix v21), you will only be able to use 1 Logix Connection.

When you verify the PLX50 Configuration Utility project (this is done by right-clicking on the device and selecting **VERIFY CONFIGURATION**), the software indicates if all the current configuration will fit into the selected EtherNet/IP Connection count. If not, you will need to increase the connection count.

In the PLX50 Configuration Utility, you can set the number of EtherNet/IP Connections in the *Logix* tab of the configuration window (as shown below):

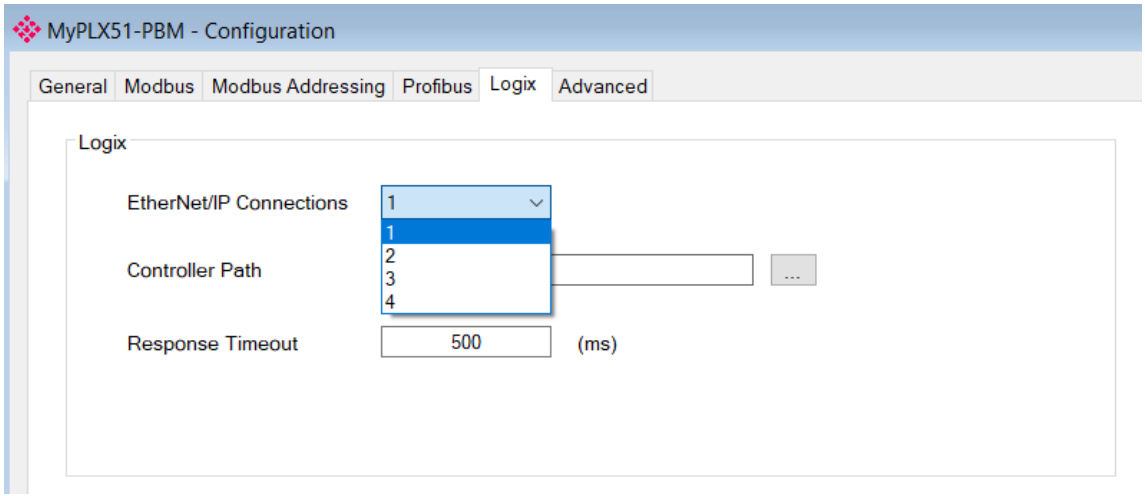


Figure 3.72 – PLX50 Configuration Utility EtherNet/IP Connection Count

In Logix, you can increase/decrease the connection count using the EDS AOP (as shown below):

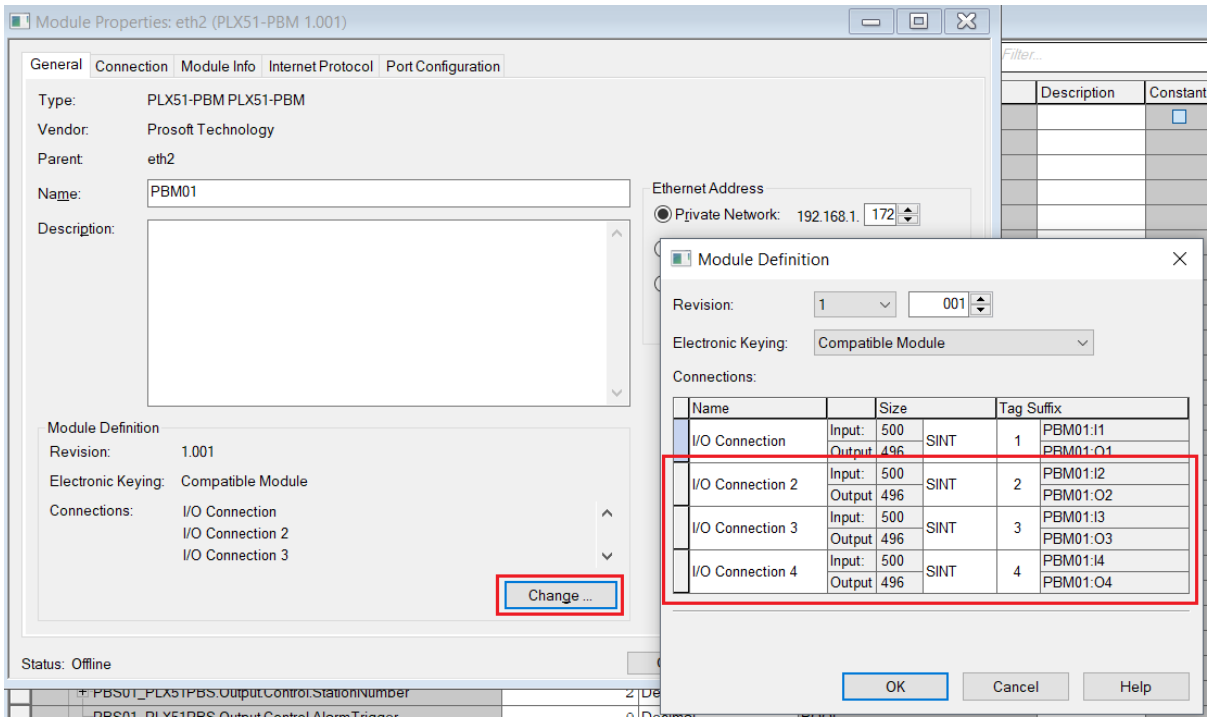


Figure 3.73 – Logix EtherNet/IP Connection Count

3.11. LOGIX MAPPING

The PLX50 Configuration Utility generates the required UDTs and Routines (based on the PLX51-PBM configuration) to map the required PROFIBUS Slave input and output data.

1 Generate the required Logix and UDTs by right-clicking on the module's icon in the PLX50 Configuration Utility and selecting the **GENERATE LOGIX L5X** option.

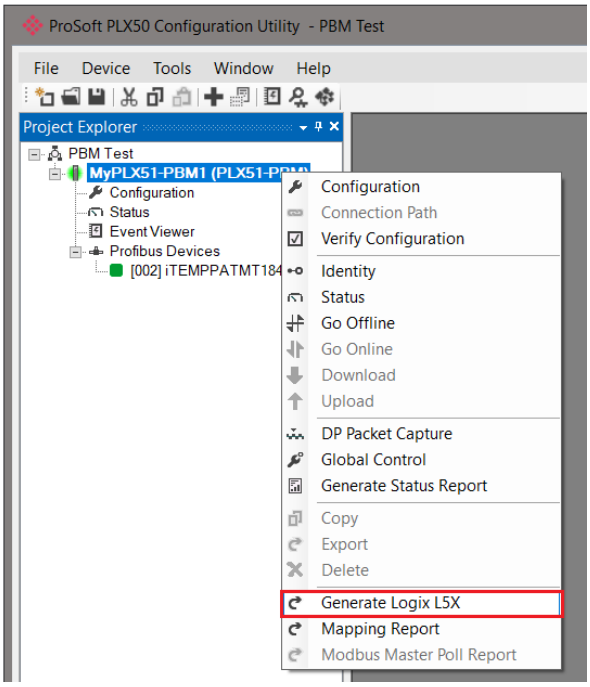


Figure 3.74 – Selecting Generate Logix L5X

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

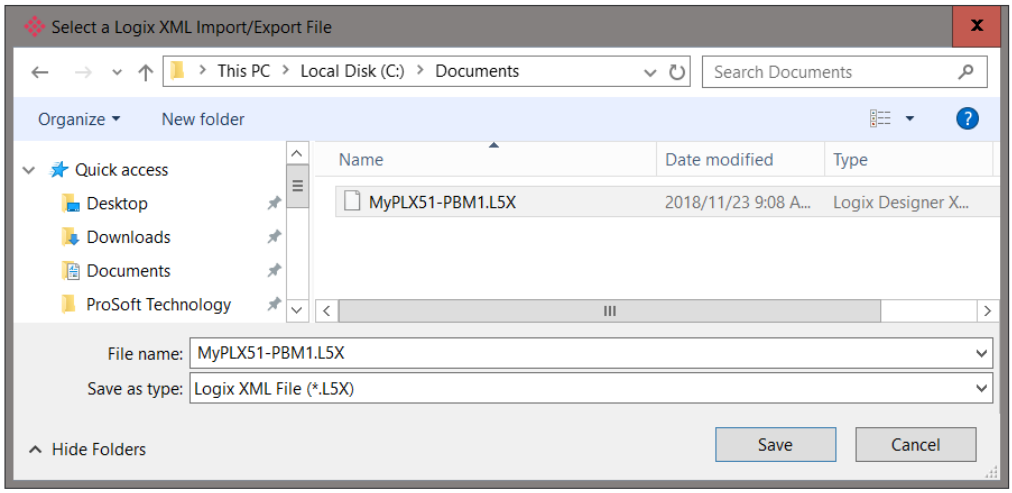


Figure 3.75 – Selecting the Logix L5X file name

3 This L5X file can now be imported in to the Studio 5000 project. Right-click on a suitable *Program* and select **ADD**, and then click **IMPORT ROUTINE**.

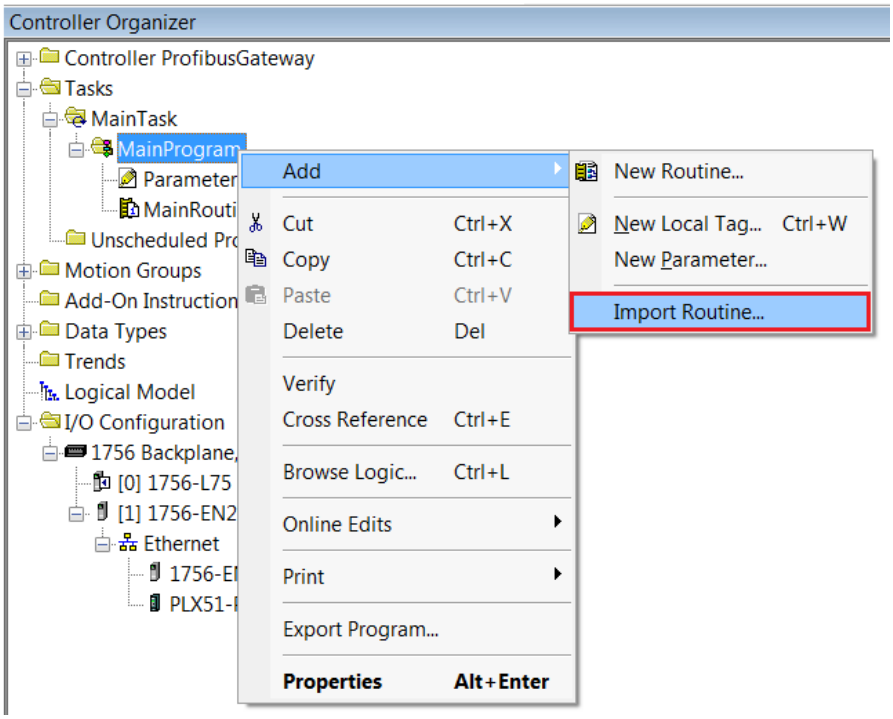


Figure 3.76 – Importing the L5X file into Studio 5000

4 In the *File Open* window, select the L5X file and click **OK**.

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

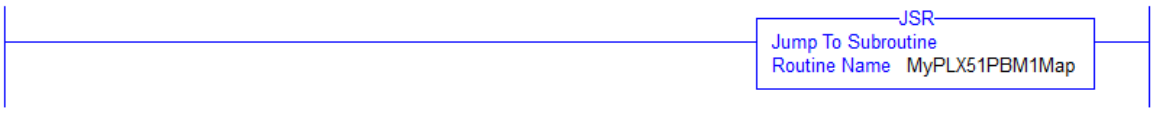


Figure 3.77 – Calling the mapping routine

6 The import creates the following:

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

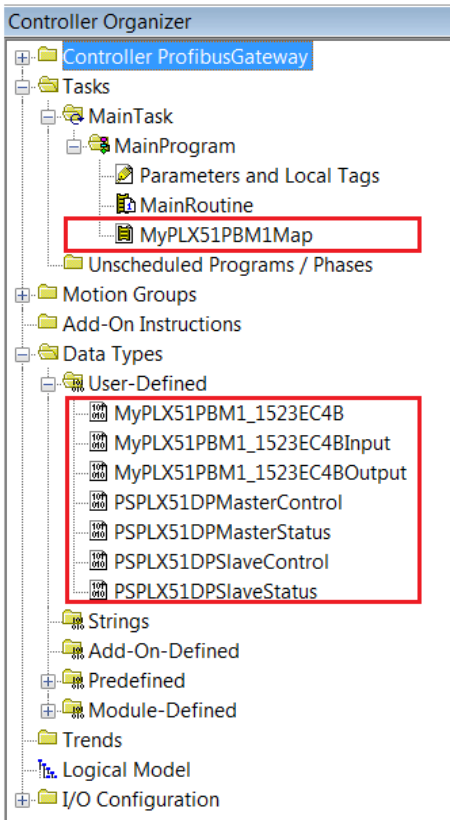


Figure 3.78 – Imported Logix Objects

A number of PLX51 specific (UDT) tags are created as shown above.

The *Master Control* tag is used to set the PROFIBUS Mode and to Enable the individual Slave Devices.

MyPLX51PBM1_MasterControl	{ . . . }		PSPLX51DPMasterControl
MyPLX51PBM1_MasterControl.MasterControl	3	Decimal	SINT
MyPLX51PBM1_MasterControl.DeviceEnable	{ . . . }	Decimal	BOOL[128]
MyPLX51PBM1_MasterControl.DeviceEnable[0]	0	Decimal	BOOL
MyPLX51PBM1_MasterControl.DeviceEnable[1]	1	Decimal	BOOL
MyPLX51PBM1_MasterControl.DeviceEnable[2]	1	Decimal	BOOL
MyPLX51PBM1_MasterControl.DeviceEnable[3]	1	Decimal	BOOL
MyPLX51PBM1_MasterControl.DeviceEnable[4]	0	Decimal	BOOL
MyPLX51PBM1_MasterControl.DeviceEnable[5]	0	Decimal	BOOL
MyPLX51PBM1_MasterControl.DeviceEnable[6]	0	Decimal	BOOL

MyPLX51PBM1_MasterControl.DeviceEnable[124]	0	Decimal	BOOL
MyPLX51PBM1_MasterControl.DeviceEnable[125]	0	Decimal	BOOL
MyPLX51PBM1_MasterControl.DeviceEnable[126]	0	Decimal	BOOL
MyPLX51PBM1_MasterControl.DeviceEnable[127]	0	Decimal	BOOL

Figure 3.79 – Master Control tag

The *Master Status* tag displays the status of the PROFIBUS Master, including arrays to show the *LiveList*, *Data Exchange Active*, *Alarm*, and *Diagnostic* pending status of each slave device.

MyPLX51PBM1_MasterStatus	{...}		PSPLX51DPMasterStatus
MyPLX51PBM1_MasterStatus.ConfigValid	1	Decimal	BOOL
MyPLX51PBM1_MasterStatus.Owned	1	Decimal	BOOL
MyPLX51PBM1_MasterStatus.DuplicateDPStation	0	Decimal	BOOL
MyPLX51PBM1_MasterStatus.ProfibusFieldbusError	0	Decimal	BOOL
MyPLX51PBM1_MasterStatus.ProfibusDeviceError	0	Decimal	BOOL
MyPLX51PBM1_MasterStatus.ProfibusOffline	0	Decimal	BOOL
MyPLX51PBM1_MasterStatus.ProfibusStopped	0	Decimal	BOOL
MyPLX51PBM1_MasterStatus.ProfibusClear	0	Decimal	BOOL
MyPLX51PBM1_MasterStatus.ProfibusOperational	1	Decimal	BOOL
MyPLX51PBM1_MasterStatus.SlaveMode	0	Decimal	BOOL
MyPLX51PBM1_MasterStatus.ConfigCRC	1537	Decimal	INT
MyPLX51PBM1_MasterStatus.DeviceLiveList	{...}	Decimal	BOOL[128]
MyPLX51PBM1_MasterStatus.DeviceDataExchangeActive	{...}	Decimal	BOOL[128]
MyPLX51PBM1_MasterStatus.DeviceAlarmPendingFlags	{...}	Decimal	BOOL[128]
MyPLX51PBM1_MasterStatus.DeviceDiagnosticPendingFlags	{...}	Decimal	BOOL[128]

Figure 3.80 – Master Status tag

There is also a tag created for each configured slave device. The structure of which comprises of the following:

- Input Status - Status related to slave device
- Input Data - As specified in the Input Data Points in the Slot configuration
- Output Control - Used to trigger alarms
- Output Data - As specified in the Output Data Points in the Slot configuration

MyPLX51PBM1_iTEMPPATMT184	{...}		MyPLX51PBM1_152365E6
MyPLX51PBM1_iTEMPPATMT184.Input	{...}		MyPLX51PBM1_152365E6Input
MyPLX51PBM1_iTEMPPATMT184.Input.Status	{...}		PSPLX51DPSlaveStatus
MyPLX51PBM1_iTEMPPATMT184.Input.Status.Online	0	Decimal	BOOL
MyPLX51PBM1_iTEMPPATMT184.Input.Status.DataExchangeActive	0	Decimal	BOOL
MyPLX51PBM1_iTEMPPATMT184.Input.Status.IdentMismatch	0	Decimal	BOOL
MyPLX51PBM1_iTEMPPATMT184.Input.Status.DisabledByOutputAssembly	0	Decimal	BOOL
MyPLX51PBM1_iTEMPPATMT184.Input.Status.DeviceError	0	Decimal	BOOL
MyPLX51PBM1_iTEMPPATMT184.Input.Status.AlarmPending	0	Decimal	BOOL
MyPLX51PBM1_iTEMPPATMT184.Input.Status.DiagnosticsPending	0	Decimal	BOOL
MyPLX51PBM1_iTEMPPATMT184.Input.Status.OutputAssemblyNodeAddrMismatch	0	Decimal	BOOL
MyPLX51PBM1_iTEMPPATMT184.Input.Status.MappingCRCMismatch	0	Decimal	BOOL
MyPLX51PBM1_iTEMPPATMT184.Input.Status.SlaveClearOpMode	0	Decimal	BOOL
MyPLX51PBM1_iTEMPPATMT184.Input.Status.SlaveAlarmAck	0	Decimal	BOOL
MyPLX51PBM1_iTEMPPATMT184.Input.Status.StationNumber	0	Decimal	SINT
MyPLX51PBM1_iTEMPPATMT184.Input.Status.DeviceMappingCRC	0	Decimal	INT
MyPLX51PBM1_iTEMPPATMT184.Input.TemperaturePV	0.0	Float	REAL
MyPLX51PBM1_iTEMPPATMT184.Input.TemperatureSts	0	Decimal	SINT
MyPLX51PBM1_iTEMPPATMT184.Output	{...}		MyPLX51PBM1_152365E6Output
MyPLX51PBM1_iTEMPPATMT184.Output.Control	{...}		PSPLX51DPSlaveControl
MyPLX51PBM1_iTEMPPATMT184.Output.Control.StationNumber	0	Decimal	SINT
MyPLX51PBM1_iTEMPPATMT184.Output.Control.AlarmTrigger	0	Decimal	BOOL
MyPLX51PBM1_iTEMPPATMT184.Output.Control.DeviceMappingCRC	0	Decimal	INT
MyPLX51PBM1_iTEMPPATMT184.Output.DisplayValue	0.0	Float	REAL
MyPLX51PBM1_iTEMPPATMT184.Output.DisplayValueSts	0	Decimal	SINT

Figure 3.81 – Slave Device-Specific tag

4. OPERATION

4.1. LOGIX OPERATION

The PLX51-PBM can exchange data with a Logix controller by establishing a Class 1 connection.

4.1.1. PROFIBUS DP - MASTER

Once the PLX51-PBM and Logix controller have been correctly configured, the PLX51-PBM can exchange data with PROFIBUS slave devices.

NOTE: The module input and output assembly of each connection is an unpopulated array of data. The imported Logix routine (generated by PLX50 Configuration Utility) copies this data to the input and output assemblies.

MASTER STATUS

Below are the definitions for the Master Status UDT tags created by the PLX50 Configuration Utility.

PBM01_MasterStatus	{...}		PSPLX51DPMasterStatus
PBM01_MasterStatus.ConfigValid	1	Decimal	BOOL
PBM01_MasterStatus.Owned	1	Decimal	BOOL
PBM01_MasterStatus.DuplicateDPStation	0	Decimal	BOOL
PBM01_MasterStatus.ProfibusFieldbusError	0	Decimal	BOOL
PBM01_MasterStatus.ProfibusDeviceError	1	Decimal	BOOL
PBM01_MasterStatus.ProfibusOffline	0	Decimal	BOOL
PBM01_MasterStatus.ProfibusStopped	0	Decimal	BOOL
PBM01_MasterStatus.ProfibusClear	0	Decimal	BOOL
PBM01_MasterStatus.ProfibusOperational	1	Decimal	BOOL
PBM01_MasterStatus.SlaveMode	0	Decimal	BOOL
PBM01_MasterStatus.ConfigCRC	-3271	Decimal	INT
PBM01_MasterStatus.DeviceLiveList	{...}	Decimal	BOOL[128]
PBM01_MasterStatus.DeviceDataExchangeActive	{...}	Decimal	BOOL[128]
PBM01_MasterStatus.DeviceAlarmPendingFlags	{...}	Decimal	BOOL[128]
PBM01_MasterStatus.DeviceDiagnosticPendingFlags	{...}	Decimal	BOOL[128]

Figure 4.1 – Master Status tags

Tag	Description
ConfigValid	Configuration has been downloaded to the PLX51-PBM and is being executed. 1 – PLX51-PBM has been successfully configured. 0 – PLX51-PBM is not configured.
Owned	Indicates if the PLX51-PBM is owned by a Logix Controller with a connection count similar to what has been configured in the PLX50 Configuration Utility. 1 – PLX51-PBM is connected. 0 – PLX51-PBM is not connected.
DuplicateDPStation	Indicates that the PLX51-PBM has detected another PROFIBUS DP station with the same station address as itself and has entered a temporary Back-off mode. 1 – Duplicate detected (Back-off mode active). 0 – Normal (No duplicate detected).  **NOTE**: In this condition, the PLX51-PBM will not communicate on the PROFIBUS DP network. Although the back-off time is approximately 5 seconds, should the conflicting DP master remain active on the PROFIBUS network, the PLX51-PBM will continuously re-enter the back-off mode.
PROFIBUSFieldbusError	There is a PROFIBUS network issue (e.g. cable unplugged, under/over terminated, etc.). 1 – Fieldbus error detected. 0 – Normal (No errors detected).
PROFIBUSDeviceError	At least one slave device has a communication issue (e.g. offline, not exchanging process data, etc.) 1 – Device error detected. 0 – Normal (No errors detected).
PROFIBUSOffline	The PROFIBUS network is offline and the PLX51-PBM will not communicate on the network. 1 – PROFIBUS fieldbus state is OFFLINE. 0 – PROFIBUS fieldbus state is **not** OFFLINE.
PROFIBUSStopped	The PROFIBUS network is running and the PLX51-PBM is communicating on the network, but it will not exchange any process data with any slave device. 1 – PROFIBUS fieldbus state is STOPPED. 0 – PROFIBUS fieldbus state is **not** STOPPED.
PROFIBUSClear	The PROFIBUS network is running and the PLX51-PBM is communicating with all slave devices on the network, and if configured in the PLX51-PBM, the module will configure and exchange process data with each slave device. **NOTE**: In CLEAR mode the PLX51-PBM will not send any output data to any slave device. 1 – PROFIBUS fieldbus state is CLEAR. 0 – PROFIBUS fieldbus state is **not** CLEAR.
PROFIBUSOperational	The PROFIBUS network is running and the PLX51-PBM is communicating with all slave devices on the network, and if configured in the PLX51-PBM, the module will configure and exchange process data with each slave device.

	1 – PROFIBUS fieldbus state is operational. 0 – PROFIBUS fieldbus state is **not** operational.
SlaveMode	When in Slave mode, the PLX51-PBM will emulate multiple PROFIBUS Slave devices. 1 – The PLX51-PBM is in PROFIBUS Slave Mode. 0 – The PLX51-PBM is **not** in PROFIBUS Slave Mode.
ConfigCRC	The signature of the configuration currently executing on the module.
DeviceLiveList	Indicates the nodes that are online on the local PROFIBUS network. Each bit represents a node. When the bit is set to '1', the device is online. When the bit is off '0', the device is not on the PROFIBUS network. Bit 0 – Node 0 Online Bit 1 – Node 1 Online ……. Bit 126 – Node 126 Online
DeviceDataExchange Active	Indicates the nodes that are online and exchanging DPV0 data on the local PROFIBUS network. Each bit represents a node. When the bit is set to '1', the device is online and exchanging data. When the bit is set to '0', the device is not exchanging data on the PROFIBUS network. Bit 0 – Node 0 Exchanging DPV0 Data Bit 1 – Node 1 Exchanging DPV0 Data ……. Bit 126 – Node 126 Exchanging DPV0 Data
DeviceAlarmPendingFlags	Indicates the nodes that have an alarm pending on the local PROFIBUS network. Each bit represents a node. When the bit is set to '1', the device has an alarm pending that must be unloaded. When the bit is set to '0', the device does not have an alarm pending. Bit 0 – Node 0 has an alarm pending Bit 1 – Node 1 has an alarm pending ……. Bit 126 – Node 126 has an alarm pending
DeviceDiagnosticPending Flags	Indicates the nodes that have diagnostics pending on the local PROFIBUS network. Each bit represents a node. When the bit is set to '1', then the device has diagnostics pending that must be unloaded. When the bit is set to '0', the device does not have any diagnostics pending. Bit 0 – Node 0 has diagnostics pending Bit 1 – Node 1 has diagnostics pending ……. Bit 126 – Node 126 has diagnostics pending

Table 4.1 – Logix Master Status tags

MASTER CONTROL

Set the PROFIBUS Operating mode from the PLX51-PBM Logix output assembly in the Logix controller.

MyPLX51PBM_MasterControl	{ . . . }	{		PSPLX51DPM...	
MyPLX51PBM_MasterControl.MasterControl	0		Decimal	SINT	Master Control Command
MyPLX51PBM_MasterControl.RedundancyControl	0		Decimal	SINT	Redundancy Control Command
MyPLX51PBM_MasterControl.DeviceEnable	{ . . . }	{	Decimal	BOOL[128]	Device Enable (0=Disable, 1=Enable)
MyPLX51PBM_MasterControl.DeviceEnable[0]	0		Decimal	BOOL	Device Enable (0=Disable, 1=Enable)
MyPLX51PBM_MasterControl.DeviceEnable[1]	0		Decimal	BOOL	Device Enable (0=Disable, 1=Enable)
MyPLX51PBM_MasterControl.DeviceEnable[2]	0		Decimal	BOOL	Device Enable (0=Disable, 1=Enable)
MyPLX51PBM_MasterControl.DeviceEnable[3]	0		Decimal	BOOL	Device Enable (0=Disable, 1=Enable)

Figure 4.2 – Master Control tags

Tag	Description
MasterControl	This tag is used to set the state of the fieldbus network. 0 – Set PROFIBUS network state to OFFLINE 1 – Set PROFIBUS network state to STOP 2 – Set PROFIBUS network state to CLEAR 3 – Set PROFIBUS network state to OPERATIONAL
RedundancyControl	Reserved
DeviceEnable	These bits enable nodes on the PROFIBUS network for data exchange. Each bit represents a node. When the bit is set to '1', the device (if configured) will exchange data with the PLX51-PBM When the bit is set to '0', the device does exchange data with the PLX51-PBM. Bit 0 – Node 0 is enabled for data exchange Bit 1 – Node 1 is enabled for data exchange ……. Bit 126 – Node 126 is enabled for data exchange

Table 4.2 – Master Control tags

You will be able to see if there are any faults (e.g. configured device not found) by viewing the LEDs of the PLX51-PBM (see the *Diagnostics* section), by going online with the module in the PLX50 Configuration Utility and viewing the PLX51-PBM Master and Device Diagnostics, or by viewing the input assembly of the PLX51-PBM in Logix.

STATUS AND DPV0 DATA EXCHANGE

The DPV0 data is exchanged with Logix using the Class 1 EtherNet/IP connection. The device-specific tag contains all the input and output data fields, as well as important control and status information.

MyPLX51PBM1_iTEMPPATMT184	{...}		MyPLX51PBM1_152365E6
MyPLX51PBM1_iTEMPPATMT184.Input	{...}		MyPLX51PBM1_152365E6Input
MyPLX51PBM1_iTEMPPATMT184.Input.Status	{...}		PSPLX51DPSlaveStatus
MyPLX51PBM1_iTEMPPATMT184.Input.Status.Online	0	Decimal	BOOL
MyPLX51PBM1_iTEMPPATMT184.Input.Status.DataExchangeActive	0	Decimal	BOOL
MyPLX51PBM1_iTEMPPATMT184.Input.Status.IdentMismatch	0	Decimal	BOOL
MyPLX51PBM1_iTEMPPATMT184.Input.Status.DisabledByOutputAssembly	0	Decimal	BOOL
MyPLX51PBM1_iTEMPPATMT184.Input.Status.DeviceError	0	Decimal	BOOL
MyPLX51PBM1_iTEMPPATMT184.Input.Status.AlarmPending	0	Decimal	BOOL
MyPLX51PBM1_iTEMPPATMT184.Input.Status.DiagnosticsPending	0	Decimal	BOOL
MyPLX51PBM1_iTEMPPATMT184.Input.Status.OutputAssemblyNodeAddrMismatch	0	Decimal	BOOL
MyPLX51PBM1_iTEMPPATMT184.Input.Status.MappingCRCMismatch	0	Decimal	BOOL
MyPLX51PBM1_iTEMPPATMT184.Input.Status.SlaveClearOpMode	0	Decimal	BOOL
MyPLX51PBM1_iTEMPPATMT184.Input.Status.SlaveAlarmAck	0	Decimal	BOOL
MyPLX51PBM1_iTEMPPATMT184.Input.Status.StationNumber	0	Decimal	SINT
MyPLX51PBM1_iTEMPPATMT184.Input.Status.DeviceMappingCRC	0	Decimal	INT
MyPLX51PBM1_iTEMPPATMT184.Input.TemperaturePV	0.0	Float	REAL
MyPLX51PBM1_iTEMPPATMT184.Input.TemperatureSts	0	Decimal	SINT
MyPLX51PBM1_iTEMPPATMT184.Output	{...}		MyPLX51PBM1_152365E6Output
MyPLX51PBM1_iTEMPPATMT184.Output.Control	{...}		PSPLX51DPSlaveControl
MyPLX51PBM1_iTEMPPATMT184.Output.Control.StationNumber	0	Decimal	SINT
MyPLX51PBM1_iTEMPPATMT184.Output.Control.AlarmTrigger	0	Decimal	BOOL
MyPLX51PBM1_iTEMPPATMT184.Output.Control.DeviceMappingCRC	0	Decimal	INT
MyPLX51PBM1_iTEMPPATMT184.Output.DisplayValue	0.0	Float	REAL
MyPLX51PBM1_iTEMPPATMT184.Output.DisplayValueSts	0	Decimal	SINT

Figure 4.3 – Slave Device-Specific tag

Tag	Description
Status	
Online	Indicates if the device is online on the PROFIBUS network. 1 – Device is online 0 – Device is not online
DataExchangeActive	Indicates if the device is configured and exchanging data on the PROFIBUS network. 1 – Device is active and exchanging data 0 – Device is not exchanging data You must ensure that all application code making use of data from a slave device first checks that the *DataExchangeActive* bit is 1.
IdentMismatch	Indicates if the device configured in the PLX50 Configuration Utility and the device at the configured node address do not match because they have different ident numbers. 1 – Online device Ident does not match configured device 0 – Online device and configured device ident match
DisabledByOutputAssembly	Indicates if the device has not been enabled for data exchange in the PLX51-PBM device enable control bits.

	1 – Device has **not** been enabled for data exchange 0 – Device has been enabled for data exchange
DeviceError	Indicates an error with the device. 1 – Device has an error 0 – Device has no error The error flag is set when one of the following conditions occur: • If there is an ident mismatch during slave parameterization. • When receiving any form of FDL fault (data link layer fault). For example: SAP Not Activated or Resource Not Available. • When the data size of the DPV0 data exchange does not match what has been configured in the PLX50 Configuration Utility. This Error flag is transient and will clear once a valid response is received.
AlarmPending	Indicates the device has an alarm pending on the local PROFIBUS network. When the bit is set to '1', the device has an alarm pending that must be unloaded When the bit is set to '0', the device does not have an alarm pending. 0 – The node has no alarm pending 1 – The node has an alarm pending
DiagnosticsPending	Indicates the device has diagnostics pending on the local PROFIBUS network. When the bit is set to '1', the device has diagnostics pending that must be unloaded When the bit is set to '0', the device does not have any diagnostics pending. 0 – The node has no diagnostics pending 1 – The node has diagnostics pending
OutputAssemblyNodeAddrMismatch	Indicates a mismatch between the actual device station address and the expected Logix mapping station address. 0 – Station address matches 1 – Station address mismatch
MappingCRCMismatch	If there is a mismatch in the mapping between Logix and the PLX51-PBM, it can result in data appearing in the incorrect location. This means you can be sending incorrect data to a device, which can have unpredictable results. 0 – The mapping for the output data is correct 1 – There is a mapping mismatch in the output data
SlaveClearOpMode	When the PLX51-PBM is in **Slave Mode**; this indicates that the respective slave is in fieldbus CLEAR mode (received from the DP Master on the network). 0 – Slave Station is in CLEAR fieldbus mode

	1 – Slave Station is **not** in CLEAR fieldbus mode
SlaveAlarmAck	When the PLX51-PBM is in **Slave Mode**; this indicates that the respective emulated slave has received an acknowledgement for the pending alarm. 0 – Slave Station has received an Alarm Acknowledgement for last pending alarm. 1 – No Alarm Acknowledgement have been received for a pending alarm or there is no alarm pending.
StationNumber	The station number of the specific slave device.
DeviceMappingCRC	The checksum of the Mapping for the specific slave device.
DeviceSpecificInputDataFields	The tags created for the input data will be slave specific.

Table 4.3 – Device Input tags

Tag	**Description**
Control	
StationNumber	The station number entered by the Logix mapping code of the specific slave device.
AlarmTrigger	When the PLX51-PBM is in **Slave Mode**; when this bit changes from 0 to 1, it will trigger an alarm notification to the DP Master.
DeviceMappingCRC	The checksum of the mapping that was applied by the generated Logix code used to verify if the mapping being used is valid.
DeviceSpecificOutputDataFields	The tags created for the output data will be slave specific.

Table 4.4 – Device Output tags

DPV1 EXPLICIT MESSAGING

The PLX51-PBM supports DPV1 Class 1 (MS1) and Class 2 (MS2) messaging, which can be used to read / write parameters in a slave device. The PLX51-PBM DPV1 communication is achieved

by using EtherNet/IP unconnected messaging (UCMM) or Class 3 connected messaging. The PLX51-PBM can buffer up to 10 DPV1 messages at a time.

NOTE: The slave device must support DPV1 messaging. You must also set the DPV1 *Enable* bit in the *User Parameters* of the slave device in the PLX50 Configuration Utility.

DPV1 CLASS 1 MESSAGING (MS1)

DPV1 Class 1 messaging is achievable if the slave device is in data exchange mode (i.e. the device is configured and exchanging cyclic data with the PLX51-PBM). Only the DP Master exchanging data with the slave device can read and write parameters using DPV1 MS1. Below are the EtherNet/IP CIP message parameters, as well as the request and response data structures.

A. DPV1 CLASS 1 READ

CIP MESSAGE:

Parameter	Description
Service Code	0x4B (Hex)
Class	0x432 (Hex)
Instance	1
Attribute	N/A
Request Data Length	8

Table 4.5 – DPV1 Class 1 Read Message

REQUEST DATA:

Parameter	Data Type	Description
Timeout	DINT	The amount of time (in milliseconds) the PLX51-PBM waits for a DPV1 response before timing out and responding to the EtherNet/IP request with a Timeout Status.
Slave Address	Byte	The station number of the PROFIBUS device.
Slot Number	Byte	The DPV1 Slot number which must be read.
Index	Byte	The DPV1 Index number which must be read.
Data Length	Byte	The maximum number of bytes that must be read.

Table 4.6 – DPV1 Class 1 Read Request

RESPONSE DATA:

Parameter	Data Type	Description
Status	Byte	Status of the DPV1 data exchange. See appendix for the definitions of the returned status.
Extended Status	Byte[3]	Extended status of the DPV1 data exchange. See appendix for the definitions of the returned extended status.
Data Length	Byte	The length of the data returned.
Reserved	Byte	-
Data	Byte[]	The data from the DPV1 Read request. The number of bytes will be equal to the *Data Length* in the response.

Table 4.7 – DPV1 Class 1 Read Response

B. DPV1 CLASS 1 WRITE

CIP MESSAGE:

Parameter	Description
Service Code	0x4C (Hex)
Class	0x432 (Hex)
Instance	1
Attribute	N/A
Request Data Length	8 + Length of Data Payload

Table 4.8 – DPV1 Class 1 Write Message

REQUEST DATA:

Parameter	Data Type	Description
Timeout	DINT	The amount of time (in milliseconds) the PLX51-PBM waits for a DPV1 response before timing out and responding to the EtherNet/IP request with a Timeout Status.
Slave Address	Byte	The station number of the PROFIBUS device.
Slot Number	Byte	The DPV1 Slot number for the write request.
Index	Byte	The DPV1 Index number for the write request.
Data Length	Byte	The number of bytes that must be written.
Data	Byte[]	The data that will be written to the specific address. The number of bytes will be equal to the Data Length in the request.

Table 4.9 – DPV1 Class 1 Write Request

RESPONSE DATA:

Parameter	Data Type	Description
Status	Byte	Status of the DPV1 data exchange. See appendix for the definitions of the returned status.
Extended Status	Byte[3]	Extended status of the DPV1 data exchange. See appendix for the definitions of the returned extended status.
Data Length	Byte	The length of the data that was written.

Table 4.10 – DPV1 Class 1 Write Response

DPV1 CLASS 2 MESSAGING (MS2)

DPV1 Class 2 messaging is possible from several DP masters simultaneously, but the connection must be established explicitly by each DP Master. Below are the EtherNet/IP CIP message parameters, as well as the request and response data structures.

C. DPV1 INITIALIZE (ESTABLISH CONNECTION)

CIP MESSAGE:

Parameter	Description
Service Code	0x4C (Hex)
Class	0x432 (Hex)
Instance	1
Attribute	N/A
Request Data Length	20 + (2 + Source Net Address Length + Source MAC Address Length) + (2 + Destination Net Address Length + Destination MAC Address Length)

Table 4.11 – DPV1 Class 2 Initialize Message

REQUEST DATA:

Parameter	Data Type	Description
Timeout	DINT	The amount of time (in milliseconds) the PLX51-PBM waits for a DPV1 response before timing out and responding to the EtherNet/IP request with a Timeout Status.
Slave Address	Byte	The station number of the PROFIBUS device.
Reserved	Byte[3]	-
Send Timeout	Short	Refer to the *PROFIBUS – DP Extensions to EN 50170 (DPV1)* for information regarding these parameters.
Features Supported	Short	
Profile Features Supported	Short	
Profile Ident Number	Short	
Source Type	Byte	
Source Address Length	Byte	
Destination Type	Byte	
Destination Address Length	Byte	
Source API	Byte	
Source SCL	Byte	
Source Net Address	Byte[]	
Source MAC Address	Byte[]	

Destination API	Byte	
Destination SCL	Byte	
Destination Net Address	Byte[]	
Destination MAC Address	Byte[]	

Table 4.12 – DPV1 Class 2 Initialize Request

RESPONSE DATA:

Parameter	Data Type	Description
Status	Byte	This is the status of the DPV1 data exchange. See appendix for the definitions of the returned status.
Extended Status	Byte[3]	This is the extended status of the DPV1 data exchange. See appendix for the definitions of the returned extended status.
Features Supported	Short	Refer to the *PROFIBUS – DP Extensions to EN 50170 (DPV1)* for information regarding these parameters.
Profile Features Supported	Short	
Profile Ident Number	Short	
Connection Reference	Byte	The connection reference is a reference number that must be used for further communication on this connection (e.g. Read, Write, or Abort).

Table 4.13 – DPV1 Class 2 Initialize Response

D. DPV1 CLASS 2 ABORT

CIP MESSAGE:

Parameter	Description

Service Code	0x4E (Hex)
Class	0x432 (Hex)
Instance	1
Attribute	N/A
Request Data Length	7

Table 4.14 – DPV1 Class 2 Abort Message

REQUEST DATA:

Parameter	Data Type	Description
Reserved	DINT	-
Connection Reference	Byte	Connection Reference Received from the DPV1 Class 2 Initialize Response.
Subnet	Byte	Refer to the *PROFIBUS – DP Extensions to EN 50170 (DPV1)* for information regarding these parameters.
Instance Reason Code	Byte	

Table 4.15 – DPV1 Class 2 Abort Request

RESPONSE DATA:

Parameter	Data Type	Description
None	-	-

Table 4.16 – DPV1 Class 2 Abort Response

E. DPV1 CLASS 2 READ

CIP MESSAGE:

Parameter	Description
Service Code	0x4F (Hex)

Class	0x432 (Hex)
Instance	1
Attribute	N/A
Request Data Length	8

Table 4.17 – DPV1 Class 2 Read Message

REQUEST DATA:

Parameter	Data Type	Description
Timeout	DINT	The amount of time (in milliseconds) the PLX51-PBM waits for a DPV1 response before timing out and responding to the EtherNet/IP request with a Timeout Status.
Connection Reference	Byte	Connection Reference Received from the DPV1 Class 2 Initialize Response.
Slot Number	Byte	The DPV1 Slot number which must be read.
Index	Byte	The DPV1 Index number which must be read.
Data Length	Byte	The maximum number of bytes that must be read.

Table 4.18 – DPV1 Class 2 Read Request

RESPONSE DATA:

Parameter	Data Type	Description
Status	Byte	This is the status of the DPV1 data exchange. See appendix for the definitions of the returned status.
Extended Status	Byte[3]	This is the extended status of the DPV1 data exchange. See appendix for the definitions of the returned extended status.
Data Length	Byte	The length of the data returned.
Reserved	Byte	-
Data	Byte[]	The data from the DPV1 Read request. The number of bytes will be equal to the Data Length in the response.

Table 4.19 – DPV1 Class 2 Read Response

F. DPV1 CLASS 2 WRITE

CIP MESSAGE:

Parameter	Description
Service Code	0x50 (Hex)
Class	0x432 (Hex)

Instance	1
Attribute	N/A
Request Data Length	8 + Length of Data Payload

Table 4.20 – DPV1 Class 2 Write Message

REQUEST DATA:

Parameter	Data Type	Description
Timeout	DINT	The amount of time (in milliseconds) the PLX51-PBM waits for a DPV1 response before timing out and responding to the EtherNet/IP request with a Timeout Status.
Connection Reference	Byte	Connection Reference Received from the DPV1 Class 2 Initialize Response.
Slot Number	Byte	The DPV1 Slot number for the write request.
Index	Byte	The DPV1 Index number for the write request.
Data Length	Byte	The number of bytes that must be written.
Data	Byte[]	The data that is written to the specific address. The number of bytes will be equal to the *Data Length* in the request.

Table 4.21 – DPV1 Class 2 Write Request

RESPONSE DATA:

Parameter	Data Type	Description
Status	Byte	This is the status of the DPV1 data exchange. See appendix for the definitions of the returned status.
Extended Status	Byte[3]	This is the extended status of the DPV1 data exchange. See appendix for the definitions of the returned extended status.
Data Length	Byte	The length of the data that was written.

Table 4.22 – DPV1 Class 2 Write Response

PROFIBUS DIAGNOSTICS

The PLX51-PBM flags you when new diagnostics have been received. You can extract the diagnostics message from the PLX51-PBM by using EtherNet/IP unconnected messaging (UCMM) or Class 3 connected messaging.

G. NOTIFICATION

The PLX51-PBM will notify you of pending diagnostics as shown below.

MASTER UDT

In the PLX51-PBM status tags (see *Logix Mapping* section), the *FieldDeviceDiagPending* tag is an array of Boolean tags that each represent a node on the network. Below is a description of the tag.

Tag	Description
FieldDeviceDiagPending	Indicates the nodes that have diagnostics pending on the local PROFIBUS network. Each bit represents a node. When the specific bit is set '1', the device has diagnostics pending that must be unloaded. When the bit is off '0', the device does not have any diagnostics pending. Bit 0 – Node 0 has diagnostics pending Bit 1 – Node 1 has diagnostics pending ……. Bit 126 – Node 126 has diagnostics pending

Table 4.23 – PLX51-PBM Logix Tags Diagnostics Pending Indications

FIELD DEVICE UDT

In the Device UDT status tags (see *Logix Mapping* section), the *DiagnosticsPending* indicates the device has diagnostics pending on the local PROFIBUS network. Below is a description of the tag.

Tag	Description
DiagnosticsPending	Indicates the device has diagnostics pending on the local PROFIBUS network. When the bit is set '1', the device has diagnostics pending that must be unloaded. When the bit is set '0', the device does not have any diagnostics pending. 0 – The node has diagnostics pending 1 – The node has diagnostics pending

Table 4.24 – PLX51-PBM UDT Diagnostics Pending Indications

H. EXTRACTION

You can extract diagnostics by using the slave device node address. You can also decide how the diagnostics data must be extracted. This is changed by updating the *Mode* in the *Diagnostics Request* message. Below are the three modes that can be selected:

Mode	Description

0	Read the slave device diagnostics that has been buffered in the PLX51-PBM.
1	Read the slave device diagnostics that has been buffered in the PLX51-PBM and clear the *Diagnostics Pending* indication.
2	Force the PLX51-PBM to send a PROFIBUS Diagnostic Request to the specific slave device and return the diagnostics data received.

Table 4.25 – Diagnostics Extract Message

CIP MESSAGE

Below are the EtherNet/IP CIP message parameters as well as the request and response data structures.

MESSAGE:

Parameter	Description
Service Code	0x52 (Hex)
Class	0x432 (Hex)
Instance	1
Attribute	N/A
Request Data Length	6

Table 4.26 – Diagnostics Extract Message

REQUEST DATA:

Parameter	Data Type	Description
Timeout	DINT	The amount of time (in milliseconds) the PLX51-PBM waits for a DPV1 response before timing out and responding to the EtherNet/IP request with a Timeout Status.
Slave Address	Byte	The station number of the PROFIBUS device.
Mode	Byte	0 – Read the slave device diagnostics buffered in the PLX51-PBM. 1 – Read the slave device diagnostics that has been buffered in the PLX51-PBM and clear the Diagnostics Pending indication. 2 – Force the PLX51-PBM to send a PROFIBUS Diagnostic Request to the specific slave device and return the diagnostics data received.

Table 4.27 – Diagnostics Extract Request

RESPONSE DATA:

Parameter	Data Type	Description
Status	Byte	This is the status of the DPV1 data exchange. See appendix for the definitions of the returned status.
Diagnostics data length	Byte	The number of diagnostic bytes that have been returned.

Diagnostics Data	Byte[]	Refer to the *PROFIBUS Specification EN 50170* for information regarding the diagnostics.

Table 4.28 – Diagnostics Extract Response

GLOBAL CONTROL

Global control commands are multi-cast PROFIBUS commands which can be sent to a group of slave devices.

CIP MESSAGE

Below are the EtherNet/IP CIP message parameters as well as the request and response data structures.

MESSAGE:

Parameter	Description
Service Code	0x54 (Hex)
Class	0x432 (Hex)
Instance	1
Attribute	N/A
Request Data Length	6

Table 4.29 – Global Control Message

REQUEST DATA:

Parameter	Data Type	Description
Timeout	DINT	The amount of time (in milliseconds) the PLX51-PBM waits for a response before timing out and responding to the EtherNet/IP request with a Timeout Status.
Control	Byte	The Global Control action:

		0 - Release the Clear mode for the devices 2 - Force the Clear Mode of devices 4 - Freeze 8 - UnFreeze 12 - UnFreeze + 16 - Sync + 32 – UnSync + 48 - UnSync
Group	Byte	The destination Group.

Table 4.30 – Global Control Request

RESPONSE DATA:

Parameter	Data Type	Description
Status	Byte	This is the status of the Global Control transmission: 0x00 – Success 0x13 – Failed

Table 4.31 – Global Control Response

ALARMING

The PLX51-PBM will flag you when a new alarm has been received. When a new alarm has been flagged by the PLX51-PBM, you can extract the alarm from the PLX51-PBM by using EtherNet/IP unconnected messaging (UCMM) or Class 3 connected messaging.

NOTE: If there is more than one alarm pending, after extract the bit will be set again to indicate there are more alarms to unload.

I. NOTIFICATION

The PLX51-PBM will notify you of a pending alarm as shown below.

MASTER UDT

In the PLX51-PBM status tags (see *Logix Mapping* section), the *FieldDeviceAlarmPending* is an array of Boolean tags each of which represents a node on the network. Below is a description of the tag.

Tag	Description
FieldDeviceAlarmPending	Indicates the nodes that have an alarm pending on the local PROFIBUS network. Each bit represents a node. When the bit is set '1', the device has an alarm pending that must be unloaded. When the bit is set '0', the device does not have an alarm pending. Bit 0 – Node 0 has an alarm pending Bit 1 – Node 1 has an alarm pending ……. Bit 126 – Node 126 has an alarm pending

Table 4.32 – PLX51-PBM Tag Alarm Pending Indications

FIELD DEVICE UDT

In the Device UDT tags (see *Logix Mapping* section), the *AlarmPending* tag indicates the device has an alarm pending on the local PROFIBUS network.

Tag	Description
AlarmPending	Indicates the device has an alarm pending on the local PROFIBUS network. When the bit is set '1', the device has an alarm pending that must be unloaded When the bit is set '0', the device does not have an alarm pending. 0 – The node has an alarm pending 1 – The node has an alarm pending

Table 4.33 – Field Device UDT Alarm Pending Indications

J. EXTRACTION

CIP MESSAGE

You can extract an alarm by using the slave device node address. Below are the EtherNet/IP CIP message parameters as well as the request and response data structures.

MESSAGE:

Parameter	Description
Service Code	0x51 (Hex)
Class	0x432 (Hex)
Instance	1
Attribute	N/A
Request Data Length	5

Table 4.34 – Alarm Extract Message

REQUEST DATA:

Parameter	Data Type	Description
Timeout	DINT	The amount of time (in milliseconds) the PLX51-PBM waits for a DPV1 response before timing out and responding to the EtherNet/IP request with a Timeout Status.
Slave Address	Byte	The station number of the PROFIBUS device.

Table 4.35 – Alarm Extract Request

RESPONSE DATA:

Parameter	Data Type	Description
Status	Byte	This is the status of the DPV1 data exchange. See appendix for the definitions of the returned status.
Extended Status	Byte[3]	This is the extended status of the DPV1 data exchange. See appendix for the definitions of the returned extended status.
Alarm data length	Byte	The amount of alarm bytes that have been returned.
Alarm data	Byte[]	Refer to the *PROFIBUS Specification EN 50170* for information regarding the diagnostics.

Table 4.36 – Alarm Extract Response

4.1.2. PROFIBUS DP - SLAVE

NOTE: The imported Logix routine (generated by the PLX50 Configuration Utility) copies the module's input and output assembly of each connection to the structured input and output assemblies.

GENERAL STATUS

Below are the definitions of the General Status UDT's created by the PLX50 Configuration Utility.

⊟ PBM01_MasterStatus	{...}		PSPLX51DPMasterStatus
PBM01_MasterStatus.ConfigValid	1	Decimal	BOOL
PBM01_MasterStatus.Owned	1	Decimal	BOOL
PBM01_MasterStatus.DuplicateDPStation	0	Decimal	BOOL
PBM01_MasterStatus.ProfibusFieldbusError	0	Decimal	BOOL
PBM01_MasterStatus.ProfibusDeviceError	1	Decimal	BOOL
PBM01_MasterStatus.ProfibusOffline	0	Decimal	BOOL
PBM01_MasterStatus.ProfibusStopped	0	Decimal	BOOL
PBM01_MasterStatus.ProfibusClear	0	Decimal	BOOL
PBM01_MasterStatus.ProfibusOperational	1	Decimal	BOOL
PBM01_MasterStatus.SlaveMode	0	Decimal	BOOL
⊞ PBM01_MasterStatus.ConfigCRC	-3271	Decimal	INT
⊞ PBM01_MasterStatus.DeviceLiveList	{...}	Decimal	BOOL[128]
⊞ PBM01_MasterStatus.DeviceDataExchangeActive	{...}	Decimal	BOOL[128]
⊞ PBM01_MasterStatus.DeviceAlarmPendingFlags	{...}	Decimal	BOOL[128]
⊞ PBM01_MasterStatus.DeviceDiagnosticPendingFlags	{...}	Decimal	BOOL[128]

Figure 4.4 – Logix General Status tags

Tag	Description
ConfigValid	Configuration has been downloaded to the PLX51-PBM and is being executed. 1 – PLX51-PBM has been successfully configured. 0 – PLX51-PBM is not configured.
Owned	Indicates if the PLX51-PBM is owned by a Logix Controller with a connection count similar to what has been configured in the PLX50 Configuration Utility. 1 – PLX51-PBM is connected. 0 – PLX51-PBM is not connected.
DuplicateDPStation	Indicates that the PLX51-PBM has detected another PROFIBUS DP station with the same station address as itself and has entered a temporary Back-off mode. 1 – Duplicate detected (Back-off mode active). 0 – Normal (No duplicate detected). **NOTE**: In this condition, the PLX51-PBM will not communicate on the PROFIBUS DP network. Although the back-off time is approximately 5 seconds, should the conflicting DP master remain active on the PROFIBUS network, the PLX51-PBM will continuously re-enter back-off mode.
PROFIBUSFieldbusError	There is a PROFIBUS network issue (e.g. cable unplugged, under/over terminated, etc.). 1 – Fieldbus error detected. 0 – Normal (No errors detected).

PROFIBUSDeviceError	At least one slave device has a communication issue (e.g. offline, not exchanging process data, etc.) 1 – Device error detected. 0 – Normal (No errors detected).
PROFIBUSOffline	Indicates if the PROFIBUS network is offline. 1 – The PROFIBUS network is offline. 0 – The PROFIBUS network is online (operational).
PROFIBUSStopped	Indicates if the state of the PROFIBUS network is in *Stopped* mode. 1 – The PROFIBUS network is stopped. 0 – The PROFIBUS network is not stopped.
PROFIBUSClear	Indicates is the state of the PROFIBUS network is in *Clear* mode. 1 – The PROFIBUS network is in *Clear* mode. 0 – The PROFIBUS network is not in *Clear* mode.
PROFIBUSOperational	Indicates is the state of the PROFIBUS network is in *Operation* mode. 1 – The PROFIBUS network is in *Operation* mode. 0 – The PROFIBUS network is not in *Operation* mode.
SlaveMode	When in **Slave** mode, the PLX51-PBM will emulate multiple PROFIBUS Slave devices. 1 – The PLX51-PBM is in Slave Mode. 0 – The PLX51-PBM is **not** in Slave Mode.
ConfigCRC	The signature of the configuration currently executing on the module.
DeviceLiveList	Indicates the nodes that are online on the local PROFIBUS network. Each bit represents a node. When the bit is set '1', the device is online. When the bit is set '0', the device is not on the PROFIBUS network. Bit 0 – Node 0 Online Bit 1 – Node 1 Online ……. Bit 126 – Node 126 Online
DeviceDataExchangeActive	Indicates the nodes that are online and exchanging DPV0 data on the local PROFIBUS network. Each bit represents a node. When the bit is set '1', the device is online and exchanging data. When the bit is set '0', the device is not exchanging data on the PROFIBUS network. Bit 0 – Node 0 Exchanging DPV0 Data Bit 1 – Node 1 Exchanging DPV0 Data ……. Bit 126 – Node 126 Exchanging DPV0 Data
DeviceAlarmPendingFlags	Indicates the nodes that have an alarm pending on the local PROFIBUS network. Each bit represents a node.

	When the bit is set '1', the device has an alarm pending that must be unloaded. When the bit is set '0', the device does not have an alarm pending. Bit 0 – Node 0 has an alarm pending Bit 1 – Node 1 has an alarm pending ……. Bit 126 – Node 126 has an alarm pending
DeviceDiagnosticPendingFlags	Indicates the nodes that have diagnostics pending on the local PROFIBUS network. Each bit represents a node. When the bit is set '1', the device has diagnostics pending that must be unloaded. When the bit is set '0', the device does not have any diagnostics pending. Bit 0 – Node 0 has diagnostics pending Bit 1 – Node 1 has diagnostics pending ……. Bit 126 – Node 126 has diagnostics pending

Table 4.37 – Logix General Status tags

GENERAL CONTROL

The PLX51-PBM Slave feature operates similar to Master mode, but each configured Slave is enabled by setting the correct enable bit in the Logix output assembly. Once the respective

bit has been set in the *DeviceEnable* BOOL array, the PLX51-PBM becomes “alive” on the PROFIBUS network, and will start responding to a PROFIBUS DP Master.

⊟ PBS01_GeneralControl	{...}		PSPLX51DPGeneralControl
⊞ PBS01_GeneralControl.MasterControl	0	Decimal	SINT
⊟ PBS01_GeneralControl.DeviceEnable	{...}	Decimal	BOOL[128]
PBS01_GeneralControl.DeviceEnable[0]	0	Decimal	BOOL
PBS01_GeneralControl.DeviceEnable[1]	0	Decimal	BOOL
PBS01_GeneralControl.DeviceEnable[2]	1	Decimal	BOOL
PBS01_GeneralControl.DeviceEnable[3]	1	Decimal	BOOL
PBS01_GeneralControl.DeviceEnable[4]	1	Decimal	BOOL
PBS01_GeneralControl.DeviceEnable[5]	1	Decimal	BOOL
• • •			
PBS01_GeneralControl.DeviceEnable[122]	0	Decimal	BOOL
PBS01_GeneralControl.DeviceEnable[123]	0	Decimal	BOOL
PBS01_GeneralControl.DeviceEnable[124]	0	Decimal	BOOL
PBS01_GeneralControl.DeviceEnable[125]	0	Decimal	BOOL
PBS01_GeneralControl.DeviceEnable[126]	0	Decimal	BOOL
PBS01_GeneralControl.DeviceEnable[127]	0	Decimal	BOOL

Figure 4.5 – General Control tags

Tag	Description
MasterControl	This tag is used to set the state of the fieldbus network. 0 – Set PROFIBUS network state to OFFLINE 1 – Set PROFIBUS network state to STOP 2 – Set PROFIBUS network state to CLEAR 3 – Set PROFIBUS network state to OPERATIONAL **Note:** When operating as a PLX51-PBM DP Slave, the *MasterControl* parameter is not be used, but only the *DeviceEnable* bits
DeviceEnable	These bits enable nodes on the PROFIBUS network for data exchange. Each bit represents a slave node. When the bit is set ‘1’, the device (if configured) will exchange data with the PLX51-PBM. When the bit is set ‘0’, the device does exchange data with the PLX51-PBM. Bit 0 – Node 0 is enabled for data exchange Bit 1 – Node 1 is enabled for data exchange ……. Bit 126 – Node 126 is enabled for data exchange

Table 4.38 – General Control tags

Monitoring faults (e.g. configured device not found) can be done by viewing the LEDs of the PLX51-PBM (see the *Diagnostics* section for more details), by going online in the PLX50 Configuration Utility and viewing the PLX51-PBM Slave and Device Diagnostics, or by viewing the input assembly of the PLX51-PBM in Logix.

STATUS AND DPV0 DATA EXCHANGE

The DPV0 data is exchanged with Logix using the Class 1 EtherNet/IP connection. The device-specific tag contains all the input and output data fields, as well as important control and status information.

PBS01_PLX51PBS	{...}		PBS01_10FF3E83
PBS01_PLX51PBS.Input	{...}		PBS01_10FF3E83Input
PBS01_PLX51PBS.Input.Status	{...}		PSPLX51DPSlaveStatus
PBS01_PLX51PBS.Input.Status.Online	1	Decimal	BOOL
PBS01_PLX51PBS.Input.Status.DataExchangeActive	1	Decimal	BOOL
PBS01_PLX51PBS.Input.Status.IdentMismatch	0	Decimal	BOOL
PBS01_PLX51PBS.Input.Status.DisabledByOutputAssembly	0	Decimal	BOOL
PBS01_PLX51PBS.Input.Status.DeviceError	0	Decimal	BOOL
PBS01_PLX51PBS.Input.Status.AlarmPending	0	Decimal	BOOL
PBS01_PLX51PBS.Input.Status.DiagnosticsPending	0	Decimal	BOOL
PBS01_PLX51PBS.Input.Status.OutputAssemblyNodeAddrMi...	0	Decimal	BOOL
PBS01_PLX51PBS.Input.Status.MappingCRCMismatch	0	Decimal	BOOL
PBS01_PLX51PBS.Input.Status.SlaveClearOpMode	0	Decimal	BOOL
PBS01_PLX51PBS.Input.Status.SlaveAlarmAck	0	Decimal	BOOL
PBS01_PLX51PBS.Input.Status.StationNumber	0	Decimal	SINT
PBS01_PLX51PBS.Input.Status.DeviceMappingCRC	0	Decimal	INT
PBS01_PLX51PBS.Input.Output1Byte	0	Decimal	SINT
PBS01_PLX51PBS.Input.Output2Bytes	{...}	Decimal	SINT[2]
PBS01_PLX51PBS.Input.Output4Bytes	0.0	Float	REAL
PBS01_PLX51PBS.Input.Output8Bytes	{...}	Decimal	SINT[8]
PBS01_PLX51PBS.Input.Output16Bytes	{...}	Decimal	SINT[16]
PBS01_PLX51PBS.Output	{...}		PBS01_10FF3E83Output
PBS01_PLX51PBS.Output.Control	{...}		PSPLX51DPSlaveControl
PBS01_PLX51PBS.Output.Control.StationNumber	2	Decimal	SINT
PBS01_PLX51PBS.Output.Control.AlarmTrigger	0	Decimal	BOOL
PBS01_PLX51PBS.Output.Control.DeviceMappingCRC	-27247	Decimal	INT
PBS01_PLX51PBS.Output.Input1Byte	33	Decimal	SINT
PBS01_PLX51PBS.Output.Input2Bytes	{...}	Decimal	SINT[2]
PBS01_PLX51PBS.Output.Input4Bytes	0.0	Float	REAL

Figure 4.6 – PLX51-PBM Slave Device-Specific tag

Tag	Description
Status	
Online	This bit indicates if the device is online on the PROFIBUS network. 1 – Device is online 0 – Device is not online
DataExchangeActive	This bit indicates if the device is configured and exchanging data on the PROFIBUS network. 1 – Device is active and exchanging data 0 – Device is not exchanging data Ensure that all application code making use of slave device data first checks that the ***DataExchangeActive*** bit is 1.

IdentMismatch	The device configured in the PLX50 Configuration Utility and the device at the configured node address do not match because they have different ident numbers. 1 – Online device Ident does not match configured device 0 – Online device and configured device ident match
DisabledByOutputAssembly	This bit indicates if the device has not been enabled for data exchange in the PLX51-PBM device enable control bits. 1 – Device has **not** been enabled for data exchange 0 – Device has been enabled for data exchange
DeviceError	This bit indicates an error with the device. 1 – Device has an error 0 – Device has no error The error flag will be set when one of the following conditions occur: • If there is an ident mismatch during slave parameterization. • When receiving any form of FDL fault (data link layer fault). For example: SAP Not Activated or Resource Not Available. • When the data size of the DPV0 data exchange does not match what has been configured in the PLX50 Configuration Utility. This Error flag is transient and will clear once a valid response is received.
AlarmPending	Indicates the device has an alarm pending on the PROFIBUS network. When the bit is set '1', the device has an alarm pending that must be unloaded. When the bit is set '0', the device does not have an alarm pending. 0 – The node has no alarm pending 1 – The node has an alarm pending
DiagnosticsPending	Indicates the device has diagnostics pending on the local PROFIBUS network. When the bit is set '1', the device has diagnostics pending that must be unloaded. When the bit is set '0', the device does not have any diagnostics pending. 0 – The node has no diagnostics pending 1 – The node has diagnostics pending
OutputAssemblyNodeAddrMismatch	Indicates that there is a mismatch between the actual device station address and the expected Logix mapping station address. 0 – Station address matches 1 – Station address mismatch
MappingCRCMismatch	If there is a mismatch in the mapping between Logix and the PLX51-PBM, it can result in data appearing in the incorrect location. This means you can be sending incorrect data to a device which can have unpredicted results. 0 – The mapping for the output data is correct. 1 – There is a mapping mismatch in the output data.

SlaveClearOpMode	When the PLX51-PBM is in **Slave Mode**; this indicates that the respective slave is in fieldbus CLEAR mode (received from the DP Master on the network). 0 – Slave Station is in CLEAR fieldbus mode. 1 – Slave Station is **not** in CLEAR fieldbus mode.
SlaveAlarmAck	When the PLX51-PBM is in **Slave Mode**; this indicates that the respective emulated slave has received an acknowledgement for the pending alarm. 0 – Slave Station has received an Alarm Acknowledgement for last pending alarm. 1 – No Alarm Acknowledgement have been received for a pending alarm or there is no alarm pending.
StationNumber	The station number of the specific slave device.
DeviceMappingCRC	The checksum of the Mapping for the specific slave device.
DeviceSpecificInputDataFields	The tags created for the input data will be slave specific.

Table 4.39 – Device Input tags

Tag	**Description**
Control	
StationNumber	The station number entered by the Logix mapping code of the specific slave device.
AlarmTrigger	When the PLX51-PBM is in **Slave** Mode; when this bit changes from 0 to 1, it will trigger an alarm notification to the DP Master.
DeviceMappingCRC	The checksum of the mapping that was applied by the generated Logix code used to verify if the mapping being used is valid.
DeviceSpecificOutputDataFields	The tags created for the output data will be slave specific.

Table 4.40 – Device Output tags

DPV1 CLASS 1 MESSAGING (MS1)

The PLX51-PBM Slave feature supports DPV1 Class 1 (MS1) messaging. See the *DPV1 Objects* in the PLX50 Configuration Utility *Device Configuration* section for more information

regarding the configuration of the DPV1 Objects. You can configure several slot and index combinations for DPV1 Class 1 communication (for each added PROFIBUS Slave device).

When the PROFIBUS Master sends a DPV1 read/write command for the configured slot and index, the PLX51-PBM accesses the configured Logix tag to provide the required data. The data to be written or read is extracted from the Logix SINT array. This array was configured in the DPV1 objects of the device configuration window. Below is an example of the DPV1 operation when the PLX51-PBM has been configured as a PROFIBUS Slave.

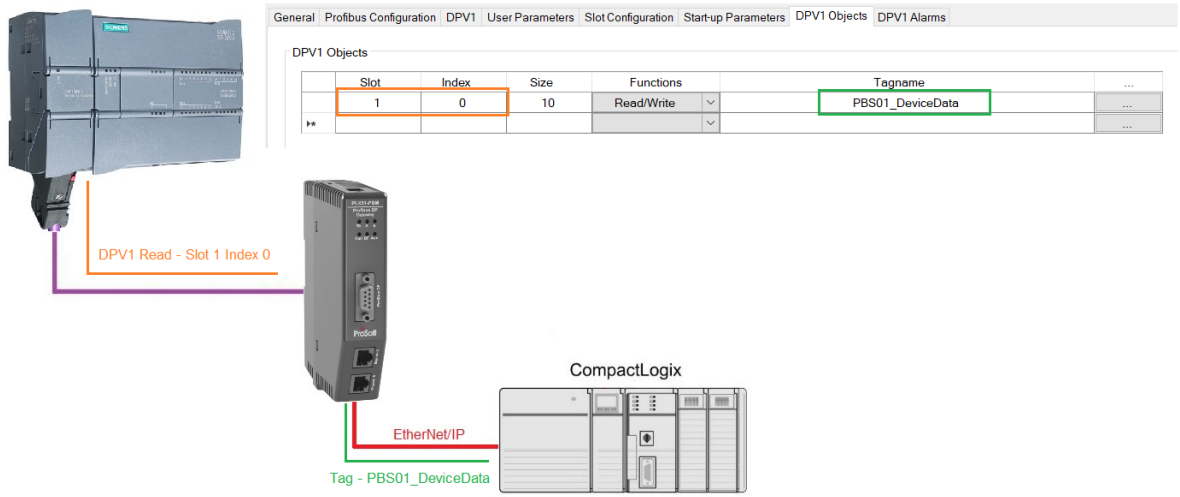


Figure 4.7 – PLX51-PBM DPV1 Object exchange

ALARMING

The PLX51-PBM slave feature supports DPV1 Alarming. You can trigger an alarm from the Logix device output assembly, which will notify the PROFIBUS Master that a new alarm has

been generated. When the PROFIBUS Master sends a DPV1 alarm read command, the PLX51-PBM accesses the configured Logix tag to provide the required data for the specific alarm.

NOTE: The PLX51-PBM allows only one alarm to be triggered at a time.

1 To trigger an alarm notification for the PROFIBUS Master, toggle (from 0 to 1) the *AlarmTrigger* tag in the field device output assembly as shown below:

PBS01_PLX51PBS.Output	{...}		PBS01_10FF3E83Output
PBS01_PLX51PBS.Output.Control	{...}		PSPLX51DPSlaveControl
PBS01_PLX51PBS.Output.Control.StationNumber	2	Decimal	SINT
PBS01_PLX51PBS.Output.Control.AlarmTrigger	0	Decimal	BOOL
PBS01_PLX51PBS.Output.Control.DeviceMappingCRC	-27247	Decimal	INT
PBS01_PLX51PBS.Output.Input1Byte	33	Decimal	SINT

Figure 4.8 – PLX51-PBM Slave Alarm Trigger

2 Once the alarm has been triggered, the PLX51-PBM reads the alarm data from the configured Logix tag and add it to the PROFIBUS diagnostics (which will then be read by the PROFIBUS Master).

3 When the PROFIBUS Master acknowledges the alarm, the *SlaveAlarmAck* bit in the field device input assembly is set, indicating to the Logix controller that the next alarm can be triggered.

PBS01_PLX51PBS.Input	{...}		PBS01_10FF3E83Input
PBS01_PLX51PBS.Input.Status	{...}		PSPLX51DPSlaveStatus
PBS01_PLX51PBS.Input.Status.Online	1	Decimal	BOOL
PBS01_PLX51PBS.Input.Status.DataExchangeActive	1	Decimal	BOOL
PBS01_PLX51PBS.Input.Status.IdentMismatch	0	Decimal	BOOL
PBS01_PLX51PBS.Input.Status.DisabledByOutputAssembly	0	Decimal	BOOL
PBS01_PLX51PBS.Input.Status.DeviceError	0	Decimal	BOOL
PBS01_PLX51PBS.Input.Status.AlarmPending	0	Decimal	BOOL
PBS01_PLX51PBS.Input.Status.DiagnosticsPending	0	Decimal	BOOL
PBS01_PLX51PBS.Input.Status.OutputAssemblyNodeAddrMi...	0	Decimal	BOOL
PBS01_PLX51PBS.Input.Status.MappingCRCMismatch	0	Decimal	BOOL
PBS01_PLX51PBS.Input.Status.SlaveClearOpMode	0	Decimal	BOOL
PBS01_PLX51PBS.Input.Status.SlaveAlarmAck	0	Decimal	BOOL
PBS01_PLX51PBS.Input.Status.StationNumber	0	Decimal	SINT
PBS01_PLX51PBS.Input.Status.DeviceMappingCRC	0	Decimal	INT

Figure 4.9 – PLX51-PBM Alarm Acknowledge

The format of the DPV1 Alarm data in the Logix SINT array is shown below:

Alarm Parameter	Byte Offset	Byte Size	Description

Alarm Length	0	1	Length of the Alarm data at the bottom of the table.
Alarm Type	1	1	Refer to the *PROFIBUS Specification EN 50170* for information regarding the diagnostics. **Examples:** 1 - Diagnosis_Alarm 3 - Pull_Alarm 4 - Plug_Alarm
Alarm Slot	2	1	Refer to the *PROFIBUS Specification EN 50170* for information regarding the diagnostics.
Alarm Specifier	3	1	Refer to the *PROFIBUS Specification EN 50170* for information regarding the diagnostics. **Examples:** 0 - no further differentiation 1 - Incident appeared 2 - Incident disappeared and slot is ok 3 - One incident disappeared, others remain
Alarm data	4	Alarm Length	Refer to the *PROFIBUS Specification EN 50170* for information regarding the diagnostics.

Table 4.41 – Slave Alarm Data Format

An example of the Alarm Data is shown below:

Name	Value	Style	Data Type	Description
DPV1Alarm	{...}	Hex	SINT[40]	
DPV1Alarm[0]	16#05	Hex	SINT	Alarm Data Length
DPV1Alarm[1]	16#01	Hex	SINT	Alarm Type
DPV1Alarm[2]	16#03	Hex	SINT	Alarm Slot
DPV1Alarm[3]	16#01	Hex	SINT	Alarm Specifier
DPV1Alarm[4]	16#11	Hex	SINT	Alarm Data ...
DPV1Alarm[5]	16#22	Hex	SINT	
DPV1Alarm[6]	16#33	Hex	SINT	
DPV1Alarm[7]	16#44	Hex	SINT	
DPV1Alarm[8]	16#55	Hex	SINT	
DPV1Alarm[9]	16#00	Hex	SINT	

Figure 4.10 –DPV1 Alarm Data Example

4.2. EXPLICIT MESSAGING UTILITY

The PLX50 Configuration Utility provides a utility to initiate explicit messages to the PROFIBUS devices via the PLX51-PBM. The messaging options include the following:

- DPV1 Class 1 Read
- DPV1 Class 1 Write
- DPV1 Class 2 Read
- DPV1 Class 2 Write
- Read Diagnostics
- Read Alarms

1 Right-click on a PROFIBUS device and select the **EXPLICIT MESSAGING** option.

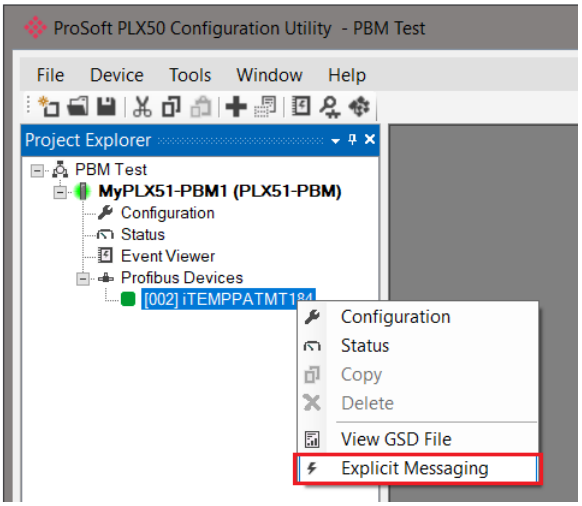


Figure 4.11 – Explicit Messaging Option

2 In the *Action* box, select the type of explicit message. Depending on the type selected, various other parameter controls will become available.

3 Once the parameters have been entered, click the **EXECUTE** button to initiate the explicit exchange.

NOTE: A Class 2 Initialization message will first be sent if a Class 2 connection has not already been established. The Class 2 connection remains open until the station address is changed, the manual **ABORT** button is selected, or the utility is closed.

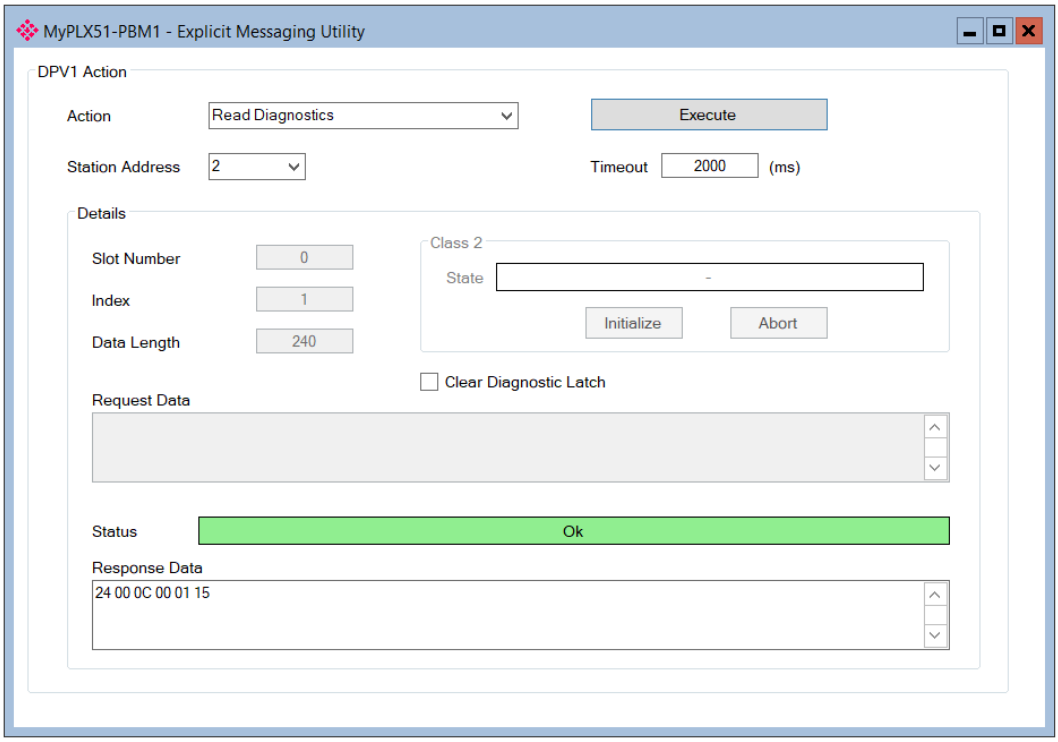


Figure 4.12 – Explicit Messaging Utility

4.3. FIRMWARE UPGRADING

Using the PLX50 Configuration Utility, you can upgrade the PLX51-PBM firmware in the field.

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

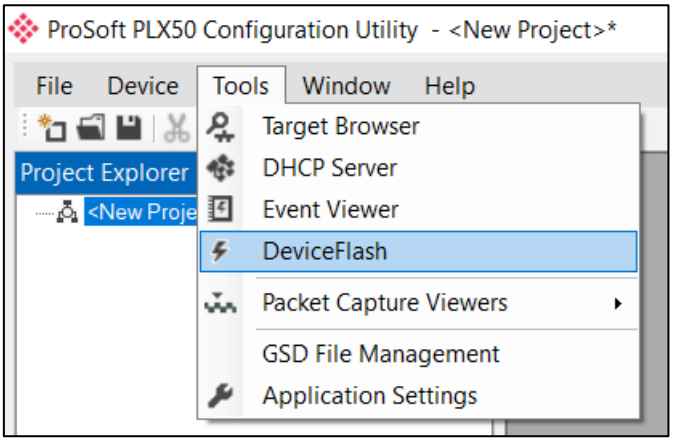


Figure 4.13 - DeviceFlash Tool

2 In the *Select a Device Flash File* window, select the appropriate AFB binary file and click **OPEN**.

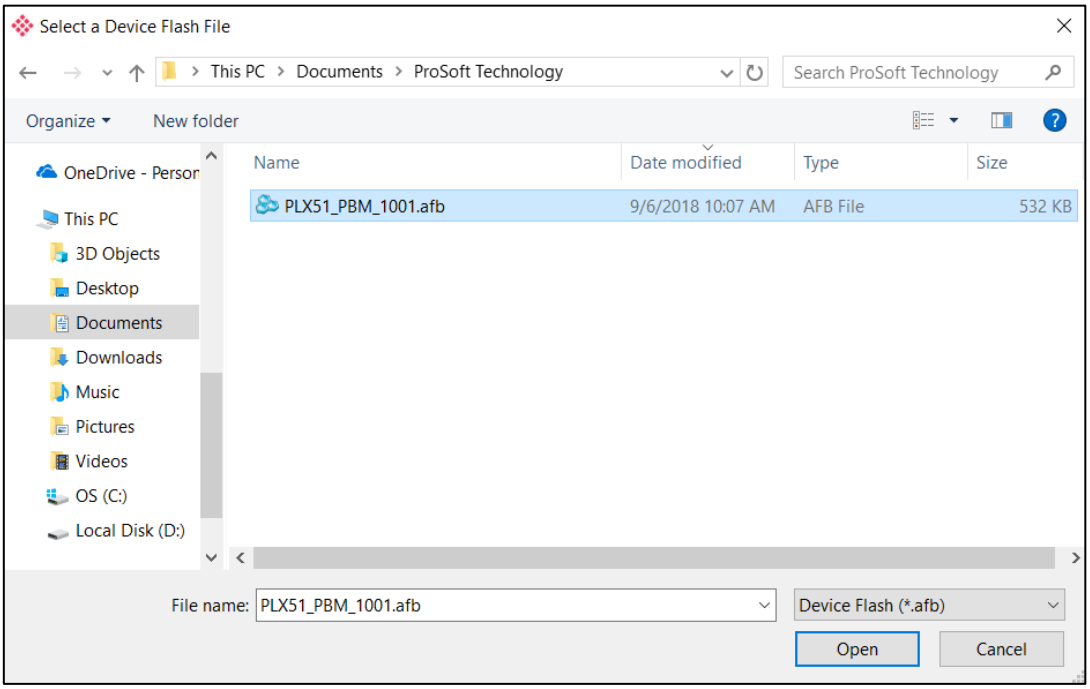


Figure 4.14 - Select the AFB binary

3 In the *Target Browser* window, select the PLX51-PBM's IP address and click **OK**.

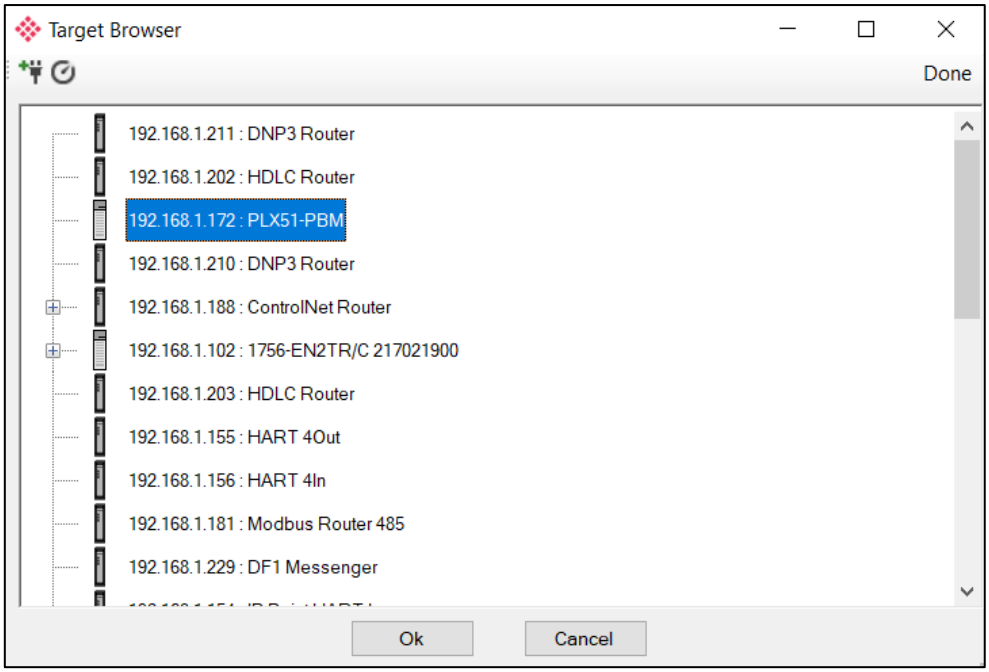


Figure 4.15 - Select the correct PLX51-PBM module

4 Once the firmware update is complete, the *DeviceFlash* option provides the details of the updated module.

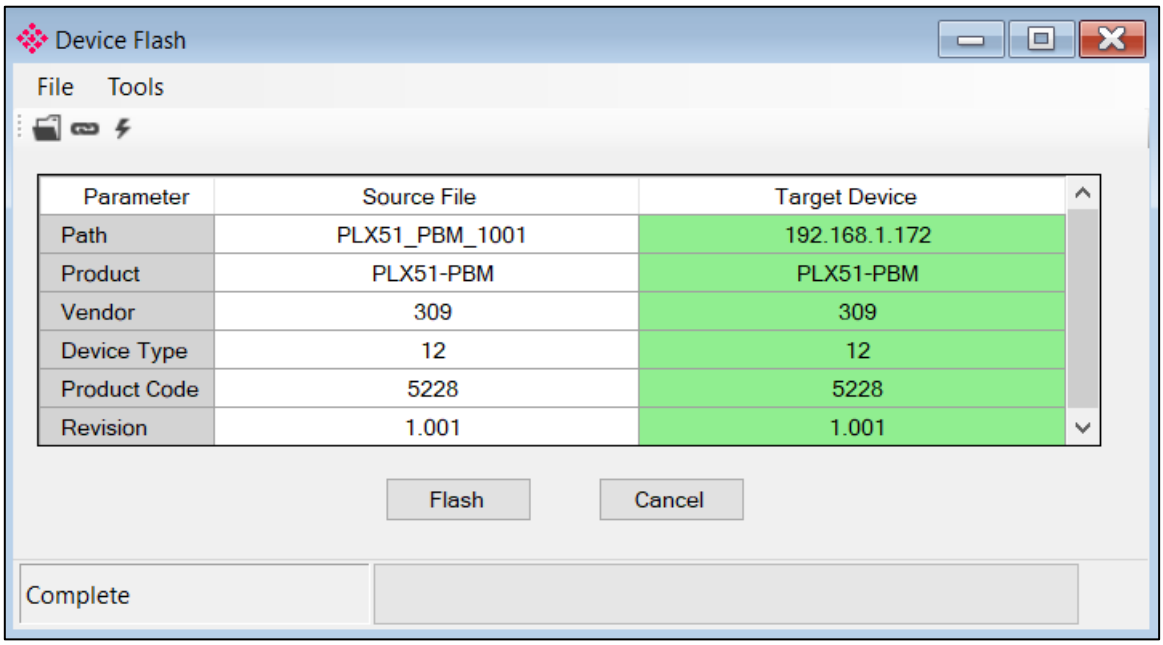


Figure 4.16 – PLX51-PBM successfully updated.

NOTE: The PLX51-PBM firmware is digitally signed so you will only be able to flash the PLX51-PBM with authorized firmware.

5. DEVICE TYPE MANAGER (DTM)

The PLX51-PBM supports FDT / DTM technology, allowing you to configure any slave device using its DTM (Device Type Manager) in any standard FDT Frame (Field Device Tool). To use a device DTM with the PLX51-PBM, the ProSoft PLX51 DTM pack software must be installed.

5.1. INSTALLATION

Download the latest version of the PLX51 DTM pack software from www.prosoft-technology.com.

The installation wizard guides you through the installation process.

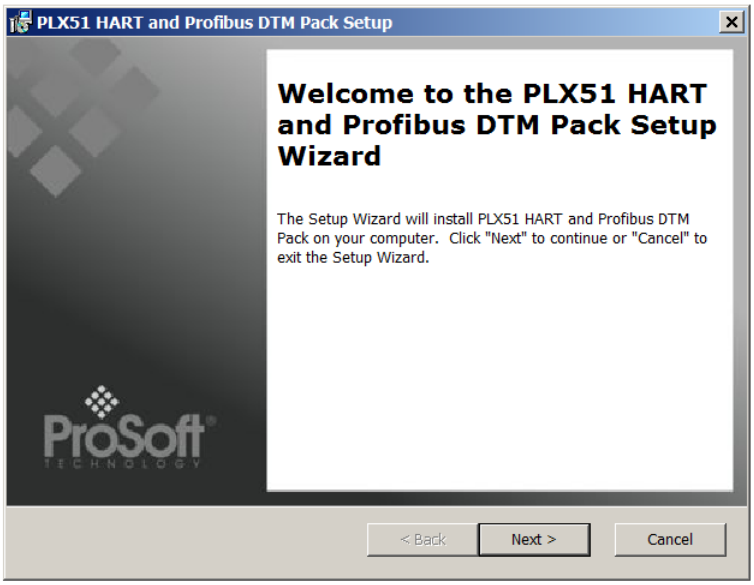


Figure 5.1 – PLX51 DTM Pack Installation

5.2. CONFIGURATION

Before you configure a slave device by using its DTM, you need to update the DTM Catalogue of the selected Field Device Tool frame. The steps required for this action are slightly different for each FDT frame. Typically, you select the DTM Catalogue or Device Catalogue, and select *Refresh* or rebuild.

1. After the catalogue has been updated, the PLX51-PBM can be added to a new project.
2. From the *Add Device* function, select the PLX51-PBM DTM and click **OK**. The example below makes use of PACTware FDT frame.

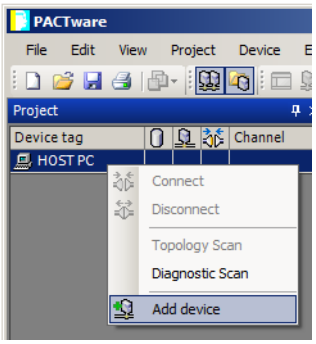


Figure 5.2 – Adding new device

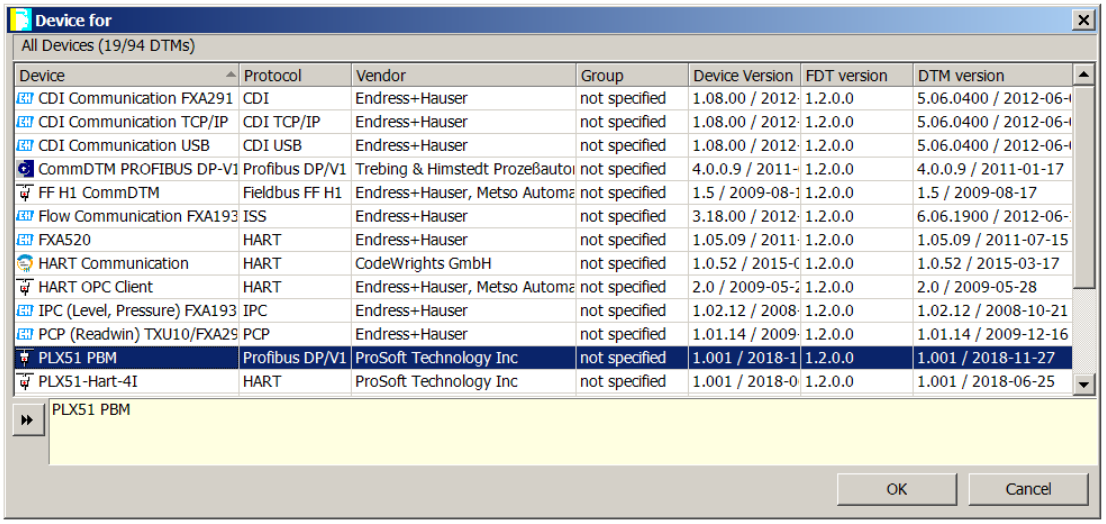


Figure 5.3 – Selecting PLX51-PBM DTM

3 After instantiating the PLX51-PBM DTM, select the **PARAMETER** option.

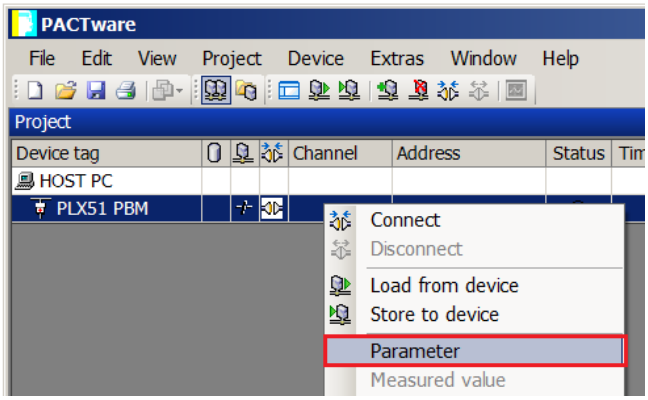


Figure 5.4 – Select Parameter option

4 The PLX51-PBM DTM's configuration allows the CIP Path to the PLX51-PBM to be configured. This is typically the IP address of the PLX51-PBM. The path can either be entered manually or the Browse **[…]** button can be used to open the *Target Browser* to select the PLX51-PBM.

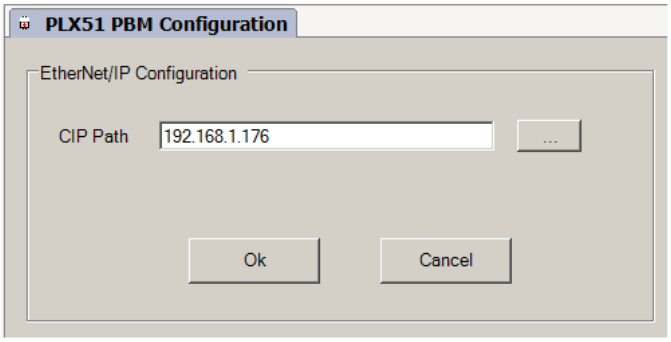


Figure 5.5 – PLX51-PBM CIP Path

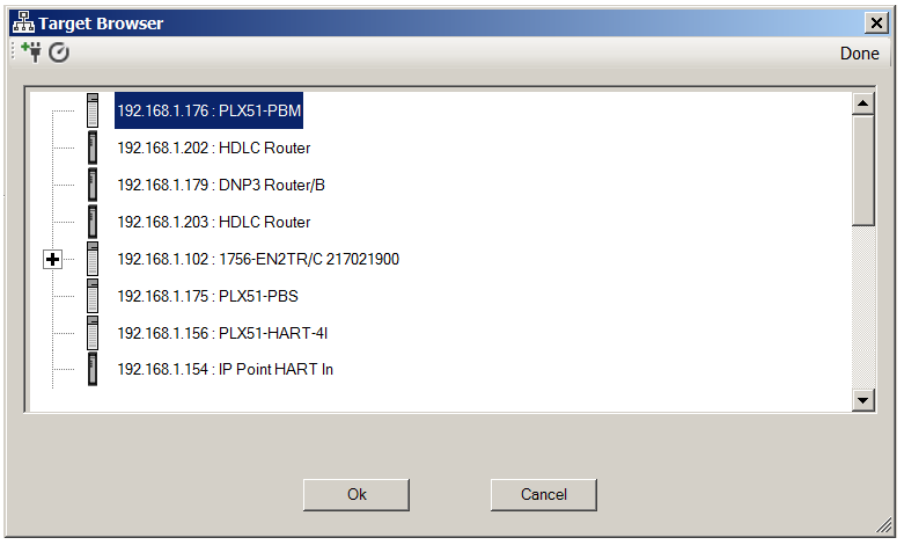


Figure 5.6 – Target Browser

5 Once the PLX51-PBM DTM has been configured, the child Device DTMs can be added by right-clicking on the PLX51-PBM DTM icon and selecting **ADD DEVICE**.

6 Select the matching device DTM. Click **OK**.

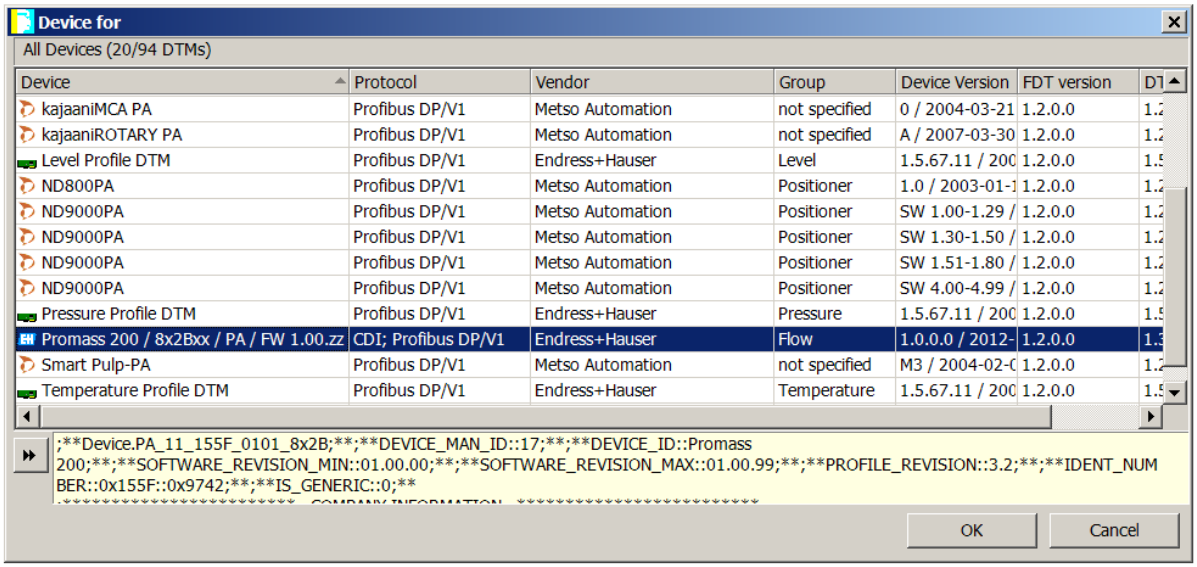


Figure 5.7 – Device DTM Selection

7 Once the child Device DTM has been added, a configuration window opens to set the Station *Node Address*. Click **OK**.

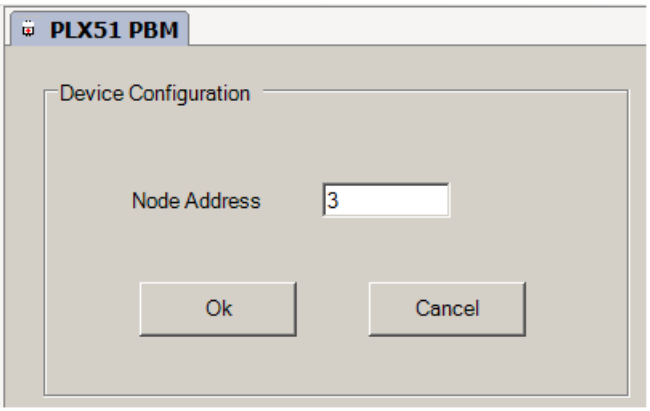


Figure 5.8 – Device DTM Node Address

5.1. OPERATION

1 Once the FDT project is configured, the DTMs can be placed online by selecting the Online or *Connect* option.

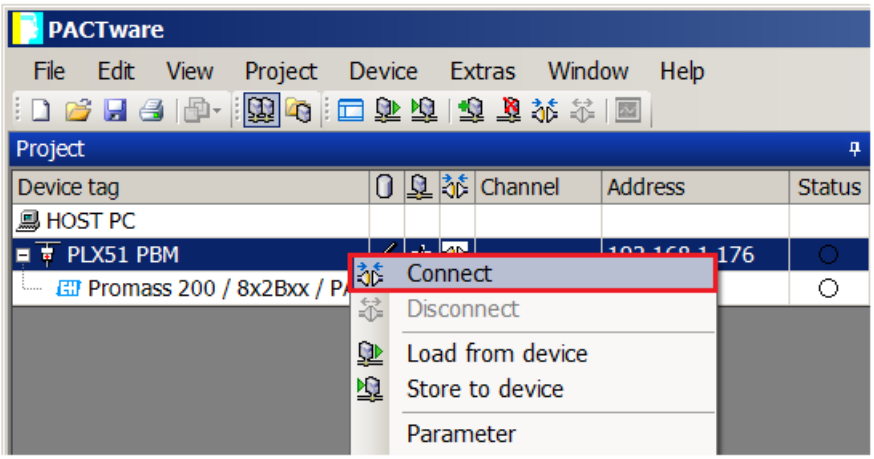


Figure 5.9 – DTM Connect

2 Once the PLX51-PBM DTM is online (connected), a number of diagnostic pages can be opened by selecting *Measure Value*.

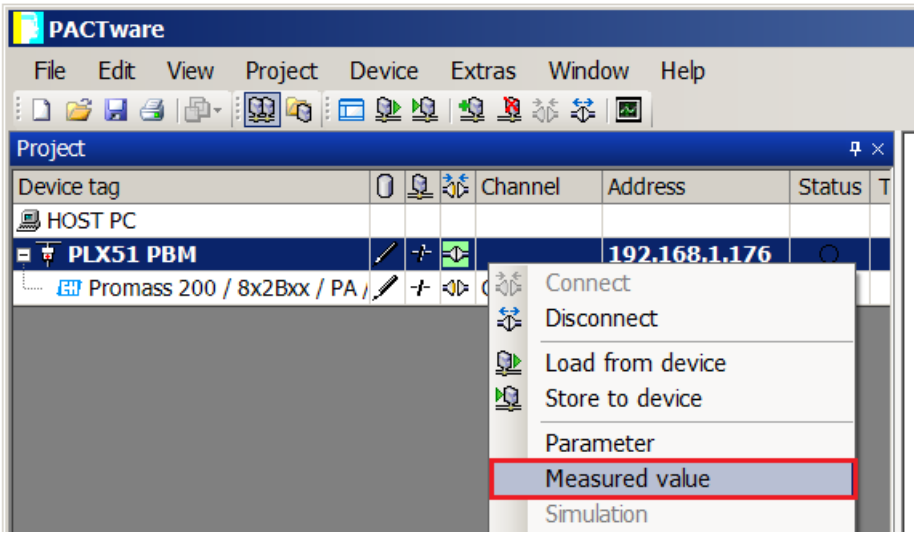


Figure 5.10 – Measured Value

3 The *General* page provides basic status information for the PLX51-PBM module, including LED status, CPU status, etc.

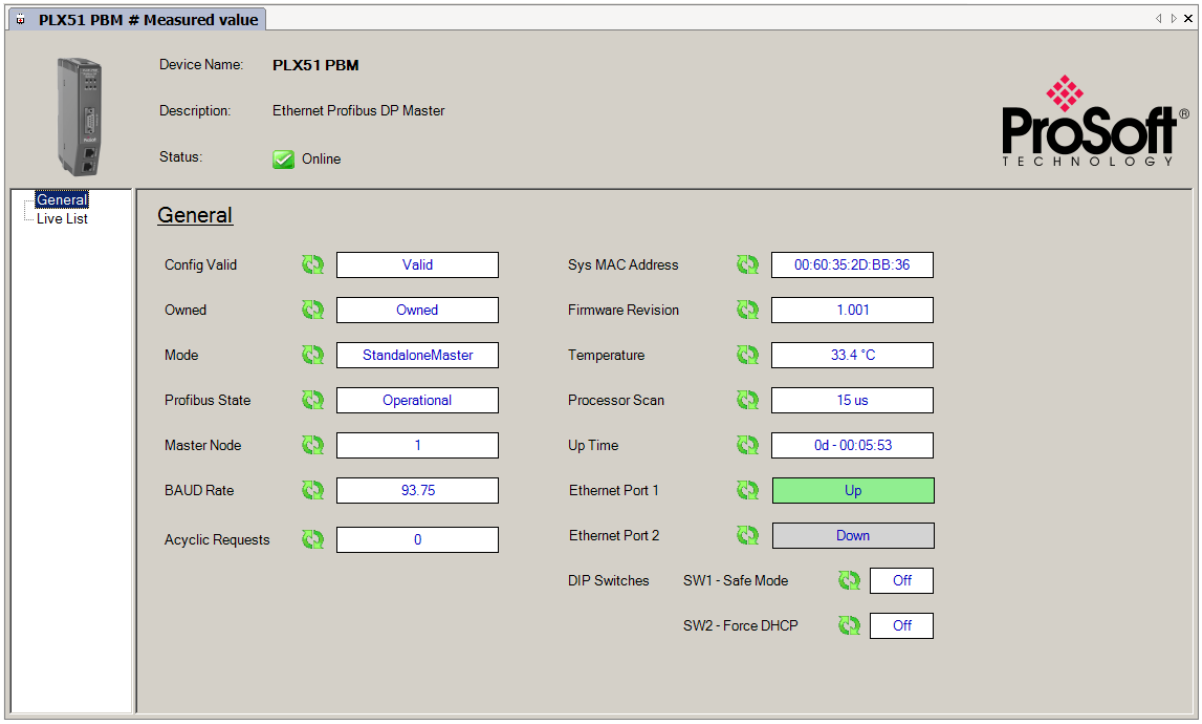


Figure 5.11 – PLX51-PBM DTM - General Status Page

4 The *Live List* page shows the state of the devices on the PROFIBUS network.

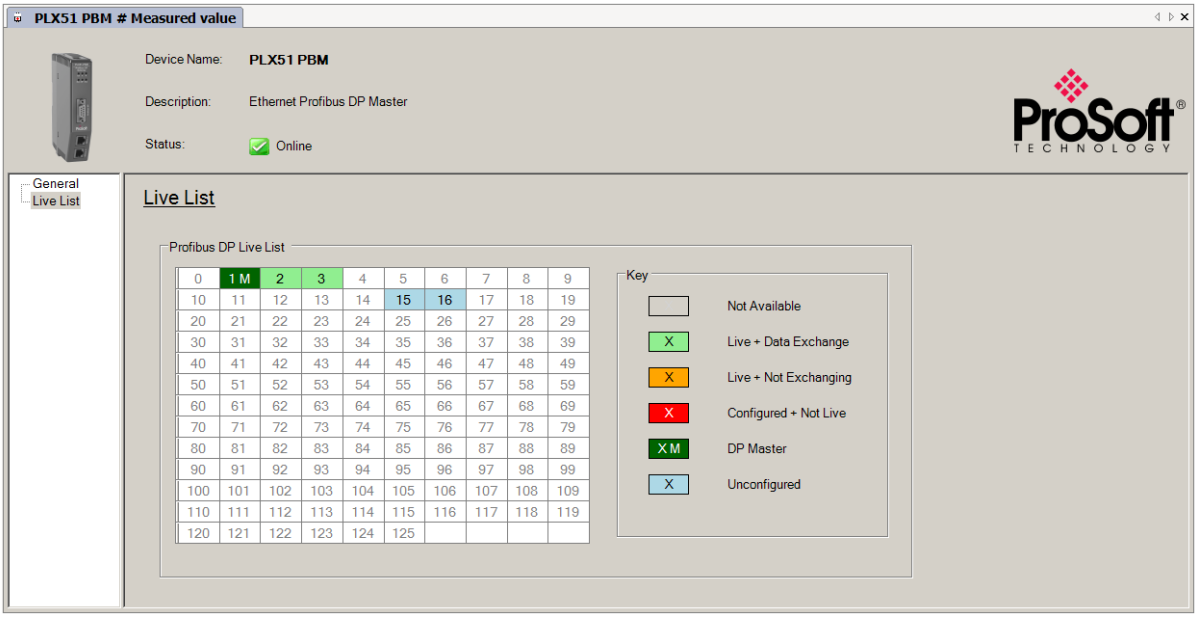


Figure 5.12 – PLX51-PBM DTM - Live List Page

5 The Slave Device DTM under the PLX51-PBM DTM can also be placed online by selecting the Online or *Connect* option.

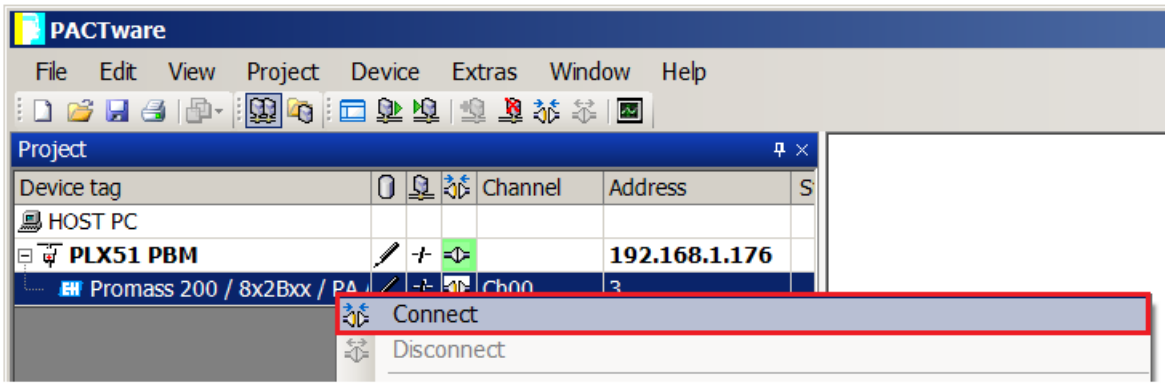


Figure 5.13 – Slave Device DTM Connect

6 Depending on the device DTM, a number of online parameters, diagnostics and measure variables is displayed.

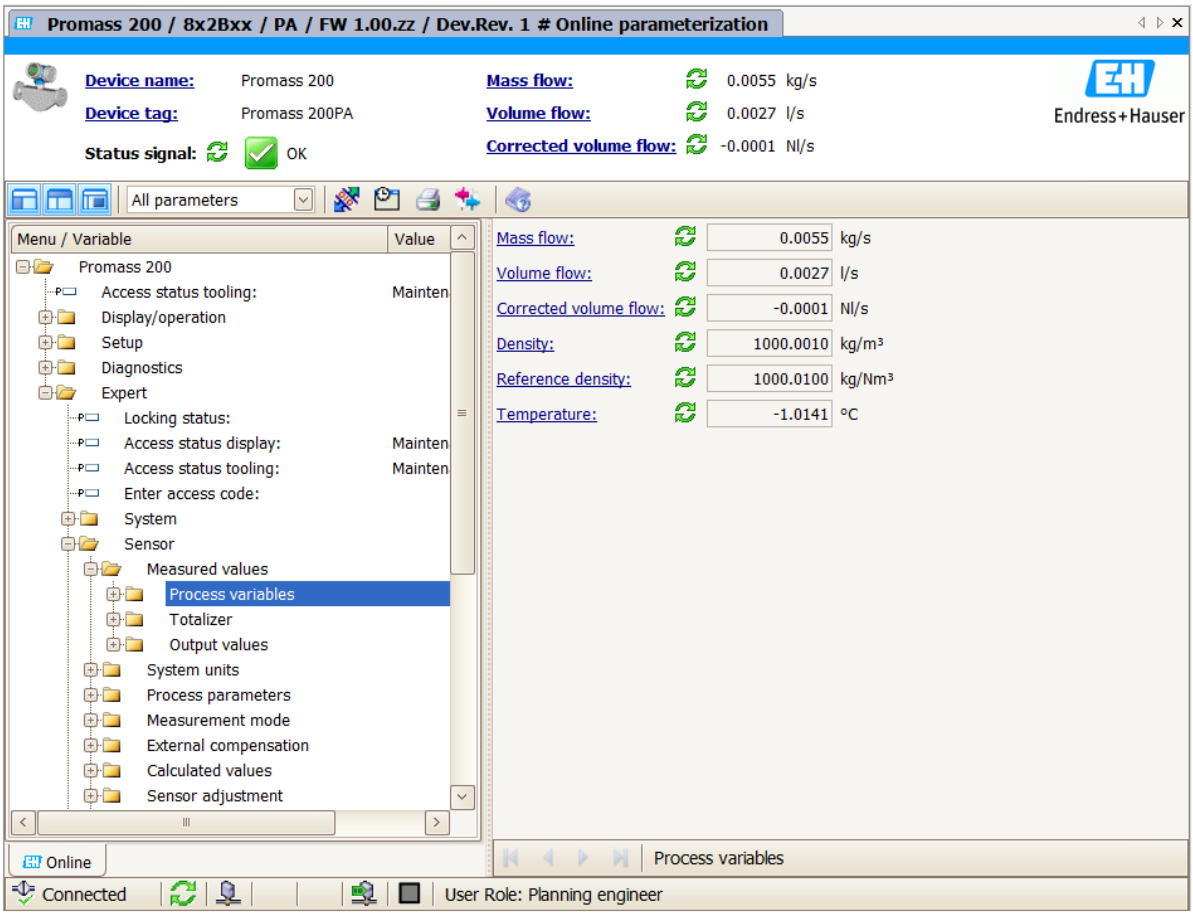


Figure 5.14 – Device DTM

6. DIAGNOSTICS

6.1. LEDS

The module provides six LEDs for diagnostics purposes as shown below.

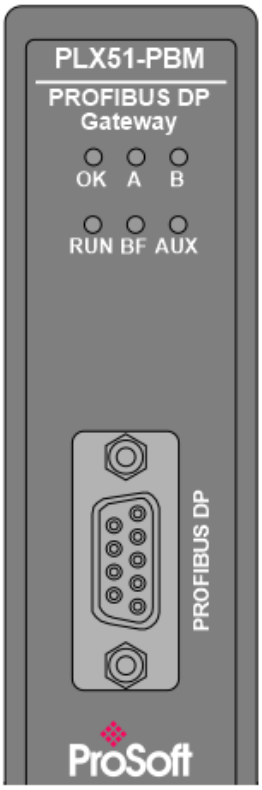


Figure 6.1 - PLX51-PBM LEDs

LED	Description
Ok	Flashing Green – The module has booted and is running correctly **without** any application configuration loaded. Solid Green – The module has booted and is running correctly **with** application configuration loaded. Solid Red – The module is not operating correctly. For example, if the module application firmware has been corrupted or there is a hardware fault.
A / B	This module has two Ethernet ports; A and B. Each LED represents each specific port. The Ethernet LED lights up when an Ethernet link has been detected (by plugging in a connected Ethernet cable). The LED flashes every time traffic is detected.

RUN	This LED indicates the PROFIBUS operating mode when in **Master** mode (Note that in **Slave** mode, this LED is N/A). **Master** Solid Red – The PROFIBUS network is in STOP mode. Flashing Green – The PROFIBUS network is in CLEAR mode. Solid Green – The PROFIBUS network is in OPERATE mode. Off - The PROFIBUS network is OFFLINE. **Slave** Off – This LED is N/A.
BF	This LED indicates the status of the PROFIBUS network when in **Master** mode, and the status of the configured field devices when in **Slave** Mode. **Master** Solid Red – There are bus communication errors. Flashing Red – There are field device errors. Off – There are no bus communication or device errors. **Slave** Solid Red – There are bus communication errors present (if no valid packet has been received by any configured slave for more than 1 second). Flashing Red – There are slave errors present (at least one slave has not been configured properly and is not exchanging DPV0 data). Flashing Green – All slaves are successfully exchanging DPV0 data and the DP network operational state is **clear**. Solid Green – All slaves are successfully exchanging DPV0 data and the DP network operational state is **operate**.
AUX	This LED is used for the activity on the Primary Interface (e.g. EtherNet/IP). Flashing Green – A valid packet is received from the Primary Interface. Flashing Red – A corrupted packet was received (e.g. failed checksum when using RS232 or RS485).

Table 6.1 - Module LED operation

6.2. MODULE STATUS MONITORING

The PLX51-PBM provides a range of statistics that can assist with module operation, maintenance, and fault finding. The statistics can be accessed by the PLX50 Configuration Utility or using the web server in the module.

To view the module's status in the PLX50 Configuration Utility environment, the PLX51-PBM 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.

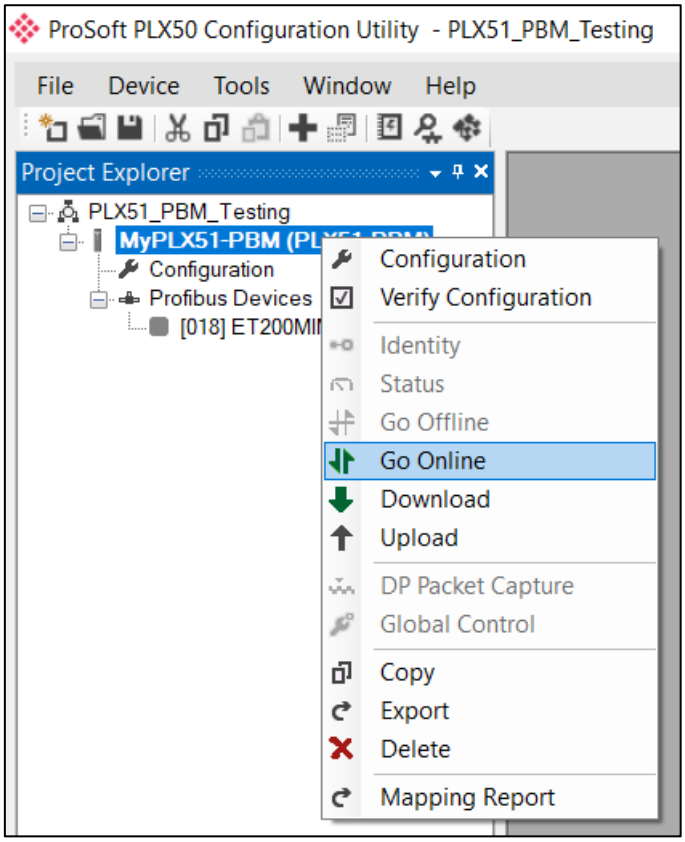


Figure 6.2 - Selecting to Go Online

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

6.2.1. PLX51-PBM

The PLX51-PBM Status window is opened by either double-clicking on the *Status* item in the Project Explorer tree, or by right-clicking on the module and selecting *Status*.

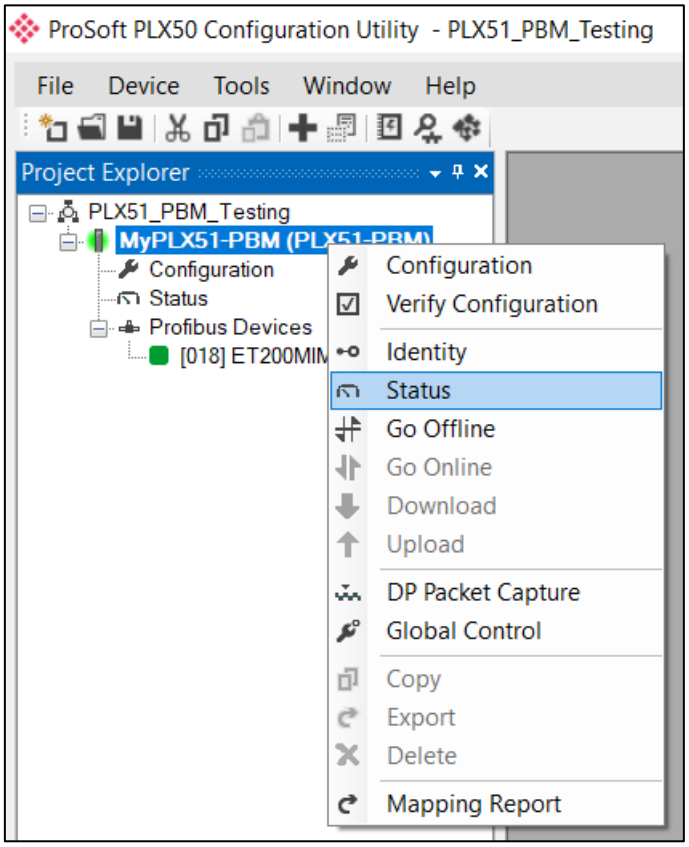


Figure 6.3 - Selecting PLX51-PBM online Status

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

GENERAL

The *General* tab displays the following general parameters:

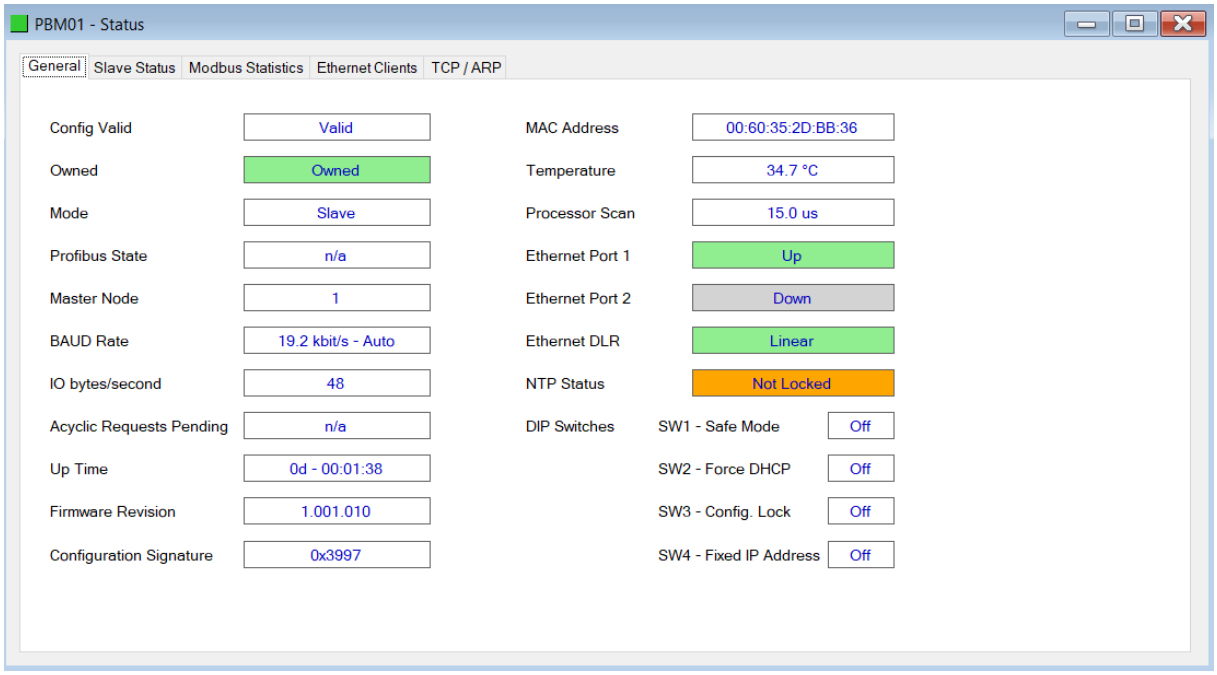


Figure 6.4 – PLX51-PBM Status monitoring - General

Parameter	Description
Config Valid	Indicates if the downloaded configuration is valid and executing.
Owned	Indicates whether or not the module is currently owned (Class 1) by a Logix Controller.
Mode	Mode of operation of the module. The following states can be returned: **Quiet** This mode allows you to connect the PLX51-PBM to an active bus and run a DP packet capture. In this mode, the PLX51-PBM will not communicate on the DP Bus, but rather only listen. **Standalone** In this mode, the PLX51-PBM is the DP Master on the PROFIBUS network. **Slave** In this mode, the PLX51-PBM will emulate multiple PROFIBUS Slave devices.
PROFIBUS State (Master mode only)	This is the operational state of the PROFIBUS network. The following states can be returned: **OFFLINE**

	The PROFIBUS network is offline and the PLX51-PBM will not communicate on the network. **STOP** The PROFIBUS network is running and the PLX51-PBM is communicating on the network, but it will not exchange any process data with any slave device. **OPERATE** The PROFIBUS network is running and the PLX51-PBM is communicating with all slave devices on the network, and if configured in the PLX51-PBM, the module will configure and exchange process data with each slave device. **CLEAR** The PROFIBUS network is running and the PLX51-PBM is communicating with all slave devices on the network, and if configured in the PLX51-PBM, the module will configure and exchange process data with each slave device. **Note**: In CLEAR mode, the PLX51-PBM will not send any output data to any slave device.
Master Node (Master mode only)	The PROFIBUS Node address of the local PLX51-PBM when in Master mode.
BAUD Rate	The BAUD Rate of the PROFIBUS network.
IO bytes/second	The number of process variable bytes being exchanged between the PLX51-PBM and slave devices every second.
Acyclic Requests Pending	The number of acyclic requests (DPV1 Class 1 and Class 2 requests) pending.
Up Time	Indicates the elapsed time since the module was powered-up.
Firmware Revision	The current PLX51-PBM application firmware revision.
Configuration Signature	The current PLX51-PBM signature of the configuration.
MAC Address	Displays the module's unique Ethernet MAC address.
Temperature	The internal temperature of the module.
Processor Scan	The amount of time (microseconds) taken by the module's processor in the last scan.
Ethernet Port 1/2	The status of each Ethernet port. **Down** The Ethernet connector has **not been** successfully connected to an Ethernet network. **Up** The Ethernet connector has successfully connected to an Ethernet network.

	Mirror Enabled The Ethernet port is mirroring the traffic on the other Ethernet port.
Ethernet DLR (Device Level Ring)	The status of the Ethernet DLR. **Disabled** The DLR functionality has been disabled. **Linear** The DLR functionality has been enabled and the Ethernet network architecture is linear. **Ring – Fault** The DLR functionality has been enabled and the Ethernet network architecture is ring, but there is a fault with the network. **Ring – Ok** The DLR functionality has been enabled and the Ethernet network architecture is ring and is operating.
NTP Status	The status of the local NTP Client. **Disabled** The NTP time synchronization has been disabled. **Locked** NTP time synchronization has been enabled and the PLX51-PBM has locked onto the target time server. **Not Locked** NTP time synchronization has been enabled and the PLX51-PBM has not locked onto the target time server.
DIP Switch Position	The status of the DIP switches when the module booted.

Table 6.2 - Parameters displayed in the Status Monitoring – General Tab

SLAVE STATUS

The *Slave Status* tab displays the following parameters:

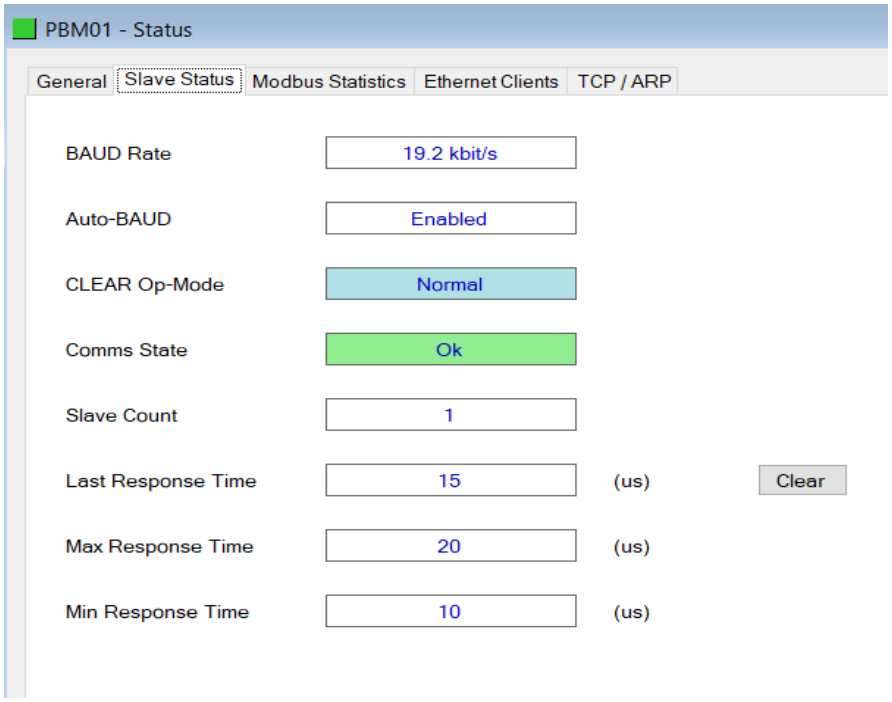


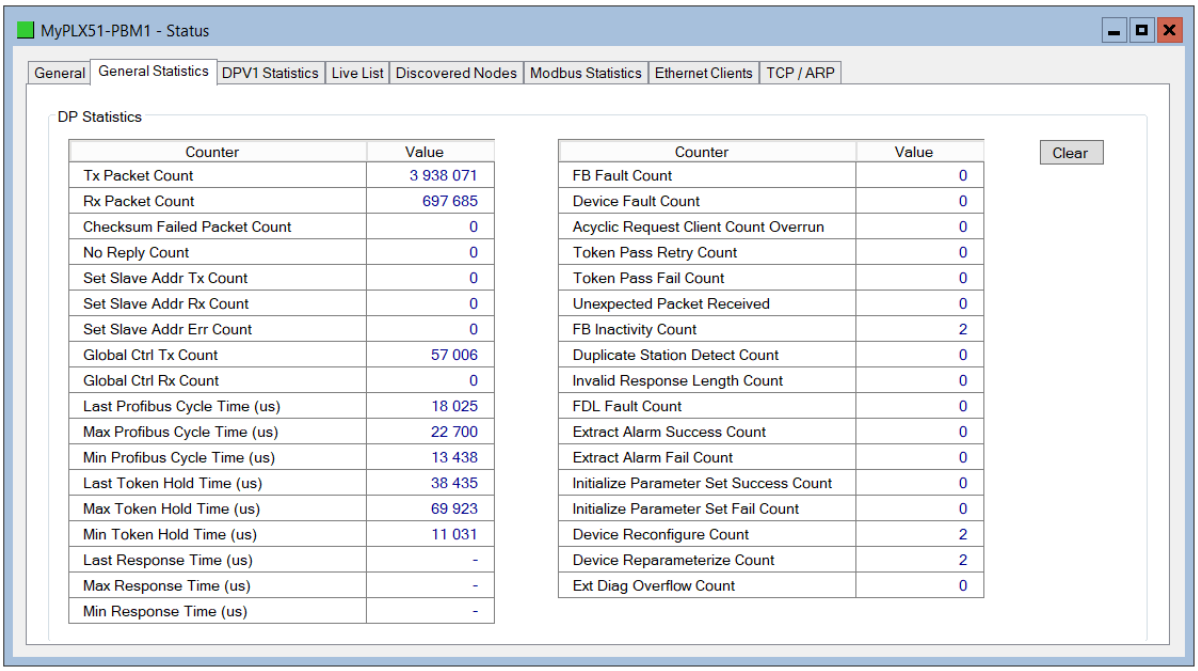
Figure 6.5 – PLX51-PBM Status monitoring – Slave Status

Parameter	Description
BAUD Rate	Current BAUD rate of the PROFIBUS Network.
Auto-BAUD	If the BAUD rate for the PROFIBUS Network will be automatically detected.
CLEAR Op-Mode	If the operational state of the PROFIBUS Network is CLEAR.
Comms State	**OK** All configured slaves are operating correctly. **Failure** At least one of the configured devices are not operating correctly.
Slave Count	Number of slaves configured.
Last Response Time	The time it took (in microseconds) to respond to the last request from a DP Master.
Max Response Time	The maximum time it took (in microseconds) to respond to a request from a DP Master.
Min Response Time	The minimum time it took (in microseconds) to respond to a request from a DP Master.

Table 6.3 - Parameters displayed in the Status Monitoring – Slave Status Tab

GENERAL STATISTICS

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



Counter	Value
Tx Packet Count	3 938 071
Rx Packet Count	697 685
Checksum Failed Packet Count	0
No Reply Count	0
Set Slave Addr Tx Count	0
Set Slave Addr Rx Count	0
Set Slave Addr Err Count	0
Global Ctrl Tx Count	57 006
Global Ctrl Rx Count	0
Last Profibus Cycle Time (us)	18 025
Max Profibus Cycle Time (us)	22 700
Min Profibus Cycle Time (us)	13 438
Last Token Hold Time (us)	38 435
Max Token Hold Time (us)	69 923
Min Token Hold Time (us)	11 031
Last Response Time (us)	-
Max Response Time (us)	-
Min Response Time (us)	-

Counter	Value
FB Fault Count	0
Device Fault Count	0
Acyclic Request Client Count Overrun	0
Token Pass Retry Count	0
Token Pass Fail Count	0
Unexpected Packet Received	0
FB Inactivity Count	2
Duplicate Station Detect Count	0
Invalid Response Length Count	0
FDL Fault Count	0
Extract Alarm Success Count	0
Extract Alarm Fail Count	0
Initialize Parameter Set Success Count	0
Initialize Parameter Set Fail Count	0
Device Reconfigure Count	2
Device Reparameterize Count	2
Ext Diag Overflow Count	0

Figure 6.6 – PLX51-PBM Status monitoring – General Statistics

Parameter	Description
Tx Packet Count	The number of PROFIBUS packets transmitted.
Rx Packet Count	The number of PROFIBUS packets received.
Checksum Failed Packet Count	The number of PROFIBUS packets that had a failed checksum.
No Reply Count	The number of PROFIBUS requests from the PLX51-PBM where the station did not respond.
Set Slave Addr Tx Count	The number of PROFIBUS Set Slave Address requests sent from the PLX51-PBM.
Set Slave Addr Rx Count	The number of successful PROFIBUS Set Slave Address responses received from the specific slave device.
Set Slave Addr Err Count	The number of failed PROFIBUS Set Slave Address responses received from the specific slave device.
Global Ctrl Tx Count	The number of PROFIBUS Global Control requests sent from the PLX51-PBM.
Global Ctrl Rx Count	The number of PROFIBUS Global Control requests received by the PLX51-PBM.
Last PROFIBUS Cycle Time	The time (in microseconds) the last PROFIBUS Cycle took to complete.

Max PROFIBUS Cycle Time	The maximum time (in microseconds) the PROFIBUS Cycle took to complete.
Min PROFIBUS Cycle Time	The minimum time (in microseconds) the PROFIBUS Cycle took to complete.
Last Token Hold Time	The time (in microseconds) the PLX51-PBM held the token in the last token rotation.
Max Token Hold Time	The maximum time (in microseconds) the PLX51-PBM held the token.
Min Token Hold Time	The minimum time (in microseconds) the PLX51-PBM held the token.
Last Response Time	In a Multi DP Master system, this is the time it took (in microseconds) to respond to the last token passed from another DP Master.
Max Response Time	In a Multi DP Master system, this is the maximum time it took (in microseconds) to respond to a token passed from another DP Master.
Min Response Time	In a Multi DP Master system, this is the minimum time it took (in microseconds) to respond to a token passed from another DP Master.
FB Fault Count	The number of fieldbus faults that have occurred (e.g. devices going offline, corrupted packets, etc.)
Device Fault Count	The number of slave device faults that have occurred (e.g. device stops communicating during data exchange).
Acyclic Request Client Count Overrun	The number of times more than 10 acyclic requests needed to be buffered in which case the PLX51-PBM will reject the 11^{th} request.
Token Pass Retry Count	In a Multi DP Master system, this is the number of times the token pass from the PLX51-PBM had to be retransmitted because the receiving DP Master did not respond in time.
Token Pass Fail Count	When the number of consecutive Token Pass Retries reaches the configured token pass retry count after which that DP Master will be assumed as offline.
Unexpected Packet Received	The number of times a response is received from a slave device that was not expected (e.g. incorrect response, response from a different node, etc.).
FB Inactivity Count	The number of times the PLX51-PBM has determined that there are no other DP Masters on the PROFIBUS network.
Duplicate Station Detect Count	The number of times the PLX51-PBM has detected that there is another station on the network with the same station address as the local PLX51-PBM.
Invalid Response Length Count	The number of times a response is received from a slave device where the length is not correct (for example if the slave device is configured to provide 10 bytes of process data and only 5 bytes are returned during data exchange).
FDL Fault Count	The number of Data Link Layer function code faults received.

	This occurs when the remote PROFIBUS device rejects a function request, e.g. if the device is not in the correct state, or if it does not support that function. A list of FDL errors is tabulated in chapter 9.
Extract Alarm Success Count	The number of alarms that have successfully been extracted from slave devices.
Extract Alarm Fail Count	The number of alarms that have **not** successfully been extracted from slave devices.
Initialize Parameter Set Success Count	The number of parameters that have successfully been set after the device has been configured for data exchange.
Initialize Parameter Set Fail Count	The number of parameters that have failed to set after the device has been configured for DPV0 data exchange.
Device Reconfigure Count	The number of times a slave device has been (re)configured for DPV0 data exchange.
Device Reparameterize Count	The number of times a slave device has been (re)parameterized for DPV0 data exchange.
Ext Diag Overflow Count	The number of times a slave device has returned diagnostics data that could not fit into a single PROFIBUS frame.

Table 6.4 - Parameters displayed in the Status Monitoring – General Statistics Tab

DPV1 STATISTICS

The *DPV1 Statistics* tab displays the following general parameters:

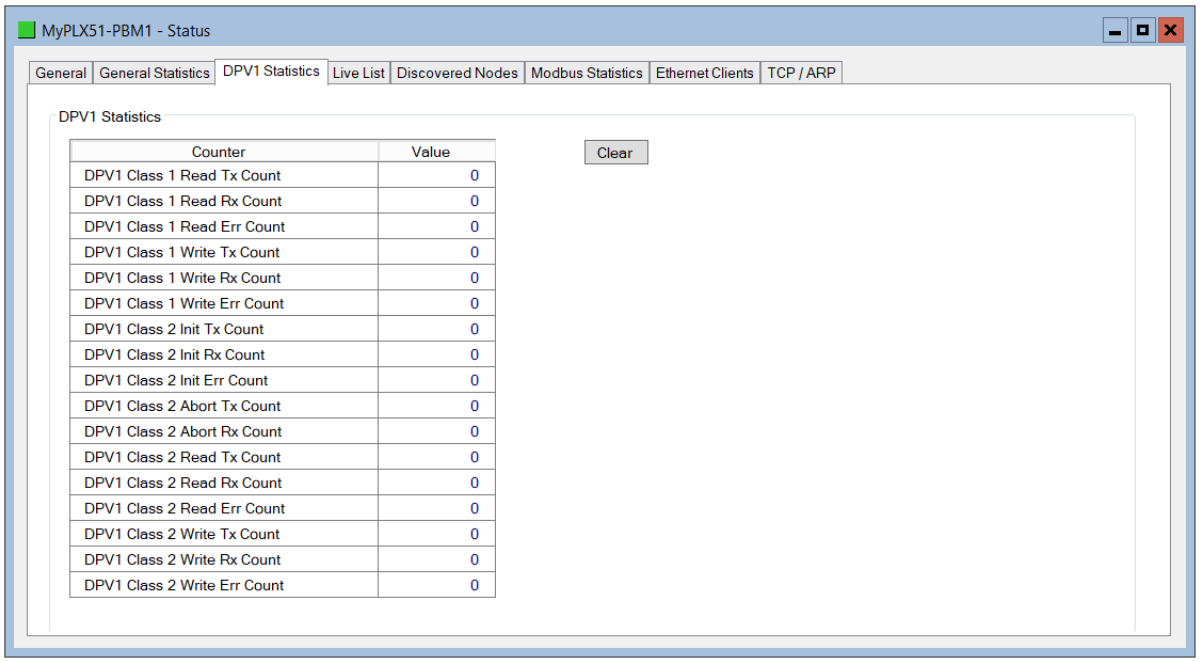


Figure 6.7 – PLX51-PBM Status monitoring – DPV1 Statistics

Parameter	Description
DPV1 Class 1 Read Tx Count	The number of PROFIBUS DPV1 Class 1 Read requests sent from the PLX51-PBM.
DPV1 Class 1 Read Rx Count	The number of successful PROFIBUS DPV1 Class 1 Read responses received by the PLX51-PBM.
DPV1 Class 1 Read Err Count	The number of failed PROFIBUS DPV1 Class 1 Read responses received by the PLX51-PBM.
DPV1 Class 1 Write Tx Count	The number of PROFIBUS DPV1 Class 1 Write requests sent from the PLX51-PBM.
DPV1 Class 1 Write Rx Count	The number of successful PROFIBUS DPV1 Class 1 Write responses received by the PLX51-PBM.
DPV1 Class 1 Write Err Count	The number of failed PROFIBUS DPV1 Class 1 Write responses received by the PLX51-PBM.
DPV1 Class 2 Init Tx Count	The number of PROFIBUS DPV1 Class 2 Initialize requests sent from the PLX51-PBM.
DPV1 Class 2 Init Rx Count	The number of successful PROFIBUS DPV1 Class 2 Initialize responses by the PLX51-PBM.
DPV1 Class 2 Init Err Count	The number of failed PROFIBUS DPV1 Class 2 Initialize responses received by the PLX51-PBM.

DPV1 Class 2 Abort Tx Count	The number of PROFIBUS DPV1 Class 2 Abort requests sent from the PLX51-PBM.
DPV1 Class 2 Abort Rx Count	The number of PROFIBUS DPV1 Class 2 Abort messages received by the PLX51-PBM.
DPV1 Class 2 Read Tx Count	The number of PROFIBUS DPV1 Class 2 Read requests sent from the PLX51-PBM.
DPV1 Class 2 Read Rx Count	The number of successful PROFIBUS DPV1 Class 2 Read responses received by the PLX51-PBM
DPV1 Class 2 Read Err Count	The number of failed PROFIBUS DPV1 Class 2 Read responses received by the PLX51-PBM.
DPV1 Class 2 Write Tx Count	The number of PROFIBUS DPV1 Class 2 Write requests sent from the PLX51-PBM.
DPV1 Class 2 Write Rx Count	The number of successful PROFIBUS DPV1 Class 2 Write responses received by the PLX51-PBM.
DPV1 Class 2 Write Err Count	The number of failed PROFIBUS DPV1 Class 2 Write responses received by the PLX51-PBM.

Table 6.5 - Parameters displayed in the Status Monitoring – DPV1 Statistics Tab

LIVE LIST

The *Live List* tab provides an overview of all slave devices and DP masters connected to the PROFIBUS network. Each station will be in one of six states.

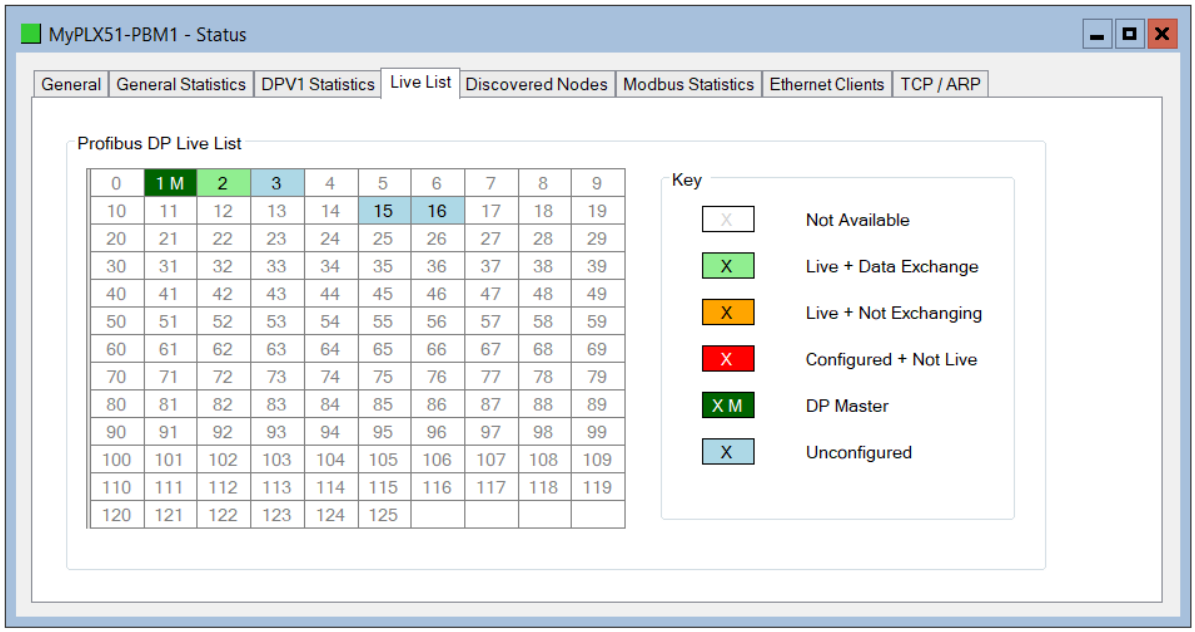


Figure 6.8 – PLX51-PBM Status monitoring – Live List

DISCOVERED NODES

The *Discovered Nodes* tab provides more detail regarding each station on the PROFIBUS network (when compared to the *Live List*). You can scan the PROFIBUS network to extract further details from each device. From here, you can add the slave device or change the slave device station address. See the *Device Discovery* section.

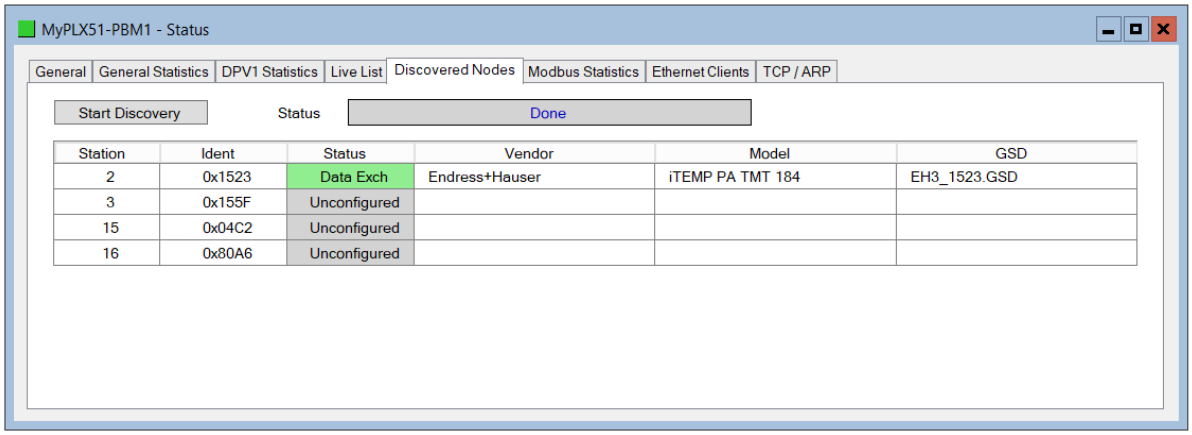


Figure 6.9 – PLX51-PBM Status monitoring – Discovered Nodes

ETHERNET CLIENTS

The *Ethernet Clients* tab displays the details of the Ethernet and EtherNet/IP clients connected to the PLX51-PBM.

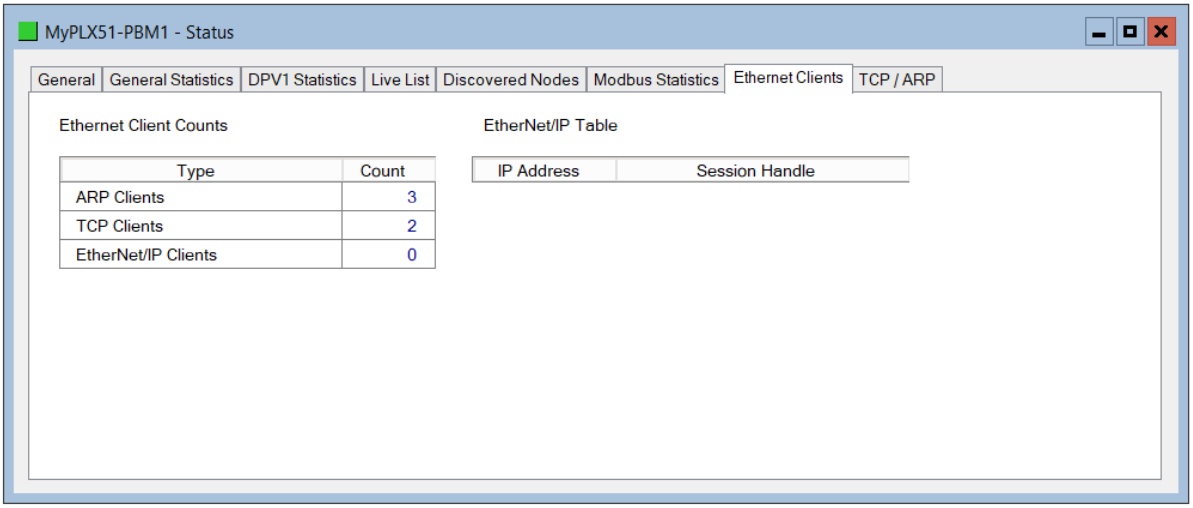


Figure 6.10 – PLX51-PBM Status monitoring – Ethernet Client Statistics

TCP/ARP

The *TCP/ARP* tab displays details of the internal Ethernet ARP and TCP lists of the PLX51-PBM.

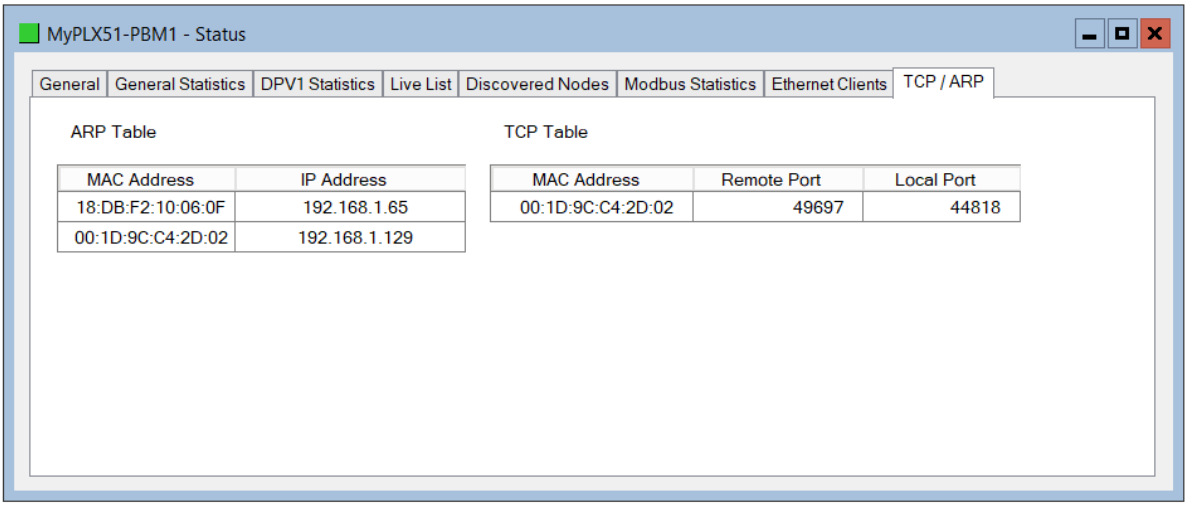


Figure 6.11 – PLX51-PBM Status monitoring – Ethernet TCP / ARP Statistics

6.2.2. Device Status

The *Device Status* window of each PROFIBUS slave device connected to the PLX51-PBM is opened by right-clicking on the specific slave device icon in the PLX50 Configuration Utility tree, and selecting **Status**.

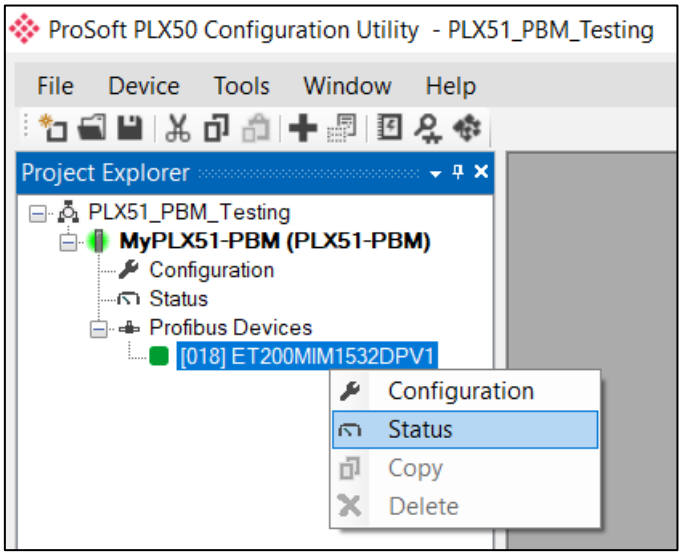


Figure 6.12 - Selecting slave status

The device status window contains multiple tabs to display the status of the specific slave device.

GENERAL – MASTER MODE

The *General* tab displays the following general parameters:

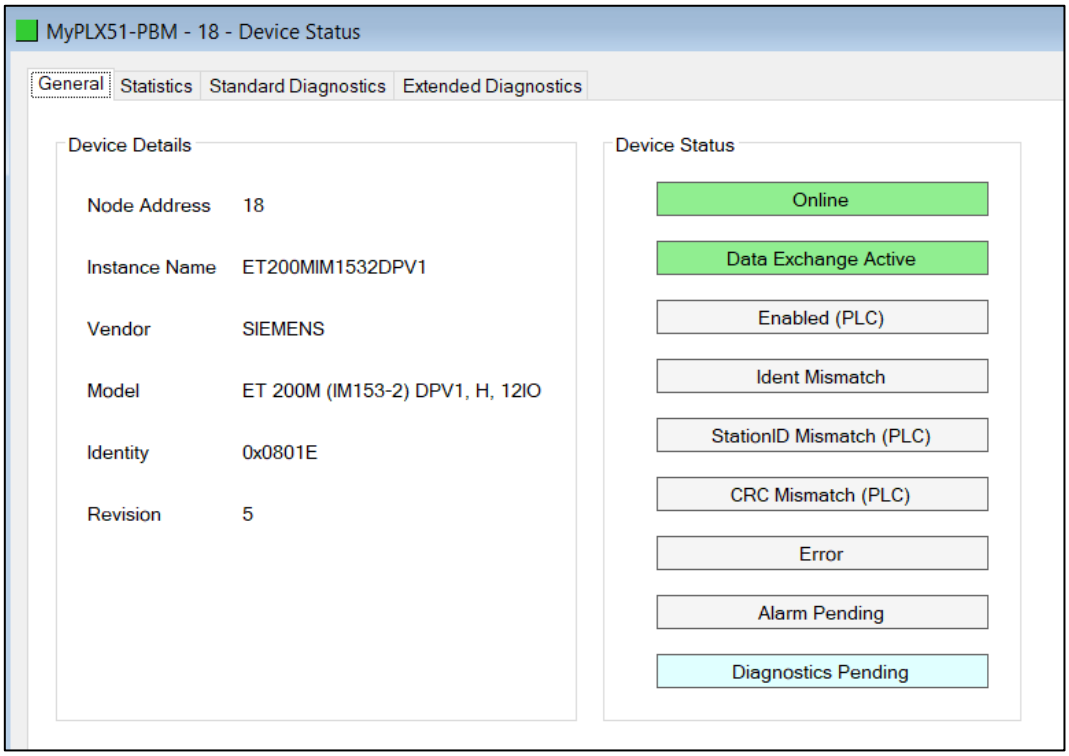


Figure 6.13 – Device Status monitoring - General

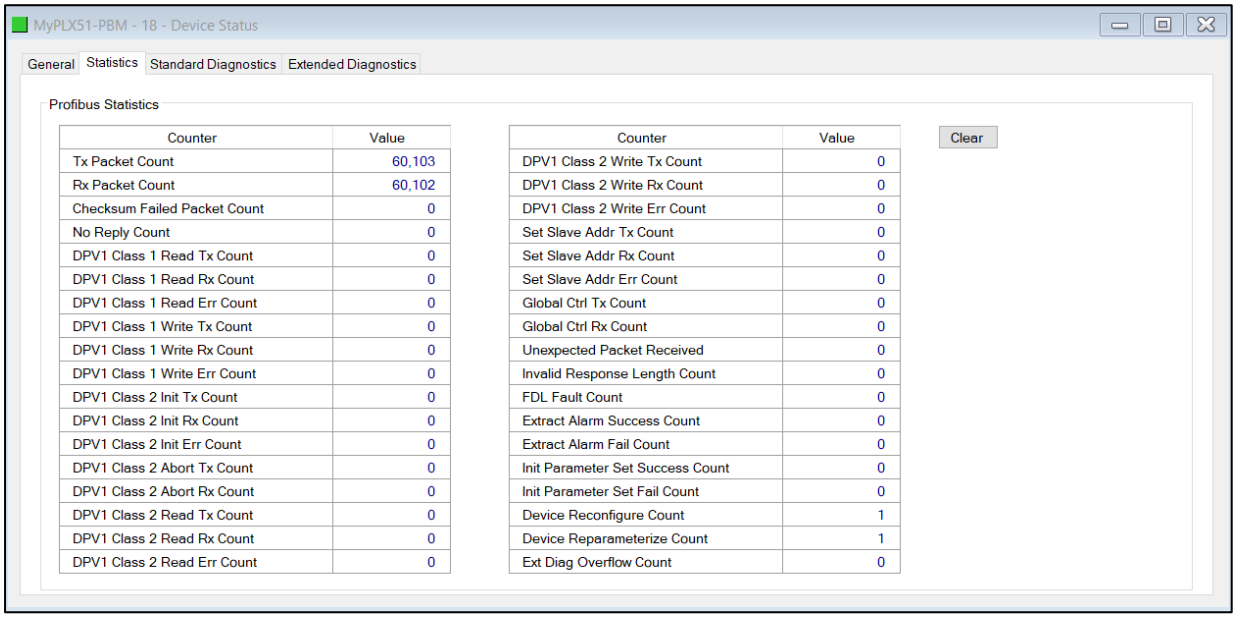
Parameter	Description
Node Address	The selected slave device station address.
Instance Name	The configured instance name of the device.
Vendor	The device Vendor name.
Model	The device Model name.
Identity	The device PNO identity.
Revision	The device revision.
Device Status	The current status of the device: **Online** The slave device is online. **Data Exchange Active** The slave device is exchanging DPV0 process data with the PLX51-PBM. **Disabled (PLC)** The slave device has been disabled from DPV0 data exchange from the Logix controller using the PLX51-PBM output assembly.

	Identity Mismatch The device configured in the PLX50 Configuration Utility and the device online at the specific station address do not match. **StationID Mismatch (PLC)** The station address entered from the Logix controller using the PLX51-PBM output assembly does not match the station address of the configured slave device. **CRC Mismatch (PLC)** Indicates the mapping from the Logix controller does not match the configured mapping. **Error** Device Error flag. **Alarm Pending** An alarm is pending in the specific slave device. **Diagnostics Pending** There is new diagnostics pending in the slave device.

Table 6.6 - Device Status Monitoring – General Tab

STATISTICS

The *Statistics* tab displays the following general parameters:



Counter	Value
Tx Packet Count	60,103
Rx Packet Count	60,102
Checksum Failed Packet Count	0
No Reply Count	0
DPV1 Class 1 Read Tx Count	0
DPV1 Class 1 Read Rx Count	0
DPV1 Class 1 Read Err Count	0
DPV1 Class 1 Write Tx Count	0
DPV1 Class 1 Write Rx Count	0
DPV1 Class 1 Write Err Count	0
DPV1 Class 2 Init Tx Count	0
DPV1 Class 2 Init Rx Count	0
DPV1 Class 2 Init Err Count	0
DPV1 Class 2 Abort Tx Count	0
DPV1 Class 2 Abort Rx Count	0
DPV1 Class 2 Read Tx Count	0
DPV1 Class 2 Read Rx Count	0
DPV1 Class 2 Read Err Count	0

Counter	Value
DPV1 Class 2 Write Tx Count	0
DPV1 Class 2 Write Rx Count	0
DPV1 Class 2 Write Err Count	0
Set Slave Addr Tx Count	0
Set Slave Addr Rx Count	0
Set Slave Addr Err Count	0
Global Ctrl Tx Count	0
Global Ctrl Rx Count	0
Unexpected Packet Received	0
Invalid Response Length Count	0
FDL Fault Count	0
Extract Alarm Success Count	0
Extract Alarm Fail Count	0
Init Parameter Set Success Count	0
Init Parameter Set Fail Count	0
Device Reconfigure Count	1
Device Reparameterize Count	1
Ext Diag Overflow Count	0

Figure 6.14 – Device Status monitoring - Statistics

Parameter	Description
Tx Packet Count	The number of PROFIBUS packets transmitted.
Rx Packet Count	The number of PROFIBUS packets received.
Checksum Failed Packet Count	The number of PROFIBUS packets that had a failed checksum.
No Reply Count	The number of PROFIBUS requests from the PLX51-PBM where the station did not respond.
DPV1 Class 1 Read Tx Count	The number of PROFIBUS DPV1 Class 1 Read requests sent from the PLX51-PBM to the specific device.
DPV1 Class 1 Read Rx Count	The number of successful PROFIBUS DPV1 Class 1 Read responses received from the specific device.
DPV1 Class 1 Read Err Count	The number of failed PROFIBUS DPV1 Class 1 Read responses received from the specific device.
DPV1 Class 1 Write Tx Count	The number of PROFIBUS DPV1 Class 1 Write requests sent from the PLX51-PBM to the specific device.
DPV1 Class 1 Write Rx Count	The number of successful PROFIBUS DPV1 Class 1 Write responses received from the specific device.
DPV1 Class 1 Write Err Count	The number of failed PROFIBUS DPV1 Class 1 Write responses received from the specific device.
DPV1 Class 2 Init Tx Count	The number of PROFIBUS DPV1 Class 2 Initialize requests sent from the PLX51-PBM to the specific device.
DPV1 Class 2 Init Rx Count	The number of successful PROFIBUS DPV1 Class 2 Initialize responses received from the specific device.
DPV1 Class 2 Init Err Count	The number of failed PROFIBUS DPV1 Class 2 Initialize responses received from the specific device.
DPV1 Class 2 Abort Tx Count	The number of PROFIBUS DPV1 Class 2 Abort requests sent from the PLX51-PBM to the specific device.
DPV1 Class 2 Abort Rx Count	The number of PROFIBUS DPV1 Class 2 Abort messages received from the specific device.
DPV1 Class 2 Read Tx Count	The number of PROFIBUS DPV1 Class 2 Read requests sent from the PLX51-PBM to the specific device.
DPV1 Class 2 Read Rx Count	The number of successful PROFIBUS DPV1 Class 2 Read responses received from the specific device.
DPV1 Class 2 Read Err Count	The number of failed PROFIBUS DPV1 Class 2 Read responses received from the specific device.
DPV1 Class 2 Write Tx Count	The number of PROFIBUS DPV1 Class 2 Write requests sent from the PLX51-PBM to the specific device.
DPV1 Class 2 Write Rx Count	The number of successful PROFIBUS DPV1 Class 2 Write responses received from the specific device.
DPV1 Class 2 Write Err Count	The number of failed PROFIBUS DPV1 Class 2 Write responses received from the specific device.

Set Slave Addr Tx Count	The number of PROFIBUS Set Slave Address requests sent from the PLX51-PBM to the specific device.
Set Slave Addr Rx Count	The number of successful PROFIBUS Set Slave Address responses received from the specific device.
Set Slave Addr Err Count	The number of failed PROFIBUS Set Slave Address responses received from the specific device.
Global Ctrl Tx Count	The number of PROFIBUS Global Control requests sent from the PLX51-PBM to the specific device.
Global Ctrl Rx Count	The number of PROFIBUS Global Control requests received by the PLX51-PBM from the specific device.
Unexpected Packet Received	The number of times a response is received from the device that was not expected (e.g. incorrect response, response from a different node, etc.).
Invalid Response Length Count	The number of times a response is received from the device where the length is not correct (For example, if the device is configured to provide 10 bytes of process data and only 5 bytes are returned during data exchange).
FDL Fault Count	The number of Data Link Layer function code faults received from the specific device.
Extract Alarm Success Count	The number of alarms that have successfully been extracted from the specific device.
Extract Alarm Fail Count	The number of alarms that have **not** successfully been extracted from the specific device.
Initialize Parameter Set Success Count	The number of parameters that have successfully been set after the device has been configured for data exchange for the specific device.
Initialize Parameter Set Fail Count	The number of parameters that have failed to set after the device has been configured for DPV0 data exchange for the specific device.
Device Reconfigure Count	The number of times the device has been (re)configured for DPV0 data exchange.
Device Reparameterize Count	The number of times the device has been (re)parameterized for DPV0 data exchange.
Ext Diag Overflow Count	The number of times the device has returned diagnostics data that could not fit into a single PROFIBUS frame.

Table 6.7 - Device Status Monitoring – Statistics Tab

STANDARD DIAGNOSTICS

The *Standard Diagnostics* tab displays the following general parameters:

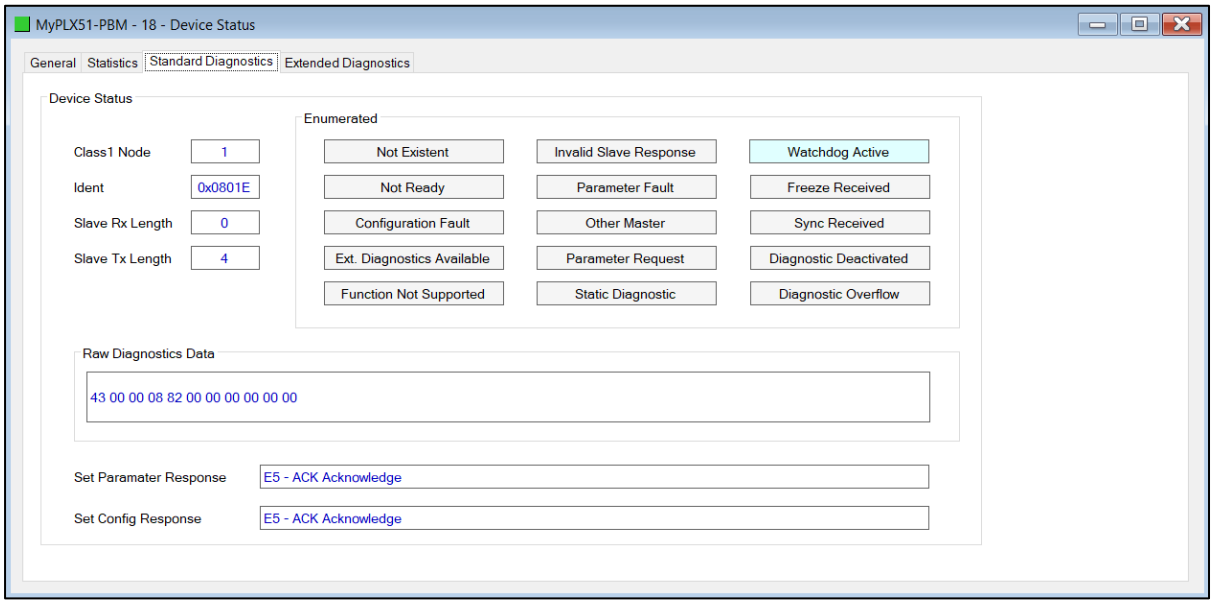


Figure 6.15 – Device Status monitoring – Standard Diagnostics

Parameter	Description
Class 1 Node	The station address of the DP Master that configured the specific device for DPV0 communication.
Ident	The PNO Identification number of the device on the PROFIBUS network.
Slave Rx Length	The number of process data (DPV0) bytes expected from the device.
Slave Tx Length	The number of process data (DPV0) bytes that will be sent to the device.
Enumerated	Refer to the *PROFIBUS Specification EN 50170* for information regarding the diagnostics.
Raw Diagnostics Data	The raw diagnostics in a hexadecimal data string.
Set Parameter Response	The last response from the specific field device to the last set parameter telegram.
Set Config Response	The last response from the specific field device to the last check config telegram.

Table 6.8 - Device Status Monitoring – Standard Diagnostics Tab

EXTENDED DIAGNOSTICS

The *Extended Diagnostics* are decoded and displayed in a table form. The diagnostics are decoded using the pre-configured GSD file.

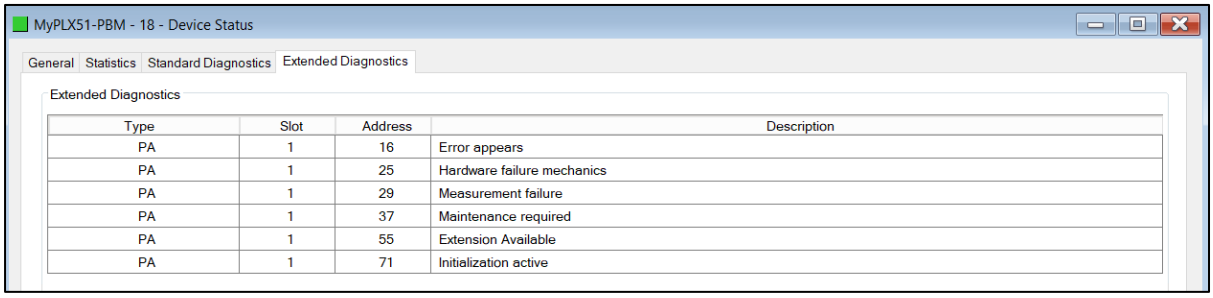


Figure 6.16 – Device Status monitoring – Extended Diagnostics

6.3. PROFIBUS PACKET CAPTURE

The PLX51-PBM allows you to capture the PROFIBUS traffic for analysis.

1 To invoke the capture of the module, right-click on the *PLX51-PBM* icon and double-click on the **DP PACKET CAPTURE** item in the Project Explorer tree.

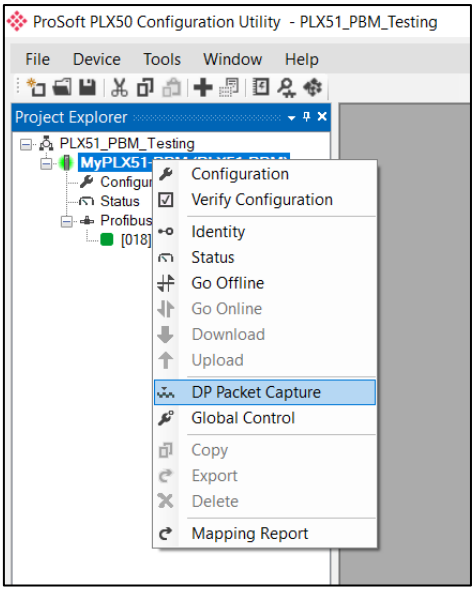


Figure 6.17 - Selecting PROFIBUS Packet Capture

2 The *DP Packet Capture* window opens and automatically starts capturing all PROFIBUS packets.

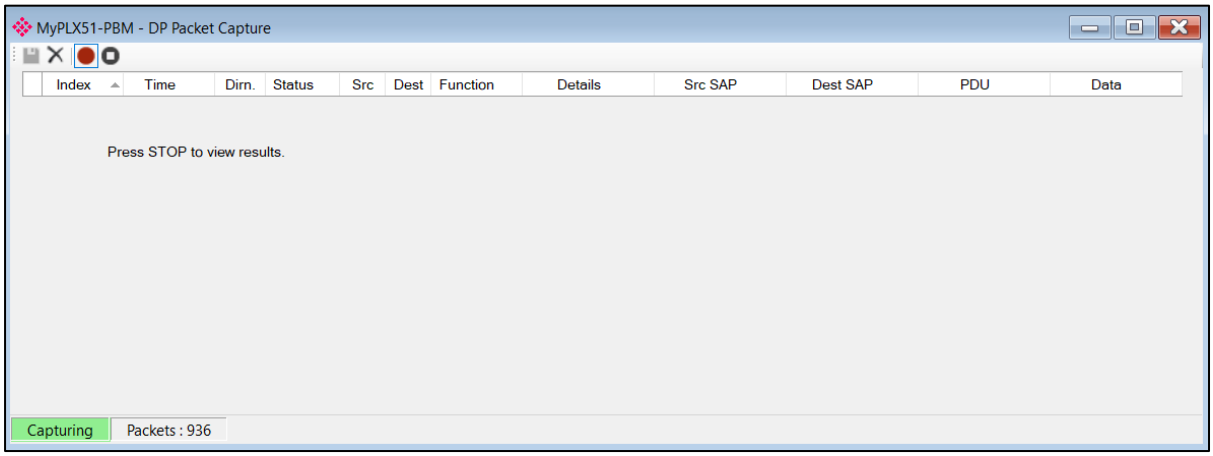
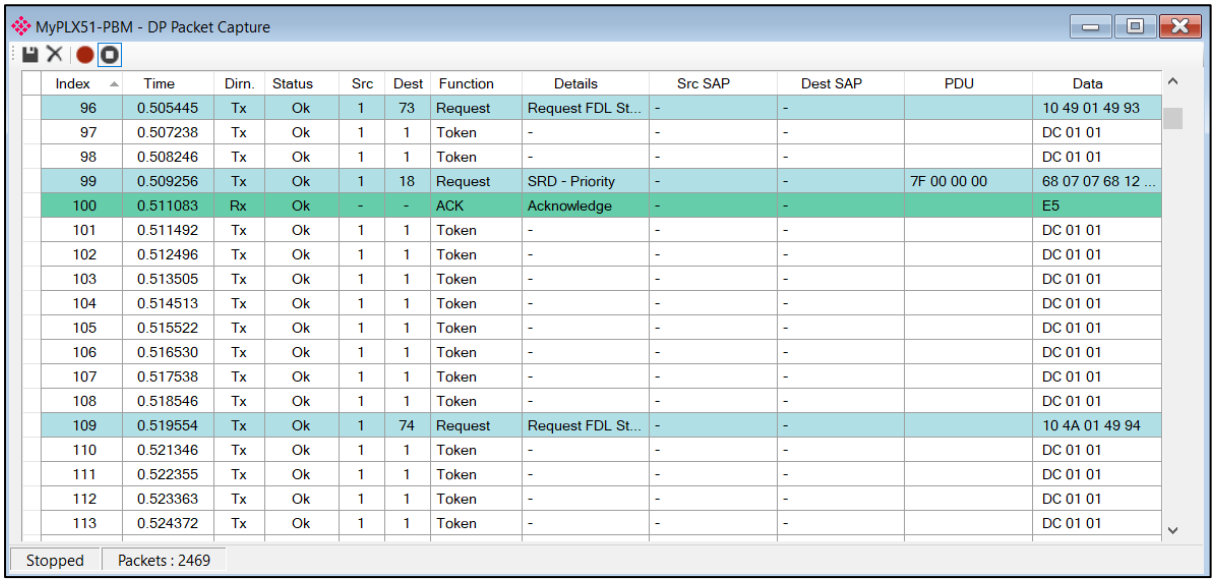


Figure 6.18 - PROFIBUS packet capture

NOTE: The module captures packets until you press the **STOP** button or when 10,000 DP packets have been reached.

3 When the capture process is stopped, the PROFIBUS capture is presented as shown below.



Index	Time	Dirn.	Status	Src	Dest	Function	Details	Src SAP	Dest SAP	PDU	Data
96	0.505445	Tx	Ok	1	73	Request	Request FDL St...	-	-		10 49 01 49 93
97	0.507238	Tx	Ok	1	1	Token	-	-	-		DC 01 01
98	0.508246	Tx	Ok	1	1	Token	-	-	-		DC 01 01
99	0.509256	Tx	Ok	1	18	Request	SRD - Priority	-	-	7F 00 00 00	68 07 07 68 12 ...
100	0.511083	Rx	Ok	-	-	ACK	Acknowledge	-	-		E5
101	0.511492	Tx	Ok	1	1	Token	-	-	-		DC 01 01
102	0.512496	Tx	Ok	1	1	Token	-	-	-		DC 01 01
103	0.513505	Tx	Ok	1	1	Token	-	-	-		DC 01 01
104	0.514513	Tx	Ok	1	1	Token	-	-	-		DC 01 01
105	0.515522	Tx	Ok	1	1	Token	-	-	-		DC 01 01
106	0.516530	Tx	Ok	1	1	Token	-	-	-		DC 01 01
107	0.517538	Tx	Ok	1	1	Token	-	-	-		DC 01 01
108	0.518546	Tx	Ok	1	1	Token	-	-	-		DC 01 01
109	0.519554	Tx	Ok	1	74	Request	Request FDL St...	-	-		10 4A 01 49 94
110	0.521346	Tx	Ok	1	1	Token	-	-	-		DC 01 01
111	0.522355	Tx	Ok	1	1	Token	-	-	-		DC 01 01
112	0.523363	Tx	Ok	1	1	Token	-	-	-		DC 01 01
113	0.524372	Tx	Ok	1	1	Token	-	-	-		DC 01 01

Figure 6.19 - PROFIBUS Packet Capture complete

The captured PROFIBUS packets are tabulated as follows:

Statistic	Description
Index	The packet index incremented for each packet sent or received.
Time	The time is measured in microseconds (us) and is started at a fraction of a second and continued until the packet capture is done.
Dirn.	The direction of the packet, either transmitted (Tx) or received (Rx).
Status	The status of the packet. Received packets are checked for valid PROFIBUS constructs and valid checksums.
Src	PROFIBUS node address of the message source.
Dest	PROFIBUS node address of the message destination.
Function	The PROFIBUS function (e.g. Token, Request, etc.).
Details	Additional details associated with the PROFIBUS command/function.
Src SAP	The source Service Access Point (SAP), when used.
Dest SAP	The destination Service Access Point (SAP), when used.
PDU	The PROFIBUS packet payload.
Data	The packet's raw data displayed in space delimited hex.

Table 6.9 - PROFIBUS Packet Capture fields

4 The packet capture can be saved to a file for further analysis by selecting the **SAVE** button on the toolbar.

5 Previously saved PROFIBUS Packet Capture files can be viewed by selecting the **PROFIBUS PACKET CAPTURE VIEWER** option in the *Tools* menu.

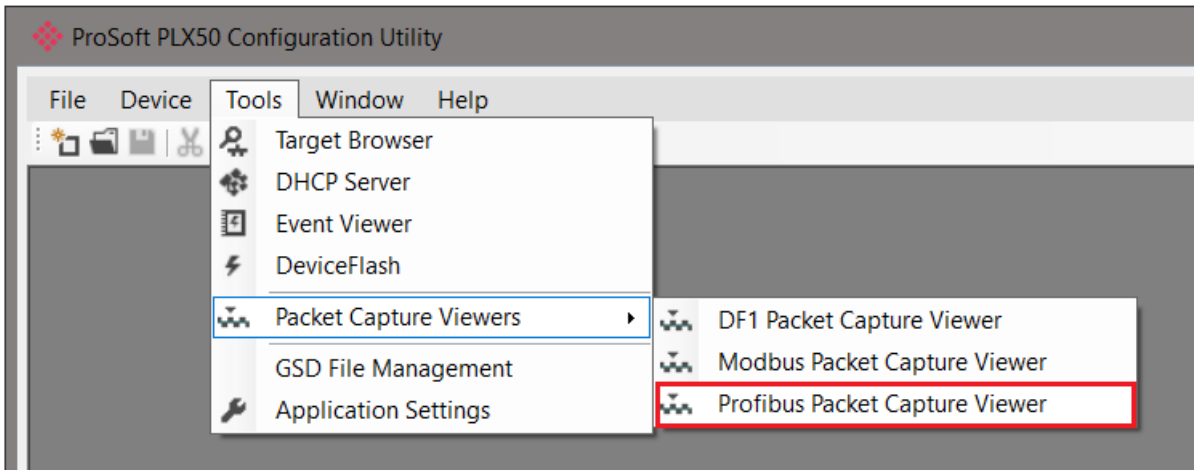


Figure 6.20 - Selecting the PROFIBUS Packet Capture Viewer

6.4. MODULE EVENT LOG

The PLX51-PBM 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 or via the web interface.

1 To view them in the PLX50 Configuration Utility, double-click on the **EVENT VIEWER** option in the Project Explorer tree.

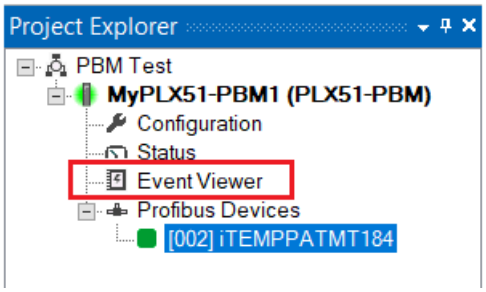
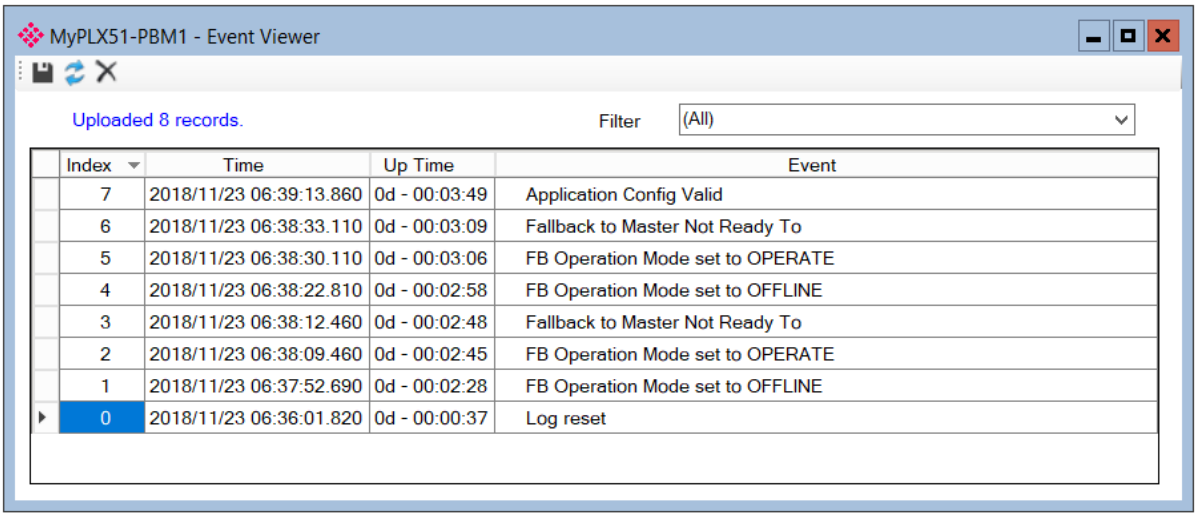


Figure 6.21. - Selecting the module Event Log

2 The Event Log window opens and automatically reads all of the events from the module. The log entries are displayed with the latest record at the top. Custom sorting is achieved by double-clicking on the column headings.



Index	Time	Up Time	Event
7	2018/11/23 06:39:13.860	0d - 00:03:49	Application Config Valid
6	2018/11/23 06:38:33.110	0d - 00:03:09	Fallback to Master Not Ready To
5	2018/11/23 06:38:30.110	0d - 00:03:06	FB Operation Mode set to OPERATE
4	2018/11/23 06:38:22.810	0d - 00:02:58	FB Operation Mode set to OFFLINE
3	2018/11/23 06:38:12.460	0d - 00:02:48	Fallback to Master Not Ready To
2	2018/11/23 06:38:09.460	0d - 00:02:45	FB Operation Mode set to OPERATE
1	2018/11/23 06:37:52.690	0d - 00:02:28	FB Operation Mode set to OFFLINE
0	2018/11/23 06:36:01.820	0d - 00:00:37	Log reset

Figure 6.22. – Module Event Log

3 The log can also be stored to a file for future analysis, by selecting the **SAVE** button in the toolbar.

4 To view previously saved files, use the *Event Log Viewer* option under the *Tools* menu.

6.5. WEB SERVER

The PLX51-PBM provides a web server for diagnostics. This allows for connectivity to the module without the use of the PLX50 Configuration Utility or Logix.

NOTE: The web server is read-only and thus no parameters or configuration can be altered from the web interface.

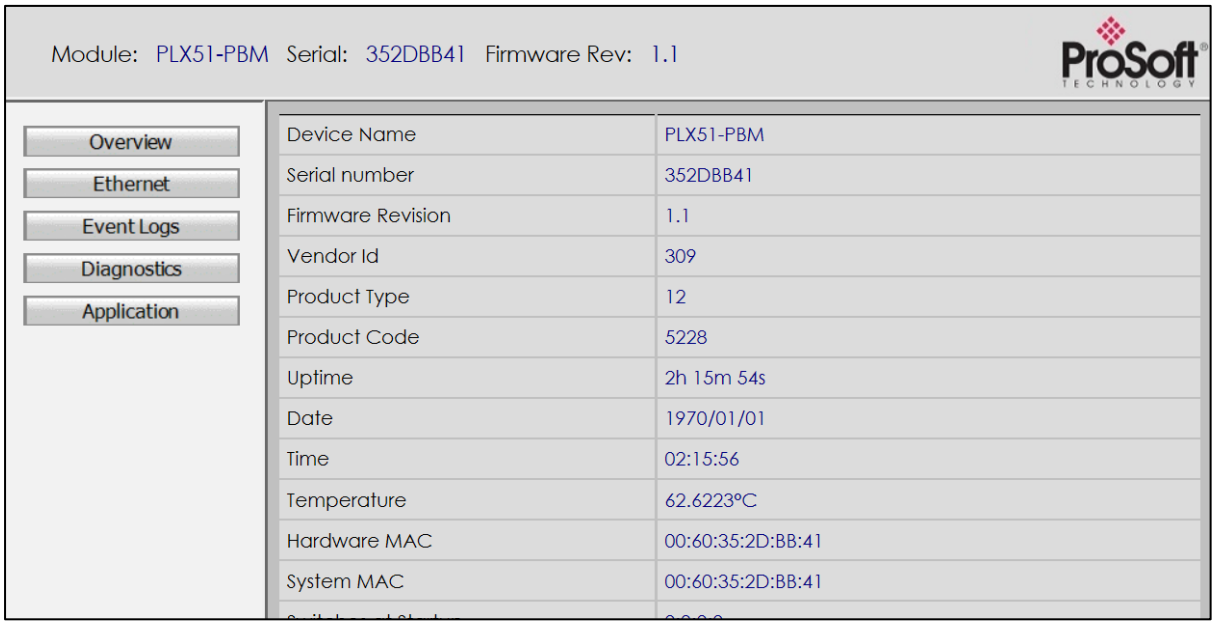


Figure 6.23 - Web interface

NOTE: The PLX51-PBM parameters and diagnostics in the web server will match those in the PLX50 Configuration Utility status.

7. TECHNICAL SPECIFICATIONS

7.1. DIMENSIONS

Below are the enclosure dimensions. All dimensions are in millimetres.

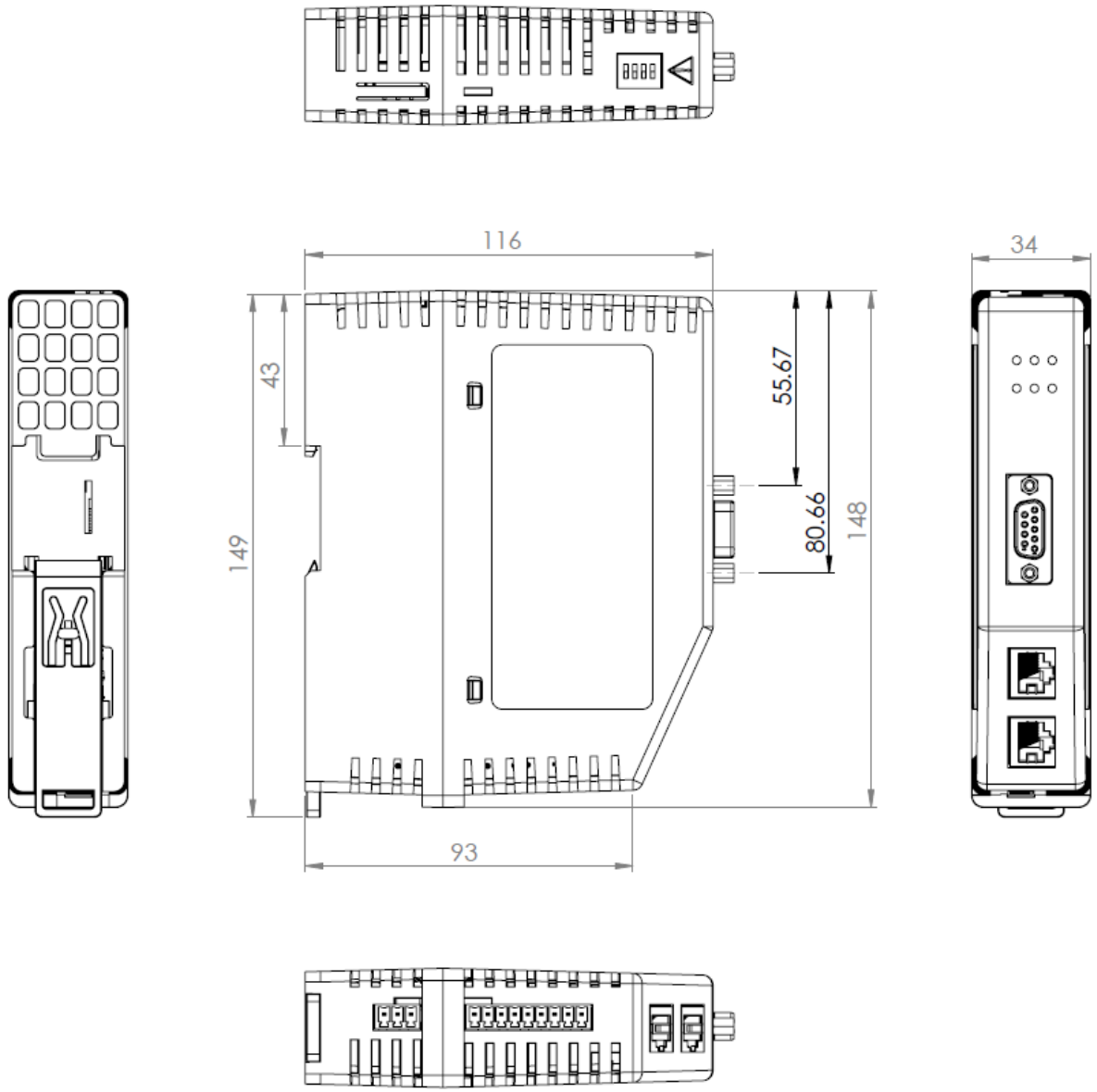


Figure 7.1 – PLX51-PBM enclosure dimensions

7.2. ELECTRICAL

Specification	Rating
Power requirements	Input: 10 to 36V DC
Power consumption	Maximum: 85mA @ 24V => 2.04W
Connector	3-way terminal
Conductors	24 to 18 AWG
Enclosure rating	IP20, NEMA/UL Open Type
Temperature	-20 to 70 °C
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 7.1 - Electrical specification

7.3. ETHERNET

Specification	Rating
Connector	RJ45
Conductors	CAT5 STP/UTP
ARP connections	Max 40
TCP connections	Max 40
CIP connections	Max 10
Communication rate	10/100Mbps
Duplex mode	Full/Half
Auto-MDIX support	Yes
Embedded switch	Yes, 2 x Ethernet ports

Table 7.2 - Ethernet specification

7.4. PROFIBUS DP

Specification	Rating
Connector	Female DB9 connector
Conductor	See *PROFIBUS DP* Section.
DP Master Mode Support	DPV0 Data Exchange DPV1 Class 1 Messaging DPV1 Class 2 Messaging DPV1 Alarming
DP Slave Mode Support	DPV0 Data Exchange DPV1 Class 1 Messaging DPV1 Alarming
Isolated	Yes
BAUD Rate supported	9.6 kbps 19.2 kbps 45.45 kbps 93.75 kbps 187.5 kbps 500 kbps 1.5 Mbps 3 Mbps 6 Mbps 12 Mbps

Table 7.3 – PROFIBUS DP specification

7.5. AGENCY APPROVALS AND CERTIFICATIONS

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

8. PROFIBUS DP

8.1. INTRODUCTION

PROFIBUS is a vendor-independent, open fieldbus standard for a wide range of applications in manufacturing, process and building automation. Vendor independence and openness are guaranteed by the PROFIBUS standard EN 50 170. With PROFIBUS, devices of different manufacturers can communicate without special interface adjustments. PROFIBUS can be used for both high-speed time critical data transmission and extensive complex communication tasks. The PROFIBUS family consists of three compatible versions.

PROFIBUS DP
Optimized for high speed and inexpensive hookup, this PROFIBUS version is designed especially for communication between automation control systems and distributed I/O at the device level. PROFIBUS-DP can be used to replace parallel signal transmission with 24 V or 4-20 mA.

OSI Layer		PROFIBUS		
7	Application	DPV0	DPV1	DPV2
6	Presentation			
5	Session			
4	Transport			
3	Network			
2	Data Link	FDL		
1	Physical	EIA-485	Optical	MBP

Table 9.1 – PROFIBUS Protocol (OSI model)

To utilize these functions, various service levels of the DP protocol were defined:

- DP-V0 provides the basic functionality of DP, including:
  - cyclic data exchange,
  - station, module and channel-specific diagnostics

- DP-V1 contains enhancements geared towards process automation, in particular:
  - acyclic data communication for parameter assignment
  - alarm handling

- DP-V2 for isochronous mode and data exchange broadcast (slave-to-slave communication)

PROFIBUS PA
PROFIBUS PA is designed especially for process automation. It permits sensors and actuators to be connected on one common bus line through a dedicated DP/PA gateway or link between the PROFIBUS DP and PROFIBUS PA networks, even in intrinsically-safe areas. PROFIBUS PA permits data communication and power over the bus using a 2-wire technology according to the international standard IEC 1158-2.

PROFIBUS FMS
PROFIBUS FMS is the general-purpose solution for communication tasks at the cell level. Powerful FMS services open up a wide range of applications and provide great flexibility. PROFIBUS FMS can also be used for extensive and complex communication tasks. This protocol is the first developed for PROFIBUS, but it is no longer currently used.

PROFIBUS specifies the technical and functional characteristics of a serial fieldbus system with which decentralized digital controllers can be networked together from the field level to the cell level.

8.2. PROFIBUS MASTER AND SLAVE

PROFIBUS distinguishes between master devices and slave devices.

Master devices determine the data communication on the bus. A master can send messages without an external request when it holds the bus access rights (the token). Masters are also called '**active stations**' in the PROFIBUS protocol.

Slave devices are peripheral devices. Typical slave devices include input/output devices, valves, drives and measuring transmitters. They do not have bus access rights and they can only acknowledge received messages or send messages to the master when requested to do so. Slaves are also called '**passive stations**'.

8.3. PROFIBUS MASTER CLASS 1 (DPM1) OR CLASS 2 (DPM2)

PROFIBUS DP Master class 1 (DPM1)
A class 1 master handles the normal communication or exchange of data with the slaves assigned to it. This is typically a PLC.

It uses **cyclic communication** to exchange process data with its associated slaves. The class 1 master sets the baud rate and the slave's auto-detect this rate. Each slave device is assigned to one master and only that master may write output data to that slave. Other masters may read information from any slave but can only write output data to their own assigned slaves.

PROFIBUS DP Master class 2 (DPM2)
A class 2 master is a special device primarily used for commissioning slaves and for diagnostic purposes. This is typically a Supervisor. It uses **acyclic communication** over what is known as the **MS2 channel**. A DPM2 does not have to be permanently connected to the bus system.

8.4. CYCLIC COMMUNICATION

The DP master class 1 cyclically exchanges data with all of the slaves assigned to it. This service is configured. During the configuration process, master and slave addresses are assigned, the bus parameters are defined, the types and numbers of modules (in the case of modular slaves) are specified, user-selectable parameter choices are made, etc.

Before data exchange can take place, the master will send parameterization and configuration telegrams to all of its assigned slaves. These parameters and configuration data are checked by the slaves. If both are valid, the master will initiate cyclic I/O data communication with the slave devices.

8.5. ACYCLIC COMMUNICATION

In addition to the cyclic data exchange, the PROFIBUS protocol has the option of acyclic communication. This service is not configured. There are 2 different communication channels possible between the requested master and the slave:

- **MS1 channel** (MS1 connection): can only be established if cyclic data exchange is taking place between that master (DPM1) and the slave
- **MS2 channel** (MS2 connection): is possible with several masters simultaneously, but the connection must be established explicitly by the master.

Acyclic reading and writing of data requires an established MS1 or MS2 connection.
For the MS1 channel, 3 conditions must be satisfied:

- The slave device must support the MS1 channel (key *C1_Read_Write_supp* at 1 in the GSD file)
- The DPV1_enable bit must be set during the parameter assignment
- Data exchange is taking place

For the MS2 channel, the connection must be explicitly initiated by the master. The maximum number of possible MS2 connections to the slave must not be reached. The connection can be closed by either the master or the slave device.

8.6. TOPOLOGY OF PROFIBUS DP

PROFIBUS devices are connected in a bus structure. Up to 32 stations (master or slaves) can be connected in one segment. The bus is terminated by an active bus terminator at the beginning and end of each segment. Both bus terminations must always be powered. When more than 32 stations are used, repeaters (line amplifiers) must be used to connect the individual bus segments.

8.7. PROFIBUS DP CABLE DESCRIPTION

Only one type of cable can be used for PROFIBUS network:

Parameter	Type A
Surge Impedance	135…165Ω (3 to 20 MHz)
Capacity	< 30 pF/m
Loop Resistance	< 110 Ω/km
Wire gauge	> 0.64 mm
Conductor area	> 0.34 mm²

Table 9.2 – PROFIBUS DP network cable

The maximum cable length depends on the transmission speed and cable type. The specified cable length can be increased using the repeaters. The use of more than 3 repeaters in series is not recommended.

Baudrate (kbps)	9.6	19.2	93.75	187.5	500	1500	3000 to 12000
Length A (m)	1200	1200	1200	1000	400	200	100

Table 9.3 – PROFIBUS DP cable length

8.8. PROFIBUS DP CONNECTOR DESCRIPTION

DB9 Pin Description	DB9 Pin#	DB9 Termination with PLX51-PBM
Chassis ground	1	
Reserved	2	
Data+ / B	3	In case of termination, connect this pin to Pin 8 (Data - / A) with 220 ohm resistor
Tx enable	4	
Isolated ground	5	Connect this pin to Pin 8 (Data - / A) with 390 ohm resistor
Voltage plus	6	Connect this pin to Pin 3 (Data + / B) with 390 ohm resistor
Reserved	7	
Data- / A	8	
Reserved	9	

Table 9.4 – PROFIBUS DP connector

9. APPENDIX

9.1. DPV1 RESPONSE STATUS (MASTER ONLY)

DP Status	Description
00h	Successful
05h	FDL error (see extended error code)
06h	DPV1 Error (see extended error code)
07h	Another command is already in progress for this slave / class 2 connection.
11h	Online state expected
13h	Invalid slave response
17h	Timeout passed

Table 9.1 – DP Status Response codes

9.2. DPV1 EXTENDED STATUS CODES (MASTER ONLY) – FDL ERROR

DP Status – Byte 0	Description
0h	OK
1h	User error, SAP locked
2h	No resource for sending data, tried to send to SAP that was not configured.
3h	No service available (SAP does not exist)
4h	Access point blocked

Table 9.2 – DP Extended Status Response codes (FDL Error)

NOTE: With an FDL Error, *Extended Status* bytes 2 and 3 will be zero.

9.3. DPV1 EXTENDED STATUS CODES (MASTER ONLY) – DPV1 ERROR

9.3.1. DPV1 READ/WRITE ERROR

DPV1 EXTENDED STATUS - BYTE 1

Value	Description
0 to 127	Reserved
128	DPV1
129 to 253	Reserved
254	PROFIBUS FMS
255	N/A

Table 9.3 – DP Extended Status Response codes (DPV1 Error) – Byte 1

DPV1 EXTENDED STATUS - BYTE 2

Bit 4 to 7 Value	Bit 0 to 3 Value	Description
0 to 9	-	Reserved
10	-	Application
	0	Read Error
	1	Write Error
	2	Module Failure
	3 to 7	Reserved
	8	Version Conflict
	9	Feature not supported
	10 to 15	User Specific
11	-	Access
	0	Invalid Index
	1	Write length error
	2	Invalid Slot
	3	Type conflict
	4	Invalid area

	5	State conflict
	6	Access Denied
	7	Invalid range
	8	Invalid parameter
	9	Invalid type
	10 to 15	User specific
12	-	Resource
	0	Read constrain conflict
	1	Write constrain conflict
	2	Resource busy
	3	Resource unavailable
	4 to 7	Reserved
	8 to 15	User specific
13 to 15	-	User specific

Table 9.4 – DP Extended Status Response codes (DPV1 Error) – Byte 2

NOTE: With a DPV1 Read/Write Error, *Extended Status* Byte 3 will be manufacturer specific.

9.3.2. DPV1 ABORT

DPV1 EXTENDED STATUS - BYTE 1 - SUBNET

Value	Description
0	No Subnet
1	Local Subnet
2	Remote Subnet
3 to 255	Reserved

Table 9.5 – DP Extended Status Response codes (DPV1 Error) – Byte 1 – Subnet

DPV1 EXTENDED STATUS - BYTE 2 – INSTANCE/REASON

Value	Description
Bit 6 to 7	Reserved
Bit 4 to 5	00 – FDL 01 – MSAC_C2 10 – User 11 – Reserved
Bit 0 to 3	See EN 50170 Part 2

Table 9.6 – DP Extended Status Response codes (DPV1 Error) – Byte 2 – Instance/Reason

10. SUPPORT, SERVICE & WARRANTY

10.1. 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 serial, Ethernet or Fieldbus devices interfaced to the module, if any.

Note: *For technical support calls within the United States, ProSoft's 24/7 after-hours phone support is available for urgent plant-down issues. Detailed contact information for all our worldwide locations is available on the following page.*

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10.2. WARRANTY INFORMATION

For complete details regarding ProSoft Technology's TERMS & CONDITIONS OF SALE, WARRANTY, SUPPORT, SERVICE AND RETURN MATERIAL AUTHORIZATION INSTRUCTIONS, please see the documents at: www.prosoft-technology.com/legal

Documentation is subject to change without notice.

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