PMIO Scanner

User Manual

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aparian

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Revision History

Revision	Date	Comment
1.0	10 March 2019	Initial document
1.1	17 April 2019	Warning updates Added accumulator, pulse, and PWM duty cycle message instructions Added IOP update rate calculation Updated LCD messages Update to redundant system information Added redundant PMIO Scanner operation
1.2	20 April 2019	Added Primary and Standby PM Address for Shadow mode with redundant PM Masters.
1.3	2 May 2019	Added new Slate screenshots. Updated Scanner Redundancy section. Added Accumulator Target and Command to Logix message reads
1.4	5 November 2021	Added new IOPS: LLAI and LLMUX Added IO Data in IO Module Status
1.5	4 August 2022	Added information required for UL regarding open type device enclosures.
1.6	13 November 2023	Added UKCA Conformance Mark
1.7	19 May 2025	Added new IOP: STIM
1.8	21 April 2026	Added UL North American Hazardous Location Approval.
1.9	2 September 2026	Updated specifications.
1.10	29 October 2026	Fixed Redundant Swap Cooldown time.
1.11	6 November 2026	Added Device Firmware Update section

1. PREFACE

1.1. INTRODUCTION TO THE PMIO SCANNER

This manual describes the installation, operation, and diagnostics of the Aparian PMIO Scanner. The PMIO Scanner provides interfacing between a Rockwell Automation ControlLogix system and Honeywell's TDC 3000 PM/HPM/APM Input/Output Processors (IOPs).

NOTE: The Honeywell's TDC 3000 PM/HPM/APM is used to describe the Honeywell Process Manager or Honeywell Controller. Hereafter this will be referred to as the **HPM**.

The PMIO Scanner plugs directly into a ControlLogix chassis and connects directly into the TDC 3000 redundant I/O Link.

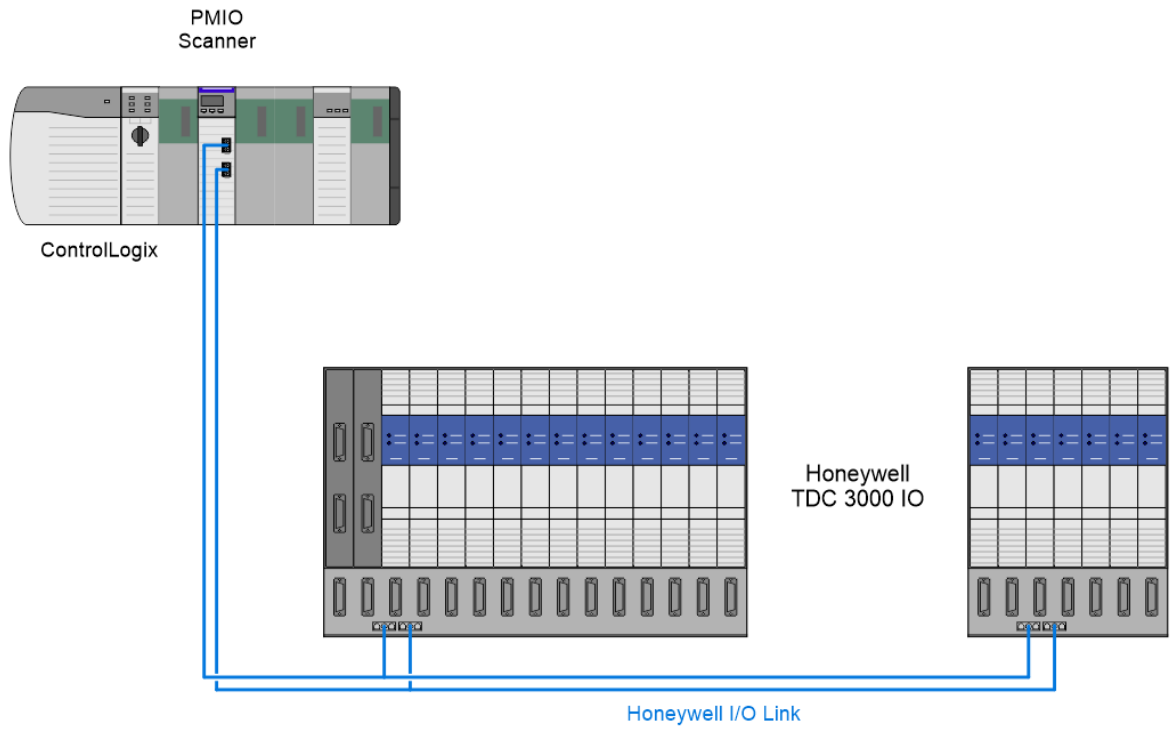


Figure 1.1 – Typical Setup

NOTE: ***TDC 3000*** and ***Process Manager*** are registered trademarks of Honeywell Inc.

1.2. FEATURES

The PMIO Scanner provides an interface between Honeywell TDC 3000 IOPs and a ControlLogix system. Up to 28 (non-LLMUX) IOPs can be added per PMIO Scanner. The LLMUX IOP occupies two IOP data structures in the PMIO Scanner, and thus each LLMUX should be counted twice when applying the 28 IOP limit.

In cases where there are more than 28 IOPs per controller, a second PMIO Scanner can be added to handle the additional IOPs.

Communication across the ControlLogix backplane utilizes six Class 1 CIP connections. Adding the PMIO Scanner in Studio 5000 is simplified by the custom AOP (Add-On-Profile).

The PMIO Scanner is configured using the Aparian Slate application which can be downloaded from www.aparian.com free of charge.

Within the Slate environment each IOP can be configured to match the application. The following IOPs are supported:

- **HLAI6** – High Level Analog Input Processor (16 channel)
- **AO16** – Analog Output Processor (16 channel)
- **DI32** – Digital Input Processor (32 channels)
- **DO16** – Digital Output Processor (16 channel)
- **DO32** – Output Processor (32 channel)
- **AO8** – Analog Output Processor (8 channel)
- **LLAI8** – Low Level Analog Input Processor (8 channel)
- **LLMUX32** – Low Level Analog Multiplexer Processor (32 channel)
- **STIM** - Smart Transmitter Interface I/O Processor (16 channel)

  Note: Limited to 16 STIM modules per PMIO Scanner.

The configuration of the IOPs and their respective IO points (channels) can be configured manually, imported from Honeywell EB (Exception Build) files, or scanned from an online Honeywell system.

To aid in migration, the PMIO Scanner provides a number of Operational Modes, including a ***Shadow*** mode where the PMIO Scanner can run in parallel with the HPM. In this mode the HPM is controlling the IOPs and the PMIO is listening-in and providing the input data to the ControlLogix.

1.3. ARCHITECTURE

The PMIO Scanner can be used in either a standalone or redundant ControlLogix architecture. In a standalone architecture, the PMIO Scanner can be placed in any slot in the local or remote chassis.

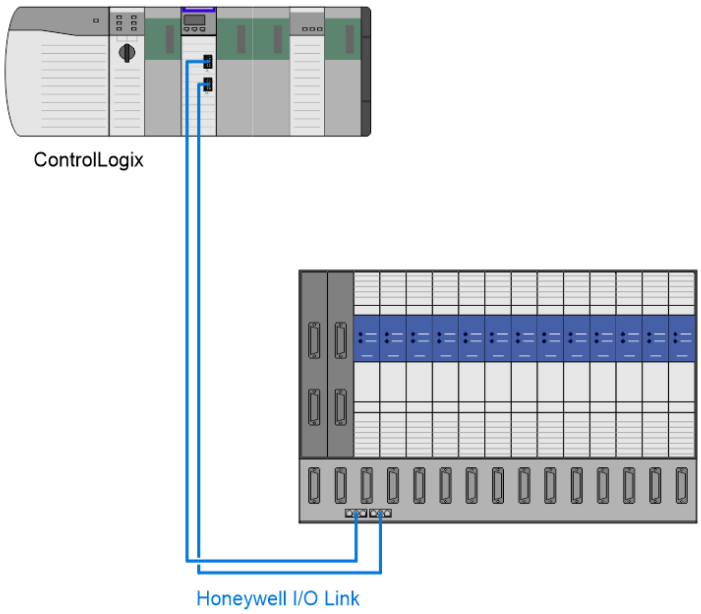


Figure 1.2 – Standalone ControlLogix Setup

In a redundant ControlLogix architecture, the PMIO Scanner must be placed in a remote chassis, that is, not in the local chassis where the Controllers reside.

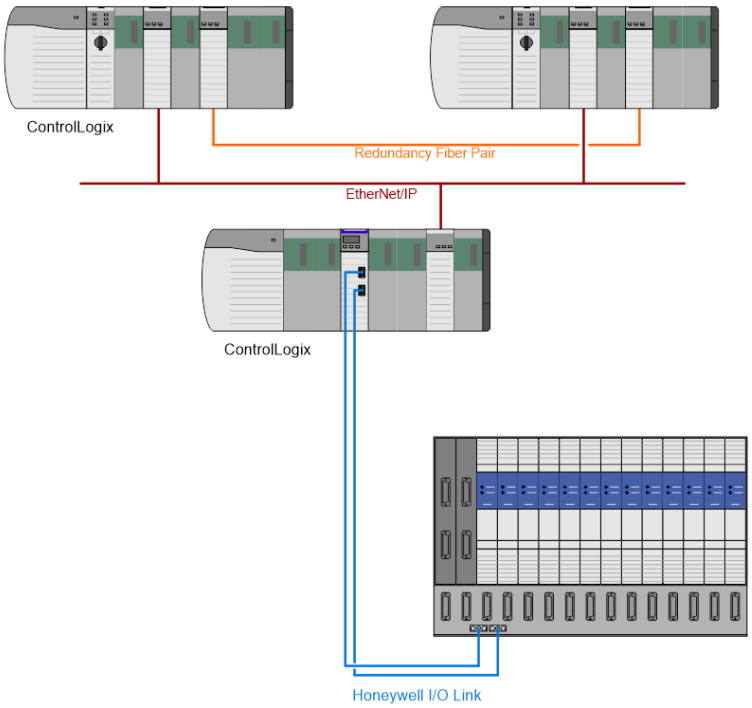


Figure 1.3 – ControlLogix Redundancy Setup

The HPM can control up to 40 Input Output Processor modules (IOPs). Since the PMIO Scanner can support up to 28 IOPs, there may be applications where the I/O Link network needs to be split and connected to two PMIO Scanners.

1.3.1. EXAMPLE 1 – 2 X 15-SLOT RACKS

In this example 2 x 15-slot racks are connected to a single PMIO Scanner.

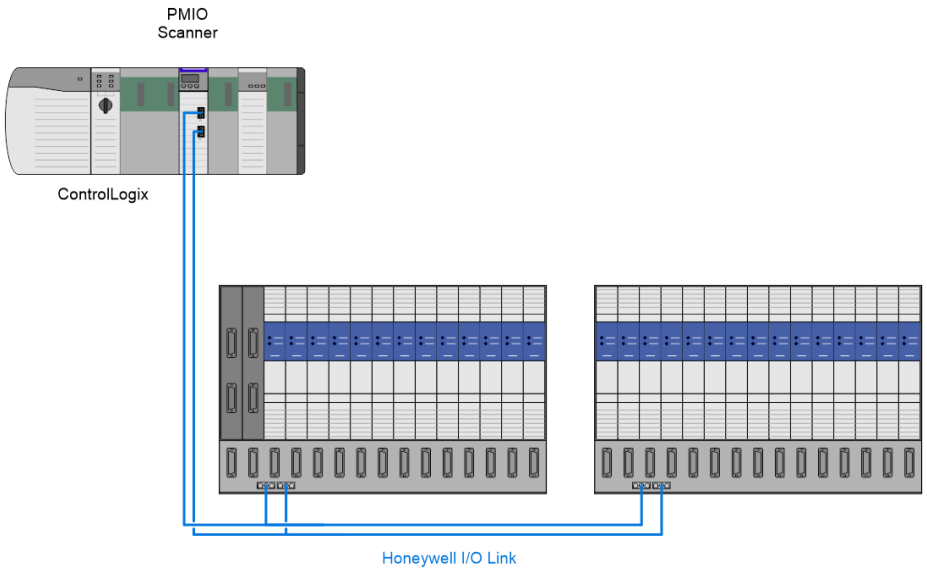


Figure 1.4. – Architecture Example 1

1.3.2. EXAMPLE 2 – 4 X 7-SLOT RACKS

In this example 4 x 7-slot racks are connected to a single PMIO Scanner.

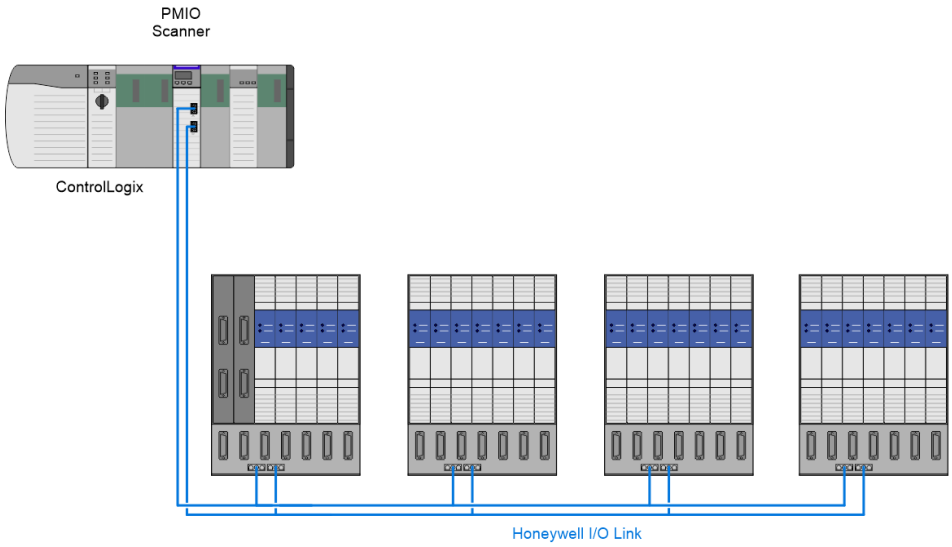


Figure 1.5. - Architecture Example 2

1.3.3. EXAMPLE 3 – 2 X 15-SLOT RACKS AND 1 X 7-SLOT RACK

In this example there are 2 x 15-slot racks and 1 x 7-slot rack. Since the total number of IOPs (35) exceeds the maximum PMIO Scanner limit of 28, the I/O Link needs to be segmented.

One solution is to connect the first 15-slot rack and 7-slot rack to the first PMIO Scanner, and the remaining 15-slot rack to a second PMIO Scanner.

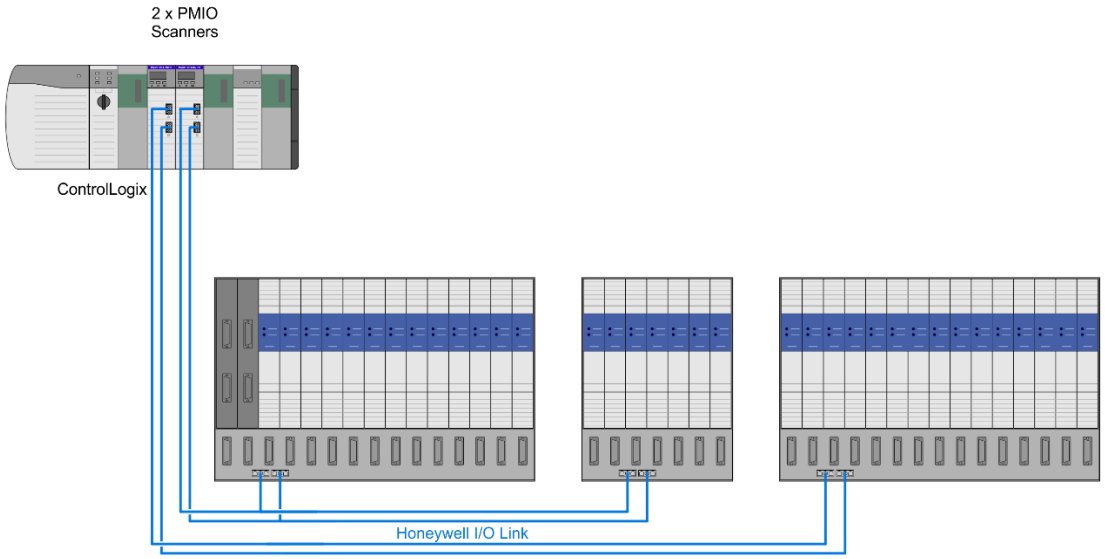


Figure 1.6. - Architecture Example 3

1.3.4. REDUNDANT PMIO SCANNER

With redundant PMIO Scanners, the PMIO Scanners must both be connected to the same I/O Link network.

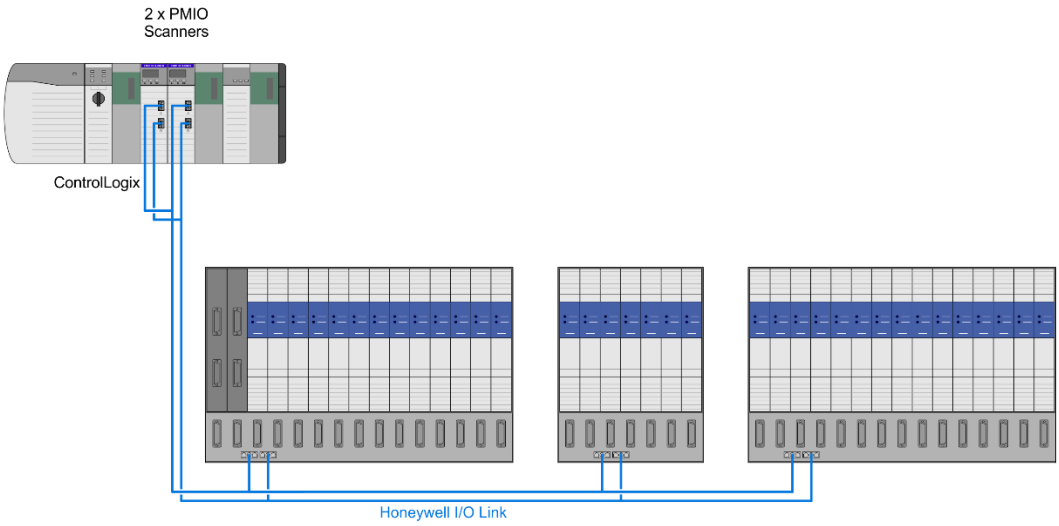


Figure 1.7. – Redundant PMIO Scanner

1.3.5. Redundant PMIO Scanner and Redundant ControlLogix

In a redundant ControlLogix architecture with redundant PMIO Scanners, the PMIO Scanners must be placed in the two-remote chassis, that is, not in the local chassis where the Controllers reside. The PMIO Scanners must both be connected to the same I/O Link network.

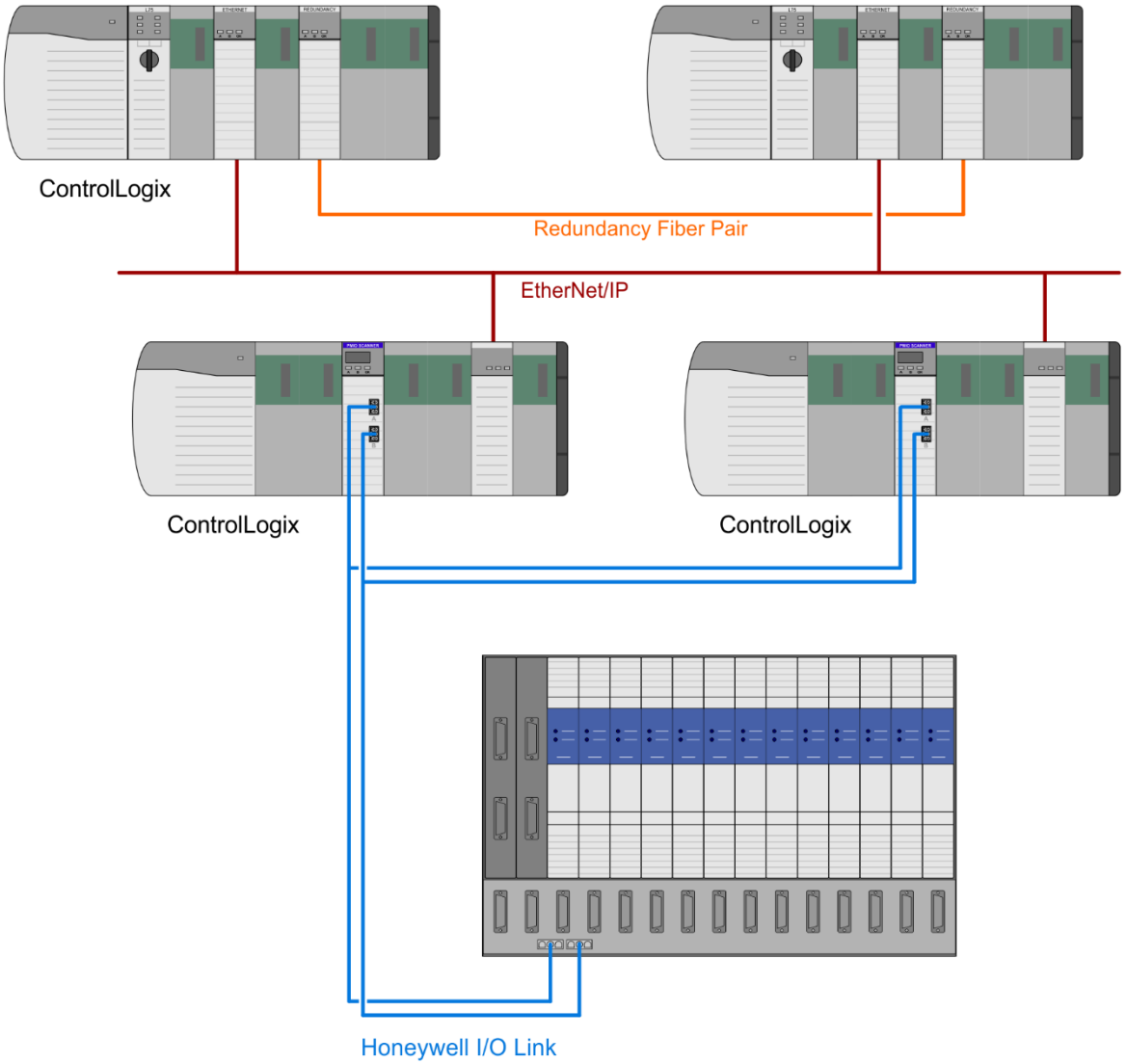


Figure 1.8. – Redundant PMIO Scanner and Redundant ControlLogix

1.4. MIGRATION

A migration from an existing Honeywell TDC 3000 system to a hybrid ControlLogix PMIO Scanner solution is illustrated below.

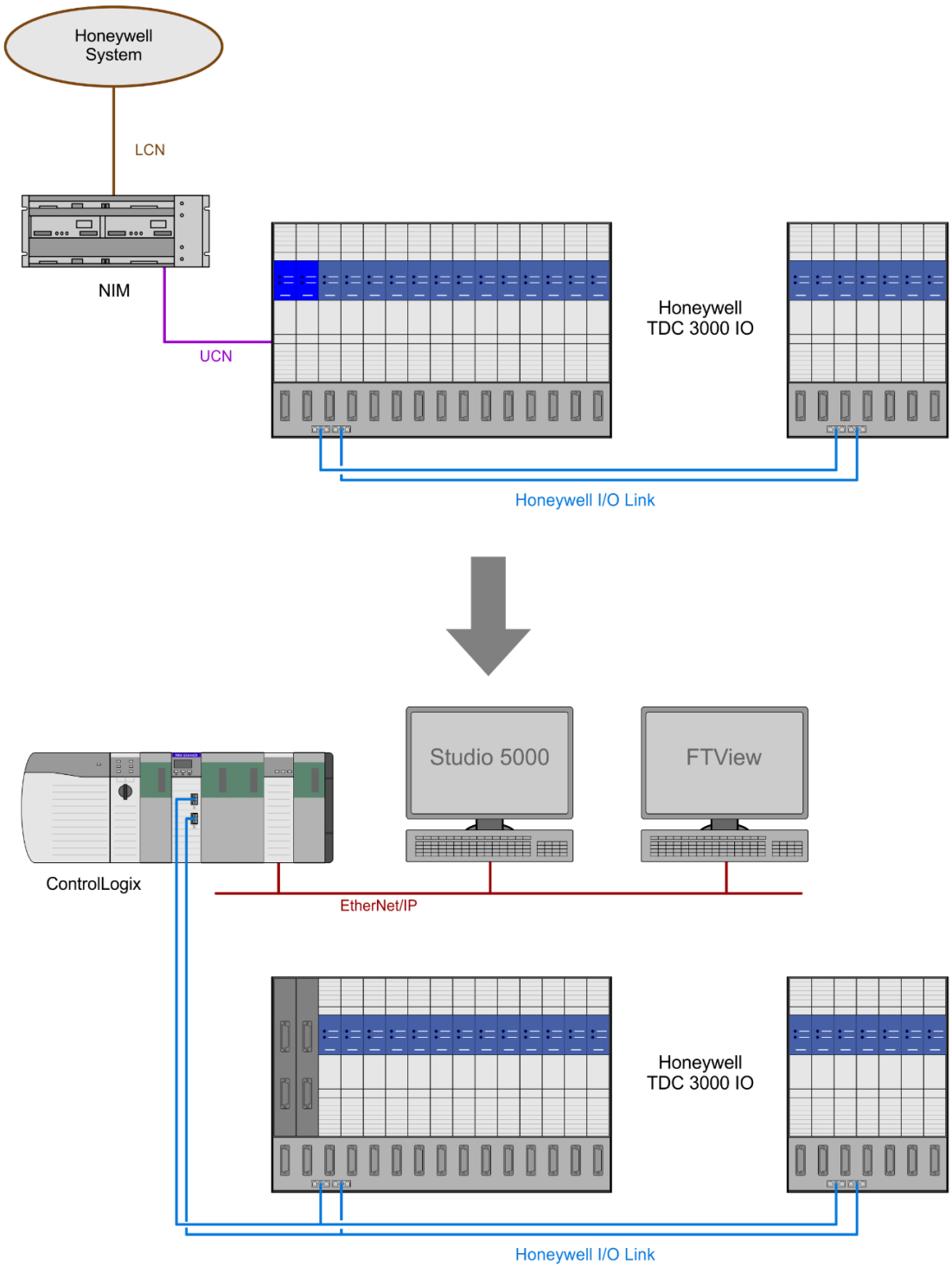


Figure 1.9. –Migration Example

The IOP configuration required by the PMIO Scanner can be composed in one of three ways

(using Slate):

- Manually configured
- EB File Import
- Learn Mode (Scan Configuration)

1.4.1. ADDITIONAL CONSIDERATIONS

1.4.1.1. TERMS

Honeywell and Rockwell Automation (Allen-Bradley) use different terms and nomenclatures which can complicate the migration process.

1.4.1.2. NUMBERING

Honeywell numbering typically starts at 1. For example, the first IO point on an IOP will be 1. Rockwell numbering typically starts at 0. Care must be taken to adjust for this offset when viewing Honeywell IO in a Logix system.

1.5. ADDITIONAL INFORMATION

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

Resource	Link
Slate Installation	https://www.aparian.com/software/slate
Add-On Profile Installation	https://www.aparian.com/products/pmio-scanner#downloads
ControlLogix Installation	https://literature.rockwellautomation.com/idc/groups/literature/documents/in/1756-in621_-en-p.pdf

Table 1.1. - Additional Information

1.6. SUPPORT

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

Resource	Link
Contact Us web link	www.aparian.com/contact-us
Support email	support@aparian.com

Table 1.2. – Support Details

2. INSTALLATION

2.1. MODULE LAYOUT

The PMIO Scanner is a standard single slot ControlLogix module and fits directly into any ControlLogix chassis.

NOTE: This module is an open-type device and is meant to be installed in an enclosure suitable for the environment such that the equipment is only accessible with the use of a tool.

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

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

On the front of the module are 2 x 3-way communication connectors for the redundant I/O Link to the Honeywell IOP Rack(s).

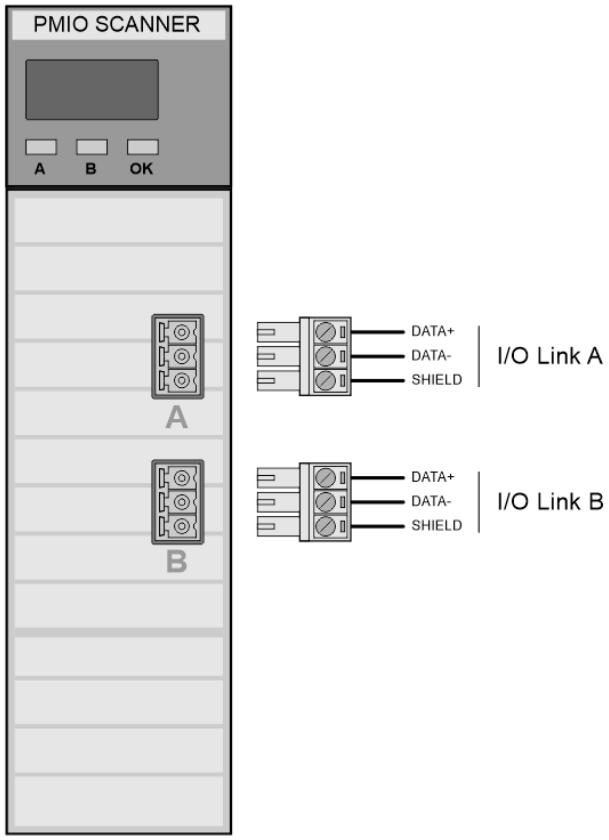


Figure 2.1 – PMIO Scanner front view

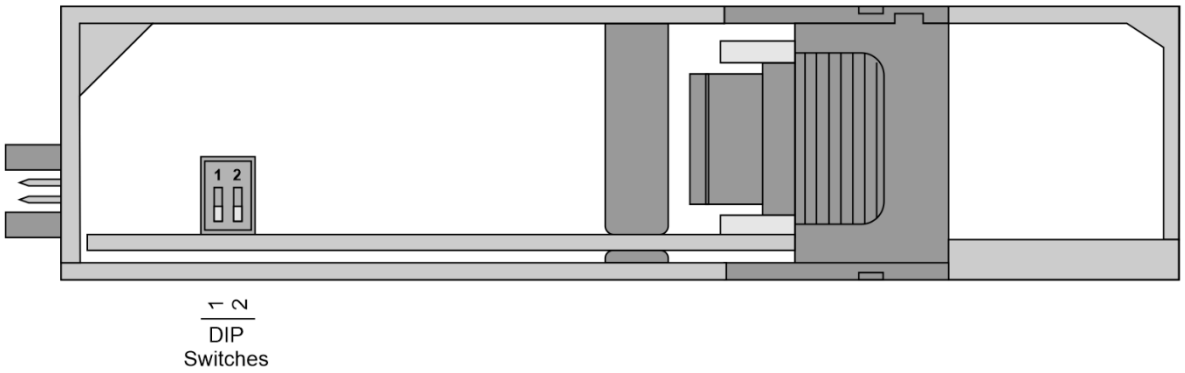


Figure 2.2 – PMIO Scanner bottom view

The module provides two DIP switches located on the bottom of the module. These switches can only be accessed when the module is removed from the ControlLogix chassis.

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

Table 2.1. - DIP Switch Settings

2.2. I/O LINK

The pair of 3-way I/O Link connectors are used to connect to the TDC 3000 I/O. The details of the I/O Link connector are shown below.

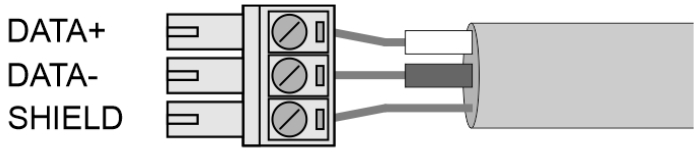


Figure 2.3 – I/O Link connector

Custom-length I/O Link cables, as shown below, are available from Aparian. To simplify installation, these cables are designed to be inserted between an existing I/O Link cable and the I/O rack. These cables are not supplied with the PMIO Scanner and must be ordered separately.

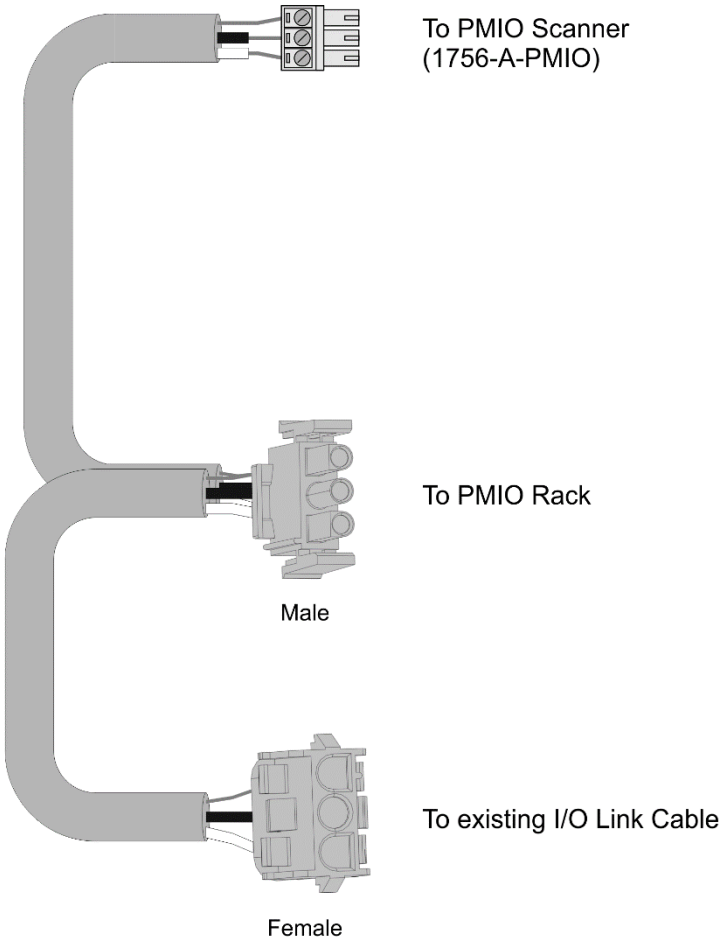


Figure 2.4 – Custom I/O Link Cables

WARNING: Connecting the PMIO Scanner to a running application may disrupt the Honeywell system. Ensure the application is in a safe state before connecting the PMIO Scanner and associated I/O Link cables. Failure to do so may result in equipment damage, serious injury or death.

2.3. NORTH AMERICAN HAZARDOUS LOCATION APPROVAL

The following information applies when operating the product in hazardous locations:

SUITABLE FOR USE IN CLASS I, DIVISION 2, GROUPS A, B, C AND D HAZARDOUS LOCATIONS, OR NONHAZARDOUS LOCATIONS ONLY.

-20°C to +70°C, T5A
Class 1, Div 2 Gps A, B, C, D

THIS EQUIPMENT IS OPEN-TYPE DEVICE AND IS MEANT TO BE INSTALLED IN AN ENCLOSURE

SUITABLE FOR THE ENVIRONMENT SUCH THAT THE EQUIPMENT IS ONLY ACCESSIBLE WITH THE USE OF A TOOL.

WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT WHILE THE CIRCUIT IS LIVE OR UNLESS THE AREA IS KNOW TO BE FREE OF IGNITABLE CONCENTRATIONS.

WARNING - EXPLOSION HAZARD - SUBSTITUTION OF ANY COMPONENT MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2.

3. SETUP

3.1. INSTALL CONFIGURATION SOFTWARE

All the network setup and configuration of the module is achieved by means of the Aparian Slate device configuration environment. This software can be downloaded from http://www.aparian.com/software/slate.

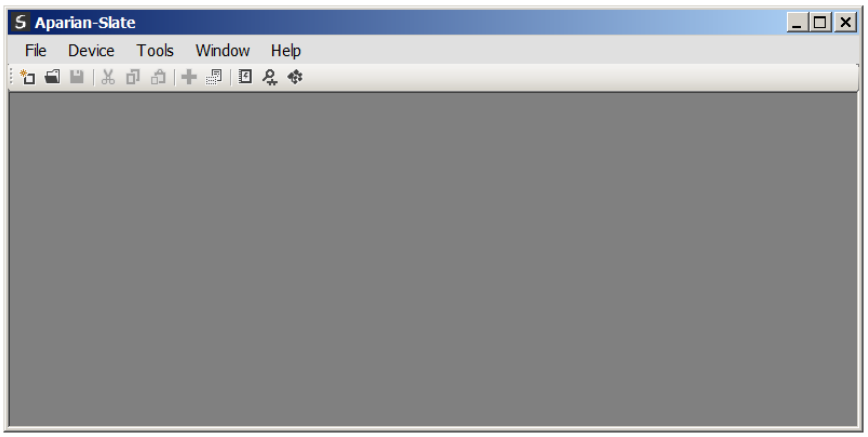


Figure 3.1. - Aparian Slate Environment

3.2. CREATING A NEW PROJECT

Before the user can configure the module, a new Slate project must be created. Under the ***File*** menu, select ***New***.

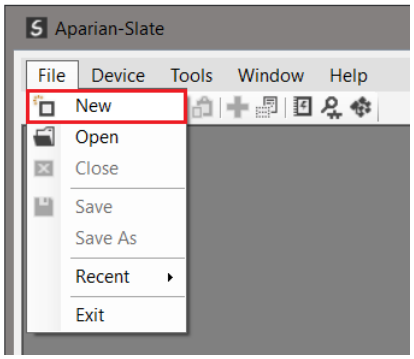


Figure 3.2. - Creating a new project

A Slate project will be created, showing the Project Explorer tree view. To save the project use the ***Save*** option under the ***File*** menu. A new device can now be added by selecting ***Add*** under the ***Device*** menu.

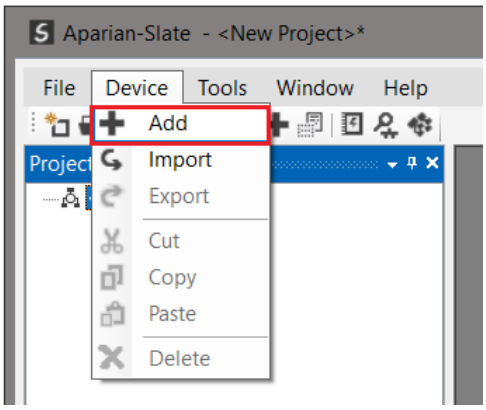


Figure 3.3. - Adding a new device

In the ***Add New Device*** window select the PMIO Scanner, and click the ***Ok*** button.

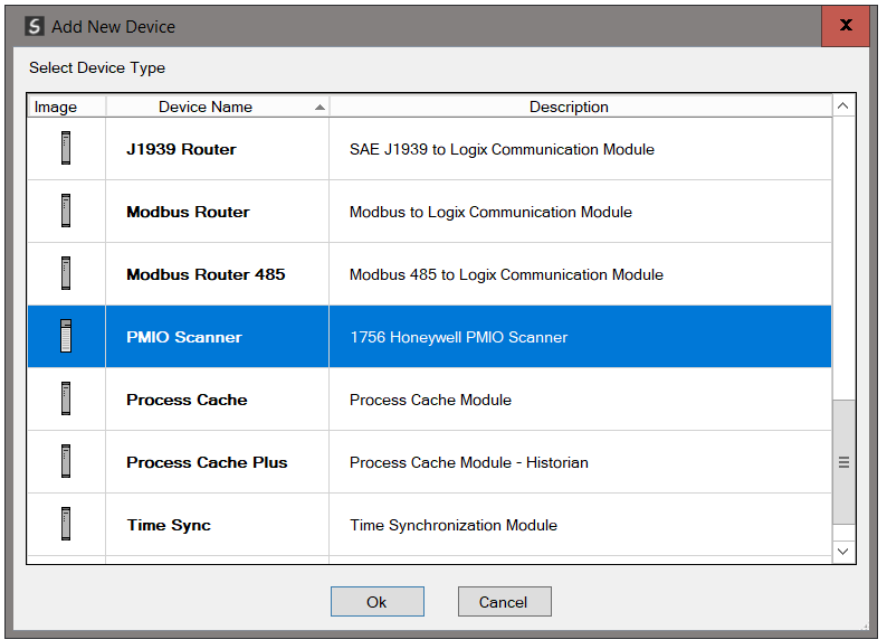


Figure 3.4 – Selecting a new PMIO Scanner

The device will appear in the Project Explorer tree as shown below, and its configuration window opened. The device configuration window can be reopened by either double clicking the module in the Project Explorer tree or right-clicking the module and selecting ***Configuration***.

3.3. PMIO SCANNER CONFIGURATION

The PMIO Scanner parameters will be configured by Slate. When downloading this configuration into the module it will be saved in non-volatile memory that persists when the module is powered down.

NOTE: When a firmware upgrade is performed the module will clear all PMIO Scanner configuration.

3.3.1. GENERAL PARAMETERS

The general configuration is shown in the figure below. The PMIO general configuration window is opened by either double clicking on the module in the tree or right-clicking the module and selecting ***Configuration***.

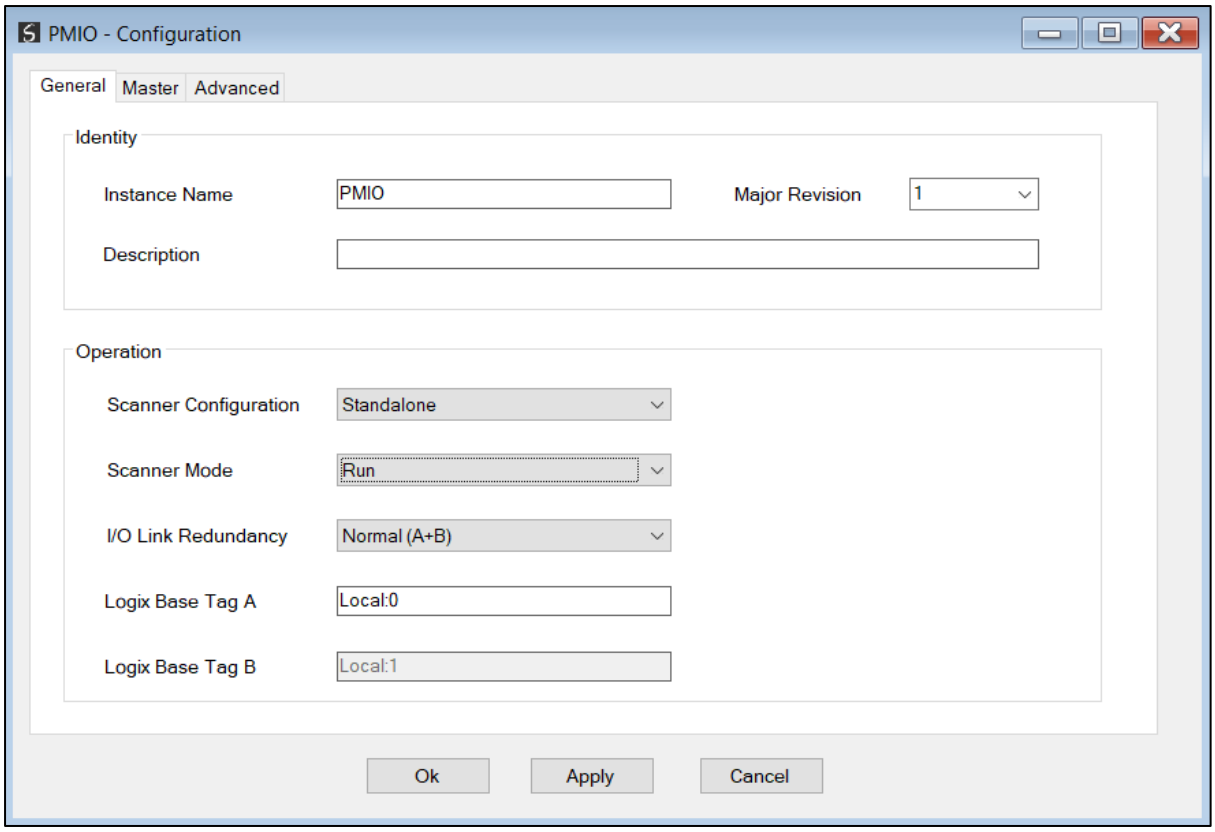


Figure 3.5 – PMIO Scanner - General Configuration

The general configuration consists of the following parameters:

Parameter	Description
Instance Name	User defined name to identify the PMIO Scanner pair.
Description	This parameter is used to provide a more detailed description of the application for the PMIO Scanner pair.
Major Revision	The major revision of the module.
Scanner Configuration	There are two configuration sets supported: **Standalone** In this mode the PMIO Scanner will be a standalone master on the I/O Link network.

	Redundant In this mode the PMIO Scanner will be part of a redundant pair of masters on the I/O Link network. Only one of the PMIO Scanners will be the active master on the I/O Link network, while the other PMIO Scanner will serve as a standby master which will take over when the active master fails. See the Redundant Scanner section for more details.
Scanner Mode	There are four modes supported: **Disabled** In this mode the PMIO Scanner will only listen to packets on the I/O Link network (no packets will be transmitted from the PMIO Scanner). The user can use this mode to capture traffic on the network. **Run** In this mode the PMIO Scanner will operate as the Master on the I/O Link network and send and receive data from the configured IOPs on the network.  **WARNING:** There can only be one Master per I/O Link network. If there are more than one Master per I/O Link network, it will result in a loss of communication and operation. **Shadow** In this mode the PMIO Scanner will only listen to packets on the I/O Link network (similar to Disabled Mode), but the PMIO Scanner will also update the relevant Logix tags based on the IOP configuration in Slate. See the Shadow Mode section. **Learn** In this mode the PMIO Scanner will only listen to packets on the I/O Link network (similar to Disabled Mode), but the PMIO Scanner will also allow pass-through messages onto the I/O Link network. This will allow Slate to interrogate each IOP to capture its current configuration.  **WARNING:** In this mode the HPM must be either removed from the IO Rack or it must be set to shut down. The HPM **cannot** be in Idle mode as the HPM will still be communicating on the I/O Link network.
IO Link Redundancy	There are three configurations supported: **Normal (A+B)** Both Channel A and B are operational and will communicate with the IOP Rack(s) on both channels. **Channel A Only** Only Channel A is operational and will communicate with the IOP Rack(s) on a single channel. **Channel B Only** Only Channel B is operational and will communicate with the IOP Rack(s) on a single channel.
Logix Base Tag A	Logix Base Tag for the PMIO Scanner, (or Scanner A in a redundant configuration). Used only for the Export of Logix Alias tags. The format is "***ChassisName:Slot***" where ***Slot*** represents the slot number and ***ChassisName*** represents the remote adapter name or "Local" when in the local

	chassis. Example: Local:2.
Logix Base Tag B	Logix Base Tag for the PMIO Scanner B, (in a redundant configuration). Used only for the Export of Logix Alias tags. The format is "***ChassisName:Slot***" where ***Slot*** represents the slot number and ***ChassisName*** represents the remote adapter name or "Local" when in the local chassis. Example: Local:2.

Table 3.1 - General configuration parameters

3.3.2. MASTER

The ***Master*** configuration is shown in the figure below. The ***Master*** configuration window is opened by either double clicking on the module in the tree, or right-clicking the module and selecting *Configuration*.

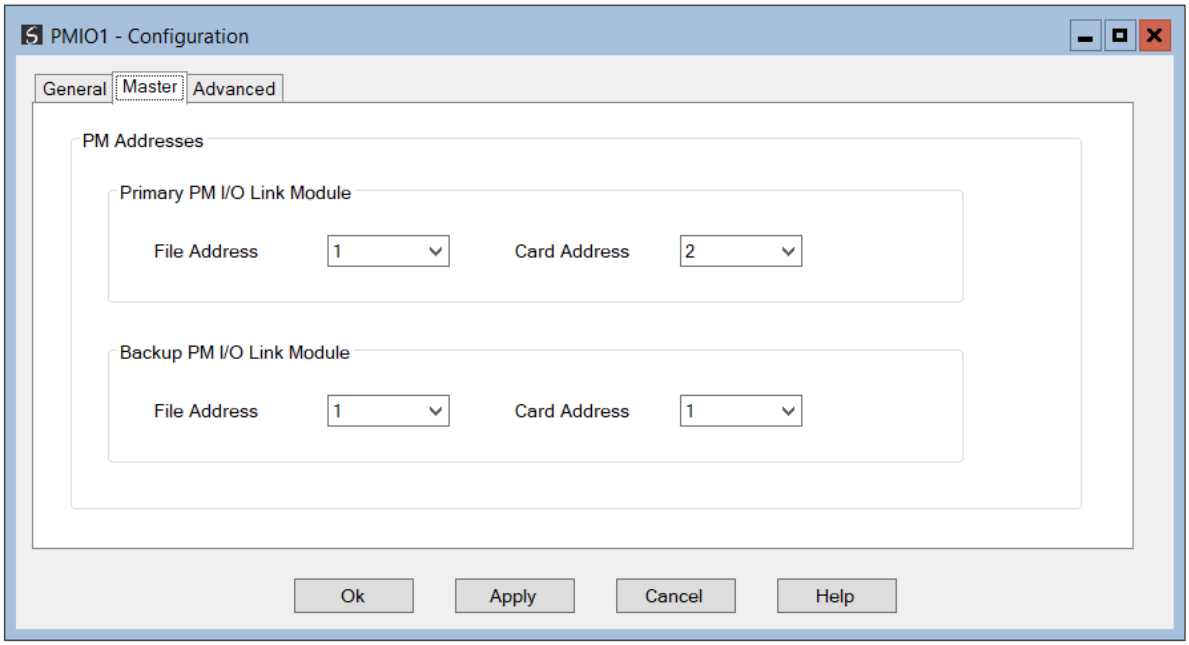


Figure 3.6 – PMIO Scanner – Master Configuration

3.3.3. ADVANCED PARAMETERS

The ***Advanced*** configuration is shown in the figure below. The ***Advanced*** configuration window is opened by either double clicking on the module in the tree, or right-clicking the module and selecting *Configuration*.

Parameter	**Description**

Primary PM File Address	The File Address of the Primary Master on the I/O Link. **NOTE:** When operating in Shadow mode, the user will need to make the PM File Address equals to the PM address that is currently the Primary Master on the I/O Link network.
Primary PM Card Address	The Card Address of the Primary Master on the I/O Link. **NOTE:** When operating in Shadow mode, the user will need to make the PM Card Address equals to the PM address that is currently the Primary Master on the I/O Link network.
Backup PM File Address	The File Address of the Standby Master on the I/O Link. **NOTE:** When operating in Shadow mode, the user will need to make the PM File Address equals to the PM address that is currently the Standby Master on the I/O Link network.
Backup PM Card Address	The Card Address of the Standby Master on the I/O Link. **NOTE:** When operating in Shadow mode, the user will need to make the PM Card Address equals to the PM address that is currently the Standby Master on the I/O Link network.

Table 3.2 – Master configuration parameters

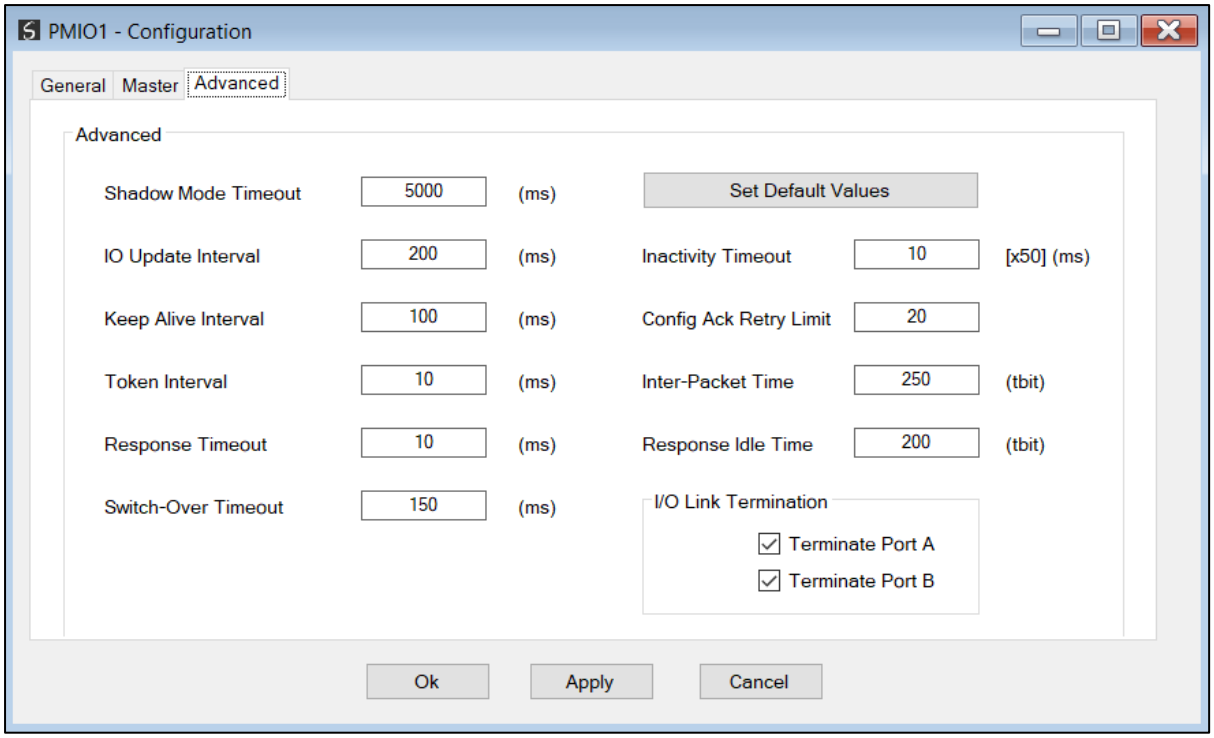


Figure 3.7 – PMIO Scanner – Advanced Configuration

NOTE: It is recommended that the user not modify these parameters without consulting Aparian.

The Advanced IO configuration consists of the following parameters:

Parameter	Description
Shadow Mode Timeout	When operating in Shadow Mode, this is the amount of time since the PMIO Scanner last received data from a specific IOP before indicating that the IOP is not operational and/or online.
IO Update Interval	The interval at which all IOPs are updated (read inputs or write outputs). Each IOP has a base update rate of approximately 5ms. For an AI or AO IOP, the user can add 2ms per channel on the IOP. **NOTE:** It is recommended to provide an additional 20-50ms for additional services on the I/O Link network. **Example:** The update rate for the following: 1 x IOP DI32 = 5ms. 1 x IOP DO32 = 5ms. 1 x IOP AI16 with 10 channels = 5ms + (10 x 1.5ms) = 20ms 2 x IOP AO8 with 4 channels = 5ms + (4 x 1.5ms) x 2 = 17ms **Min IOP Update Interval:** 5 + 5 + 20 + 17 = 47ms **Recommended IOP Update Interval**: 47 + 20 = 67ms.
Keep Alive Interval	The interval at which keep-alive packets are sent.
Token Interval	The interval at which token packets are sent.
Response Timeout	The amount of time the PMIO Scanner will wait for an IOP to respond to a request before marking the transaction as a failed timeout.
Switch-Over Timeout	When the PMIO Scanner has been configured to communicate on both Channel A and B, this parameter is the amount of inactivity time on the active Channel before switching communication to the standby Channel.
Inactivity Timeout	When operating in Run Mode, this is the amount of time since the PMIO Scanner last received data from a specific IOP before indicating that the IOP is not operational and/or online. Note that the actual timeout is the configuration value multiplied by 50ms.
Config Ack Retry Limit	The amount of Parameter Configuration ACKs sent before marking the transaction as failed.
Inter-Packet Time	The minimum quiet time before another packet is sent by the PMIO Scanner on the I/O Link network.
Response Idle Time	The minimum quiet time before another packet is sent by the PMIO Scanner on the I/O Link network after receiving a packet from an IOP.
Termination Port A	Enable/Disable 124 Ω terminator on Channel A.
Termination Port B	Enable/Disable 124 Ω terminator on Channel B.

Table 3.3 – Advanced configuration parameters

3.4. ADDING IOPS (INPUT OUTPUT PROCESSORS)

Once the general PMIO Scanner configuration is complete, the user can configure the required IOPs.

NOTE: An alternative to configuring the IOPs manually, is to import EB files (see section 3.5) or to use the online ***Learn*** mode (see section 3.8).

Manually adding IOPs is achieved by right-clicking on the ***IO Processors*** item in the project tree and selecting the ***Add IO Processor*** menu item.

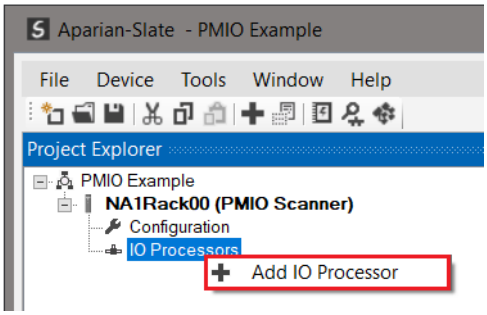


Figure 3.8 – Adding IOPs

The ***Select IOP*** window will appear. Select the appropriate module and press ***Ok***.

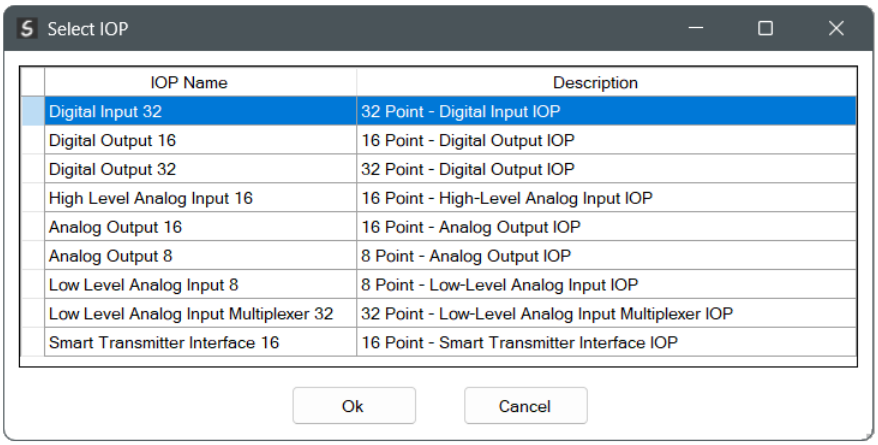


Figure 3.9 – Select IO card

The configuration window for the selected IO card will then open.

3.4.1. GENERAL IOP CONFIGURATION

The first tab of the configuration form comprises the general configuration parameters of the

IOP.

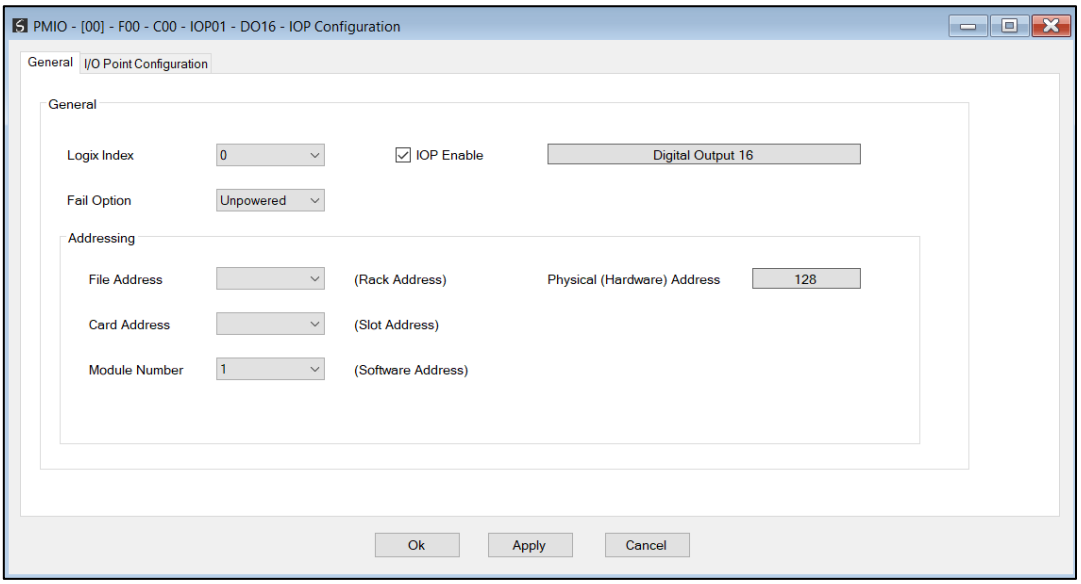


Figure 3.10 – IOP - General Configuration

The general IO card configuration consists of the following parameters:

Parameter	Description
Logix Index	This is the IOP index used in the Logix tag for the specific IOP. For example, if the index is 7 then the data for the module will appear in Logix connection 2 – IOP07.
Fail Option	For output IOPs (e.g. DO16, AO8, etc.) this will configure the behaviour of the IOP when communication to the IOP is lost. **Unpowered** When communication to the IOP is lost the IOP will clear all outputs (e.g. force digital outputs to zero). **Hold** When communication to the IOP is lost the IOP will hold its last values. **NOTE:** Only relevant to AO16, AO8, DO16, and DO32.
IOP Enable	This will enable/disable the operation from the PMIO Scanner for the specific IOP.
File Address	This is the file address configured on the physical IOP rack (jumpers).
Card Address	This is the physical slot position of the IOP in the local IOP rack.
Module Number	This is the assigned module number.
Physical Address	This is the physical address of the module (which is derived from the File and Card Addresses). Note this value is read only.

Table 3.4 – IOP - General configuration parameters

3.4.2. IO Point Configuration

The second tab comprises the IO Point configuration. Although the configuration is different for each type of IOP, the basic layout is the same. The configuration of each IO point (channel) is contained within its own row.

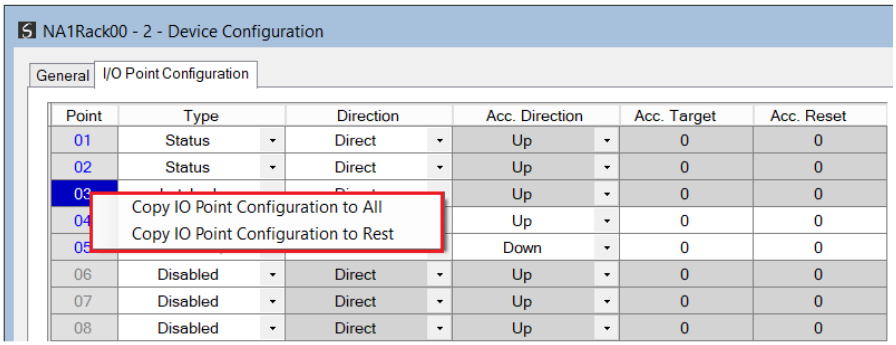


Figure 3.11 – IOP IO Point Configuration

To simplify the configuration of similar IO points, two shortcuts are available to multiplicate the configuration of an IO point. These can be invoked by right-clicking on the IO point and selecting either:

- Copy IO Point Configuration to All
- Copy IO Point Configuration to Rest

The former copies the configuration of the selected IO point to all the other points of that card. The latter copies the configuration to only the IO points below the selected point.

3.4.2.1. DIGITAL INPUT 32 (DI32)

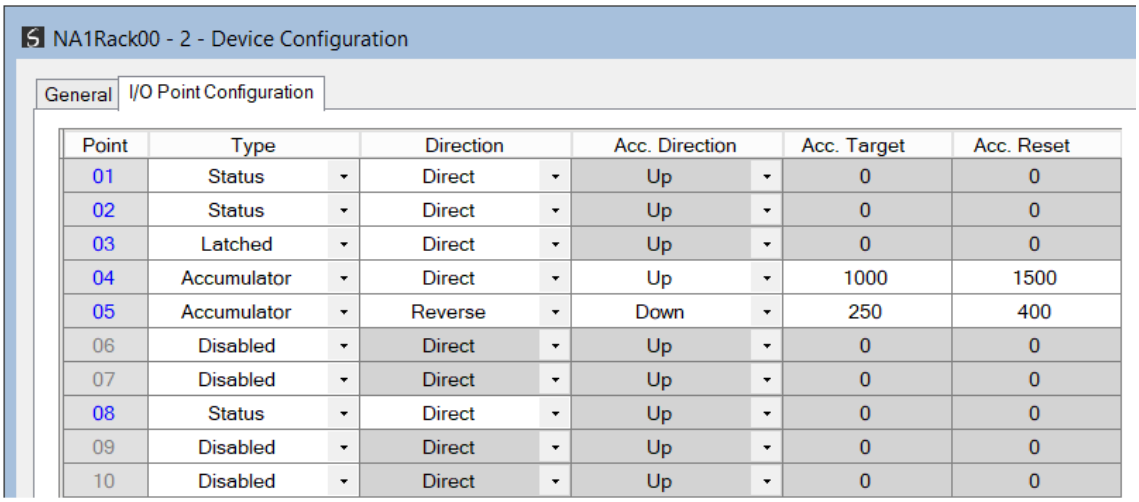


Figure 3.12 – IOP IO Point Configuration – Digital Input 32 (DI32)

The Digital Input IOP IO Point configuration consists of the following parameters:

Parameter	Description
Point	IO Point Index (channel) 1-32
Type	• Disabled • Status • Latched • Accumulator (view the accumulator section below).
Direction	• Direct • Reverse
Acc. Direction	**NOTE:** This selection is only applicable when the type has been selected as accumulator. • Up • Down
Acc. Target	**NOTE:** This selection is only applicable when the type has been selected as accumulator. • The target value for the accumulator.
Acc. Reset	**NOTE:** This selection is only applicable when the type has been selected as accumulator. • The reset value of the accumulator.
User Tag	Optional User Tagname. Can be used to generate Logix Alias tags if required. **NOTE:** The User Tag is not downloaded to the PMIO Scanner and exists only in the offline configuration.

Table 3.5 – IOP IO Point Configuration – Digital Input 32 (DI32) – Parameters

A. STATUS / LATCHED TYPE

When the status / latched type has been selected for a point, the digital value will be in the PMIO Scanner input assembly at the specific IOP address (as shown below). Each bit represents the digital value of a specific point on the DI32 IOP.

Local:3:I2.IOP05	{...}		AP:1756_APMIOIOPInput:I:0
Local:3:I2.IOP05.Status	{...}		AP:1756_APMIOIOPStatus:I:0
Local:3:I2.IOP05.HardwareAddress	24	Decimal	SINT
Local:3:I2.IOP05.SoftwareAddress	88	Decimal	SINT
Local:3:I2.IOP05.DigitalStatus	0	Decimal	DINT
Local:3:I2.IOP05.DigitalInput	2#0000_0000_0000_0000_0000_0000_0000_0000	Binary	DINT
Local:3:I2.IOP05.ChannelStatus	{...}	Decimal	SINT[16]
Local:3:I2.IOP05.ChannelPV	{...}	Float	REAL[16]

Figure 3.13 – PMIO Logix Input Assembly - Digital Input 32 (DI32) – Status/Latched

NOTE: When the latched type has been selected the operation will be identical to the status type, but when a point is set high for longer than 40ms it will be latched for 1.5s.

B. ACCUMULATOR TYPE

When the accumulator type has been selected, the specific point will increment or decrement a counter when the digital input point transitions from 0 to 1. To enable the accumulator (once the type has been set to accumulator in Slate) the user will need to set Bit 1 of the Channel Control for the specific IOP in the output (see below).

Local:3:O1.IOP01	{...}		AP:1756_APMIOIOPOutput:O:0
Local:3:O1.IOP01.Control	{...}		AP:1756_APMIOIOPControl:O:0
Local:3:O1.IOP01.DigitalOutputs	0	Decimal	DINT
Local:3:O1.IOP01.ChannelControl	{...}	Decimal	SINT[16]
Local:3:O1.IOP01.ChannelControl[0]	2#0000_0010	Binary	SINT
Local:3:O1.IOP01.ChannelControl[1]	2#0000_0000	Binary	SINT
Local:3:O1.IOP01.ChannelControl[2]	2#0000_0000	Binary	SINT
Local:3:O1.IOP01.ChannelControl[3]	2#0000_0000	Binary	SINT

Figure 3.14 – PMIO Logix Input Assembly - Digital Input 32 (DI32) – Accumulator Enable

The value of the accumulator will be displayed as a float in the ***ChannelPV*** of the input assembly (as shown below).

Local:3:I1.IOP01	{...}		AP:1756_APMIOIOPInput:I:0
Local:3:I1.IOP01.Status	{...}		AP:1756_APMIOIOPStatus:I:0
Local:3:I1.IOP01.HardwareAddress	-50	Decimal	SINT
Local:3:I1.IOP01.SoftwareAddress	21	Decimal	SINT
Local:3:I1.IOP01.DigitalStatus	1	Decimal	DINT
Local:3:I1.IOP01.DigitalInput	2#0000_0000_0000_0010_0000_0000_0000_0000	Binary	DINT
Local:3:I1.IOP01.ChannelStatus	{...}	Decimal	SINT[16]
Local:3:I1.IOP01.ChannelPV	{...}	Float	REAL[16]
Local:3:I1.IOP01.ChannelPV[0]	33.0	Float	REAL

Figure 3.15 – PMIO Logix Input Assembly - Digital Input 32 (DI32) - Accumulator

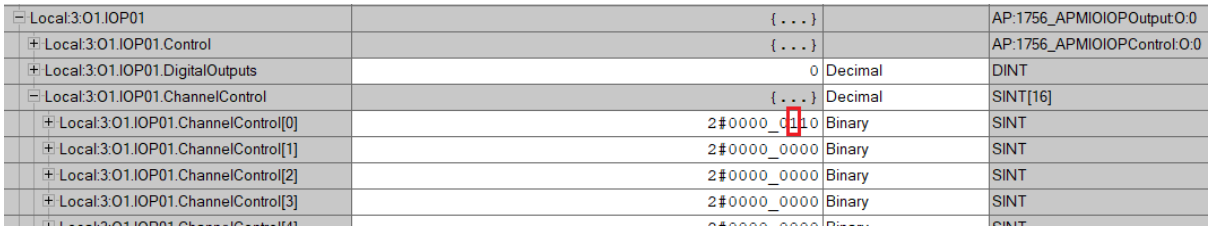
For example, in Slate (for a DI32 IOP) if Point 05 has been configured for accumulator the value will be displayed in ***ChannelPV[4]***.

Once the accumulator value reaches the configured target value for the point (set in Slate), the user will be notified in the Channel Status for the configured point. Bit 1 of the Channel Status for the specific point in the DI32 IOP will be set once the accumulator target value has been reached (as shown below).

Local:3:I1.IOP01	{...}		AP:1756_APMIOIOPInput:I:0
Local:3:I1.IOP01.Status	{...}		AP:1756_APMIOIOPStatus:I:0
Local:3:I1.IOP01.HardwareAddress	-50	Decimal	SINT
Local:3:I1.IOP01.SoftwareAddress	21	Decimal	SINT
Local:3:I1.IOP01.DigitalStatus	1	Decimal	DINT
Local:3:I1.IOP01.DigitalInput	2#0000_0000_0000_0010_0000_0000_0000_0000	Binary	DINT
Local:3:I1.IOP01.ChannelStatus	{...}	Decimal	SINT[16]
Local:3:I1.IOP01.ChannelStatus[0]	2#0000_0011	Binary	SINT
Local:3:I1.IOP01.ChannelStatus[1]	2#0000_0001	Binary	SINT
Local:3:I1.IOP01.ChannelStatus[2]	2#0000_0001	Binary	SINT
Local:3:I1.IOP01.ChannelStatus[3]	2#0000_0001	Binary	SINT

Figure 3.16 – PMIO Logix Input Assembly - Digital Input 32 (DI32) – Accumulator Target Set

The user can reset the accumulator (which will return the accumulator value to the Reset Value configured in Slate), by toggling the reset bit (bit 2) in the output control of the specific IOP from 0 to 1 (as shown below):



Local:3:O1.IOP01	{...}		AP:1756_APMIOIOPOutput:O:0
Local:3:O1.IOP01.Control	{...}		AP:1756_APMIOIOPControl:O:0
Local:3:O1.IOP01.DigitalOutputs	0	Decimal	DINT
Local:3:O1.IOP01.ChannelControl	{...}	Decimal	SINT[16]
Local:3:O1.IOP01.ChannelControl[0]	2#0000_0110	Binary	SINT
Local:3:O1.IOP01.ChannelControl[1]	2#0000_0000	Binary	SINT
Local:3:O1.IOP01.ChannelControl[2]	2#0000_0000	Binary	SINT
Local:3:O1.IOP01.ChannelControl[3]	2#0000_0000	Binary	SINT

Figure 3.17 – PMIO Logix Input Assembly - Digital Input 32 (DI32) – Accumulator Reset

Once the reset has occurred the accumulator value displayed in the ***ChannelPV*** will be at the Reset value configured in Slate.

NOTE: For more details regarding the IOP configuration settings, refer to the relevant Honeywell user manuals.

NOTE: Only the first 16 points in the DI32 IOP can be configured for accumulator type in the input assembly. If point 17+ is configured the user will not have access to the accumulator value in the input assembly and will need to use a Logix Message Instruction to extract the value. See the message instruction below.

ACCUMULATOR VALUE FOR CHANNEL 17+

CIP Message:

Parameter	Description
Service Code	0x6B (Hex)
Class	0x423 (Hex)
Instance	1
Attribute	N/A
Request Data Length	4

Table 3.6 – CIP Message Parameter

Request Data:

Parameter	Data Type	Description
Timeout	INT	The amount of time (in milliseconds) the PMIO Scanner waits for a response before timing out and responding to the EtherNet/IP request with a Timeout Status.

Module Number	SINT	The Module Number (Software Number) of the IOP.
Channel Number	SINT	The channel number on the IOP card.

Table 3.7 – Accumulator Value Request Data

Response Data:

Parameter	Data Type	Description
Status	INT	The status of the response for the specific request. Bit 0 – Checksum Failed Bit 1 – Response Timeout
Accumulator value	INT	When a valid response was received this is the accumulator value for the specific IOP Channel.

Table 3.8 – Accumulator Value Response Data

ACCUMULATOR TARGET REACHED FOR CHANNEL 17+

CIP Message:

Parameter	Description
Service Code	0x71 (Hex)
Class	0x423 (Hex)
Instance	1
Attribute	N/A
Request Data Length	4

Table 3.9 – CIP Message Parameter

Request Data:

Parameter	Data Type	Description
Timeout	INT	The amount of time (in milliseconds) the PMIO Scanner waits for a response before timing out and responding to the EtherNet/IP request with a Timeout Status.
Module Number	SINT	The Module Number (Software Number) of the IOP.
Channel Number	SINT	The channel number on the IOP card.

Table 3.10 – Accumulator Target Reached Request Data

Response Data:

Parameter	Data Type	Description
Status	INT	The status of the response for the specific request. Bit 0 – Checksum Failed Bit 1 – Response Timeout
Accumulator Target Reached	SINT	0 – The configured accumulator target has **not** been reached. 1 – The configured accumulator target has been reached.

Table 3.11 – Accumulator Target Reached Response Data

ACCUMULATOR COMMANDS FOR CHANNEL 17+

CIP Message:

Parameter	Description
Service Code	0x72 (Hex)
Class	0x423 (Hex)
Instance	1
Attribute	N/A
Request Data Length	4

Table 3.12 – CIP Message Parameter

Request Data:

Parameter	Data Type	Description
Timeout	INT	The amount of time (in milliseconds) the PMIO Scanner waits for a response before timing out and responding to the EtherNet/IP request with a Timeout Status.
Module Number	SINT	The Module Number (Software Number) of the IOP.
Channel Number	SINT	The channel number on the IOP card.
Command	SINT	1 – Start Accumulator 2 – Stop Accumulator 3 – Reset Accumulator Value and Target Reached.

Table 3.13 – Accumulator Command Request Data

Response Data:

Parameter	Data Type	Description
Status	INT	The status of the response for the specific request. Bit 0 – Checksum Failed Bit 1 – Response Timeout

Table 3.14 – Accumulator Command Response Data

3.4.2.2. DIGITAL OUTPUT 16 (DO16)

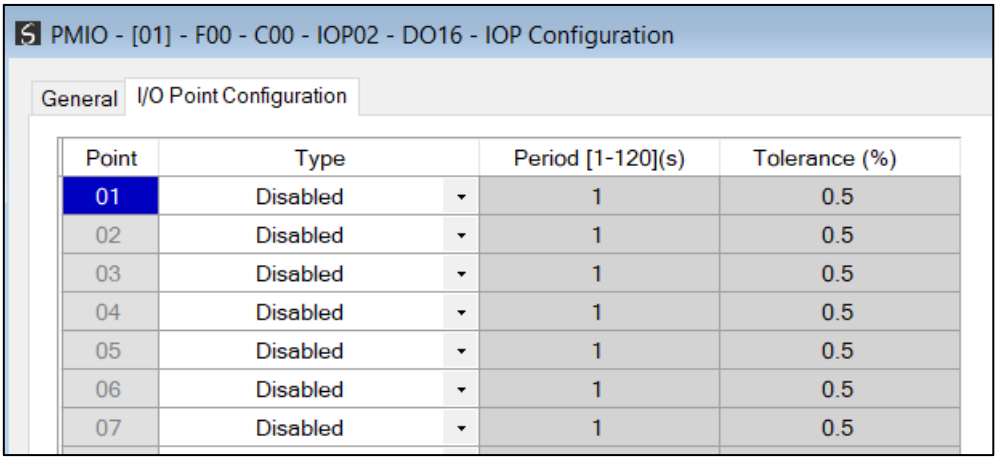


Figure 3.18 – IOP IO Point Configuration – Digital Output 16 (DO16)

The Digital Output IOP IO Point configuration consists of the following parameters:

Parameter	Description
Point	IO Point Index (channel) 1-16
Type	• Disabled • Status • On-Pulse • Off-Pulse • PWM Direct • PWM Reverse
Period	**NOTE:** This selection is only applicable when the type has been selected as PWM. • The period for the Pulse Width Modulation (PWM) in seconds.
Tolerance (%)	• The percentage change required by the output before the value is written to the physical IOP (this is done to lessen the traffic on the IOP network).
User Tag	Optional User Tagname. Can be used to generate Logix Alias tags if required. **NOTE:** The User Tag is not downloaded to the PMIO Scanner and exists only in the offline configuration.

Table 3.15 – IOP IO Point Configuration – Digital Output 16 (DO16) – Parameters

A. STATUS

When the status type has been selected for a point the digital value written to the physical output will be driven by the ***DigitalOutputs*** in the PMIO Output assembly (as shown below). Each bit represents the digital value of a specific point on the DO32 IOP. When the value in

the Digital Output is 1, output point 1 on the DO16 IOP will be driven high.

Local:3:O1.IOP01	{...}		AP:1756_APMIOIOPOutput:O:0
Local:3:O1.IOP01.Control	{...}		AP:1756_APMIOIOPControl:O:0
Local:3:O1.IOP01.DigitalOutputs	2#0000_0000_0000_0000_0000_0000_0000_0000	Binary	DINT
Local:3:O1.IOP01.ChannelControl	{...}	Decimal	SINT[16]
Local:3:O1.IOP01.ChannelPV	{...}	Float	REAL[16]

Figure 3.19 – PMIO Logix Output Assembly - Digital Output 16 (DI16) – Status

B. PULSE

A point on the digital output IOP can be configured to pulse the output On or Off for a specific amount of time. When this mode is set the physical output will be driven by the seconds written to the ***ChannelPV*** of the specific point (as shown below). Thus, if the user writes 3.4 in the ***ChannelPV*** output then the specific output point will pulse on/off (depending on the pulse type selected) for 3.4 seconds.

NOTE: Each time a pulse value is written to the ***ChannelPV*** for the specific output the user will need to write a zero value to the ***ChannelPV*** first before writing the new pulse value.

NOTE: When the Pulse On or Pulse Off type has been selected the user must **not** use the digital outputs in the output assembly to drive the specific output point.

Local:3:O1.IOP01	{...}		AP:1756_APMIOIOPOutput:O:0
Local:3:O1.IOP01.Control	{...}		AP:1756_APMIOIOPControl:O:0
Local:3:O1.IOP01.DigitalOutputs	0	Decimal	DINT
Local:3:O1.IOP01.ChannelControl	{...}	Decimal	SINT[16]
Local:3:O1.IOP01.ChannelPV	{...}	Float	REAL[16]
Local:3:O1.IOP01.ChannelPV[0]	3.4	Float	REAL
Local:3:O1.IOP01.ChannelPV[1]	0.0	Float	REAL
Local:3:O1.IOP01.ChannelPV[2]	0.0	Float	REAL
Local:3:O1.IOP01.ChannelPV[3]	0.0	Float	REAL

Figure 3.20 – PMIO Logix Output Assembly - Digital Output 16 (DO16) – Pulse

C. PWM

A point on the digital output IOP can be configured to Pulse Width Modulate a specific output point on the physical output channel of the DO16 card. The period configured in Slate for the specific output point will determine the frequency of the pulse. For example, if the period is 5s then every 5 seconds the pulse will be initiated.

The pulse width (as a % of the full period time) is changed by writing a value from 0 to 100 to the ChannelPV in the PMIO Scanner output assembly. This value will determine the amount of time the output is pulsed. For example, if the period for the specific point is 10 seconds and the type selected is PWM Direct, then writing a value of 25 to the ***ChannelPV*** in the output will force the physical output to be On for 25% of the period (25% of 10s = 2.5s) before being set to Off.

When the type is selected as PWM Reverse the output will be pulsed Off for the % value written to the ***ChannelPV***.

NOTE: When a digital output point has been set to PWM and the point needs to be disabled, the user will first need to set the PWM value to 0 before disabling the output point. Failing to do this will result in the output pulsing at the last configuration.

NOTE: For more details regarding the IOP configuration settings, refer to the relevant Honeywell user manuals.

3.4.2.3. DIGITAL OUTPUT 32 (DO32)

The configuration for this IOP will be identical to that of the DO16, but with 32 points instead of 16.

NOTE: For more details regarding the IOP configuration settings, refer to the relevant Honeywell user manuals.

NOTE: Only the first 16 points in the DO32 IOP can be configured for Pulse or PWM type using the Output Assembly. If point 17+ is configured the user will not have access to the pulse or duty cycle value in the output assembly and will need to use a Logix Message Instruction to set these values. See the message instructions below.

A. PULSE LOGIX MESSAGE INSTRUCTION

CIP Message:

Parameter	Description
Service Code	0x6C (Hex)
Class	0x423 (Hex)
Instance	1
Attribute	N/A
Request Data Length	8

Table 3.16 – CIP Message Parameter

Request Data:

Parameter	Data Type	Description
Timeout	INT	The amount of time (in milliseconds) the PMIO Scanner waits for a response before timing out and responding to the EtherNet/IP request with a Timeout Status.
Module Number	SINT	The Module Number (Software Number) of the IOP.
Channel Number	SINT	The channel number on the IOP card.
Pulse Time	REAL	The time the Digital Output must be set to ON in seconds.

Table 3.17 – Pulse Request Data

Response Data:

Parameter	Data Type	Description
Status	INT	The status of the response for the specific request. Bit 0 – Checksum Failed Bit 1 – Response Timeout

Table 3.18 – Pulse Response Data

B. PWM DUTY CYCLE LOGIX MESSAGE INSTRUCTION

CIP Message:

Parameter	Description
Service Code	0x6D (Hex)
Class	0x423 (Hex)
Instance	1
Attribute	N/A
Request Data Length	8

Table 3.19 – CIP Message Parameter

Request Data:

Parameter	Data Type	Description
Timeout	INT	The amount of time (in milliseconds) the PMIO Scanner waits for a response before timing out and responding to the EtherNet/IP request with a Timeout Status.
Module Number	SINT	The Module Number (Software Number) of the IOP.
Channel Number	SINT	The channel number on the IOP card.
PWM Duty Cycle	REAL	The duty cycle (in %) of the configured period for the Digital

		Output.

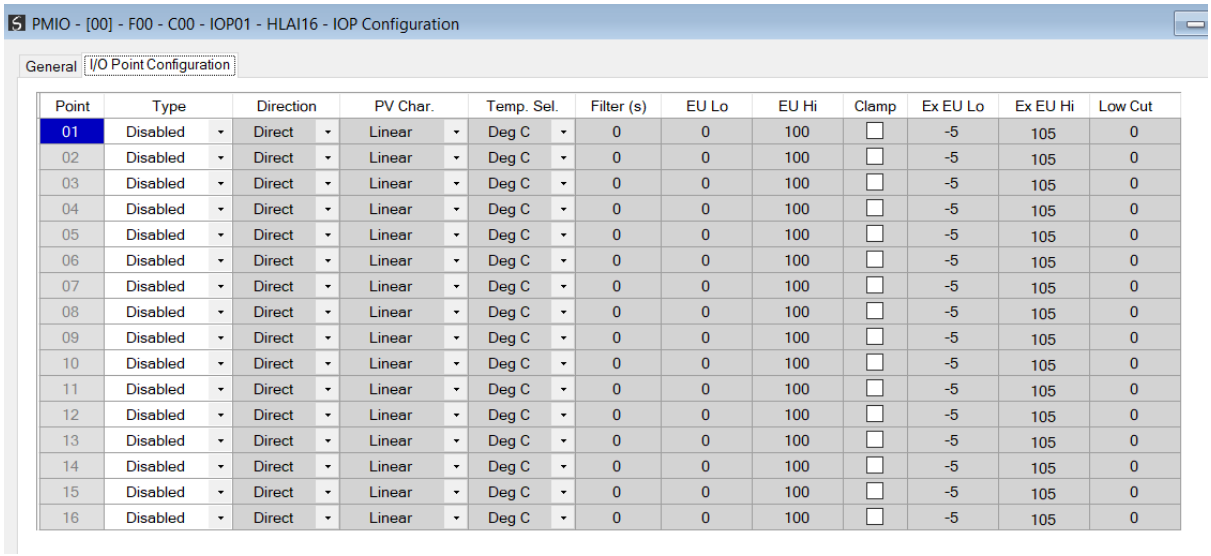
Table 3.20 – PWM Duty Cycle Request Data

Response Data:

Parameter	Data Type	Description
Status	INT	The status of the response for the specific request. Bit 0 – Checksum Failed Bit 1 – Response Timeout

Table 3.21 – PWM Duty Cycle Response Data

3.4.2.4. HIGH LEVEL ANALOG INPUT 16 (HLAI16)



Point	Type	Direction	PV Char.	Temp. Sel.	Filter (s)	EU Lo	EU Hi	Clamp	Ex EU Lo	Ex EU Hi	Low Cut
01	Disabled	Direct	Linear	Deg C	0	0	100	☐	-5	105	0
02	Disabled	Direct	Linear	Deg C	0	0	100	☐	-5	105	0
03	Disabled	Direct	Linear	Deg C	0	0	100	☐	-5	105	0
04	Disabled	Direct	Linear	Deg C	0	0	100	☐	-5	105	0
05	Disabled	Direct	Linear	Deg C	0	0	100	☐	-5	105	0
06	Disabled	Direct	Linear	Deg C	0	0	100	☐	-5	105	0
07	Disabled	Direct	Linear	Deg C	0	0	100	☐	-5	105	0
08	Disabled	Direct	Linear	Deg C	0	0	100	☐	-5	105	0
09	Disabled	Direct	Linear	Deg C	0	0	100	☐	-5	105	0
10	Disabled	Direct	Linear	Deg C	0	0	100	☐	-5	105	0
11	Disabled	Direct	Linear	Deg C	0	0	100	☐	-5	105	0
12	Disabled	Direct	Linear	Deg C	0	0	100	☐	-5	105	0
13	Disabled	Direct	Linear	Deg C	0	0	100	☐	-5	105	0
14	Disabled	Direct	Linear	Deg C	0	0	100	☐	-5	105	0
15	Disabled	Direct	Linear	Deg C	0	0	100	☐	-5	105	0
16	Disabled	Direct	Linear	Deg C	0	0	100	☐	-5	105	0

Figure 3.21 – IOP IO Point Configuration – High Level Analog Input 16 (HLAI16)

The High-Level Analog Input IOP IO Point configuration consists of the following parameters:

Parameter	Description
Point	IO Point Index (channel) 1-16
Type	• Disabled • 0 – 5V • 0.4 – 2.0V • 1 – 5V • Slide Wire
Direction	• Direct • Reverse

PV Char	• Linear • Square Root • B Thermal • E Thermal • J Thermal • K Thermal • R Thermal • RP Thermal • S Thermal • T Thermal • Din RTD • Jis RTD • Nickel RTD • Copper RTD
Temp Select	**NOTE:** This selection is only applicable when the PV Char has been selected as a Thermal. • Deg C • Deg F • Deg K • Deg R
Filter	First order filtering is performed on the analog input value based on the value in seconds entered into this parameter. Note that the value is a float and the unit is seconds.
EU Lo/Hi	If the analog input value reaches the Ex EU limits (and the Clamp parameter is set) it will be limited to the EU Lo and EU Hi parameters defined.
Clamp	This parameter will force the analog input value to be clamped to the EU Lo/Hi parameters once the value reached the Ex EU Lo/Hi limits.
Ex EU Lo/Hi	PV range limits defined by the Ex EU Lo and Hi parameters.
Low Cut	If the Analog Input value is less than the Low-Cut parameter, it will force the Analog Input value to EU Lo.
User Tag	Optional User Tagname. Can be used to generate Logix Alias tags if required. **NOTE:** The User Tag is not downloaded to the PMIO Scanner and exists only in the offline configuration.

Table 3.22 – IOP IO Point Configuration – High Level Analog Input 16 (HLAI16) - Parameters

The value of the specific analog input will be displayed as a float in the ***ChannelPV*** of the input assembly (as shown below).

Local:3:I1.IOP01	{...}		AP:1756_APMIOIOPInput:I:0
Local:3:I1.IOP01.Status	{...}		AP:1756_APMIOIOPStatus:I:0
Local:3:I1.IOP01.HardwareAddress	-50	Decimal	SINT
Local:3:I1.IOP01.SoftwareAddress	21	Decimal	SINT
Local:3:I1.IOP01.DigitalStatus	1	Decimal	DINT
Local:3:I1.IOP01.DigitalInput	2#0000_0000_0000_0010_0000_0000_0000_0000	Binary	DINT
Local:3:I1.IOP01.ChannelStatus	{...}	Decimal	SINT[16]
Local:3:I1.IOP01.ChannelPV	{...}	Float	REAL[16]
Local:3:I1.IOP01.ChannelPV[0]	33.0	Float	REAL

Figure 3.22 – PMIO Logix Input Assembly - Analog Input 16 (HLAI16) - PV

For example, an HLAI16 configured for AOP Index 1 will have Analog input Point 5 available at ***IOP01.ChannelPV[4]***.

3.4.2.5. LOW LEVEL ANALOG INPUT 8 (LLAI8)

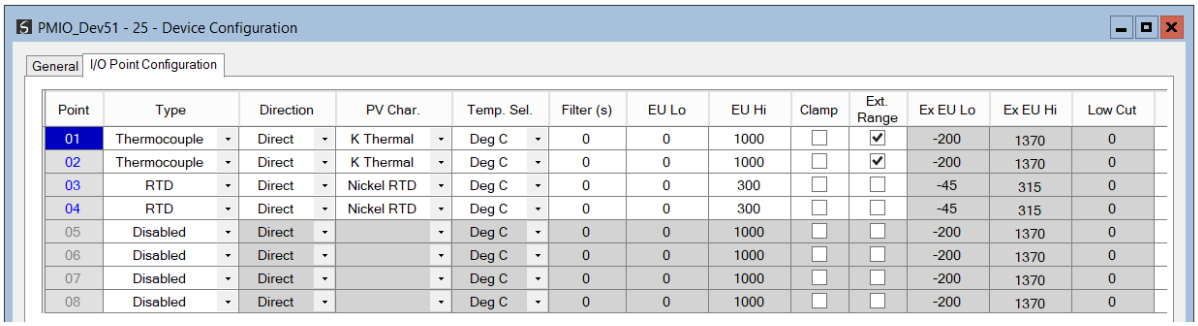


Figure 3.23 – IOP IO Point Configuration – Low Level Analog Input 8 (LLAI8)

The Low-Level Analog Input IOP IO Point configuration consists of the following parameters:

Parameter	**Description**
Point	IO Point Index (channel) 1-8
Type	• Disabled • 0 – 5V • 1 – 5V • 0 – 100 mV • Thermocouple • RTD
Direction	• Direct • Reverse
PV Char	• Linear • Square Root • B Thermal • E Thermal • J Thermal • K Thermal • R Thermal • RP Thermal • S Thermal • T Thermal • Din RTD • Jis RTD • Nickel RTD

	• Copper RTD
Temp Select	**NOTE:** This selection is only applicable when the type has been selected as a Thermocouple or RTD. • Deg C • Deg F • Deg K • Deg R
Filter	First order filtering is performed on the analog input value based on the value in seconds entered into this parameter. Note that the value is a float and the unit is seconds.
EU Lo/Hi	The selected EU Lo and Hi values must be within the Ex EU Lo and EX EU Hi Limits.
Clamp	This parameter will force the analog input value to be clamped to the EU Lo/Hi parameters once the value reached the limits.
Ex EU Lo/Hi	PV range limits defined by the Ex EU Lo and Hi parameters.
Low Cut	If the Analog Input value is less than the Low-Cut parameter, it will force the Analog Input value to EU Lo. Not applicable for Thermocouple and RTD types.
User Tag	Optional User Tagname. Can be used to generate Logix Alias tags if required. **NOTE:** The User Tag is not downloaded to the PMIO Scanner and exists only in the offline configuration.

Table 3.23 – IOP IO Point Configuration – Low Level Analog Input 8 (LLAI8) - Parameters

The value of the specific analog input will be displayed as a float in the ***ChannelPV*** of the input assembly (as shown below).

Local:3:I1.IOP01	{...}		AP:1756_APMIOIOPInput:I:0
Local:3:I1.IOP01.Status	{...}		AP:1756_APMIOIOPStatus:I:0
Local:3:I1.IOP01.HardwareAddress	-50	Decimal	SINT
Local:3:I1.IOP01.SoftwareAddress	21	Decimal	SINT
Local:3:I1.IOP01.DigitalStatus	1	Decimal	DINT
Local:3:I1.IOP01.DigitalInput	2#0000_0000_0000_0010_0000_0000_0000_0000	Binary	DINT
Local:3:I1.IOP01.ChannelStatus	{...}	Decimal	SINT[16]
Local:3:I1.IOP01.ChannelPV	{...}	Float	REAL[16]
Local:3:I1.IOP01.ChannelPV[0]	33.0	Float	REAL

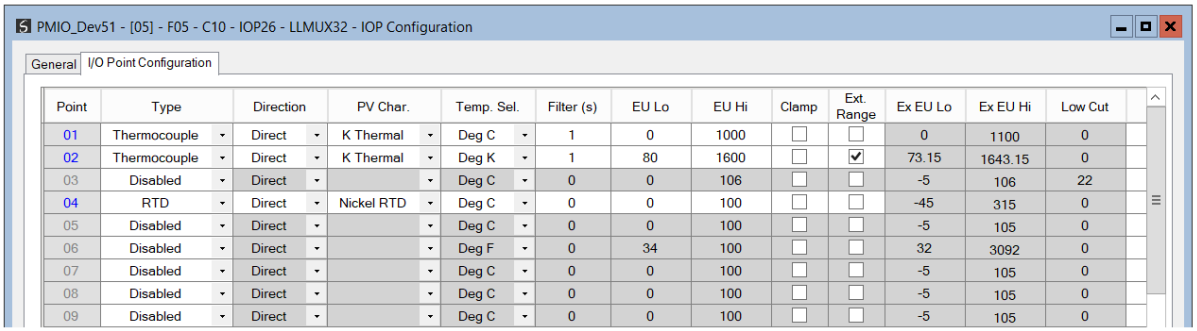
Figure 3.24 – PMIO Logix Input Assembly - Low Level Analog Input 8 (LLAI8) - PV

For example, an LLAI8 configured for AOP Index 1 will have Analog input Point 5 available at ***IOP01.ChannelPV[4]***.

NOTE: For more details regarding the IOP configuration settings, refer to the relevant Honeywell user manuals.

3.4.2.6. LOW LEVEL ANALOG MULTIPLEXER 32 (LLMUX32)

NOTE: Due to the density (32) of this module, the LLMUX32 occupies 2 logical AOP indexes. It will occupy the configured index and the one immediately thereafter. The LLMUX32 should therefore be counted twice when applying the maximum IOP per Scanner Limit of 28.



Point	Type	Direction	PV Char.	Temp. Sel.	Filter (s)	EU Lo	EU Hi	Clamp	Ext. Range	Ex EU Lo	Ex EU Hi	Low Cut
01	Thermocouple	Direct	K Thermal	Deg C	1	0	1000	☐	☐	0	1100	0
02	Thermocouple	Direct	K Thermal	Deg K	1	80	1600	☐	☑	73.15	1643.15	0
03	Disabled	Direct		Deg C	0	0	106	☐	☐	-5	106	22
04	RTD	Direct	Nickel RTD	Deg C	0	0	100	☐	☐	-45	315	0
05	Disabled	Direct		Deg C	0	0	100	☐	☐	-5	105	0
06	Disabled	Direct		Deg F	0	34	100	☐	☐	32	3092	0
07	Disabled	Direct		Deg C	0	0	100	☐	☐	-5	105	0
08	Disabled	Direct		Deg C	0	0	100	☐	☐	-5	105	0
09	Disabled	Direct		Deg C	0	0	100	☐	☐	-5	105	0

Figure 3.25 – IOP IO Point Configuration – Low Level Analog Multiplexer32 (LLMUX32)

The Low-Level Analog Multiplexer IOP IO Point configuration consists of the following parameters:

Parameter	Description
Point	IO Point Index (channel) 1-32
Type	• Disabled • 0 – 5V • 1 – 5V • 0 – 100 mV • Thermocouple • RTD
Direction	• Direct • Reverse
PV Char	• Linear • Square Root • B Thermal • E Thermal • J Thermal • K Thermal • R Thermal • RP Thermal • S Thermal • T Thermal

	• Din RTD • Jis RTD • Nickel RTD • Copper RTD
Temp Select	**NOTE:** This selection is only applicable when the type has been selected as PV Char has been selected as a Thermocouple or RTD. • Deg C • Deg F • Deg K • Deg R
Filter	First order filtering is performed on the analog input value based on the value in seconds entered into this parameter. Note that the value is a float and the unit is seconds.
EU Lo/Hi	The selected EU Lo and Hi values must be within the Ex EU Lo and EX EU Hi Limits.
Clamp	This parameter will force the analog input value to be clamped to the EU Lo/Hi parameters once the value reached the limits.
Ex EU Lo/Hi	PV range limits defined by the Ex EU Lo and Hi parameters.
Low Cut	If the Analog Input value is less than the Low-Cut parameter, it will force the Analog Input value to EU Lo. Not applicable for Thermocouple and RTD types.
User Tag	Optional User Tagname. Can be used to generate Logix Alias tags if required. **NOTE:** The User Tag is not downloaded to the PMIO Scanner and exists only in the offline configuration.

Table 3.24 – IOP IO Point Configuration – Low Level Analog Multiplexer 32 (LLMUX32) - Parameters

The value of the specific analog input will be displayed as a float in the ***ChannelPV*** of the input assembly (as shown below).

Local:3:I1.IOP01	{...}		AP:1756_APMIOIOPInput:I:0
Local:3:I1.IOP01.Status	{...}		AP:1756_APMIOIOPStatus:I:0
Local:3:I1.IOP01.HardwareAddress	-50	Decimal	SINT
Local:3:I1.IOP01.SoftwareAddress	21	Decimal	SINT
Local:3:I1.IOP01.DigitalStatus	1	Decimal	DINT
Local:3:I1.IOP01.DigitalInput	2#0000_0000_0000_0010_0000_0000_0000_0000	Binary	DINT
Local:3:I1.IOP01.ChannelStatus	{...}	Decimal	SINT[16]
Local:3:I1.IOP01.ChannelPV	{...}	Float	REAL[16]
Local:3:I1.IOP01.ChannelPV[0]	33.0	Float	REAL

Figure 3.26 – PMIO Logix Input Assembly - Low Level Analog Multiplexer 32 (LLAI32) - PV

For example, an LLMUX32 configured for AOP Index 1, will occupy both AOP index 1 and AOP Index 2, and

Analog input Point 5 will be available at IOP01.ChannelPV[4], and
Analog input Point 16 will be available at IOP01.ChannelPV[15], and
Analog input Point 17 will be available at IOP02.ChannelPV[0], and
Analog input Point 32 will be available at IOP02.ChannelPV[15].

NOTE: For more details regarding the IOP configuration settings, refer to the

relevant Honeywell user manuals.

3.4.2.7. ANALOG OUTPUT 16 (AO16)

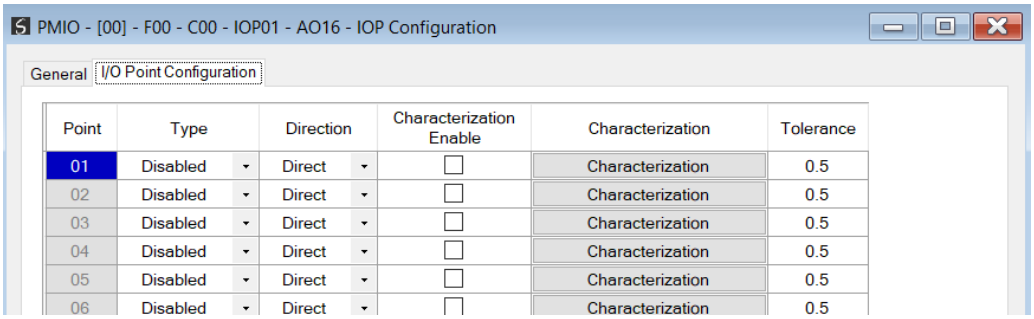


Figure 3.27 – IOP IO Point Configuration – Analog Output 16 (AO16)

The Analog Output IOP IO Point configuration consists of the following parameters:

Parameter	Description
Point	IO Point Index (channel) 1-16
Type	• Disabled • Enable
Direction	• Direct • Reverse
Characterization Enabled	Enable the output characterization.
Characterization	The output characterization allows the user to specify an output transfer function using a set of X-Y coordinates.
Tolerance	The value change required by the output before the value is written to the physical IOP (this is done to lessen the traffic on the IOP network).
User Tag	Optional User Tagname. Can be used to generate Logix Alias tags if required. **NOTE:** The User Tag is not downloaded to the PMIO Scanner and exists only in the offline configuration.

Table 3.25 – IOP IO Point Configuration – Analog Output 16 (AO16) – Parameters

The physical analog output will be driven by the % value written to the *ChannelPV* of the specific point (as shown below). Thus, if the user writes 3.4 in the *ChannelPV* output then the specific output point will be 3.4% of the 0 – 20mA output.



NOTE: The value written to the *ChannelPV* will need to change by more than the tolerance configured for the specific analog output point before the value will be written to the IOP.

Local:3:O1.IOP01	{...}		AP:1756_APMIOIOPOutput:O:0
Local:3:O1.IOP01.Control	{...}		AP:1756_APMIOIOPControl:O:0
Local:3:O1.IOP01.DigitalOutputs	0	Decimal	DINT
Local:3:O1.IOP01.ChannelControl	{...}	Decimal	SINT[16]
Local:3:O1.IOP01.ChannelPV	{...}	Float	REAL[16]
Local:3:O1.IOP01.ChannelPV[0]	3.4	Float	REAL
Local:3:O1.IOP01.ChannelPV[1]	0.0	Float	REAL
Local:3:O1.IOP01.ChannelPV[2]	0.0	Float	REAL
Local:3:O1.IOP01.ChannelPV[3]	0.0	Float	REAL

Figure 3.28 – PMIO Logix Output Assembly - Analog Output 16 (AO16)

3.4.2.8. ANALOG OUTPUT 8 (AO8)

The configuration for this IOP will be identical to that of the AO16, but with 8 points instead of 16.

NOTE: For more details regarding the IOP configuration settings, refer to the relevant Honeywell user manuals.

3.4.2.9. SMART TRANSMITTER INTERFACE (STIM)

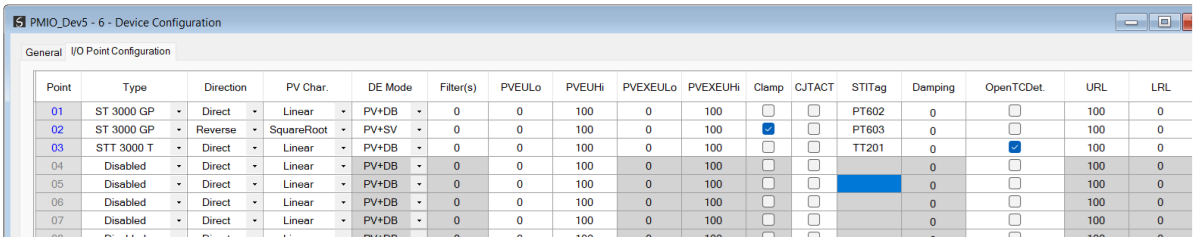


Figure 3.29 – IOP IO Point Configuration – Smart Transmitter Interface (STIM)

The STIM IOP IO Point configuration consists of the following parameters:

Parameter	Description
Point	IO Point Index (channel) 1-16
Type	Select the Sensor Type • Disabled • 0 – 5V • 1 – 5V • 0 – 100 mV • Thermocouple • RTD • 0.4 – 2V • Slidewire • Slidewire Source • ST 3000 DP (Differential Pressure) • ST 3000 GP (Gauge Pressure)

	• ST 3000 AP (Absolute Pressure) • STT 3000 T (STT – Temperature) • MW 3000 MF (SFM – Magnetic Flow and Multivariable)
Direction	Select the Input Direction: • Direct • Reverse
PV Char	Select the PV Characterization: • Linear • Square Root • B Thermal • E Thermal • J Thermal • K Thermal • R Thermal • S Thermal • T Thermal • N Thermal • W3W25TC Thermal • W5W26TC Thermal • NiNiMo Thermal • P100 DIN RTD • PT100 JIS RTD • PT200 RTD • PT500 RTD • Nickel RTD • Copper 10 RTD • Copper 25 RTD • RH Rad RTD
DE Mode	Digitally Enhanced Configuration Mode • None (Analog) • PV (Transmits only the PV; 4-byte) • PV+SV (Transmits the PV and the secondary variable (SV); 4-byte) • PV+DB (Transmits the PV and the transmitter database; 6-byte) • PV+SV+DB (Transmits the PV, SV, and the transmitter database; 6-byte)
Filter	First order filtering is performed on the analog input value based on the value in seconds entered into this parameter. Note that the value is a float and the unit is seconds.
EU Lo/Hi	The selected EU Lo and Hi values must be within the Ex EU Lo and EX EU Hi Limits.
Ex EU Lo/Hi	PV range limits defined by the Ex EU Lo and Hi parameters.
Clamp	This parameter will force the analog input value to be clamped to the EU Lo/Hi parameters once the value reached the limits.
CJTACT	Internal Cold Junction Temperature selection:

	• Unchecked – **External** cold junction temperature • Checked – **Internal** cold junction temperature
STI Tag	Transmitter Tag Name
Damping	The first order filtering executed at the transmitter level. Allowed values depend on the transmitter type.
Open TC Det.	Open Thermocouple Detection Enable
URL	Upper Range Limit of Transmitter
LRL	Lower Range Limit of Transmitter
URV	Upper Range Value of Transmitter
LRV	Lower Range Value of Transmitter
User Tag	Optional User Tagname. Can be used to generate Logix Alias tags if required. **NOTE:** The User Tag is not downloaded to the PMIO Scanner and exists only in the offline configuration.
Eng Units	Smart Transmitter Engineering Units • In H2O (PT - Inches of water) • mm HG (PT - Millimeters of mercury) • psi (PT - Pounds per square inch) • kPa (PFT - Kilopascals) • MPa (PT - Millipascals) • Mbar (PT - Millibars) • bar (PT - Bars) • g/cm2 (PT - Grams per square centimeter) • Kg/cm2 (PFT - Kilograms per square centimeter) • mm H2O (PT - Millimeters of water) • In HG (PT - inches of mercury) • deg C (TT - Degrees Centigrade) • deg F (TT - Degrees Fahrenheit) • deg K (TT - Degrees Kelvin) • deg R (TT - Degrees Rankine) • mV (TT - Millivolts) • V (TT - Volts) • ohms (TT - RTD Ohms) • m3/h (MFT (V) - Cubic Meters Per Hour) • gal/h (MFT (V) - Gallons per hour) • l/h (MFT (V) - Liters per hour) • cm3/h (MFT (V) - Cubic Centimeters per hour) • m3/h (MFT (V) - Cubic Meters Per Hour) • gal/m (MFT (V) - Gallons per minute) • l/m (MFT (V) - Liters per minute) • cm3/m (MFT (V) - Cubic centimeters per minute)

	• m3/day (MFT (V) - Cubic meters per day) • gal/day (MFT (V) - Gallons per day) • kgal/day (MFT (V) - Thousands of gallons per day) • brl/day (MFT (V) - Barrels per day) • cm/s (MFT (V) - Centimeters per second) • kg/h (MFT (m) - Kilograms Per Hour) • lbs/h (MFT (m) - Pounds Per Hour) • ft/s (MFT (V) - Feet per second) • m/s (MFT (V) - Meters per second) • kg/m (MFT (m) - Kilograms per minute) • kg/s (MFT (m) - Kilograms per second) • lbs/m (MFT (m) - Pounds per minute) • lbs/s (MFT (m) - Pounds per second) • % (Percent) • (None) (Blank - (Multi-PV Transmitter with SFM SENSRTYP)) • lbs (Pounds) • kg (Kilograms) • tons (Tons) • g (Grams) • oz (Ounces) • gal (Gallons) • brl (Barrels) • m3 (Cubic Meters) • l (Liters) • ml (Milliliters) • floz (Fluid Ounce) • ft (Feet) • m (Meters) • mm (Millimeters) • in (Inches) • kg/m3 (Kilograms per cubic meter) • g/m3 (Grams per cubic meter) • lbs/ft3 (Pounds per cubic foot) • lbs/in3 (Pounds per cubic inches)
Low Level Cut	If the Analog Input value is less than the Low-Cut parameter, it will force the Analog Input value to EU Lo. Applies only if the PV Char is set to Linear or Square Root.

Table 3.26 – IOP IO Point Configuration – Smart Transmitter Interface (STIM) - Parameters

The value of the specific point's PV will be displayed as a float in the ***ChannelPV*** of the input assembly (as shown below).

Local:3:I1.IOP01	{...}		AP:1756_APMIOIOPInput:I:0
Local:3:I1.IOP01.Status	{...}		AP:1756_APMIOIOPStatus:I:0
Local:3:I1.IOP01.HardwareAddress	-50	Decimal	SINT
Local:3:I1.IOP01.SoftwareAddress	21	Decimal	SINT
Local:3:I1.IOP01.DigitalStatus	1	Decimal	DINT
Local:3:I1.IOP01.DigitalInput	2#0000_0000_0000_0010_0000_0000_0000_0000	Binary	DINT
Local:3:I1.IOP01.ChannelStatus	{...}	Decimal	SINT[16]
Local:3:I1.IOP01.ChannelPV	{...}	Float	REAL[16]
Local:3:I1.IOP01.ChannelPV[0]	33.0	Float	REAL

Figure 3.30 – PMIO Logix Input Assembly - Smart Transmitter Interface (STIM) - PV

For example, a STIM configured for AOP Index 1 will have Analog input Point 5 available at ***IOP01.ChannelPV[4]***.

NOTE: For more details regarding the STIM IOP configuration settings, refer to the relevant Honeywell user manuals.

3.5. IMPORTING EB (EXCEPTION BUILD) FILES

The Slate utility provides the ability to import Honeywell Exception Build (EB) files. EB Files can be generated from the Honeywell system to include information on IO Points and network (UCN) information.

To import one or more EB files, right-click on the PMIO Scanner in the project tree and select the ***Import TDC 3000 'EB' File*** option.

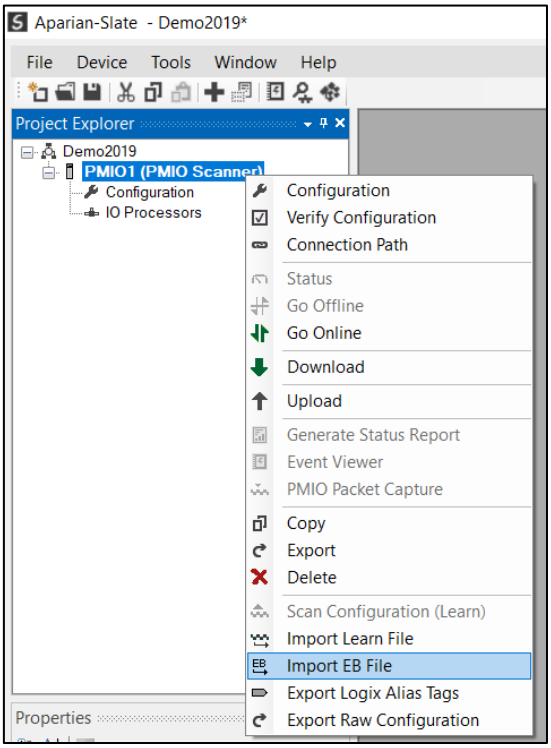


Figure 3.31 – Import EB File option

An open file dialog will open allowing the user to select one or more EB files. To select multiple files, use the ***shift*** key.

NOTE: Ensure that all relevant EB files are contained within the same Windows folder before starting the import process.

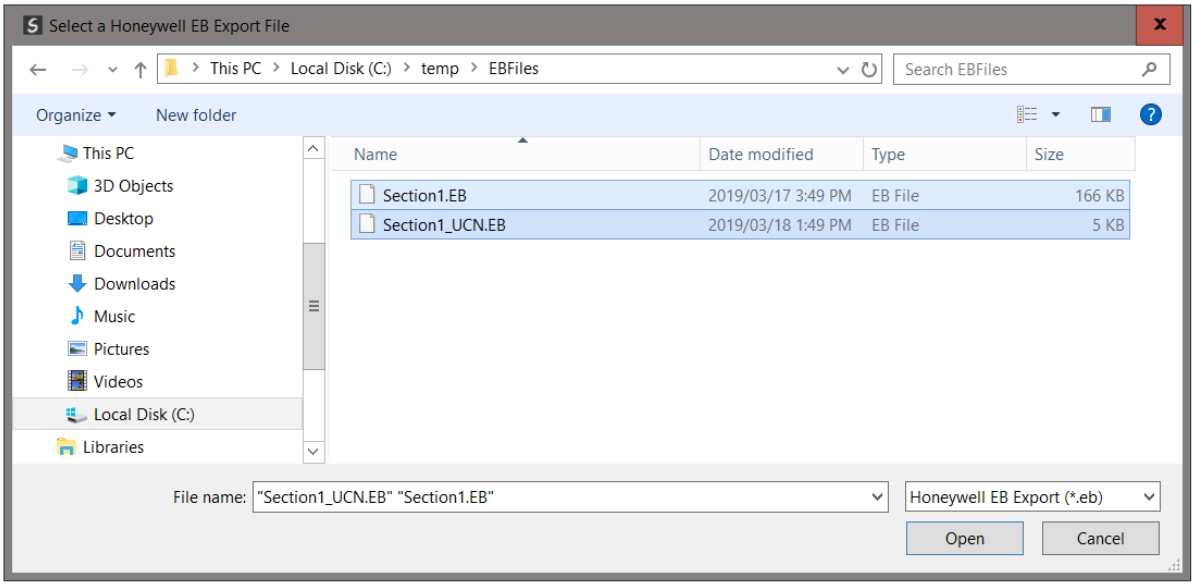


Figure 3.32 – Selecting EB files

Once the files have been selected, they are processed, and a summary generated. The user is then able to select which of the IOPs should be imported into the current PMIO Scanner. Once an IOP is selected for import, the user has the ability to configure the Logix Index, confirm the IOP Type and adjust the File and Card addresses. If the selected EB file set contains information on the UCN network setup, then the File and Card addresses would be populated automatically. If they are not included, then the File and Card addresses would default to zero, and the user would need to configure these addresses manually.

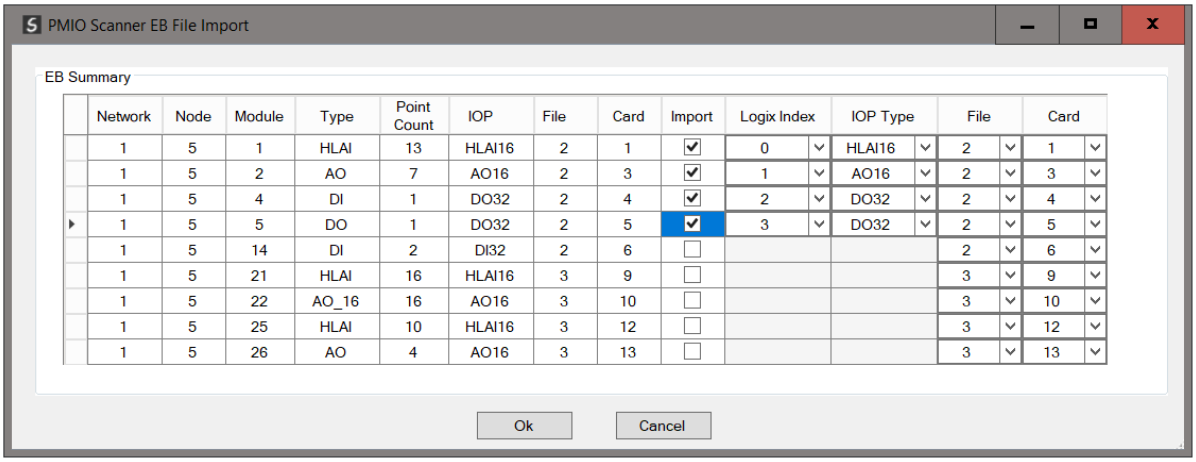


Figure 3.33 – EB Import Summary

Once the IOP selection has been completed, press ***Ok***. The IOPs, and their respective channel configuration will be added to the PMIO Scanner's configuration.

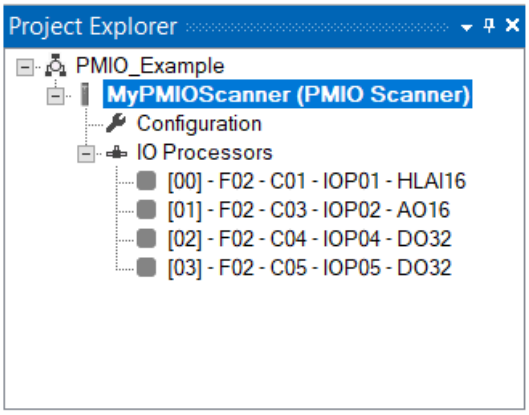


Figure 3.34 – EB Import complete

3.6. CABLE REDUNDANCY

The PMIO Scanner supports cable redundancy on the I/O Link network with Channel A and Channel B ports. If the user configures the ***IO Link Redundancy*** in the module configuration to ***Normal (A+B)*** then both Channel A and B will be operational.

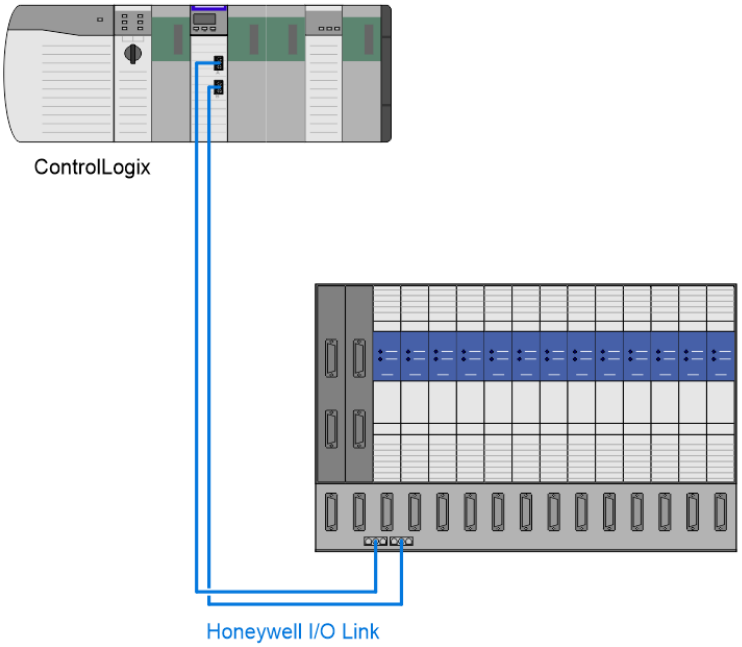


Figure 3.35 – PMIO Redundant cable architecture

In this mode one of the channels (can be either Channel A or Channel B) will be the active (i.e. sending request packets) while the other channel is in standby (listening). Once the cable of the active channel is broken the other channel will become active and take over the communication within the *Switch-Over Timeout* parameter in the Advanced configuration.

Once the broken cable is repaired that channel will now be in standby (listening).

NOTE: Once a redundancy event has occurred (i.e. the cable on the active channel is broken and the standby channel takes over) there is a **30 second cool down period** required before another redundancy event can occur.

3.7. PMIO SCANNER REDUNDANCY

The PMIO Scanner supports module redundancy, where two PMIO Scanners operate in an Active/Standby configuration.

NOTE: The user will need to use the ***APMIOScannerRedundancyAOI*** AOI (Add-On-Instruction) provided by Aparian to correctly incorporate module redundancy. Example Logix code (including the AOI and UDTs) can be found on the Aparian website.

In this mode the Logix AOI will determine if the standby PMIO Scanner needs to take over from the active PMIO Scanner due to, for example, faulty or missing I/O Link cables on the active PMIO Scanner.

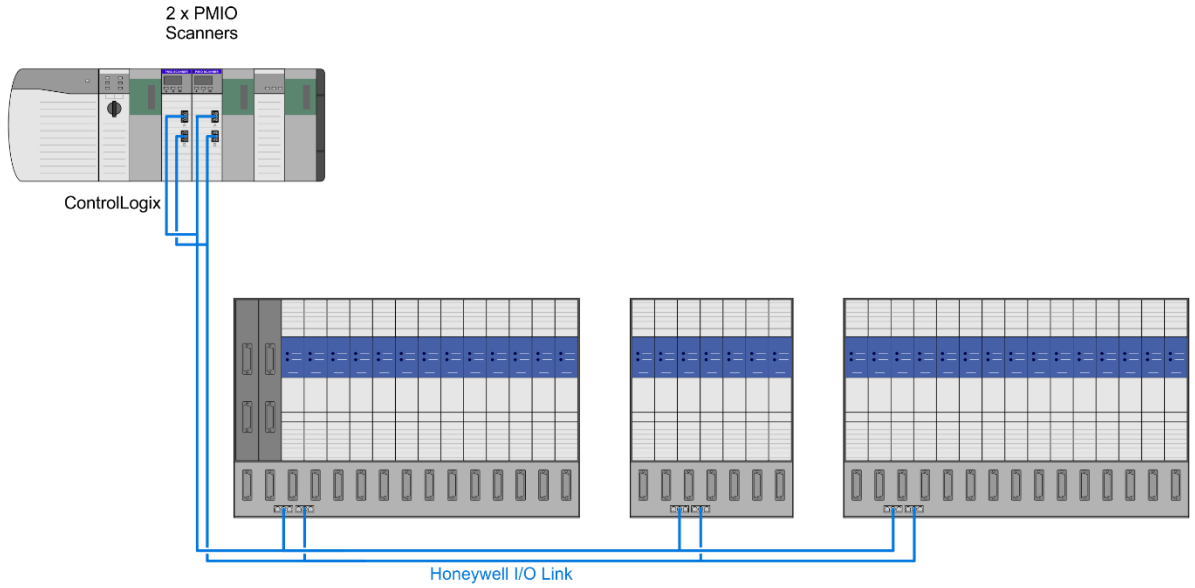


Figure 3.36 – PMIO Redundant module architecture

The PMIO Scanners can be in the same or different ControlLogix chassis.

The user will need to set the ***Scanner Configuration*** in the General Configuration to ***Redundant***.

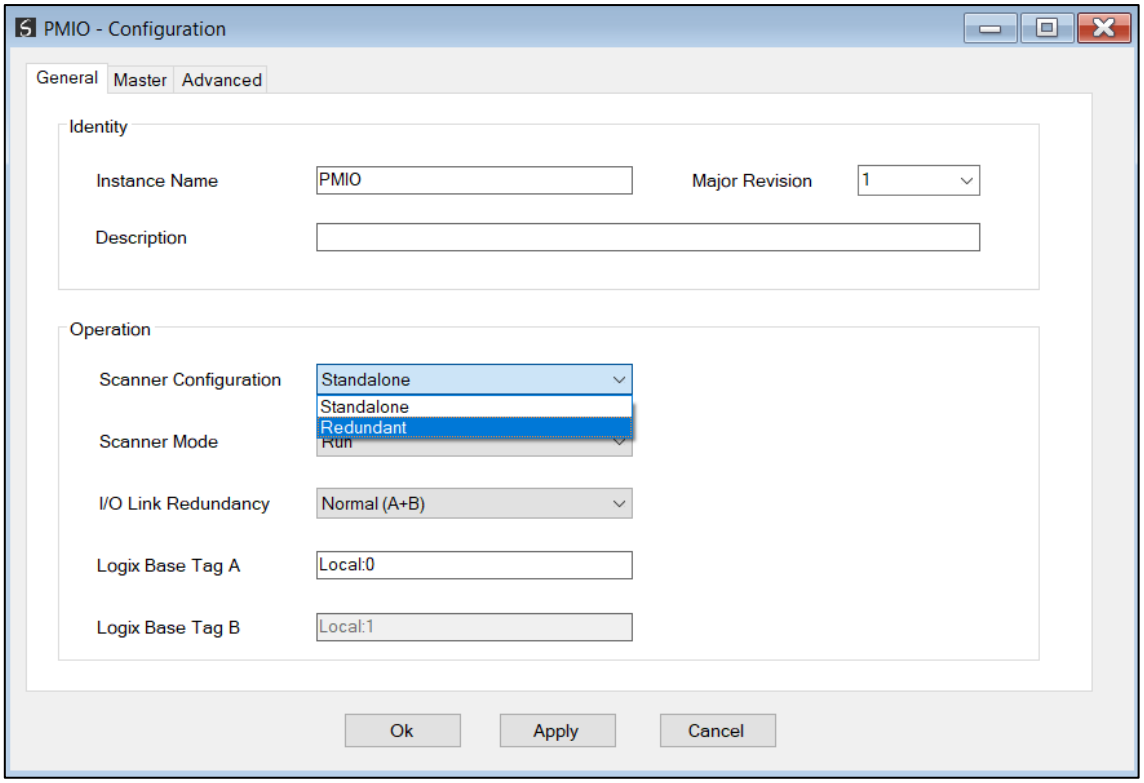


Figure 3.37 – Scanner Configuration – Redundant

The PMIO Scanner redundancy is shown by the dual module icon in the Slate project tree. The same configuration is downloaded to both PMIO Scanners by selecting the ***Download to Both*** option in the right-click menu.

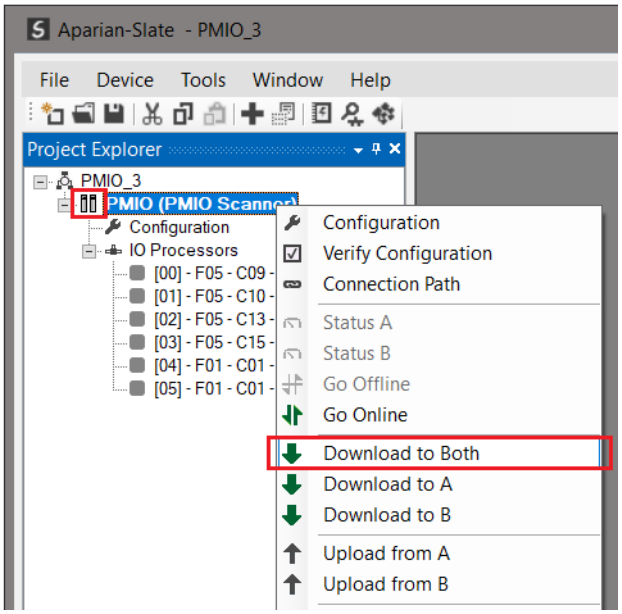


Figure 3.38 – Redundant Configuration Tree

NOTE: When operating in module redundancy mode, the user needs to ensure that the configuration of both modules is identical. Different module configuration within the pair could result in unexpected behaviour when a module switch-over occurs.

3.7.1. Redundant Scanner AOI Operation

The ***APMIOScannerRedundancyAOI*** AOI must be employed for PMIO Scanner redundancy.

NOTE: When using module redundancy mode, the ***APMIOScannerRedundancyAOI*** Add-On-Instruction must be used and must be configured correctly. Failure to do this may result in both PMIO Scanners being active on the same I/O Link network causing errors.

The user application code should make use of the common tag of UDT type ***APMIOScannerPair*** e.g. “MyAPMIOPair”. This structure contains Input and Output sections for each IOP similar to that provided by the AOP.
When PMIO Scanner A is selected, then this tag will reflect the inputs from Scanner A. Conversely, when PMIO Scanner B is selected, then this tag will reflect the inputs from Scanner B. The common tag’s outputs are written to both PMIO Scanners A and B, but only the active scanner will make use of them.

NOTE: In redundant PMIO Scanner applications the common ***APMIOScannerPair*** tag name must be the same as the modules’ ***Instance Name*** for the exported Logix Alias tags to be valid.

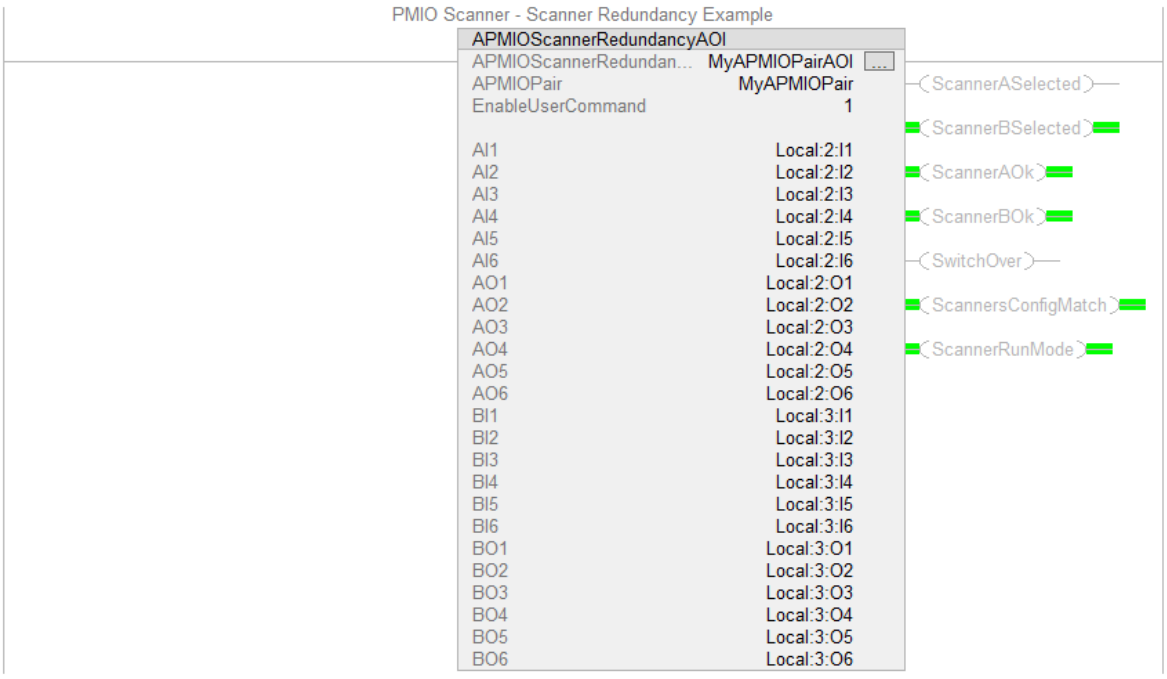


Figure 3.39 – PMIO Scanner Redundant AOI example

The AOI sets the ***MasterControl.Disable*** bit of the PMIO Scanner that is in Standby (Not Active.)

The ***APMIOScannerRedundancyAOI*** Add-On-Instruction monitors the status of each of the PMIO Scanner modules in the pair and selects which module should be active by disabling the other.

The AOI has the following parameters:

Parameter	Type	Description
APMIOPair	InOut	Common Tag (UDT ***APMIOScannerPair***)
ScannerASelected	Output	Scanner A is currently selected.
ScannerBSelected	Output	Scanner B is currently selected.
ScannerAOk	Output	Scanner A is connected on the backplane, has valid configuration and has at least one I/O Link port active.
ScannerBOk	Output	Scanner B is connected on the backplane, has valid configuration and has at least one I/O Link port active.
SwitchOver	Output	A switch-over has recently occurred. During this time the IOPs inputs and status will be frozen until the (new) active Scanner reports it running.
ScannersConfigMatch	Output	Set to zero if the two PMIO Scanners have different configurations.
ScannerRunMode	Output	Set to 1 when the Scanner is in RUN mode.
EnableUserComamnd	Input	When 1, the user command is processed, When 0, the user command is ignored. (The user command can be used to manually select the Active PMIO Scanner.)
AI1 … AI6	InOut	The AOP Input connections from Scanner A (1 through 6)
AO1 … AO6	InOut	The AOP Output connections from Scanner A (1 through 6)
BI1 … BI6	InOut	The AOP Input connections from Scanner B (1 through 6)
BO1 … BO6	InOut	The AOP Output connections from Scanner B (1 through 6)

Table 3.27 – Redundant Scanner AOI Parameters

For the sake of convenience some of the AOI output parameters are echoed in the ***APMIOScannerPair*** UDT.

The UDT also contains the ***UserCommand*** (INT) which can be used to manually select the Active PMIO Scanner. Where a value of:

- 1 – selects PMIO Scanner A, and
- 2 – selects PMIO Scanner B.

Once the user command has been processed by the AOI, it is set to a value of 0. Note that if

the AOI input ***EnableUserComamnd*** is set to 0, then the user command will be ignored.

MyAPMIOPair	APMIOScannerPair
MyAPMIOPair.ScannerASelected	BOOL
MyAPMIOPair.ScannerBSelected	BOOL
MyAPMIOPair.ScannerAOk	BOOL
MyAPMIOPair.ScannerBOk	BOOL
MyAPMIOPair.SwitchOver	BOOL
MyAPMIOPair.ScannersConfigMatch	BOOL
MyAPMIOPair.ScannerRunMode	BOOL
MyAPMIOPair.UserCommand	INT
MyAPMIOPair.Input	APMIOInput
MyAPMIOPair.Output	APMIOOutput

Figure 3.40 – *APMIOScannerPair* UDT

3.8. IOP REDUNDANCY

PMIO IOP redundancy is possible using the PMIO Scanner, however, it is handled differently to the conventional TDC 3000 approach.

In this configuration inputs are typically wired to the same channels (slots) of two different IOPs.

In Slate, both Input IOPs (of a redundant pair) must be added to the PMIO Scanner configuration, and must have unique Module Numbers.

An Add-On-Instruction (AOI) is used to select between the IOPS, based on their status. User application code should use the common tag (UDT type APMIOPair) rather than the individual IOP sections.

NOTE: The relevant AOIs and UDTs can be found in the example Logix code on the Aparian website.

There are two AOIs for IOP redundancy:

- ***APMIOIOPRedundancyAOI*** – IOP Redundancy (Standalone PMIO Scanner)
- ***APMIOIOPRedundancyAOI2*** – IOP Redundancy with PMIO Scanner Redundancy

The AOIs are identical with the exception of the IOP Input and output sections, where the former makes us of the AOI tags directly, and the latter makes use of the Scanner Redundancy

common tag described in the previous chapter.

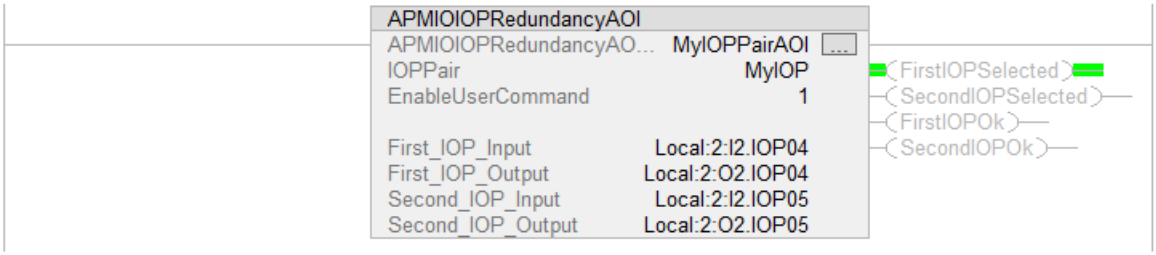


Figure 3.41 – IOP Redundant AOI example (Standalone PMIO Scanner)

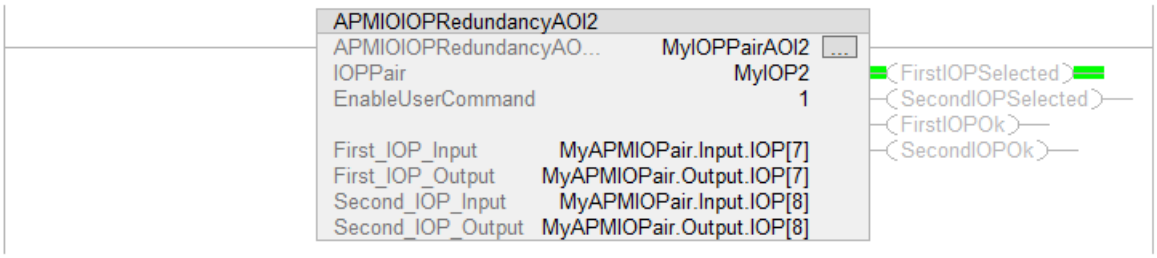


Figure 3.42 – IOP Redundant AOI example (Redundant PMIO Scanner)

The user application code should make use of the common tag of UDT type ***APMIOIOPPair*** e.g. “MyIOP”. This structure contains Input and Output sections for each IOP similar to that provided by the AOP.

The AOI will select between the First and Second IOP based on the status of each IOP.

When the First IOP is selected, then this tag will reflect the inputs from the First IOP. Conversely, when the Second is selected, then this tag will reflect the inputs from the Second IOP.

Both AOIs have the following parameters:

Parameter	Type	Description
IOPPair	InOut	Common Tag (UDT ***APMIOIOPPair***)
FirstIOPSelected	Output	First IOP is currently selected.
SecondIOPSelected	Output	Second IOP is currently selected.
FirstIOPOk	Output	First IOP is Configured, Online and Running with no Errors.
SecondIOPOk	Output	Second IOP is Configured, Online and Running with no Errors.
EnableUserComamnd	Input	When 1, the user command is processed, When 0, the user command is ignored.

		(The user command can be used to manually select the Active IOP.)
First_IOP_Input	InOut	The IOP Input tag for the First IOP.
First_IOP_Output	InOut	The IOP Output tag for the First IOP.
Second_IOP_Input	InOut	The IOP Input tag for the Second IOP.
Second_IOP_Output	InOut	The IOP Output tag for the Second IOP.

Table 3.28 – Redundant IOP AOI Parameters

For the sake of convenience some of the AOI output parameters are echoed in the ***APMIOIOPPair*** UDT.

The UDT also contains the ***UserCommand*** (INT) which can be used to manually select the Active IOP. Where a value of:

- 1 – selects the First IOP, and
- 2 – selects the Second IOP.

Once the user command has been processed by the AOI, it is set to a value of 0. Note that if the AOI input ***EnableUserComamnd*** is set to 0, then the user command will be ignored.

◢ MyIOP	APMIOIOPPair
MyIOP.FirstIOPSelected	BOOL
MyIOP.SecondIOPSelected	BOOL
MyIOP.FirstIOPOk	BOOL
MyIOP.SecondIOPOk	BOOL
▷ MyIOP.UserCommand	INT
▷ MyIOP.Input	APMIOIOPInput
▷ MyIOP.Output	APMIOIOPOutput

Figure 3.43 – APMIOIOPPair UDT

3.9. SHADOW MODE

Shadow mode will allow the user to connect the PMIO Scanner to an existing system and listen for data exchanges between the Honeywell PM/HPM/APM and the IOPs while updating the Logix input assembly tags with the data read from the input IOPs.



NOTE: For shadow mode to operate correctly the user will need to configure the IOPs in Slate as if the PMIO Scanner is going to control them in Run Mode. Each IOP (that the data is required from) will need to be configured exactly the same as in the Honeywell control system.

NOTE: Shadow mode is only relevant for input IOPs, that is, DI32 and AI16.

Once the PMIO Scanner has been correctly setup and is connected to the active I/O Link network, the data for the specific IOP and data point will be updated in the input assembly of the PMIO (similar to being in Run Mode).

3.10. LEARN MODE

The PMIO Scanner has the ability to interrogate previously configured IOPs and extract their configuration. For this to work, the IOP racks must not be powered-down after they were configured and running in the Honeywell system.

Before the Learn process can commence, the existing Process Manager must be unplugged from the rack.

NOTE: The Learn process requires the existing Honeywell Process Managers (PM, HPM or APM) to be disconnected or set to shut down. Make sure that all equipment is in a safe state before attempting this operation. Failure to do so may result in equipment damage, serious injury or death.

Change the PMIO Scanner configuration to ***Learn*** mode and download to the PMIO Scanner.

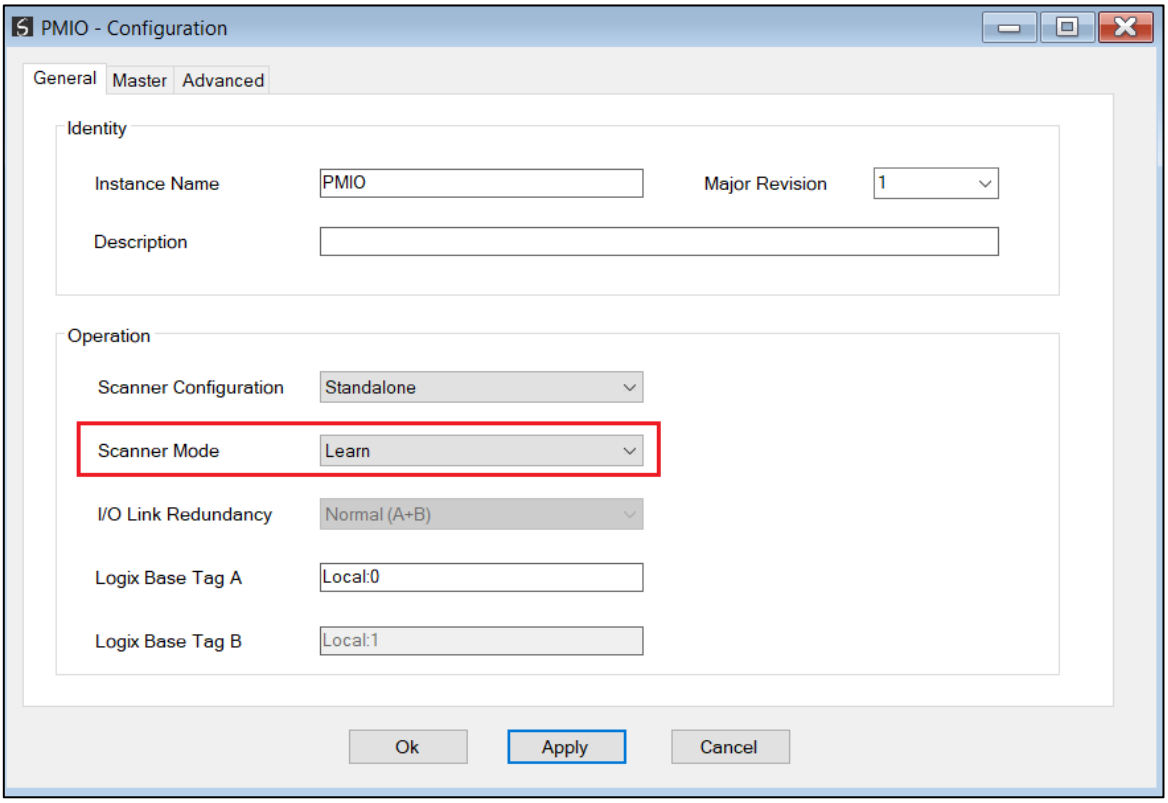


Figure 3.44 – Configure Learn mode

While online, right click on the PMIO Scanner and select the *Scan Configuration* option.

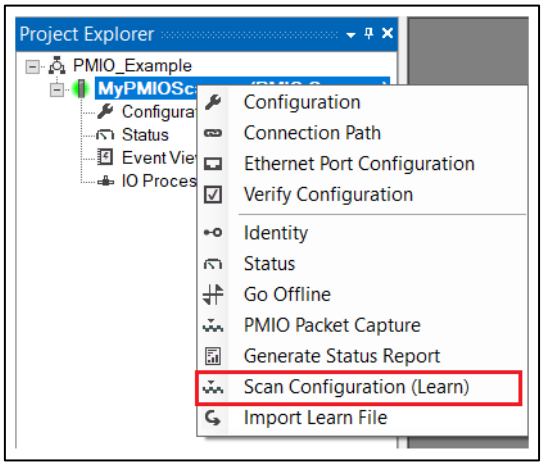


Figure 3.45 - Selecting Scan Configuration

The PMIO Scanner will then start scanning the I/O Link for IOPs. This process may take a number of minutes to complete.

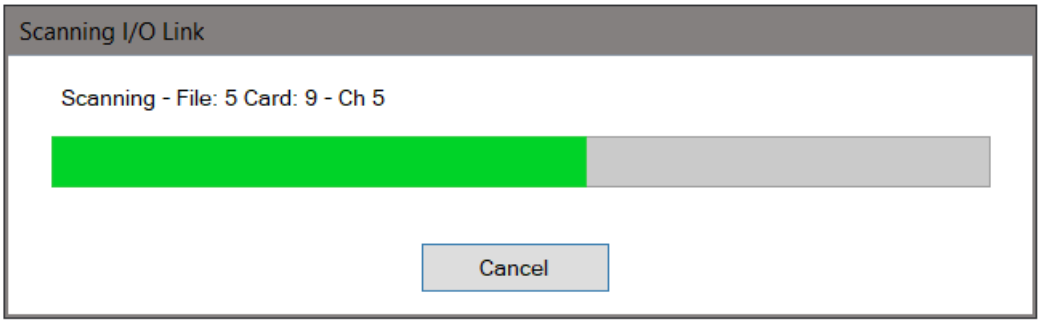


Figure 3.46 – Scanning I/O Link

Once the scan has been completed the user will be prompted to save the Scan File. This not only allows the importing of IOPs to be postponed, but also allows other PMIO Scanners to be configured using the same Scan results.

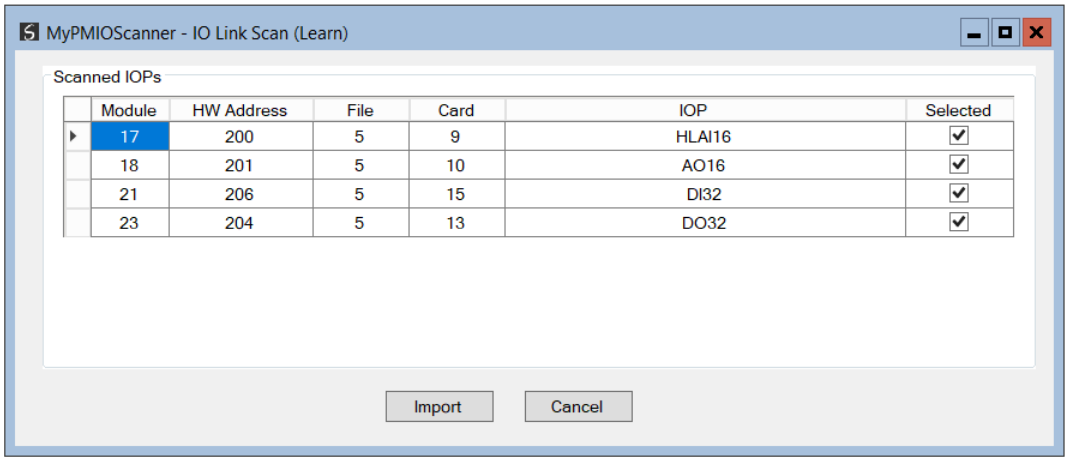


Figure 3.47 – IOP Scan Results

A summary of the found IOPs is then displayed. To import IOPs into the configuration, check the ***Selected*** checkbox adjacent to each IOP. Note that a maximum of 28 IOPs can be selected per PMIO Scanner. Then select the ***Import*** button.

After the import is complete the user will be prompted to either download the new configuration to the online PMIO Scanner or go offline. The project tree will reflect the newly created IOPs.

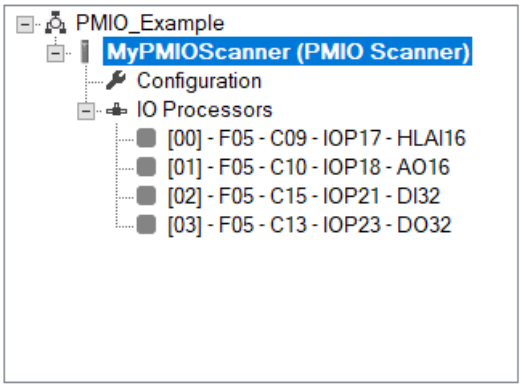


Figure 3.48 – Imported IOPs into Configuration

To repeat this process, making use of an existing Learn File, right-click on the PMIO Scanner and select the ***Import Learn File*** option. The IOP summary page will appear and the IOPs can be selected for import as before.

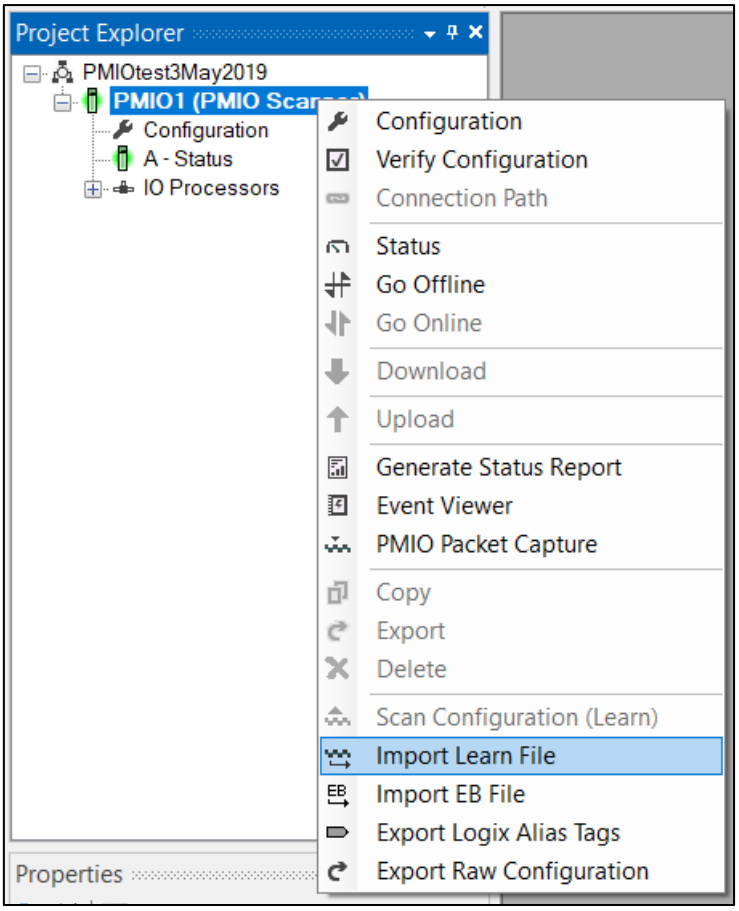


Figure 3.49 – Import Learn File

3.1. EXPORT LOGIX ALIAS TAGS

Slate provides the ability to export Logix Alias tags which may assist in the user's generation of application code.

Only IO points that have associated User Tags will be included in the export. Before exporting, ensure that the ***Instance Name*** and ***Logix Base Tag A*** are configured correctly. For Standalone applications, the ***Logix Base Tag A*** is used as the base tag prefix. In a redundant PMIO Scanner application, the ***Instance Name*** is used as the base tag prefix.

NOTE: In redundant PMIO Scanner applications the common ***APMIOScannerPair*** tag name must be the same as the modules' ***Instance Name*** for the exported Logix Alias tags to be valid.

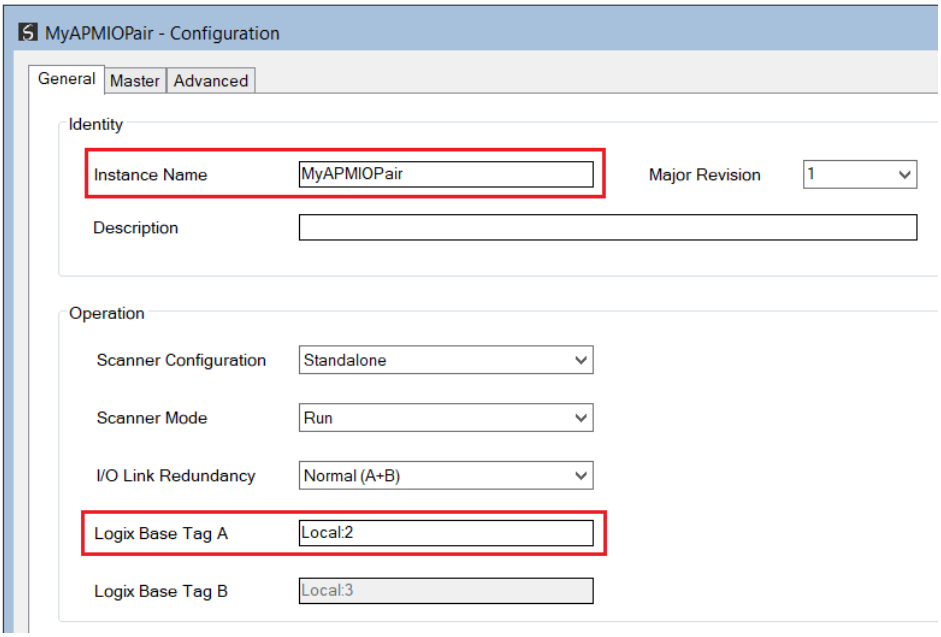


Figure 3.50 – Configuration for Logix Alias Export

To export, right-click on the PMIO Scanner and select the ***Export Logix Alias Tags*** option.

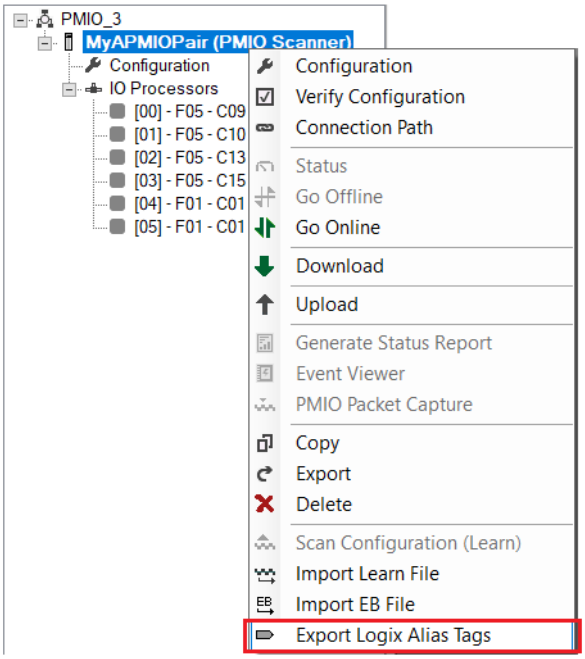


Figure 3.51 – Export Logix Alias Tags

Then select a destination path and file name for the generated CSV (comma separated variable) file.

	A	B	C	D	E	F
1	remark	CSV - Import - Export				
2	remark	Date = 2019/05/0610:05 AM				
3	remark	Version = RSLogix 5000 v32.00				
4	remark	Owner = Aparian-Slate				
5	remark	Company = Aparian				
6	0.3					
7	TYPE	SCOPE	NAME	DESCRIPTION	DATATYPE	SPECIFIER
8	ALIAS		LT123_AI	Analog Input		Local:2:I1.IOP00.ChannelPV[0]
9	ALIAS		LT123_AIOk	Analog Input Update Ok		Local:2:I1.IOP00.ChannelStatus[0].0
10	ALIAS		FT124_AI	Analog Input		Local:2:I1.IOP00.ChannelPV[1]
11	ALIAS		FT124_AIOk	Analog Input Update Ok		Local:2:I1.IOP00.ChannelStatus[1].0
12	ALIAS		PT125_AI	Analog Input		Local:2:I1.IOP00.ChannelPV[2]
13	ALIAS		PT125_AIOk	Analog Input Update Ok		Local:2:I1.IOP00.ChannelStatus[2].0
14	ALIAS		LY213_AO	Analog Output		Local:2:O1.IOP01.ChannelPV[0]
15	ALIAS		LY213_AODisable	Analog Output Disable		Local:2:O1.IOP01.ChannelControl[0].0

Figure 3.52 – Logix Alias Tag Example

To import the Alias Tags into Studio 5000's Logix Designer, select the ***Tools*** menu, then ***Import***, then ***Tags and Logic Comments*** option. Then select the file created in the previous step.

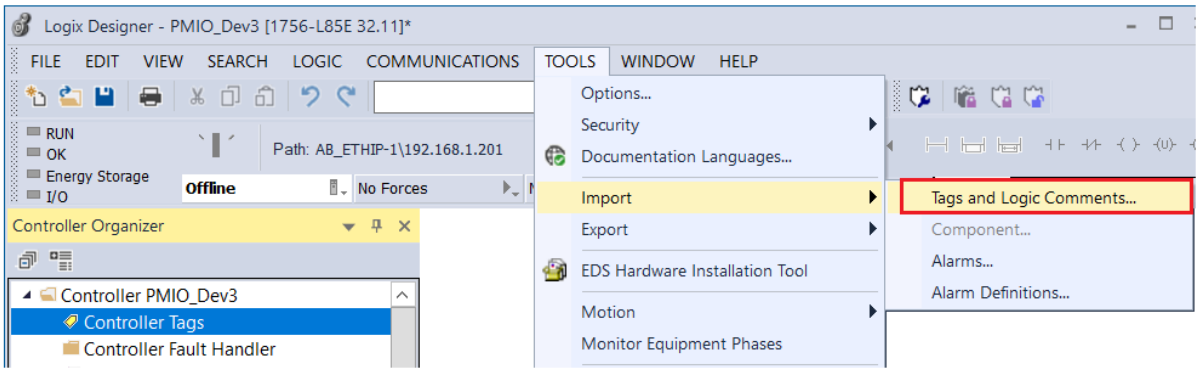


Figure 3.53 – Import Logix Alias Tags

3.2. MODULE DOWNLOAD

Once the PMIO Scanner configuration has been completed, it must be downloaded to the module. Before downloading the ***Connection Path*** of the module should be set. The Connection path can be set by right-clicking on the module and selecting the ***Connection Path*** option.

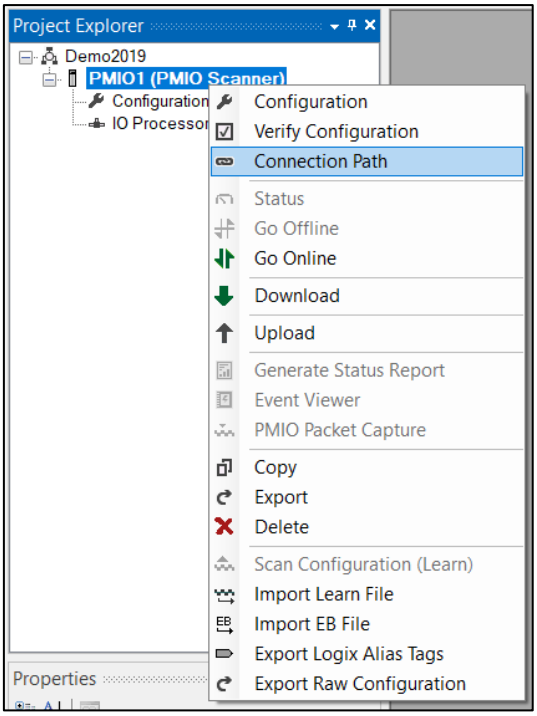


Figure 3.54 - Selecting Connection Path

The new connection path can then be either entered manually or selected by means of the ***Target Browser***.

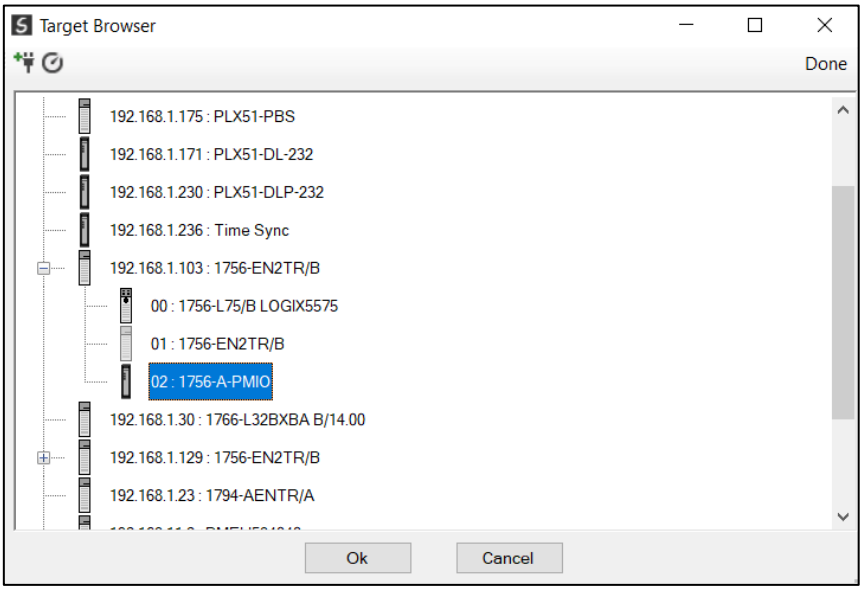


Figure 3.55 – PMIO Scanner in Target Browser

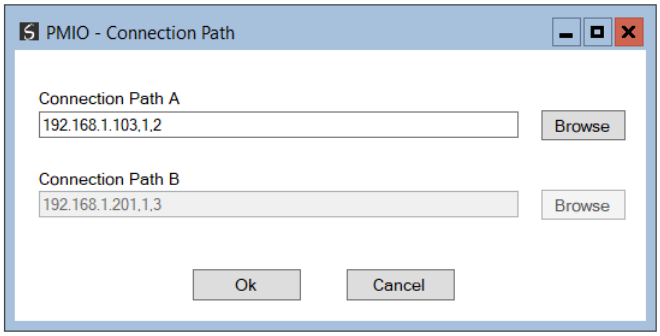


Figure 3.56 - Connection Path

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

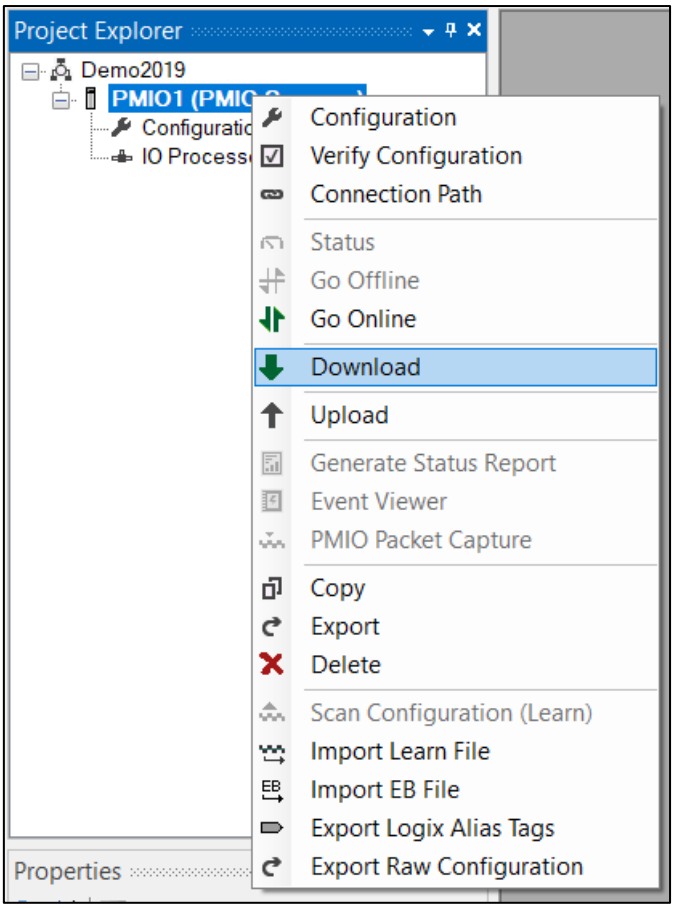


Figure 3.57 - Selecting Download

NOTE: In the case of redundant PMIO Scanners, the configuration will be downloaded to both PMIO Scanners.

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

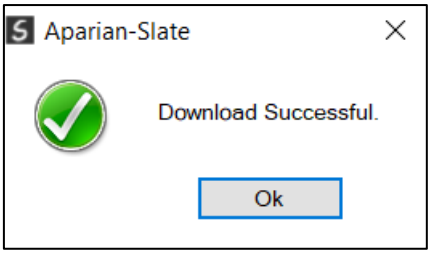


Figure 3.58 - Successful download

Within the Slate environment the module will be in the Online state, indicated by the green circle around the module. The module is now configured and will start operating immediately.

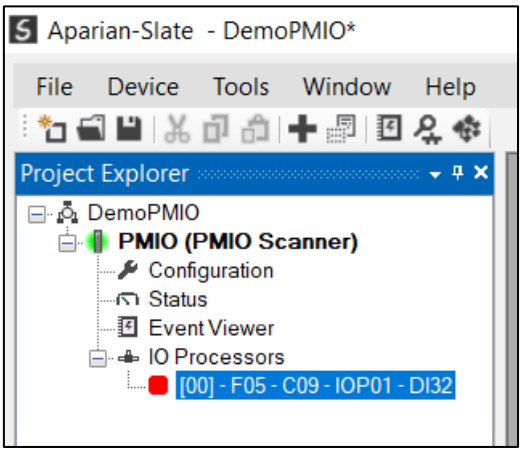


Figure 3.59 - Module online

3.3. STUDIO 5000 CONFIGURATION

NOTE: The minimum Studio 5000 version that can be used is v21. The PMIO Scanner uses an Add-On Profile (AOP) for the 1756 Backplane.

3.3.1. INSTALLING THE ADD-ON PROFILE (AOP)

The user will first need to install the PMIO Scanner AOP before the module can be added to the Logix I/O tree. The AOP for the PMIO Scanner (*Aparian 1756-A-PMIO AOP V1.02.00.zip*) can be downloaded from the Aparian website: https://www.aparian.com/products/pmio-scanner#downloads
Once downloaded extract the zip file, run the *MPSetup.exe* file, and follow the on-screen instructions.

3.3.2. ADD MODULE TO PMIO I/O CONFIGURATION

Integration with the Logix family in Studio5000 makes use of an AOP. Under the 1756 Backplane, right-click and select the New Module option.

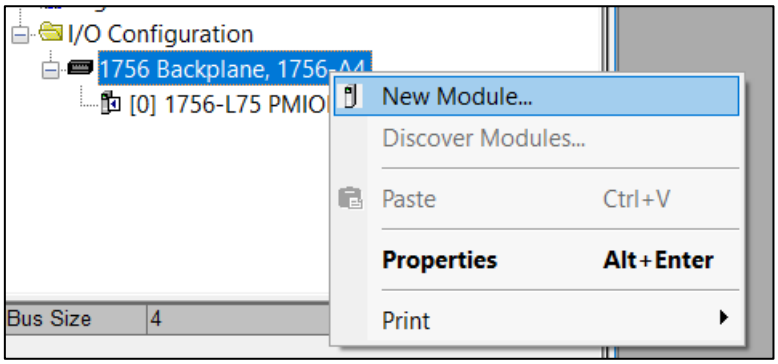


Figure 3.60 – Adding a module

The module selection dialog will open. To find the module more easily, use the Vendor filter to select only the Aparian modules as shown in the figure below.

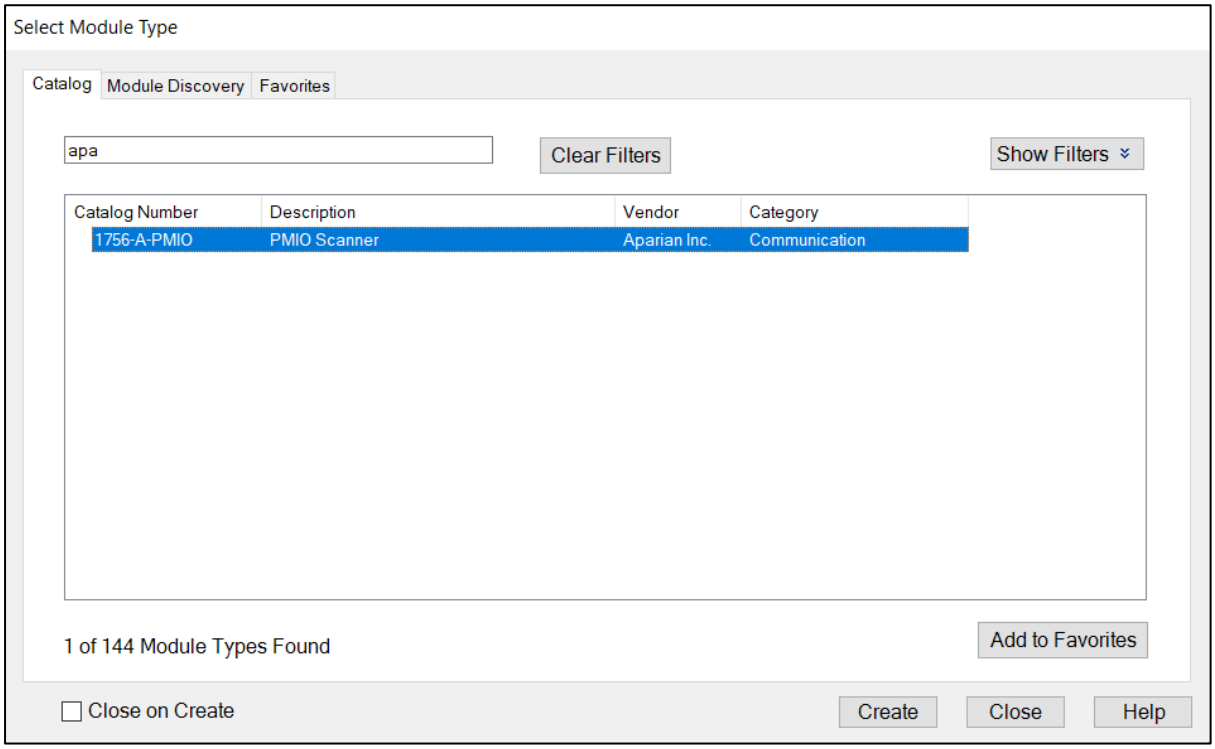


Figure 3.61 – Selecting the module

Locate and select the PMIO Scanner module and select the *Create* option. The module configuration dialog will open, where the user must specify the Name and Slot as a minimum to complete the instantiation.

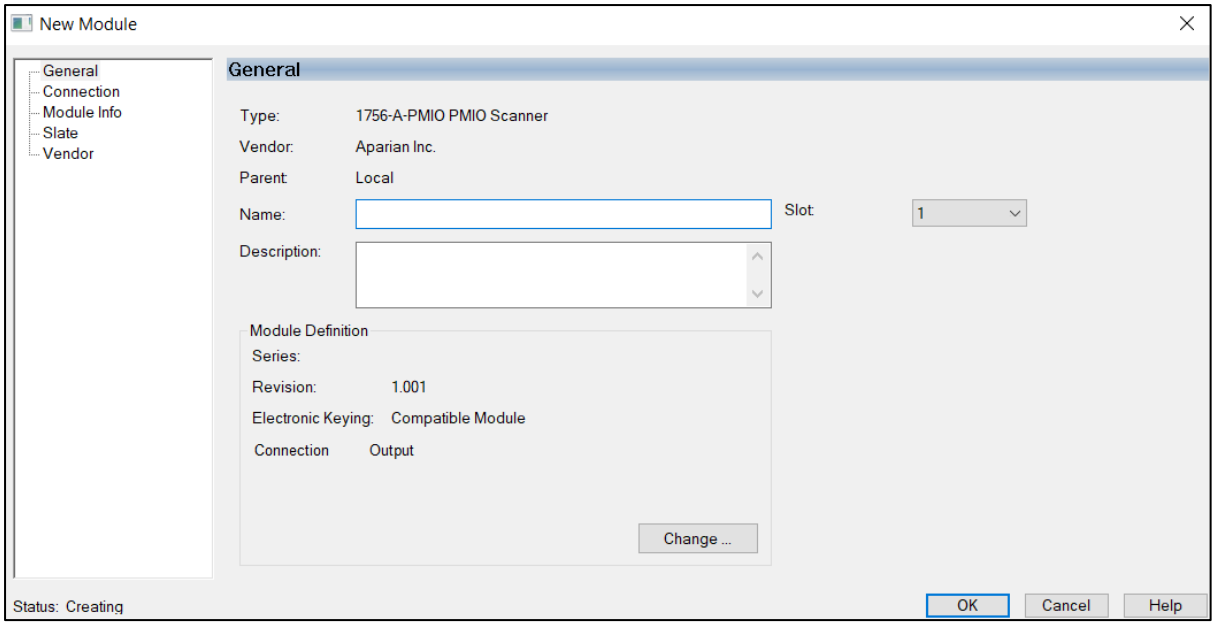


Figure 3.62 – Module instantiation

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

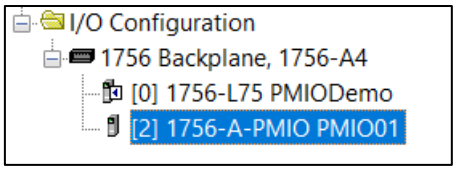


Figure 3.63 – Logix IO tree

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

3.3.3. SLATE PROJECT FILE

The PMIO Scanner AOP allows the user to save the Slate project file in the AOP as well as launch Slate from the AOP.

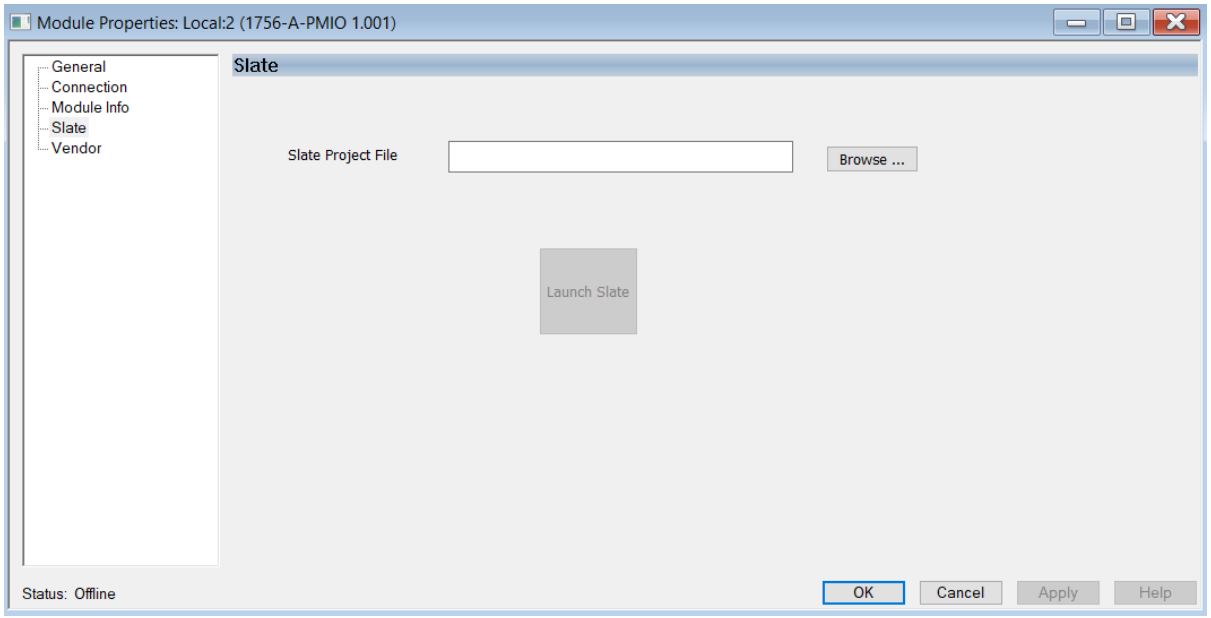


Figure 3.64 – AOP - Slate

When no Slate project has been defined the user can either *Browse* for an existing Slate project. If no Slate project has been defined the user can type in the project file name in the *Slate Project File* textbox and select Launch Slate.

NOTE: Once the file name has been typed in, the user will first need to press *Apply* before the *Launch Slate* button will become available.

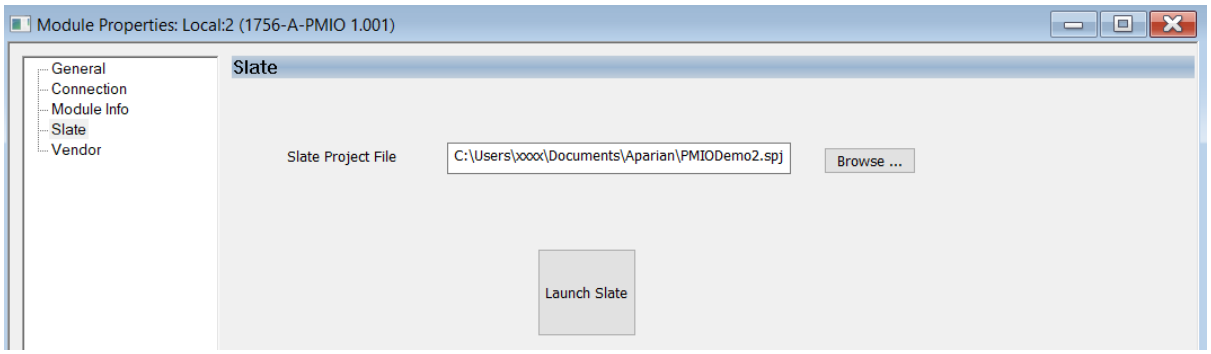


Figure 3.65 – AOP – Launch Slate

4. OPERATION

4.1. LOGIX 5000 ASSEMBLIES

Each PMIO Scanner uses six cyclic class 1 IO connections with the Logix controller. An input and output assembly for each IO connection is exchanged at a fix interval (RPI).

NOTE: When the PMIO Scanner is not owned by a Logix controller it will inhibit all I/O Link communication.

NOTE: When the PMIO Scanner is owned by a Logix controller, but the Logix controller is in Program mode or Faulted, it will inhibit all I/O Link communication.

4.1.1. STATUS AND STATISTICS

The following parameters are used to provide the status and statistics of each PMIO Scanner.

Local:2:I1	{ . . . }		AP:1756_APMIO_0_3:I1:0
Local:2:I1.ConnectionFaulted	0	Decimal	BOOL
Local:2:I1.Status	{ . . . }		AP:1756_APMIOMasterStatus:I:0
Local:2:I1.Status.IOLinkAOk	0	Decimal	BOOL
Local:2:I1.Status.IOLinkBOk	0	Decimal	BOOL
Local:2:I1.Status.ConfigValid	0	Decimal	BOOL
Local:2:I1.LiveList	{ . . . }		AP:1756_APMIOMasterLiveList:I:0
Local:2:I1.Statistics	{ . . . }		AP:1756_APMIOMasterStatistics:I:0
Local:2:I1.Statistics.IOLinkATx	0	Decimal	DINT
Local:2:I1.Statistics.IOLinkARx	0	Decimal	DINT
Local:2:I1.Statistics.IOLinkAErrs	0	Decimal	DINT
Local:2:I1.Statistics.IOLinkBTx	0	Decimal	DINT
Local:2:I1.Statistics.IOLinkBRx	0	Decimal	DINT
Local:2:I1.Statistics.IOLinkBErrs	0	Decimal	DINT

Figure 4.1 – Status and Statistics section of PMIO Scanner

Parameter	Data Type	Description
Status		
ConnectionFaulted	BOOL	Set if the PMIO Scanner does not have a cyclic class 1 connection to the Logix controller.
IOLinkAOk	BOOL	Set if the I/O Link communication on Channel A is ok.
IOLinkBOk	BOOL	Set if the I/O Link communication on Channel B is ok.
ConfigValid	BOOL	Set if the PMIO Scanner has a valid application configuration (downloaded from Slate).
LiveList	BOOL[32]	List of all the IOP indexes configured to indicate if they are

		online. Bits 0 to 27 are used (max IOP count is 28). Each bit represents a Logix IOP index. For example, if the IOP at IOP04 (in the Slate configuration) is online, then Live List bit 4 will be set.
Statistics		
IOLinkATx	DINT	The number of packets sent on Channel A.
IOLinkARx	DINT	The number of packets received on Channel A.
IOLinkAErrs	DINT	The number of bad packets (e.g. failed Checksum) received on Channel A.
IOLinkBTx	DINT	The number of packets sent on Channel B.
IOLinkBRx	DINT	The number of packets received on Channel B.
IOLinkBErrs	DINT	The number of bad packets (e.g. failed Checksum) received on Channel B.

Table 4.1 – Parameters for Status and Statistics

4.1.2. Master Control

The following parameters are used to provide the status and statistics of each PMIO Scanner.

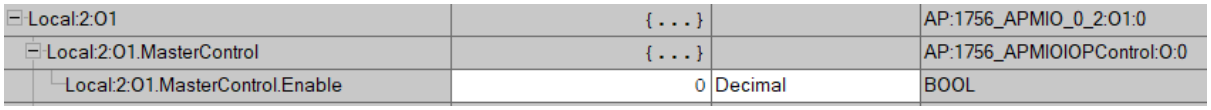


Figure 4.2 – Master Control section of PMIO Scanner

Parameter	Data Type	Description
Master Control		
Disable	BOOL	When this bit is set the module will inhibit all I/O Link Communication.

Table 4.2 – Parameters for Master Control

4.1.3. IOPs

The following parameters are used to provide the status, input, and output data of each IOP configured.

Each configured IOP occupies one IOP structure in the Logix assembly, except for the LLMUX32 IOP which occupies two IOP structures.

NOTE: The IOPs are spread across the six class 1 connections. For example:
Local:2:**I1**.IOPxx has **IOP00 – IOP02**
Local:2:**I2**.IOPxx has **IOP03 – IOP07**

Local:2:**I3**.IOPxx has **IOP08 – IOP12**
Local:2:**I4**.IOPxx has **IOP13 – IOP17**
Local:2:**I5**.IOPxx has **IOP18 – IOP22**
Local:2:**I6**.IOPxx has **IOP23 – IOP27**

4.1.3.1. INPUT

Local:2:I1.IOP00	{ . . . }		AP:1756_APMIOIOPInput:I:0
Local:2:I1.IOP00.Status	{ . . . }		AP:1756_APMIOIOPStatus:I:0
Local:2:I1.IOP00.Status.Configured	0	Decimal	BOOL
Local:2:I1.IOP00.Status.Online	0	Decimal	BOOL
Local:2:I1.IOP00.Status.Running	0	Decimal	BOOL
Local:2:I1.IOP00.Status.Error	0	Decimal	BOOL
Local:2:I1.IOP00.Status.IOLinkAOk	0	Decimal	BOOL
Local:2:I1.IOP00.Status.IOLinkBOk	0	Decimal	BOOL
Local:2:I1.IOP00.HardwareAddress	0	Decimal	SINT
Local:2:I1.IOP00.SoftwareAddress	0	Decimal	SINT
Local:2:I1.IOP00.DigitalStatus	0	Decimal	DINT
Local:2:I1.IOP00.DigitalInput	0	Decimal	DINT
Local:2:I1.IOP00.ChannelStatus	{ . . . }	Decimal	SINT[16]
Local:2:I1.IOP00.ChannelPV	{ . . . }	Float	REAL[16]

Figure 4.3 – Input assembly IOPs

For each IOP (from 0 to 27), there are range of parameters provided (as shown below).

Parameter	Datatype	Description
Status		
Configured	BOOL	The IOP has been successfully configured with the parameters from Slate.
Online	BOOL	This bit is set when the IOP is online.
Running	BOOL	The IOP is running and producing and accepting valid data from the PMIO Scanner.
Error	BOOL	This bit is set if there was an error with the IOP. This can be failed configuration, failed response, or an IOP Soft Fault.
IOLinkAOK	BOOL	The PMIO Scanner can see the specific IOP on Channel A.
IOLinkBOK	BOOL	The PMIO Scanner can see the specific IOP on Channel B.
HardwareAddress	SINT	The hardware address received from the specific IOP.
SoftwareAddress	SINT	The module number received from the specific IOP.
DigitalStatus	DINT	**Bit 0** – This bit is set if the digital value has successfully received from the DI32 IOP. **Bit 1 to 7** - Reserved
DigitalInput	DINT	The digital input read from the DI32 IOP. Each bit represents

		a point on the DI32 IOP.
ChannelStatus	SINT[16]	**Bit 0** – This bit is set if the analog value has successfully received from the HLAI16 IOP. **Bit 1** – This bit is set once the accumulator value reaches its target. See the DI32 IOP Accumulator section for more details. **Bit 2 to 7** - Reserved
ChannelPV	REAL[16]	The analog input read from the HLAI16 IOP as well as the readback for the AO16 IOP. This value is also used by the DI32 IOP to display the current accumulator value if the specific DI32 data point has been configured for accumulator. See the DI32 IOP Accumulator section for more details.

Table 4.3 - Parameters for IOP input assembly

4.1.3.2. OUTPUT

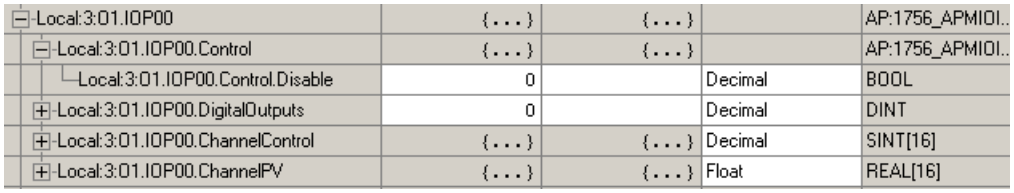


Figure 4.4 – Output assembly IOPs

Parameter	Datatype	Description
Control		
Disable	BOOL	This bit is used to disable the PMIO Scanner to prevent writing the digital output values to the specific output IOP (e.g. DO16 or DO32).
DigitalOutputs	DINT	The digital outputs written to the digital output IOPs (e.g. DO16). Each bit in the DigitalOutput value represents a data point on the Digital Output IOP.
ChannelControl	SINT[16]	Bit 0 – The Channel Disable bit is used to disable the PMIO Scanner to write the analog output values to the specific output IOP (e.g. AO16 or AO8). Bit 1 – The Enable Accumulator bit is used to enable or disable the accumulator function of the DI32 IOP. See the DI32 IOP Accumulator section for more details. Bit 2 – The Reset Accumulator bit is used to reset the accumulator value to the configured value in Slate. See the DI32 IOP Accumulator section for more details.
ChannelPV	REAL[16]	The analog outputs written to the analog output IOPs (e.g. AO16). The value will only be written to the analog output IOP once the value has changed by more than the tolerance configured. See the Analog Output 8/16 sections.

		The ChannelPV is also used to write the Digital Output IOP Pulse duration and PWM duty cycle. Refer to the DO16/32 sections.

Table 4.4 - Parameters for IOP output assembly

5. MODULE REPLACEMENT

When a PMIO Scanner needs to be replaced the user will need to follow the steps below.

1. Remove the current PMIO Scanner from the Logix rack.
2. Insert the replacement PMIO Scanner into the same slot as the removed PMIO Scanner.
3. Launch the Slate configuration utility software and open the Slate project specific to the replaced PMIO Scanner.
4. The user will need to download this configuration to the replacement PMIO Scanner. To initiate the download, right-click on the module and select the ***Download*** option.

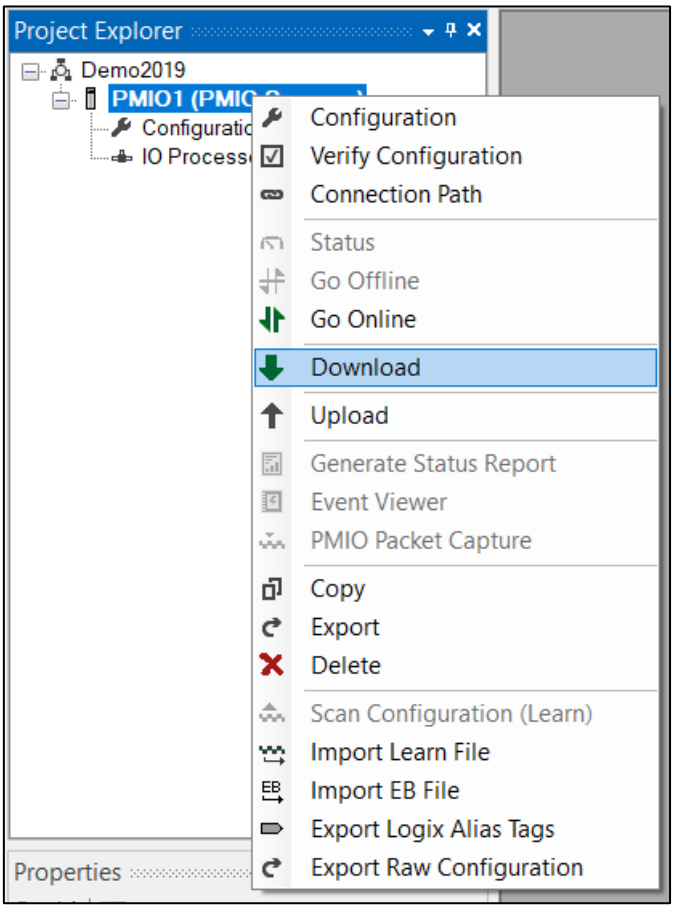


Figure 5.1 - Selecting Download

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

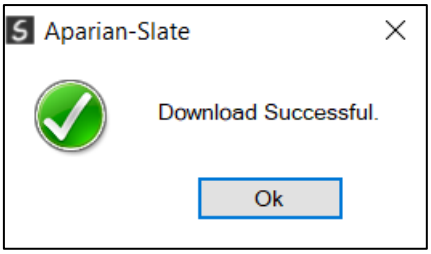


Figure 5.2 - Successful download

Within the Slate environment the module will be in the Online state, indicated by the green circle around the module. The module is now configured and will start operating immediately.

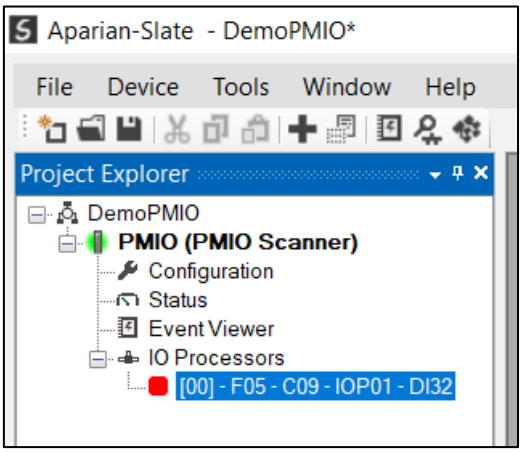


Figure 5.3 - Module online

5. The PMIO Scanner has now been successfully replaced and should be operational.

6. DIAGNOSTICS

6.1. LEDS

The module provides 3 diagnostic LEDs and a 4-character alpha-numeric LED display for diagnostics purposes as shown in the front view figure below. A description of each LED is given in the table below.

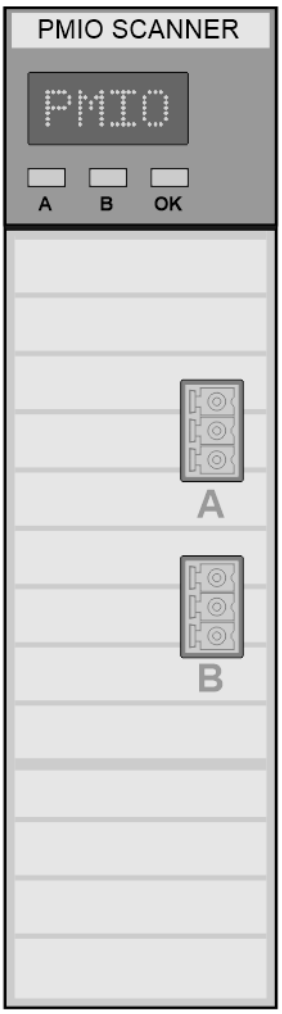


Figure 6.1 – PMIO Scanner front view

LED	Description
Ok	The module LED will provide information regarding the system-level operation of the module. If the LED is **red**, then the module is not operating correctly. For example, if the module application firmware has been corrupted or there is a hardware fault the module will have a red Module LED.

	If the LED is **green (flashing)**, then the module has booted and is running correctly **without** any application configuration loaded. If the LED is **green (solid)**, then the module has booted and is running correctly **with** application configuration loaded.
A / B	LED A represents Channel A of the I/O Link and LED B represents Channel B of the I/O Link. Each time a valid packet is received on a specific channel the relevant LED will flash green. When a corrupted packet is received the relevant LED will flash red.

Table 6.1 - Module LED operation

LCD	Description
TEST	The module is busy testing all hardware during bootup.
OK	The module has successfully booted, and all hardware testing has passed.
Channel A Comms Error	There is a communication error on Channel A (eg. cable break).
Channel B Comms Error	There is a communication error on Channel B (eg. cable break).
IOP Comms Error	At least one IOP is **not** correctly configured and producing data.
Disabled Mode	The PMIO Scanner is in Disabled Mode (see the Scanner Mode in PMIO General Configuration).
Run Mode	The PMIO Scanner is in Run Mode (see the Scanner Mode in PMIO General Configuration).
Run Redundant Mode	The PMIO Scanner is in Run Redundant Mode (see the Scanner Mode in PMIO General Configuration).
Shadow Mode	The PMIO Scanner is in Shadow Mode (see the Scanner Mode in PMIO General Configuration).
Learn Mode	The PMIO Scanner is in Learn Mode (see the Scanner Mode in PMIO General Configuration).
Active Master	In Run Redundant Mode the local PMIO Scanner is the active Master on the I/O Link network (i.e. send and receiving packets).
Standby Master	In Run Redundant Mode the local PMIO Scanner is the standby Master on the I/O Link network (i.e. only listening).
No Config Loaded	No configuration has been loaded onto the PMIO Scanner.

Table 6.2 - Module LCD operation

6.2. MODULE STATUS MONITORING IN SLATE

The PMIO Scanner provides various statistics which can assist with module operation, maintenance, and fault finding. The statistics can be accessed in full by Slate.

6.2.1. STANDALONE

To view the module's status in the Aparian-Slate environment, the module 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.

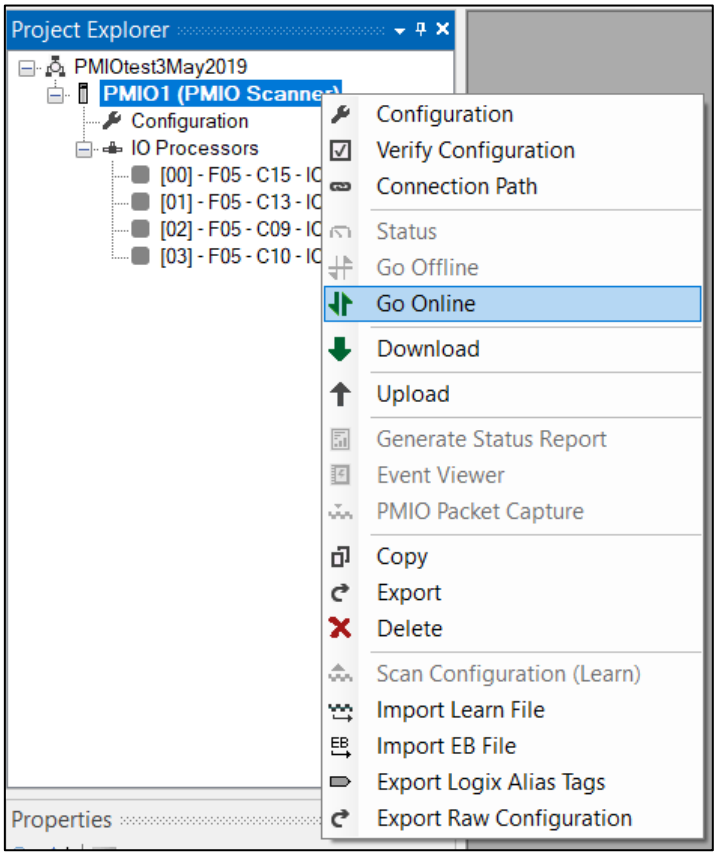


Figure 6.2 - Selecting to Go Online

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

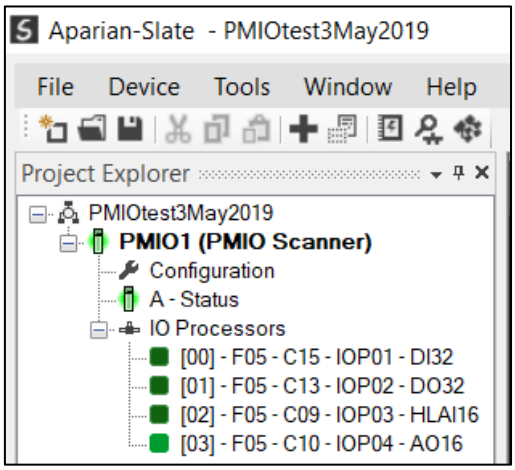


Figure 6.3 – Online in Slate

The definition for the IOPs icon colour in the tree is shown below:

Icon	Description
	The IOP is running and exchanging data, but there is a soft fault.
	The IOP is running and exchanging data without any faults.
	The IOP is offline.
	The IOP is online, but the configuration sent to the IOP was rejected.
	The IOP is online and configured, but it is not exchanging data.
	The IOP has been disabled.

Table 6.3 – Tree Icon Colour

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

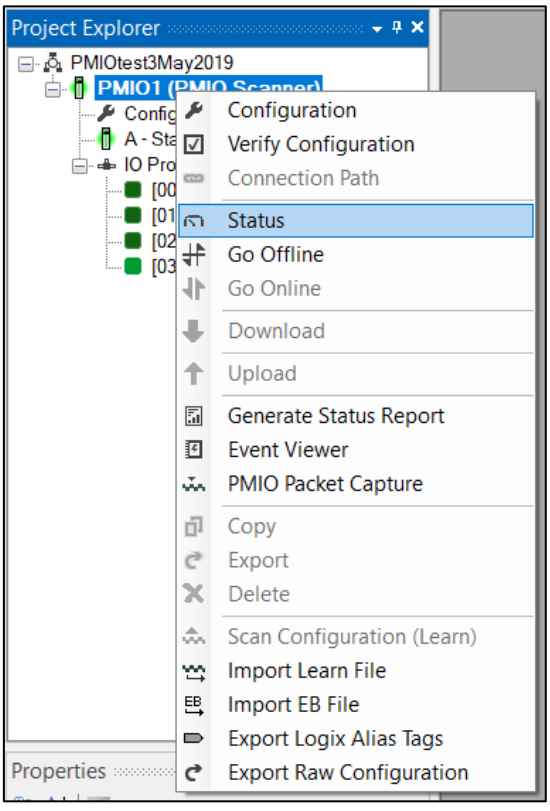


Figure 6.4 - Selecting online Status

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

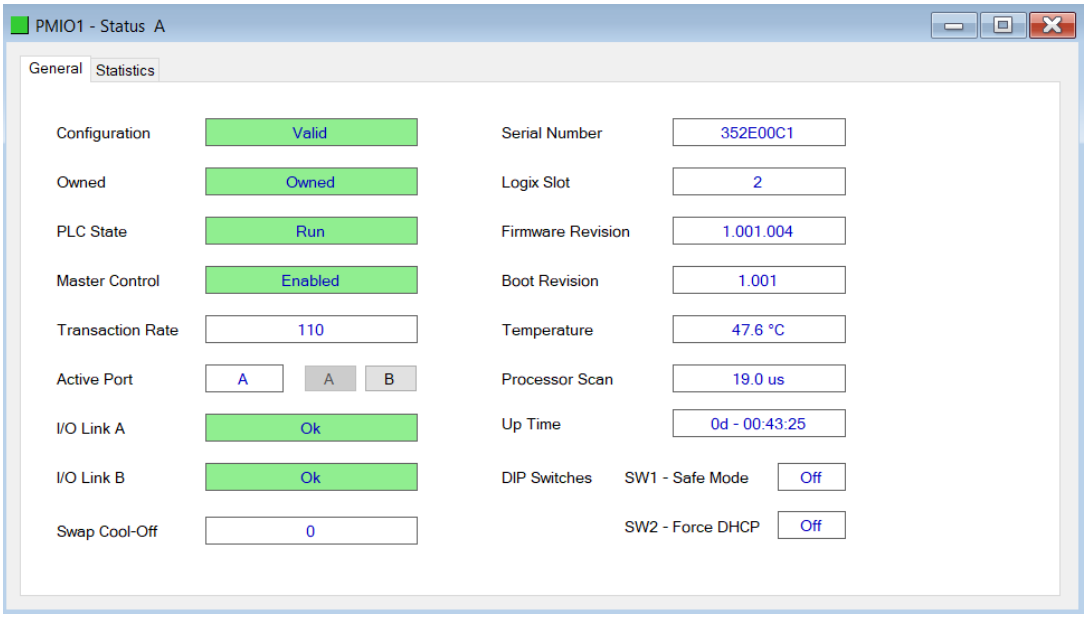


Figure 6.5 - Status monitoring – General

The General tab displays the following general parameters:

Parameter	Description
Configuration	This parameter will indicate if the configuration loaded on the module (if any) is valid. When in redundant mode this will also show if the configuration between the two PMIO Scanners are the same or if there is a *Partner Mismatch.*
Owned	Indicates whether or not the module is currently owned (Class 1) by a Logix controller.
PLC State	The State of the Logix controller owning the local PMIO Scanner. **Run** The Logix controller is in Run state and the PMIO Scanner will start communicating on the I/O Link network (when set to Run mode). **Program** The Logix controller is in Program/Fault state which means the PMIO Scanner will not communicate on the I/O Link network (when set to Run mode).
Master Control	The control to enable/disable the PMIO Scanner operations from Logix (see Logix output assembly - *MasterControl.Enable*). In redundant mode the Master Control will display *Standby* for the PMIO Scanner that is in standby mode.
Transaction Rate	The number of packets exchanged per second.
Active Port	When the PMIO Scanner is in Run Mode this will indicate to the user which port is currently sending the requests from the PMIO Scanner to the I/O Link network. There are two buttons next to the active port that will allow the user to force

	the PMIO Scanner to communicate on a specific I/O Link. A Once pressed the PMIO Scanner will request data on I/O Link A. B Once pressed the PMIO Scanner will request data on I/O Link B. **NOTE:** Once a swap has been forced the user will not be able to swap until the Swap Cool-Off timer has reached zero.
I/O Link A	The PMIO Scanner can see response data on Channel A.
I/O Link B	The PMIO Scanner can see response data on Channel B.
Swap Cool-Off	The amount of time (in milliseconds) before the PMIO Scanner is allowed to swap the communication from one I/O Link cable to the other. Once a swap has occurred the PMIO Scanner will not be able to swap again for 30s.
Up Time	Indicates the elapsed time since the module was powered-up.
Serial Number	The serial number of the PMIO Scanner.
Logix Slot	The Slot Number of the PMIO Scanner in the local rack.
Firmware Revision	The current firmware revision of the module.
Boot Revision	The current boot loader revision of the module.
Temperature	The internal temperature of the module.
Processor Scan	The amount of time (microseconds) taken by the module's processor in the last scan.
DIP Switches	The status of the DIP switches when the module booted. Note that this status will not change if the DIP switches are altered when the module is running.

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

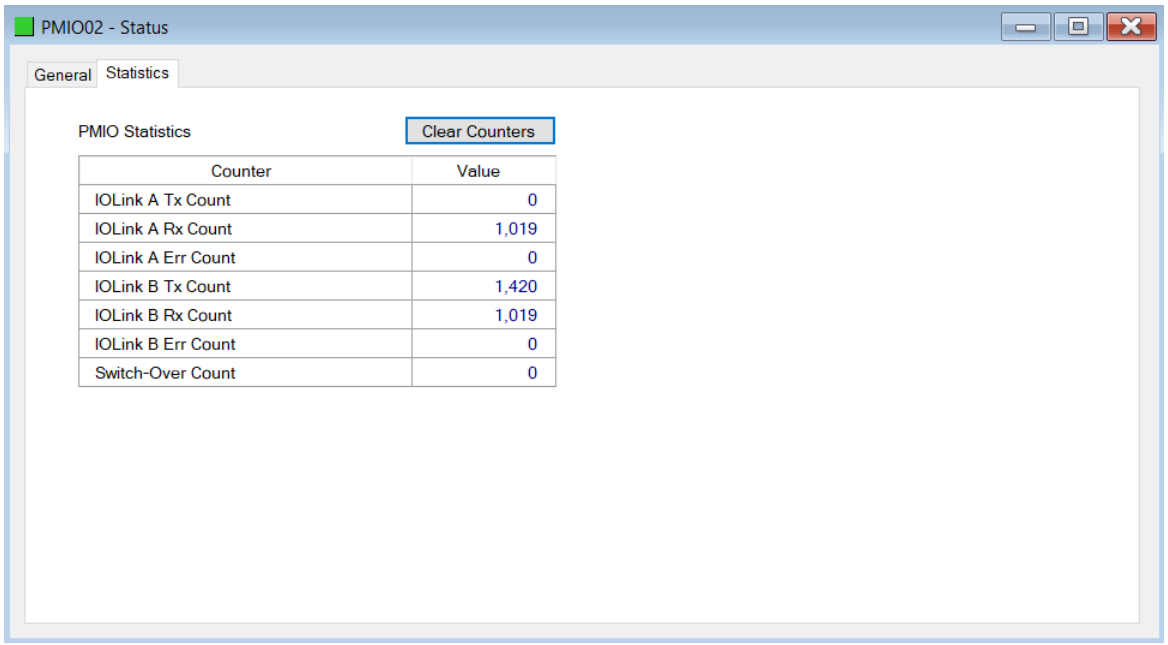


Figure 6.6 - Status monitoring – General Statistics

The Statistics tab displays the general status of the PMIO Scanner.

Parameter	Description
IOLinkATx	The number of packets sent on Channel A.
IOLinkARx	The number of packets received on Channel A.
IOLinkAErrs	The number of bad packets (e.g. failed Checksum) received on Channel A.
IOLinkBTx	The number of packets sent on Channel B.
IOLinkBRx	The number of packets received on Channel B.
IOLinkBErrs	The number of bad packets (e.g. failed Checksum) received on Channel B.
Switch Over Count	The number of times the PMIO Scanner has switched Channels because of a fault on the active Channel.

Table 6.5 – PMIO General Statistics

6.2.2. Redundant Mode

The general status information when running in Redundant Mode will be the same as when running in Standalone mode, but the user will be able to view both PMIO Scanners used for redundancy in the same module configuration (as shown below):

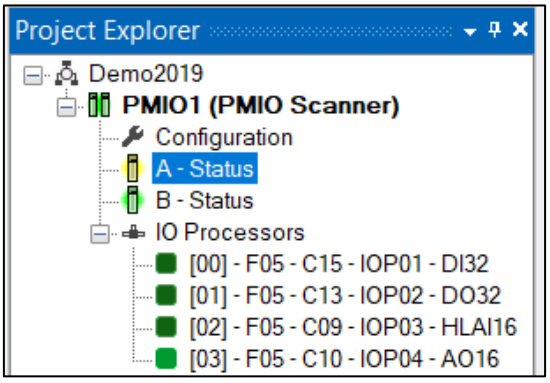


Figure 6.7 – Redundant – IO Tree

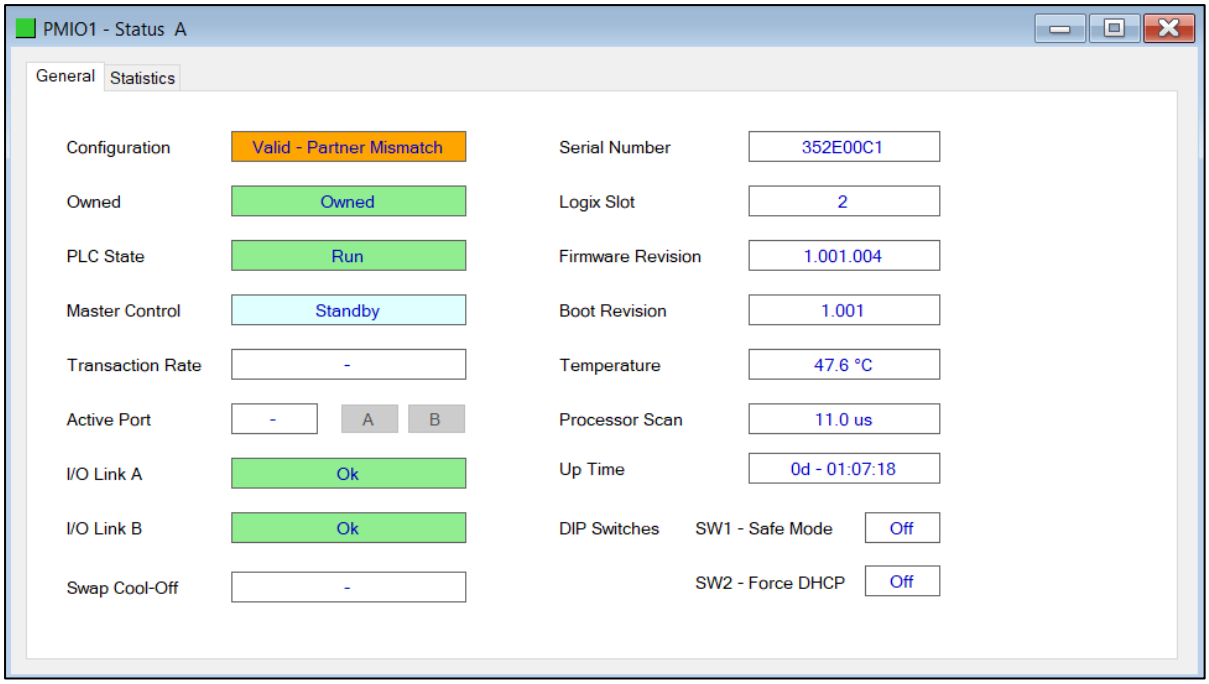


Figure 6.8 – Redundant – IOP Status monitoring – General

NOTE: When viewing the IOP status in redundant mode Slate will always show the IOP status from the Active Master's point of view.

6.2.3. IOP STATUS

Each IOP can also provide status and statistic information relevant to that specific IOP.

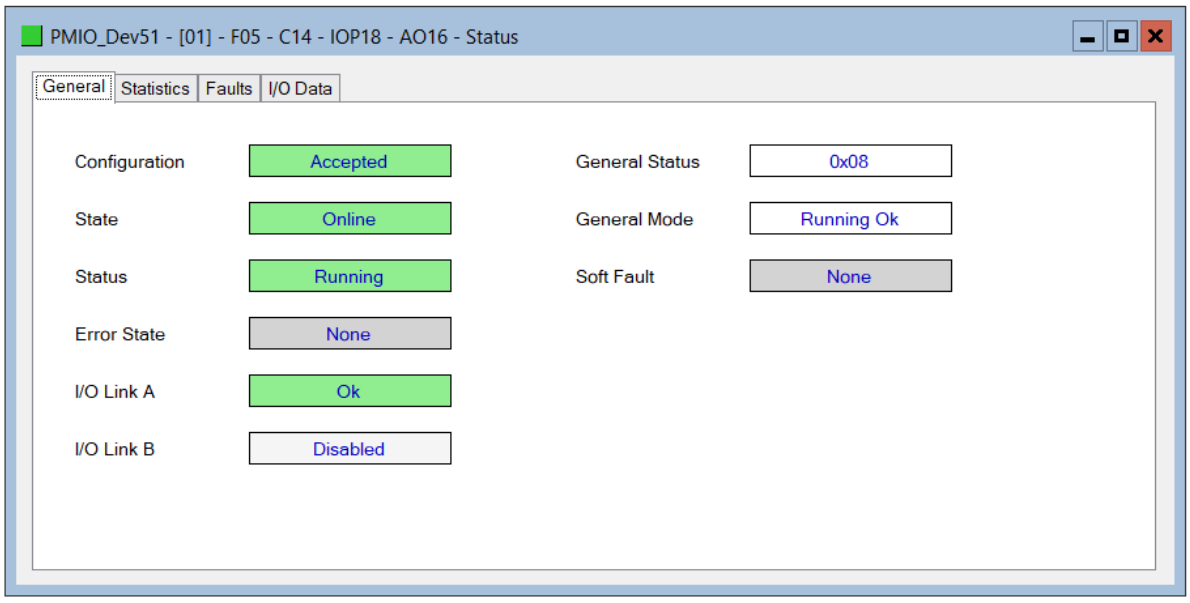


Figure 6.9 – IOP Status monitoring – General

The IOP General tab displays the following general parameters:

Parameter	Description
Configured	The IOP has been successfully configured with the parameters from Slate.
Online	This bit is set when the IOP is online.
Running	The IOP is running and producing and accepting valid data from the PMIO Scanner.
Error	This bit is set if there was an error during the configuration phase of the IOP or during the operational phase.
IO Link A	The status of the communication between the PMIO Scanner and the IOP on I/O Link Channel A.
IO Link B	The status of the communication between the PMIO Scanner and the IOP on I/O Link Channel B.
General Status	Honeywell card status: • Idle • Going to Idle • Running Ok • Going to Run
Gen Mode	Current Mode of the IOP
Soft Fault	The IOP will indicate a soft fault when, for example, the IOP has been configured but there is no FTA connected. • None • Fault The user can use the Faults tab to see what has caused the Soft Error.

Table 6.6 - Parameters displayed in the Status Monitoring – General Tab

Each IOP can also provide status and statistic information relevant to that specific IOP.

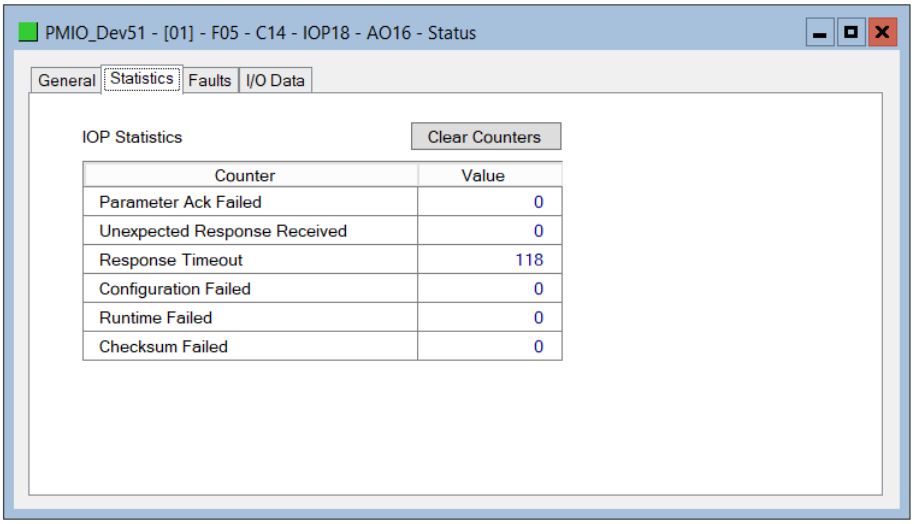


Figure 6.10 – IOP Status monitoring – Statistics

The IOP Statistics tab displays the following general parameters:

Parameter	Description
Parameter Ack Failed	A parameter that was set for the IOP has failed to acknowledge.
Unexpected Response received	A response was received from the IOP that the PMIO Scanner did not expect.
Response Timeout	An IOP did not respond to a request within required time.
Configuration Failed	The IOP could not complete the configuration phase because of an error.
Runtime failed	The IOP did not provide the required operational responses.
Checksum Failed	A response was received from the IOP where the checksum has failed.

Table 6.7 - Parameters displayed in the Status Monitoring – Statistics Tab

The PMIO Scanner supports the Honeywell IOP Soft Fault codes. The user can determine if the IOP has a Soft Fault by either checking the Error bit in the IOP input assembly or by viewing the IOP Status form in Slate (which will indicate a Soft Fault).

The user will need to press the *Refresh* button to force the PMIO Scanner to update the IOP Soft Fault diagnostics. The status form will indicate to the user what is the fault (in text) as well as which channels have Soft Faults.

NOTE: When there is an error with a specific channel on the IOP the Slot Faults will display the specific channel number in red.

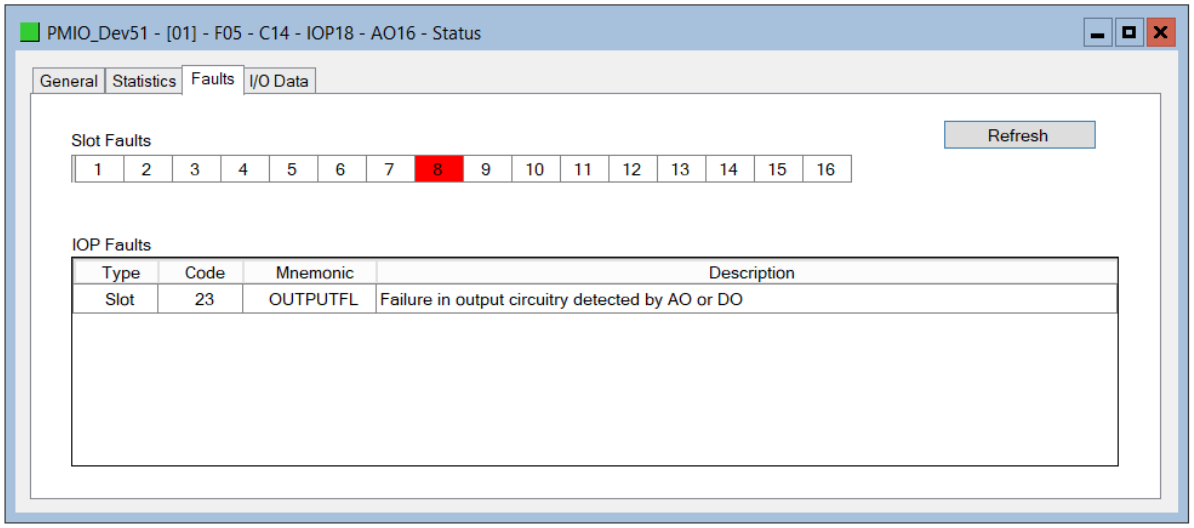


Figure 6.11 – IOP Status monitoring – Faults

The last tab displays a summary of the IOP's IO data available in the PMIO Scanner's Input and Output assembly.

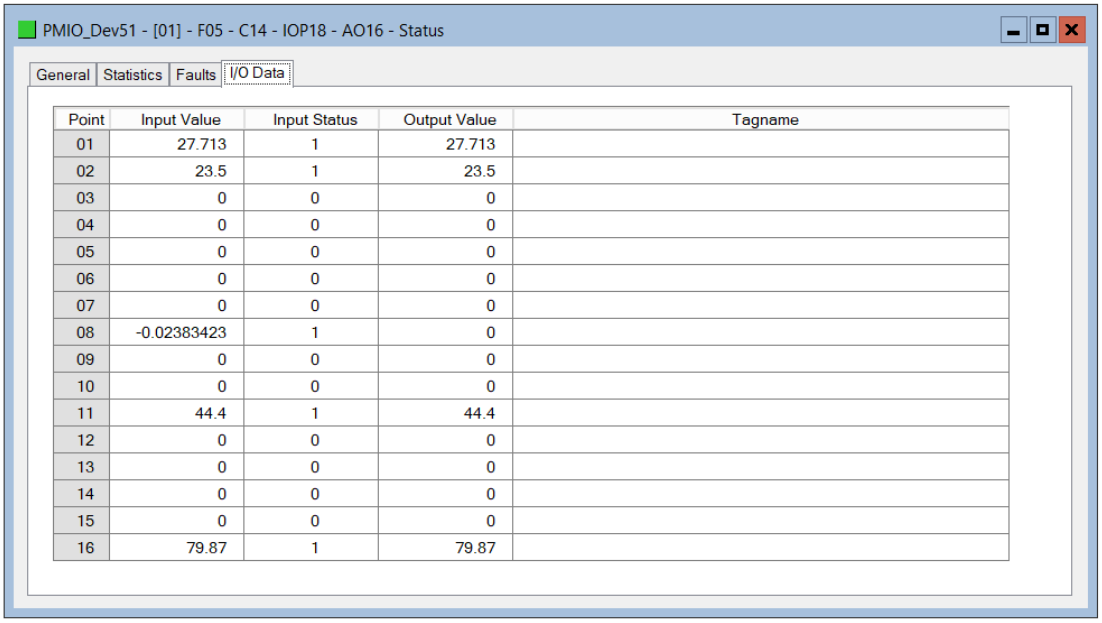
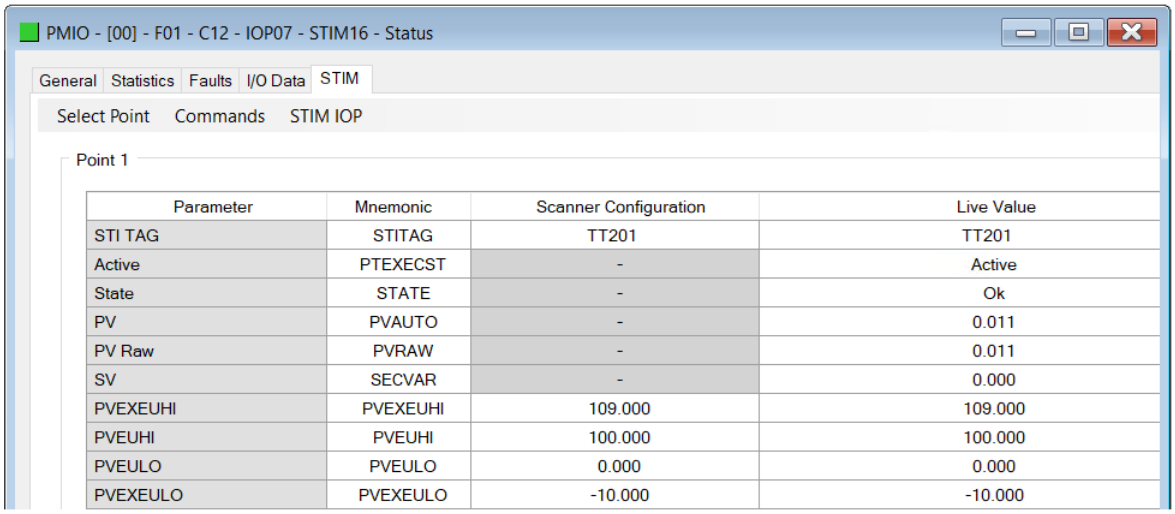


Figure 6.12 – IOP Status monitoring – I/O Data

6.2.4. IOP STATUS – STIM SPECIFIC

When selecting the IOP status for a STIM module, additional information and functionality is provided.



Parameter	Mnemonic	Scanner Configuration	Live Value
STI TAG	STITAG	TT201	TT201
Active	PTEXECST	-	Active
State	STATE	-	Ok
PV	PVAUTO	-	0.011
PV Raw	PVRAW	-	0.011
SV	SECVAR	-	0.000
PVEXEUHI	PVEXEUHI	109.000	109.000
PVEUHI	PVEUHI	100.000	100.000
PVEULO	PVEULO	0.000	0.000
PVEXEULO	PVEXEULO	-10.000	-10.000

Figure 6.13 – STIM Status monitoring

An additional STIM tab is provided which can be used to monitor a STIM channel, and send STIM IOP and STIM Point specific commands.

6.2.4.1. STIM POINT MONITORING

To monitor a STIM Point (channel) open the ***Select Point*** menu and select the required point (1-16).

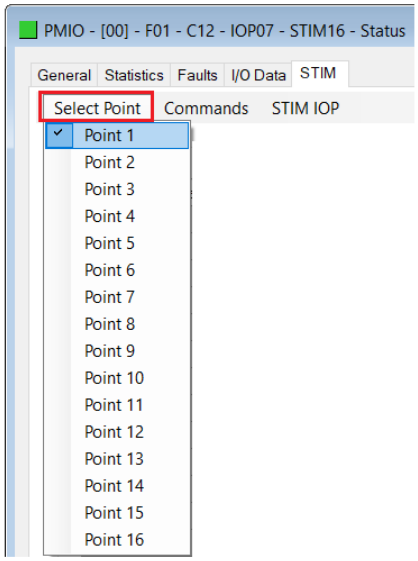
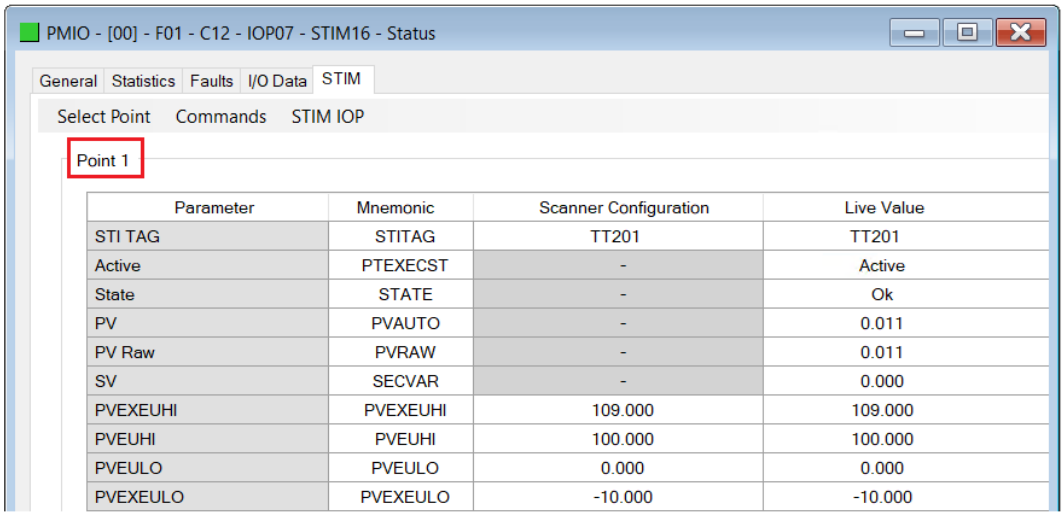


Figure 6.14 – STIM Status – Point Selection

All the STIM parameters will be updated in the background and displayed in the ***Live Value*** column. Where the parameter is a configuration parameter, the corresponding value in the PMIO Scanner's configuration will be shown in the ***Scanner Configuration*** column.

Each time the parameter is updated from the STIM IOP, the background of the corresponding

Live Value will be highlighted (light cyan).



Parameter	Mnemonic	Scanner Configuration	Live Value
STI TAG	STITAG	TT201	TT201
Active	PTEXECST	-	Active
State	STATE	-	Ok
PV	PVAUTO	-	0.011
PV Raw	PVRAW	-	0.011
SV	SECVAR	-	0.000
PVEXEUHI	PVEXEUHI	109.000	109.000
PVEUHI	PVEUHI	100.000	100.000
PVEULO	PVEULO	0.000	0.000
PVEXEULO	PVEXEULO	-10.000	-10.000

Figure 6.15 – STIM Status – Point Monitoring

NOTE: When the PMIO Scanner is in ***Shadow*** mode, these parameters will only be updated when requested by the running Honeywell system, for example, when that specific point is being actively monitored.

Configuration parameters can be written directly to the STIM IOP, without updating the PMIO Scanner's configuration. This can be done by either double-clicking on the parameter, or right-clicking on the parameter and selecting the ***Write*** option.

NOTE: Writing a parameter requires the selected Point to be ***Inactive***. Use the ***Deactivate*** command to achieve this.

Parameter	Mnemonic	Scanner Configuration	Live Value
Input Direction	INPTDIR	Direct	Direct
PV Characterization	PVCHAR	E Thermal	E Thermal
Cold Junction Internal	CJTACT	OFF	OFF
Open TC Detection	PIUOTDCF	OFF	ON
DE Config	DECONF	PV+SV+DB	PV+SV+DB
STI Eng Units	STI_EU	deg C	deg C
Filter Constant	TF	2.000	2.000
Damping	DAMPING	3.1000	3.1000
Low Cut-Off	LOCUTOFF	NaN	NaN
PV Clamp	PVCLAMP	No Clamp	No Clamp
Serial Number	SERIALNO	-	B9253277
STI SW Version	STISWVER	-	3.2

Figure 6.16 – STIM Status – Parameter Write

NOTE: Once a parameter has been updated, a ***Download DB*** command will be required to transfer the updated configuration to the transmitter.

6.2.4.2. STIM POINT COMMANDS

A number of Point commands are available under the Commands menu.

NOTE: These commands are available only when the STIM IOP is in ***RUN*** mode. (See STIM IOP Commands).

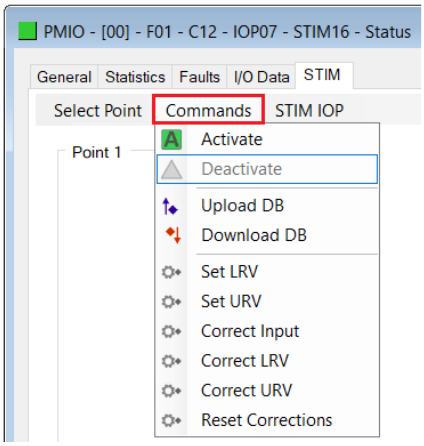


Figure 6.17 – STIM Status – Point Commands

The STIM Point commands are summarised below. For more detailed information see the relevant STIM user manual.

NOTE: All commands (except for the ***Activate*** command) require the point to be in an ***Inactive*** state first (see ***Deactivate*** command).

Point Command	Description
Activate	Commands the point to an Active (operational) state.
Deactivate	Commands the point to an Inactive state.
Upload DB	Commands the STIM to transfer the transmitter database from the transmitter to the STIM.
Download DB	Commands the STIM to transfer the transmitter database from the STIM to the transmitter.
Set LRV	Sets the Lower Range Value to current value of input.
Set URV	Sets the Upper Range Value to current value of input.
Correct Input	Corrects the zero point.
Correct LRV	Corrects the Lower Range Value.
Correct URV	Corrects the Upper Range Value.
Reset Corrections	Sets all input calibration parameters to their factory default values.

Table 6.8 - STIM Status – Point Command Summary

6.2.4.3. STIM IOP COMMANDS

The STIM IOP menu provides access to a number of STIM IOP and related configuration options.

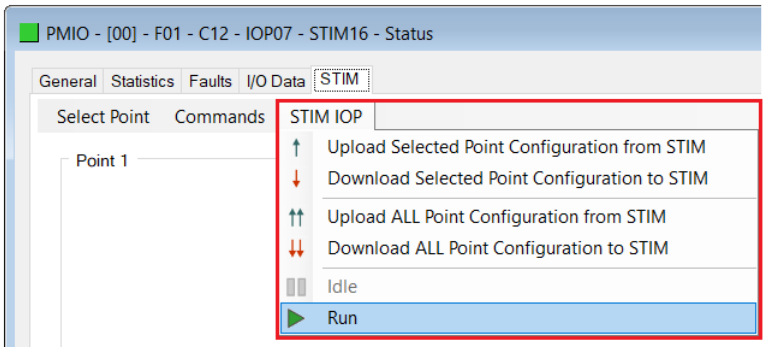


Figure 6.18 – STIM Status – STIM IOP Commands

STIM IOP Command	Description
Upload Selected Point Configuration from STIM	Transfers the selected point configuration from the STIM IOP to the PMIO Scanner's configuration. ***WARNING***: Once the configuration has been transferred to Slate, it will need to be downloaded to the PMIO Scanner to remain online. This action will cause a temporary disruption to all IOPs. ***NOTE***: The STIM must be in ***RUN*** mode for this action.
Download Selected Point Configuration to STIM	Transfers the selected point configuration from the PMIO Scanner to the STIM IOP. ***NOTE***: The STIM must be in ***IDLE*** mode for this action.
Upload ALL Point Configuration from STIM	Transfers the point configuration of all points from the STIM IOP to the PMIO Scanner's configuration. ***WARNING***: Once the configuration has been transferred to Slate, it will need to be downloaded to the PMIO Scanner to remain online. This action will cause a temporary disruption to all IOPs. ***NOTE***: The STIM must be in ***RUN*** mode for this action.
Download ALL Point Configuration to STIM	Transfers the point configuration of all points from the PMIO Scanner to the STIM IOP. ***NOTE***: The STIM must be in ***IDLE*** mode for this action.
Idle	Places the STIM IOP in IDLE mode.
Run	Places the STIM IOP in RUN mode.

Table 6.9 - STIM Status – STIM IOP Command Summary

6.2.4.4. TYPICAL STIM PROCEDURES

The following describes some typical STIM procedures.

A. UPDATE PMIO SCANNER WITH PREVIOUSLY CONFIGURED STIM

Use Case:
The STIM has been previously configured and is operational, but the PMIO Scanner does not have the matching configuration.

NOTE: Usually this configuration can be imported using the EB file import.

Steps:

- Add the STIM IOP in the PMIO Scanner configuration.
- Configure the correct File, Card, and Module number.
- Download the configuration to the PMIO Scanner.
- Right-click on the STIM and open the IOP Status form.
- Confirm that the STIM is ***Running OK*** (Green) if not, use the STIM IOP ... ***RUN*** command.
- In the STIM IOP menu, select the ***Upload ALL Point Configuration from STIM*** option.
- When prompted, download the new configuration to the PMIO Scanner.

B. CONFIGURE NEW / REPLACED STIM IOP

Use Case:
The PMIO Scanner has the correct and valid STIM IOP configuration, but the actual STIM module has been replaced and is therefore either unconfigured or incorrectly configured.

Steps:

- Insert the new STIM IOP in the rack.
- In Slate, right-click on the STIM and open the IOP Status form.
- Confirm that the STIM is ***Online***.
- Confirm that the STIM is in ***IDLE*** mode (orange), if not, use the STIM IOP ... ***IDLE*** command.
- In the STIM IOP menu, select the ***Download ALL Point Configuration to STIM*** option.
- Once completed, change the STIM IOP to ***RUN*** mode.
- For each configured point, one by one:
    - Select the Point (1-16)
    - Check that the point is Active and the State is Ok.

- If the State shows ***DB Change***, then use either the ***Upload DB*** or ***Download DB*** to resolve this condition (depending on which has the more up-to-date configuration.) Wait until the State shows ***Load Complete*** before making the point Active.

C. CONFIGURE NEW / REPLACED DE TRANSMITTER

Use Case:
The PMIO Scanner and STIM IOP are configured, but a DE transmitter has been replaced.

Steps:

- In Slate, right-click on the STIM and open the IOP Status form.
- Confirm that the STIM is ***Running OK*** (Green) if not, use the STIM IOP ... ***RUN*** command.
- Select the relevant Point (1-16)
- Check that the point is ***Inactive***, if not use the ***Deactivate*** command.
- Select the ***Download DB*** command.
- Monitor the ***State*** until it changes to ***Load Complete***.
- Use the ***Activate*** command to ***Activate*** the point.
- Confirm the point is ***Active*** and the ***State*** is ***Ok***.

6.3. MODULE EVENT LOG

The PMIO Scanner module logs various diagnostic records to an internal event log. These logs are stored in non-volatile memory and can be displayed using Slate or via the web interface. To view them in Slate, select the Event Viewer option from the dropdown menu.

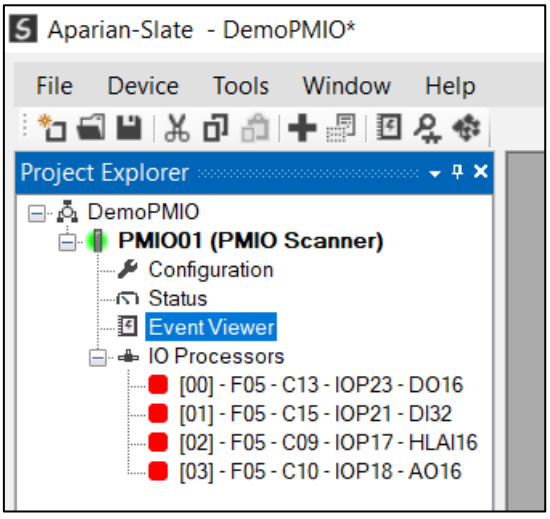
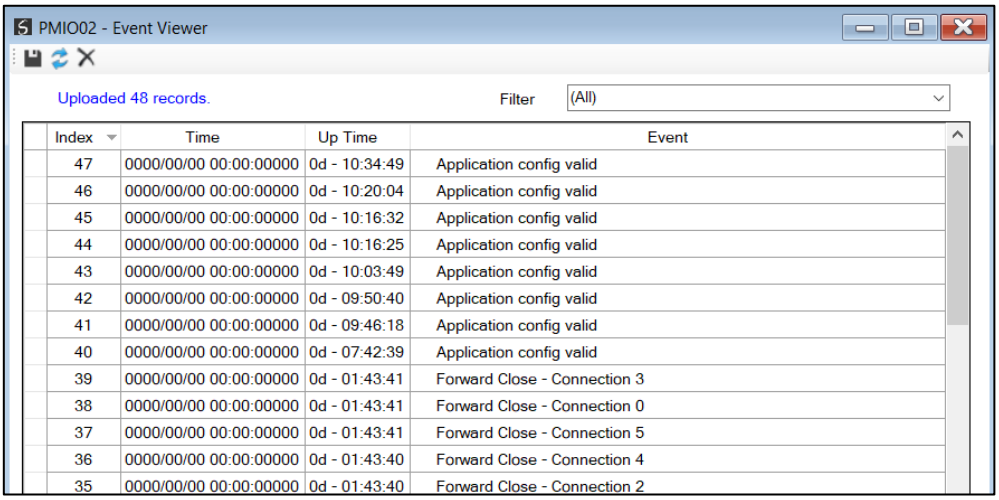


Figure 6.19 - Selecting the Module Event Log

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



Index	Time	Up Time	Event
47	0000/00/00 00:00:00000	0d - 10:34:49	Application config valid
46	0000/00/00 00:00:00000	0d - 10:20:04	Application config valid
45	0000/00/00 00:00:00000	0d - 10:16:32	Application config valid
44	0000/00/00 00:00:00000	0d - 10:16:25	Application config valid
43	0000/00/00 00:00:00000	0d - 10:03:49	Application config valid
42	0000/00/00 00:00:00000	0d - 09:50:40	Application config valid
41	0000/00/00 00:00:00000	0d - 09:46:18	Application config valid
40	0000/00/00 00:00:00000	0d - 07:42:39	Application config valid
39	0000/00/00 00:00:00000	0d - 01:43:41	Forward Close - Connection 3
38	0000/00/00 00:00:00000	0d - 01:43:41	Forward Close - Connection 0
37	0000/00/00 00:00:00000	0d - 01:43:41	Forward Close - Connection 5
36	0000/00/00 00:00:00000	0d - 01:43:40	Forward Close - Connection 4
35	0000/00/00 00:00:00000	0d - 01:43:40	Forward Close - Connection 2

Figure 6.20 - Module Event Log

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

7. DEVICE FIRMWARE UPDATE

The PMIO Scanner module supports in-field firmware upgrading. The latest firmware for the module can be downloaded from the Aparian website ***www.aparian.com***. The firmware is digitally signed, so only the correct firmware can be used.

To firmware upgrade the module, follow the steps below:

- From the ***Tools*** menu in Slate, select the ***DeviceFlash*** utility.

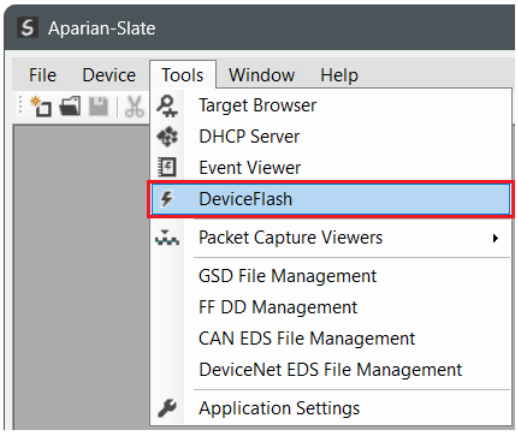


Figure 7.1 – Select DeviceFlash utility from Slate

- When the utility opens, the user will be prompted to select the binary file to be used to firmware upgrade the module.

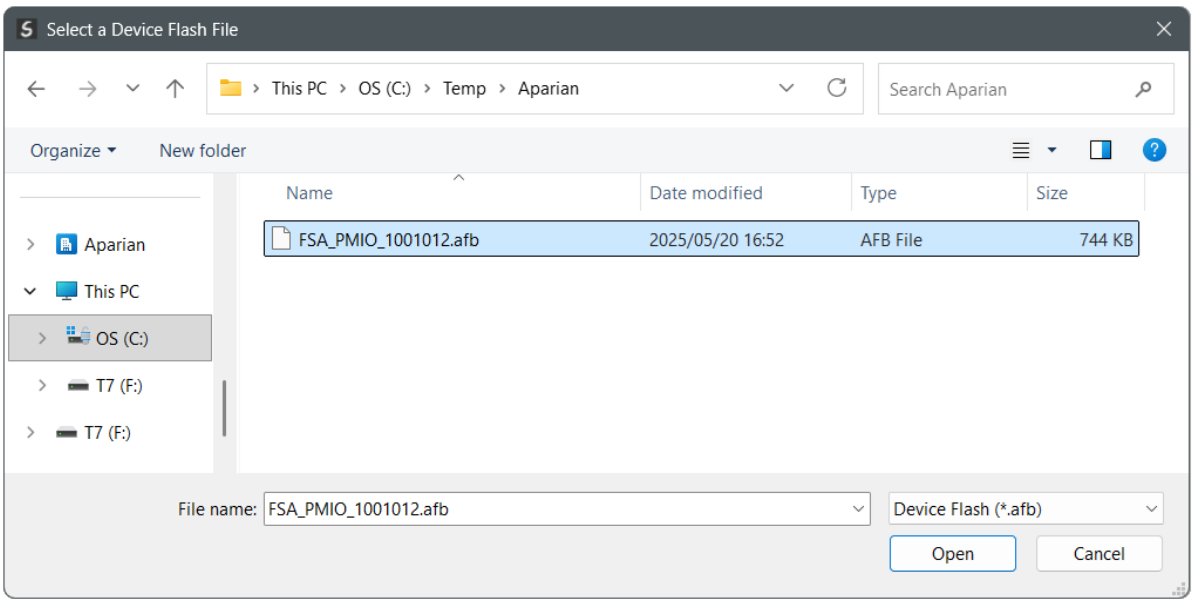


Figure 7.2 – Select the binary file

- After selecting the file, the user will be prompted to select the device to firmware upgrade on the local network.

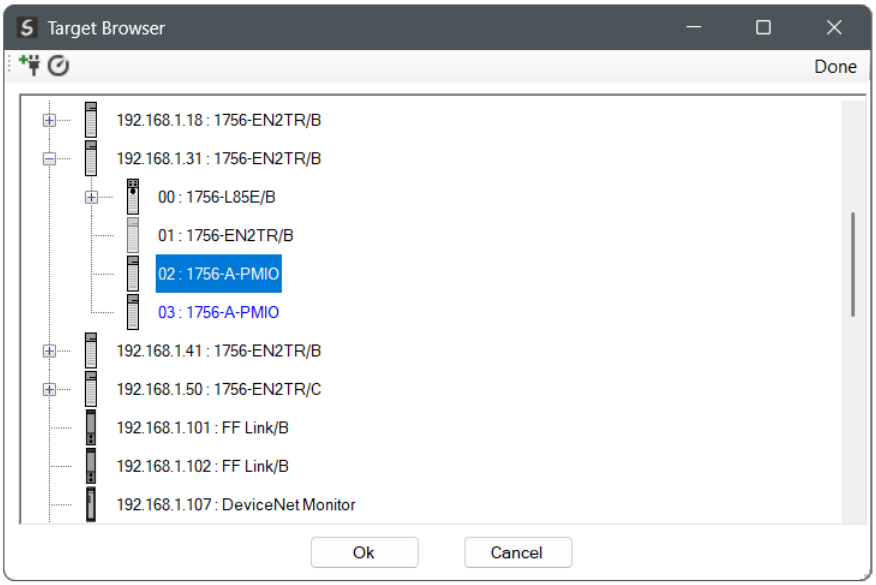


Figure 7.3 – Select the device to be updated

- After the device selection, the user will be prompted to start the device flash process. The firmware update will take less than 2 minutes to complete.

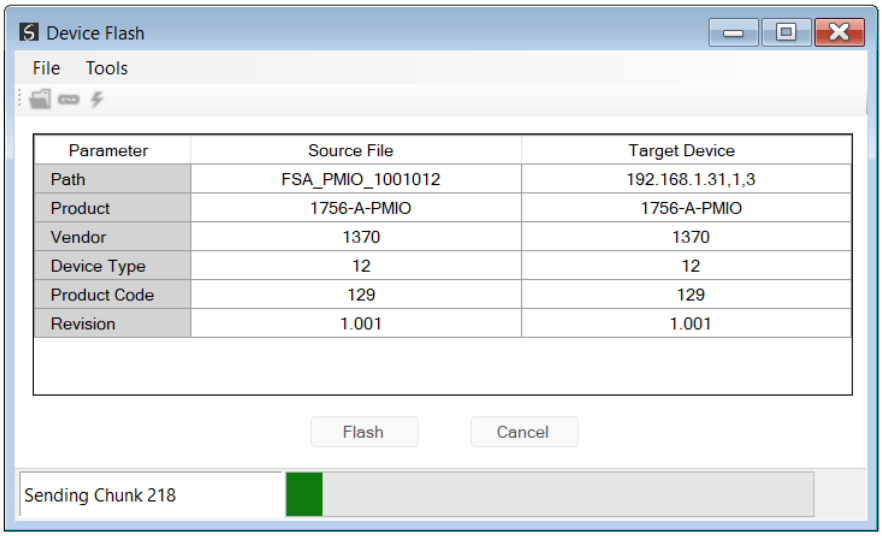


Figure 7.4 – Firmware update busy

- Once the firmware update has successfully completed, the Target Device textboxes will display green.

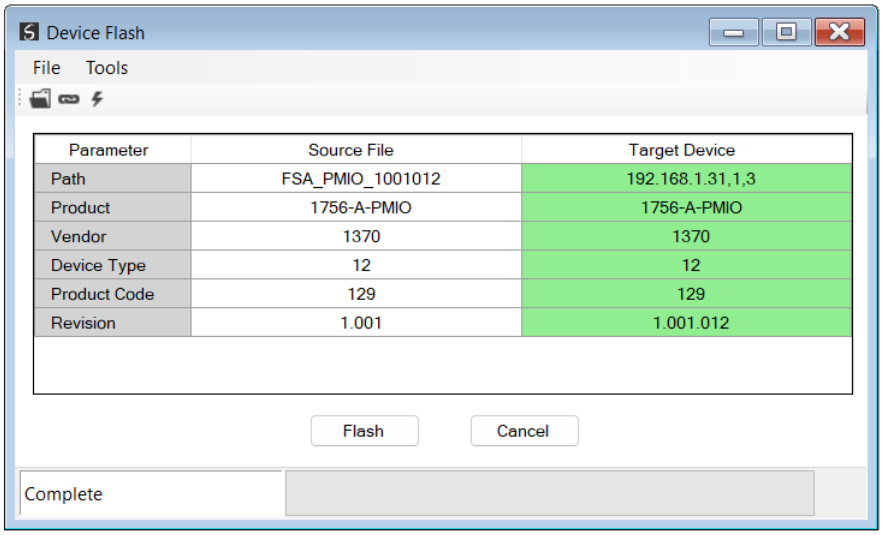


Figure 7.5 – Firmware update successfully completed

NOTE: If for any reason the firmware update failed (e.g. power down during the update), then the module will revert back to the bootloader. The user can then simply reflash the module again to update it to the latest application firmware.

8. TECHNICAL SPECIFICATIONS

8.1. ELECTRICAL AND ENVIRONMENTAL

Specification	Rating
Backplane Current Load	450 mA @ 5 VDC 2 mA @ 24 VDC
Enclosure rating	IP20, NEMA/UL Open Type
Temperature	-20 – 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 8.1 - Electrical specification

8.2. I/O LINK

Specification	Rating
Connector	2 x 3-way terminals
Conductor	24 – 18 AWG
Termination	124 Ω (Can be enabled/disabled)
Redundant I/O Link	Yes

Table 8.2 – I/O Link specification

8.3. CERTIFICATIONS

Certification	Mark
CE Mark	CE
RoHS2 Compliant	RoHS2
UL Mark File: E494895	c UL us LISTED CLASS 1, DIV 2, GROUPS A, B, C, D
ATEX	Ex II 3 G Ex nA IIC T5 X Gc -20°C ≤ Ta ≤ 70 °C
UKCA	UK CA

Table 8.3 – Certifications

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