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# PLX51-DL-232

**Data Logger**

Data Storage Module

June 22, 2022

**USER MANUAL**

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PLX51-DL-232 User Manual
For Public Use.

June 22, 2022



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# Contents

# 1 Preface

## 1.1 Introduction to the Data Logger

This manual describes the installation, configuration, operation, and diagnostics of the PLX51-DL-232. The PLX51-DL-232 can read and store data from Logix Controllers, DF1 Serial Interfaces, or Modbus devices. The PLX51-DL-232 has the capacity to store over 16 million records in its solid-state non-volatile memory. Each stored record includes a Date Time stamp with a 50 ms resolution, Tag Name, Data Type, and Value.

The PLX51-DL-232 can be used to log data at a remote site with limited communication with its base. The PLX51-DL-232 is also used to store records on mobile equipment such as trucks, drilling rigs, or snow plows. Once the equipment returns back to its base, the historical data can be uploaded and transferred to a more permanent storage device. The PLX51-DL-232 can also be configured to collect data which is only downloaded and examined if a fault occurs, otherwise the data is overwritten.

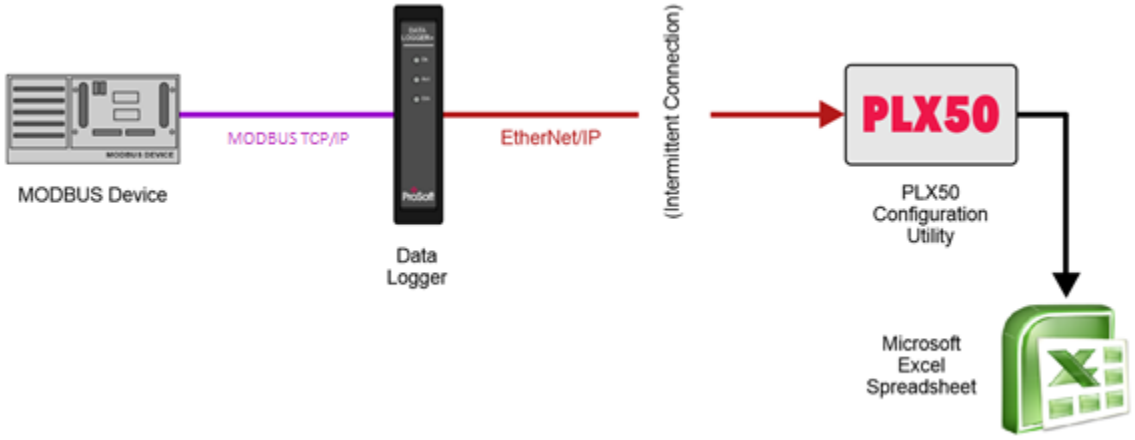



Figure 1.1. – Non-Historian Option

## 1.2 Features

The PLX51-DL-232 provides temporary extensive on-board storage capability for storing process tags. A total of 16,777,216 records can be stored in its non-volatile memory.

Each record consists of the following data:

Table 1.1. – Components of a Record

| Parameter | Link |
|---|---|
| Date Time | UTC Time includes: Year, Month, Day, Hour, Minute, Second, Milliseconds. Time has a resolution of 50 milliseconds. |
| Tag Name | As defined in Controller or in the PLX50 Configuration Utility for other sources |
| Data Type | BOOL, SINT, INT, DINT, or REAL |
| Value | Logix Tag / DF1 File / Modbus Register value |

The Log Index is managed by the PLX51-DL-232 and incremented each time a new record is stored. The Unload Index is managed externally by the unload service. It is only incremented after a record has been logged successfully to a text file. The records can be unloaded in Logix with the Example Code. Both the Log Index and Unload Indices loop around, eventually reaching the end of the cache. The cache becomes 100% full when the Log Index loops around and equals the Unload Index. In this situation, either older records are overwritten (Log Mode = Overwrite) or newer records are not logged (Log Mode = Hold).

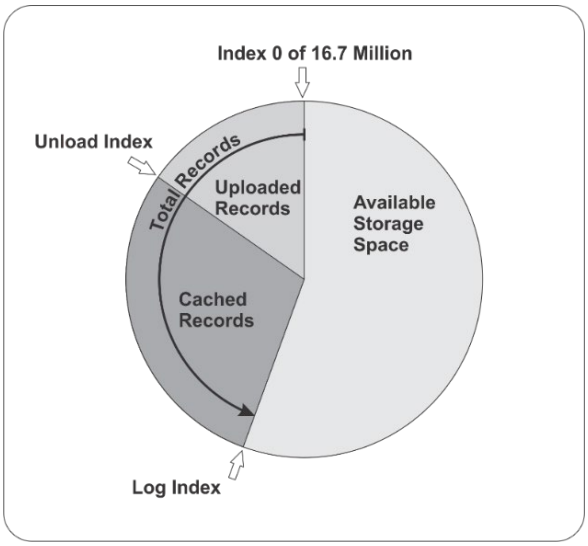



Figure 1.2. - Memory Schematic

The PLX51-DL-232 is configured using the ProSoft PLX50 Configuration Utility. This program can be downloaded from www.prosoft-technology.com, free of charge. The PLX50 Configuration Utility offers various configuration methods, including a controller tag browser. The PLX50 Configuration Utility can also be used to monitor the status and download historical data to a local file.

The PLX51-DL-232 can operate in both a Logix “owned” and standalone mode. With a Logix connection, the input and output assemblies provide additional diagnostics information. This information is available in the Logix controller environment.

The PLX51-DL-232 uses isolated RS232 for DF1 communication. The RS232 port also uses a terminal block for convenient installation.

A built-in webserver provides detailed diagnostics of system configuration and operation.

## 1.3 Additional Information

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

Table 1.2. - Additional Information

| Resource | Link |
|---|---|
| PLX50 Configuration Utility Installation | www.prosoft-technology.com |
| User Manual<br>Datasheet<br>Example Code & UDTs | www.prosoft-technology.com |
| Ethernet wiring standard | www.cisco.com/c/en/us/td/docs/video/cds/cde/cde205_220_420/installation/guide/cde205_220_420_hig/Connectors.html |
| CIP Routing | The CIP Networks Library, Volume 1, Appendix C:Data Management |

# 2 Installation

## 2.1 Module Layout

The PLX51-DL-232 has three ports at the bottom of the enclosure, as shown in the figure below. The ports are used for Ethernet, RS232 serial, and power.

The DC power port uses a three-way connector (**+** positive, **-** negative, and **Earth**).

The RS232 port uses a four-way connector (**Tx** Transmit, **Rx** Receive, **Gnd** Ground, and **Shield** earth connection).

The Ethernet cable must be wired according to industry standards which can be found in the additional information section of this document.

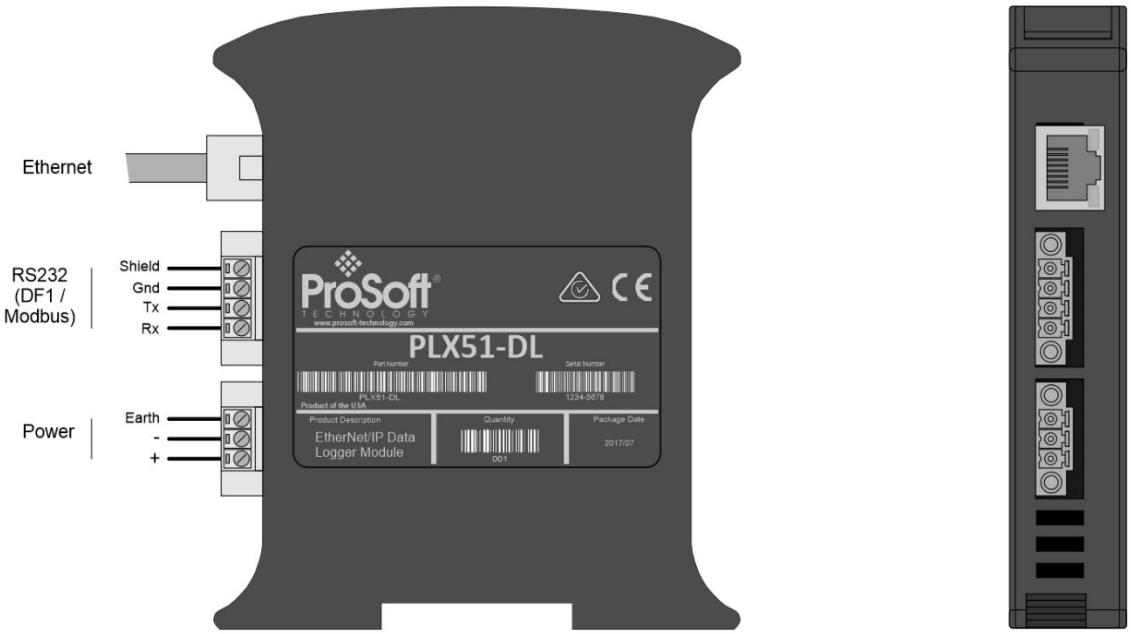



Figure 2.1. – Data Logger side and bottom view

The PLX51-DL-232 provides three diagnostic LEDs (**Ok**, **Act**, and **Eth**). These LEDs provide information on system operation, the Ethernet interface, and the auxiliary communication interface (RS232).

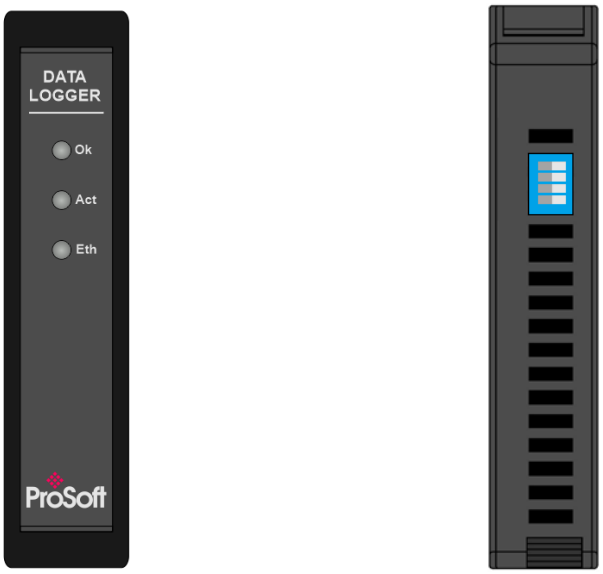



Figure 2.2. – Module front and top view

The PLX51-DL-232 has four DIP switches at the top of the enclosure as shown above.

Table 2.1. - DIP Switch Settings

| DIP Switch | Description |
|---|---|
| DIP 1 | Used to force the PLX51-DL-232 into “Safe Mode”. When in “Safe Mode”, the PLX51-DL-232 does not load the application firmware. It waits for new firmware to be downloaded. This should only be used when a firmware update was interrupted at a critical stage. |
| DIP 2 | Used to force the PLX51-DL-232 into DHCP mode, useful when the user has forgotten the IP address of the PLX51-DL-232. |
| DIP 3 | Reserved |
| DIP 4 | Reserved |

## 2.2 Module Mounting

The PLX51-DL-232 provides a DIN rail clip to mount onto a 35mm DIN rail.

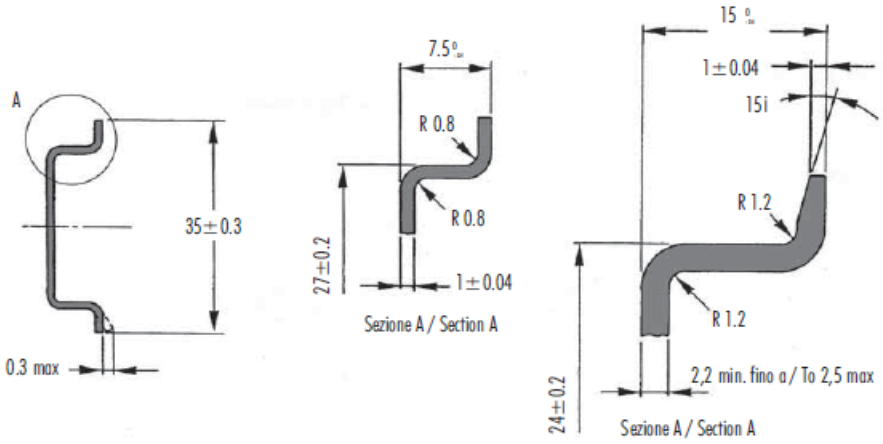



Figure 2.3. - DIN rail specification

The DIN rail clip is mounted on the bottom of the PLX51-DL-232. Use a flat screw driver to pull the clip downward. Once the PLX51-DL-232 is mounted onto the DIN rail, the clip must be pushed upward to lock the PLX51-DL-232 in place.

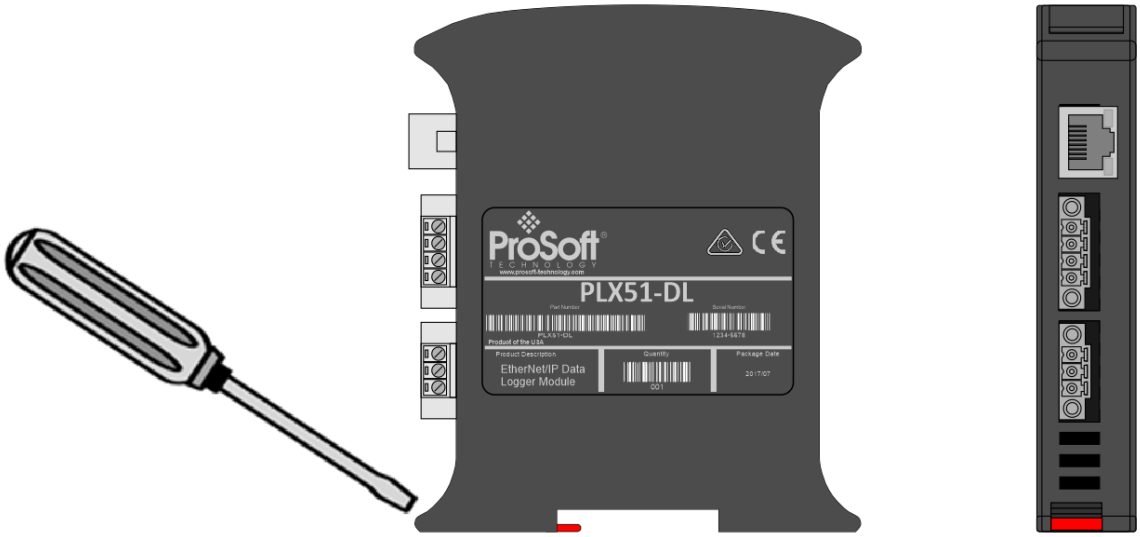



Figure 2.4. - DIN rail mouting

## 2.3 Power

A three-way power connector is used to connect + positive, - negative, and Earth. The PLX51-DL-232 requires an input voltage of 10 to 28 Vdc.

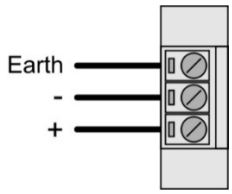



Figure 2.5. - Power connector

## 2.4 RS232 Port

The RS232 connector is used to connect the Transmit (Tx), Receive (Rx), and Ground conductors for serial communication. The shield terminal can be used for shielded cable in high noise environments.

**Important:** The shield of the RS232 port is internally connected to the power connector earth. Thus, when using a shield it is important to connect the Earth terminal on the power connector to a clean earth. Failing to do this can lower the signal quality of the RS232 communication.

**Important:** When using a shielded cable, it is important that only one end of the shield is connected to earth to avoid current loops. It is recommended to connect the shield to the PLX51-DL-232, and not to the other Serial device.

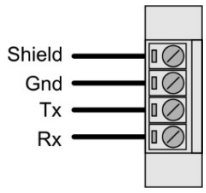



Figure 2.6. - RS232 connector

## 2.5 Ethernet Port

The Ethernet connector should be wired according to industry standards. Refer to the additional information section in this document for further details.

# 3 Setup

## 3.1 Install Configuration Software

The PLX51-DL-232 is configured using the PLX50 Configuration Utility environment. This software can be downloaded from www.prosoft-technology.com.


Figure 3.1. - PLX50 Configuration Utility Environment

## 3.2 Network Parameters

### *3.2.1 DHCP Server Settings*

By default, the PLX51-DL-232 has DHCP (Dynamic Host Configuration Protocol) enabled. Thus, a DHCP server must be used to provide the PLX51-DL-232 with the required network parameters (IP address, subnet mask, etc.). There are a number of DHCP utilities available. However, it is recommended to use the DHCP server in the PLX50 Configuration Utility.

**1** Within the PLX50 Configuration Utility, click on **TOOLS** > **DHCP SERVER**.

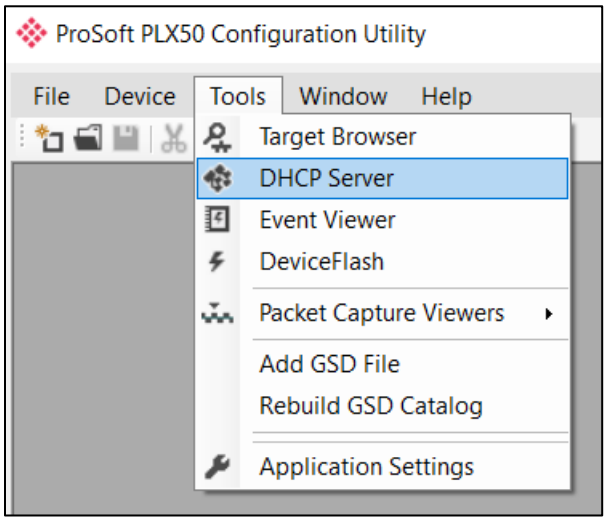



Figure 3.2. - Selecting DHCP Server

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

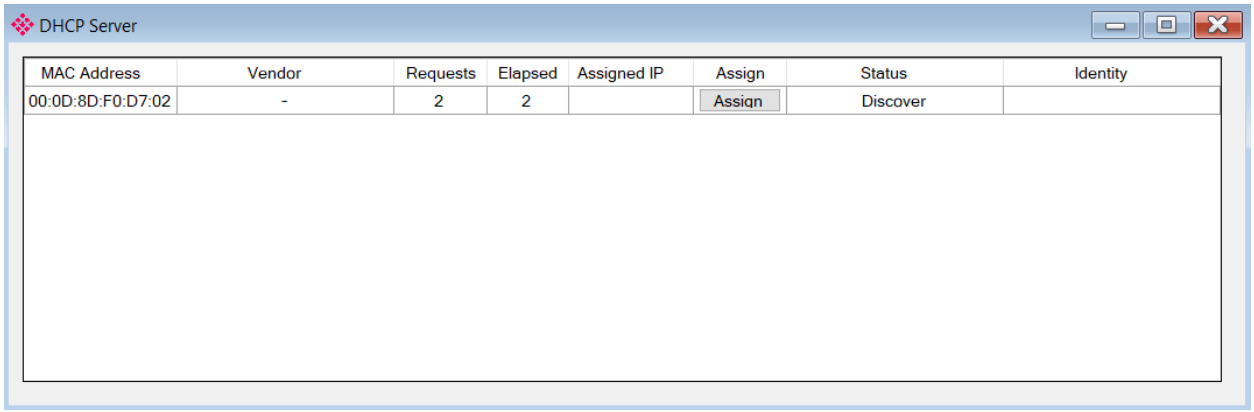



Figure 3.3. - DHCP Server

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

**3** To assign an IP address, click on the corresponding **ASSIGN** button. The *Assign IP Address* dialog box opens.

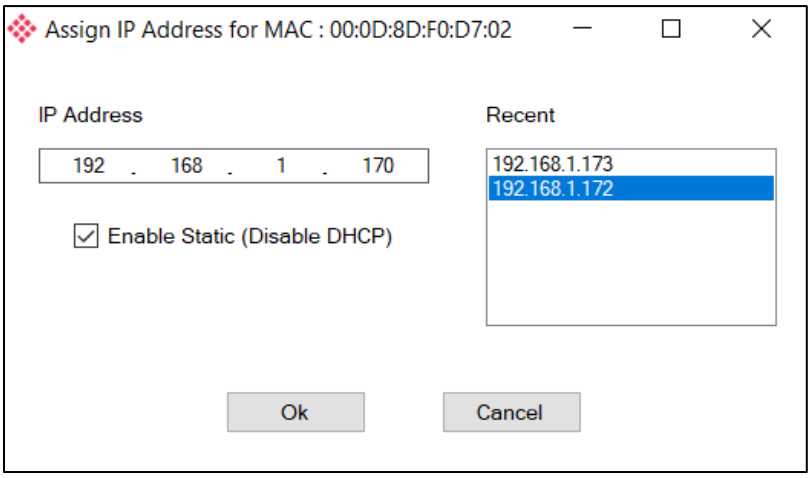



Figure 3.4. - Assigning IP Address

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

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

**4** Click **OK** when complete.

**5** Once the *Assign IP Address* dialog box has been accepted, the DHCP server automatically assigns the IP address to the PLX51-DL-232 and reads the *Identity Object Product* name from the device. The device indicates a green background upon successful assignment of the IP address.

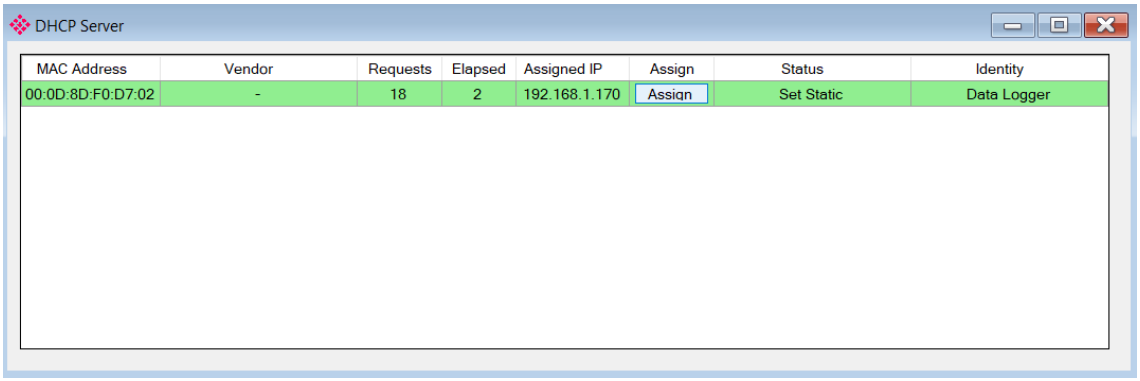



Figure 3.5. - Successful IP address assignment

It is possible to force the PLX51-DL-232 into DHCP mode by powering up the device with DIP switch 2 in the **On** position. A new IP address can then be assigned by repeating the previous steps.

**Important:** It is important to return DIP switch 2 back to Off position, to avoid the PLX51-DL-232 returning to a DHCP mode after the power is cycled again.

In addition to the setting the IP address, other network parameters can be set during the DHCP process. These settings can be viewed and edited by clicking on **TOOLS** > **APPLICATION SETTINGS**.

### *3.2.2 Network Settings*

Once the DHCP process has been completed, the network settings can be set using the *Ethernet Port Configuration* via the *Target Browser*.

**1** Click on Tools > Target Browser

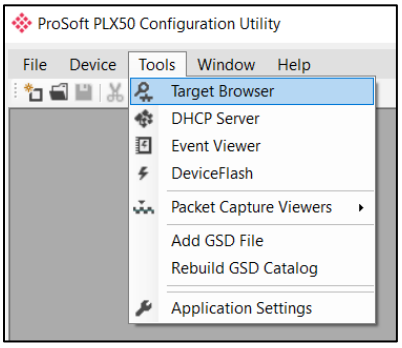



Figure 3.6. - Selecting the Target Browser

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

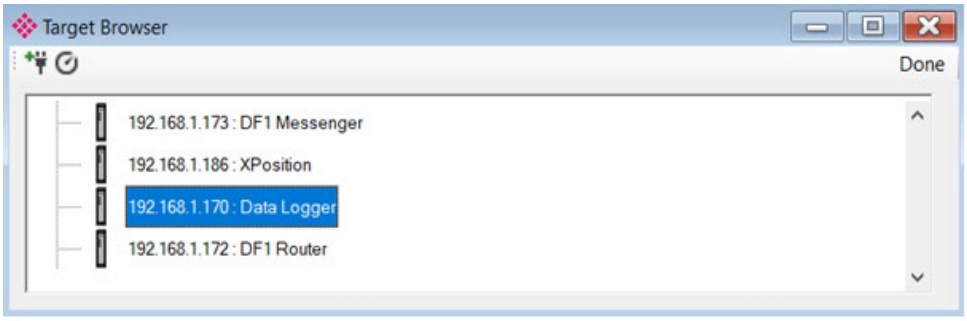



Figure 3.7. - Target Browser

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

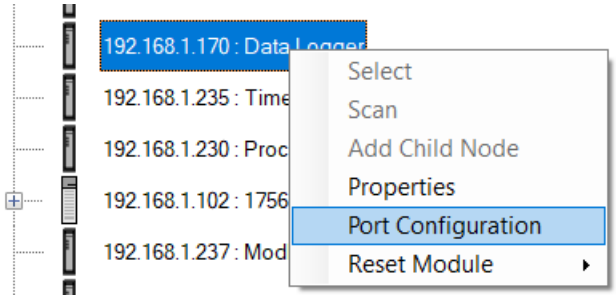



Figure 3.8. - Selecting Port Configuration

**4** All relevant Ethernet port configuration parameters can be modified using the *Port Configuration* dialog box.

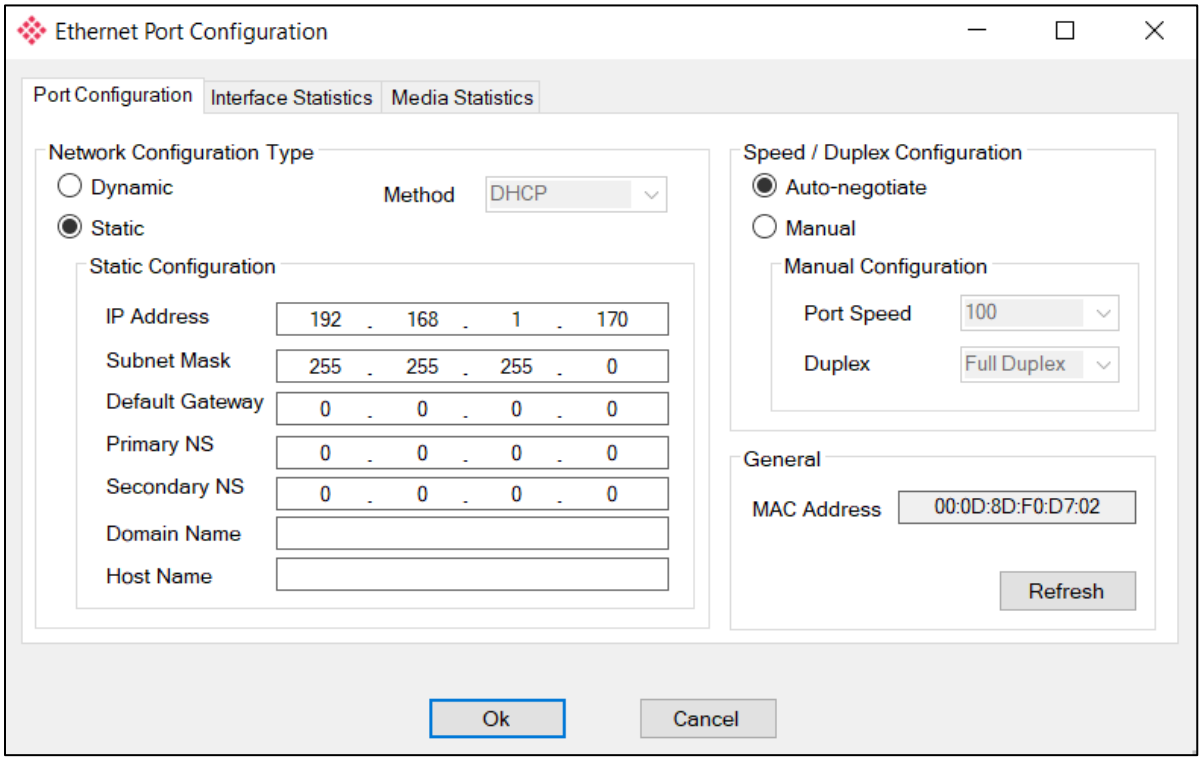



Figure 3.9. - Port Configuration

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

## 3.3 Creating a New Project

Before you configure the PLX51-DL-232, a new PLX50 Configuration Utility project must be created.

**1** Click on **File** > **New**.

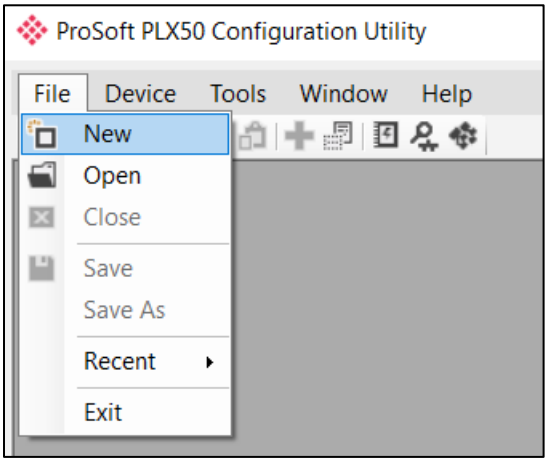



Figure 3.10. - Creating a new project

**2** A new project is created and displayed in the Project Explorer tree view.

**3** Add a new device by clicking on **DEVICE** > **ADD**.

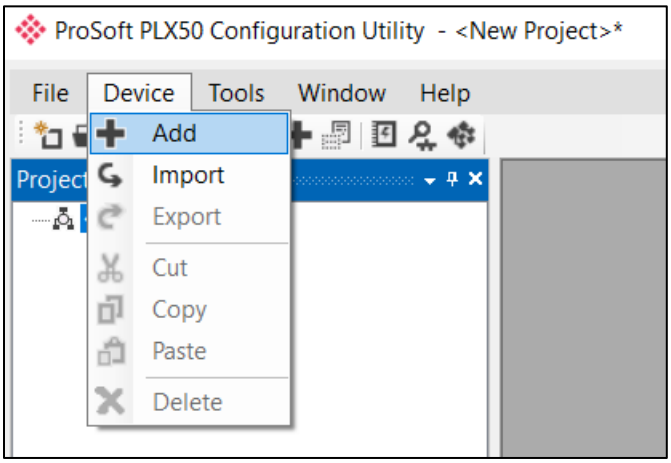



Figure 3.11 - Adding a new device

**4** In the *Add New Device* dialog box, select the PLX51-DL-232 and click the **Ok** button.

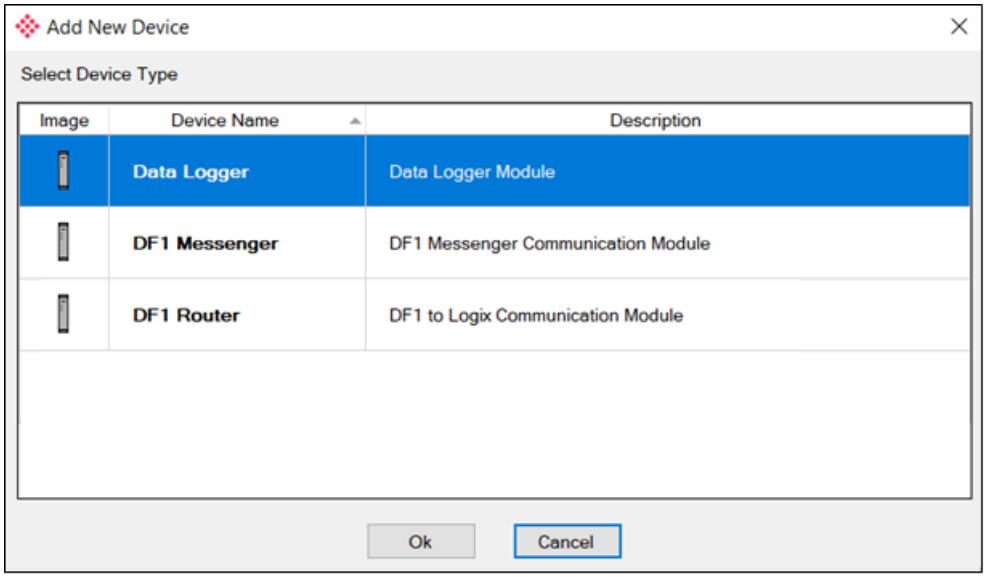



Figure 3.12 – Selecting a new PLX51-DL-232

**5** The device appears in the Project Explorer tree, and its configuration window is opened. The device configuration window can also be opened by double-clicking the PLX51-DL-232 icon in the Project Explorer tree, or right-clicking the PLX51-DL-232 icon and selecting *Configuration*.

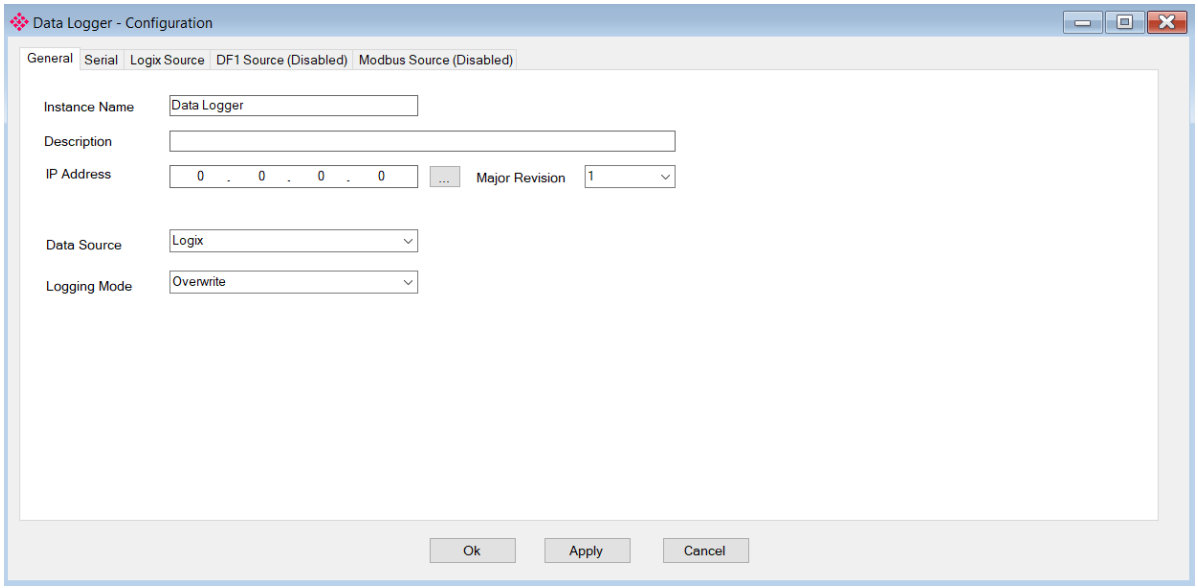



Figure 3.13 – PLX51-DL-232 configuration

## 3.4 Configuring the PLX51-DL-232

The PLX51-DL-232 is configured by the PLX50 Configuration Utility. The configuration consists of a general configuration, serial configuration for DF1 or Modbus RTU, data source configuration, and tag selections. The PLX51-DL-232 configuration is saved in non-volatile memory that persists when the PLX51-DL-232 is powered down.

**Important:** When a firmware upgrade is performed, the PLX51-DL-232 will clear all configuration and cached records.

### *3.4.1 General Tab*

The general configuration is shown in the figure below. The general configuration window is opened by either double-clicking on the PLX51-DL-232 icon in the tree, or right-clicking the PLX51-DL-232 icon and selecting *Configuration*.

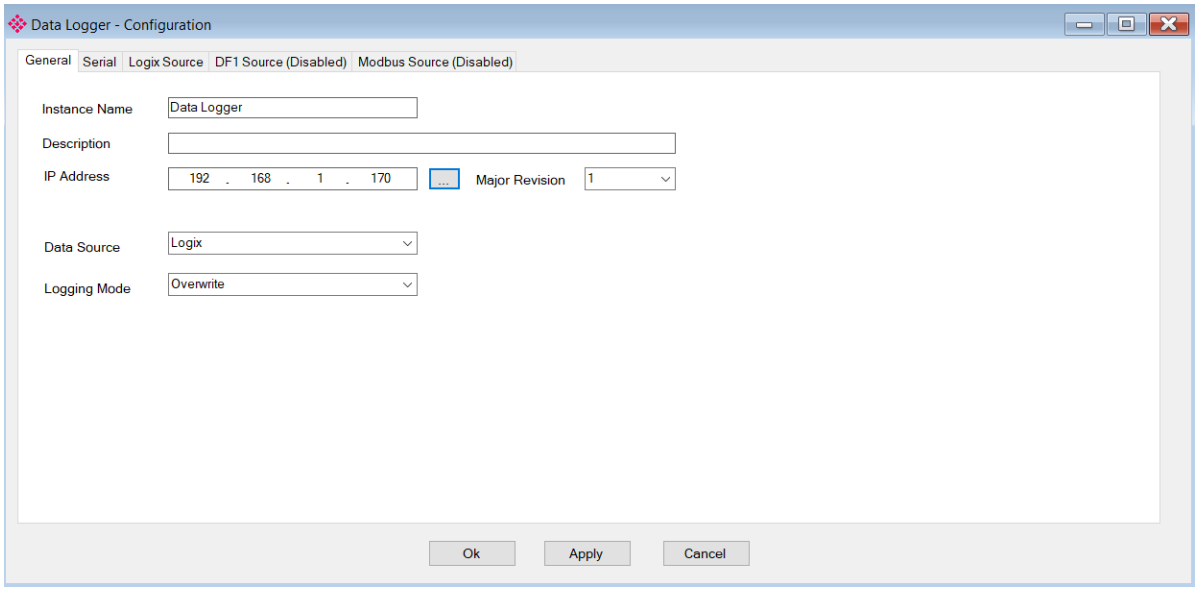



Figure 3.14 - General Configuration (Data Logger)

The general configuration consists of the following parameters:

Table 3.1 - General configuration parameters

| Parameter | Description |
|---|---|
| Instance Name | This parameter is a user defined name to identify between various PLX51-DL-232's. |
| Description | This parameter is used to provide a more detailed description of the PLX51-DL-232. |
| Major Revision | The major revision of the PLX51-DL-232. |
| IP Address | The PLX51-DL-232's IP address used by the PLX50 Configuration Utility to communicate with the PLX51-DL-232. |
| Data Source | This parameter selects the source of the data.<br>Logix – Rockwell Automation ControlLogix or Compact Logix controller<br>DF1 – Serial DF1 |

| Parameter | Description |
|---|---|
| | ModbusRTU – Serial Modbus<br>ModbusTCP – Modbus over Ethernet |
| Logging Mode | This parameter determines if records are overwritten once the memory is filled.<br>Overwrite = Old records are overwritten, giving priority to newer data.<br>Hold = Old records are preserved while new records are not stored. |

### 3.4.2 Serial Tab

The *Serial* tab is shown in the figure below. The Serial configuration is opened by either double-clicking on the PLX51-DL-232 icon in the tree, or right-clicking the PLX51-DL-232 icon and selecting *Configuration.* Select the *Serial* tab.

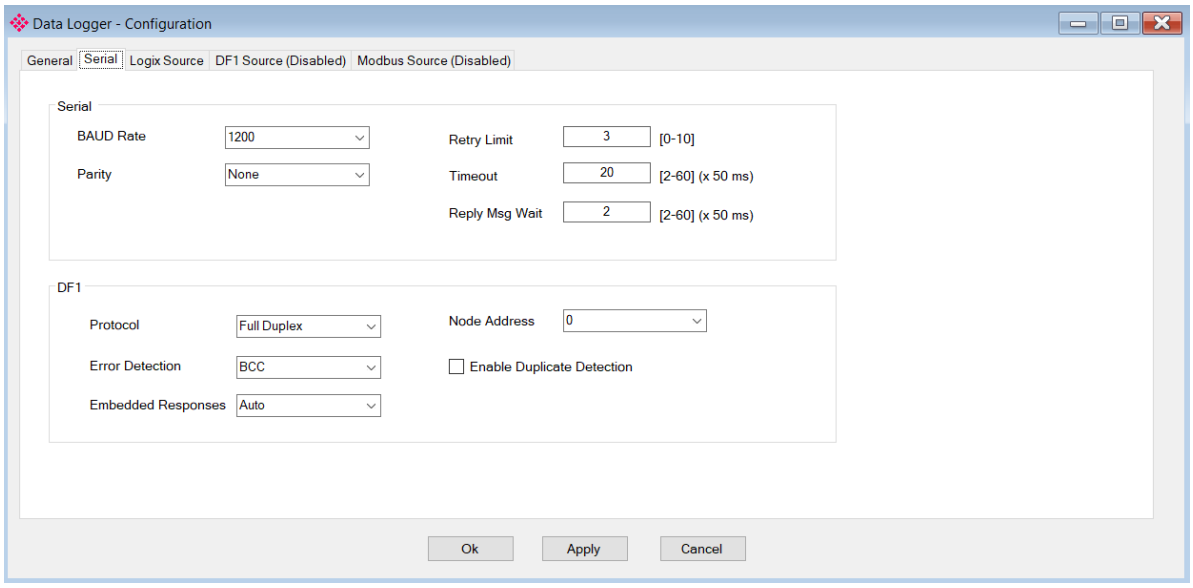



Figure 3.15 - Serial configuration

The Serial configuration (*Serial* tab) consists of general Serial and DF1-specific parameters. For Modbus RTU, only the *Baud Rate* and *Parity* need be configured.

Table 3.2 - Serial ModbusRTU and DF1 configuration parameters

| Parameter | Description |
|---|---|
| Baud Rate | This configures the speed of the data that is sent across the RS232 serial network. The PLX51-DL-232 provides the following speeds:<br>1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200 |
| Parity | This configures the parity of the RS232 serial port. The PLX51-DL-232 allows for Even, Odd, or None. |
| Protocol | This configures the PLX51-DL-232 to operate in full duplex or half duplex mode on the DF1 network. |
| Error Detection | The PLX51-DL-232 can be configured to perform either BCC or CRC checksum validation on incoming and outgoing packets. CRC checksums is a much stronger validation method, but is more processor-intensive to perform. |
| Embedded Response | This configures the PLX51-DL-232 to add the acknowledge responses in the data payload. It can be configured to be Auto Detect or On. |

| Parameter | Description |
|---|---|
| | This function is only available in Full Duplex mode. |
| Node Address | The node address is the local node address of the PLX51-DL-232. |
| Retry Limit | This determines how many times the PLX51-DL-232 must retry and message exchange before failing it. |
| Timeout | This determines the interval between retries for a failed message exchange. |
| Reply Msg Wait | This is the minimum delay before the DF1 reply is transmitted to the DF1 device. |
| Duplicate Detection | This configures the PLX51-DL-232 to check for duplicate packets and flagging them. |

## 3.5 Data Source Configuration

The Data Source tabs determine the PLX51-DL-232 communication mode used to acquire data. The Data Source options include:

- *Logix Source* – ControlLogix and Compact Logix controllers
- *DF1 Source* – For collecting data over DF1 Serial communications
- *Modbus Source* – for ModbusRTU (Serial) and ModbusTCP (Ethernet) communications

Once the data source is selected, each tab allows the configuration of up to three source devices and a total of 200 tags.

Tags can be logged as a result of their individual log criteria **or** via a group trigger. There are eight trigger groups (A thru H), and a tag can be a member of any trigger group. Groups are in turn triggered by one or more tags. The triggering of a group ensures all its member's values are logged at the same instance.

### *3.5.1 Group and Tag Triggers*

Three parameters determine when a tag is triggered:

- Delta Y (Δy) – A change in the value of the tag by this amount or more, AND
- Min ΔT – The minimum time in seconds between each consecutive trigger, OR
- Max ΔT – The maximum time between each consecutive trigger. Setting the Max ΔT to '**0**' disables the "heartbeat" and allows you to log on trigger.

The first two parameters work together to ensure tags are not logged too frequently, and the Max ΔT is set at a minimum logging frequency.

Logix Tag (max. of 200 items.)

| Target Name | Target Tag | Group Trigger | Group Member | Data Type | Digital Set | Δy | Min ΔT | Max ΔT |
|---|---|---|---|---|---|---|---|---|
| Truck6 | OutputRate | | | SINT | | 1 | 10 | 300 |
| Truck6 | TankLevel | | | INT | | 10 | 60 | 300 |
| Truck6 | Speed | A | AB | SINT | | 10 | 5 | 300 |
| Truck6 | Direction | | AB | REAL | | 10 | 30 | 300 |
| Truck6 | Temp | B | B | REAL | | 3 | 60 | 300 |
| Truck6 | Mix | | B | SINT | | 1 | 20 | 300 |
| Truck6 | Pressure | B | B | REAL | | 1 | 20 | 300 |
| | | | | | | | | |

Figure 3.16 – Group and Tag Triggers

### 3.5.2 Logix Source

The *Logix Source* tab is used to configure tags from Rockwell Automation Logix controllers over EtherNet/IP. The PLX51-DL-232 can read tags from up to three separate controllers. A *Target Name* must be provided. This acts as a reference to the Logix CIP path. The *Target Name* does not have to match the actual controller name set in RSLogix. The Controller's CIP Path can either be typed in or selected from a list in the *Target Browser*.

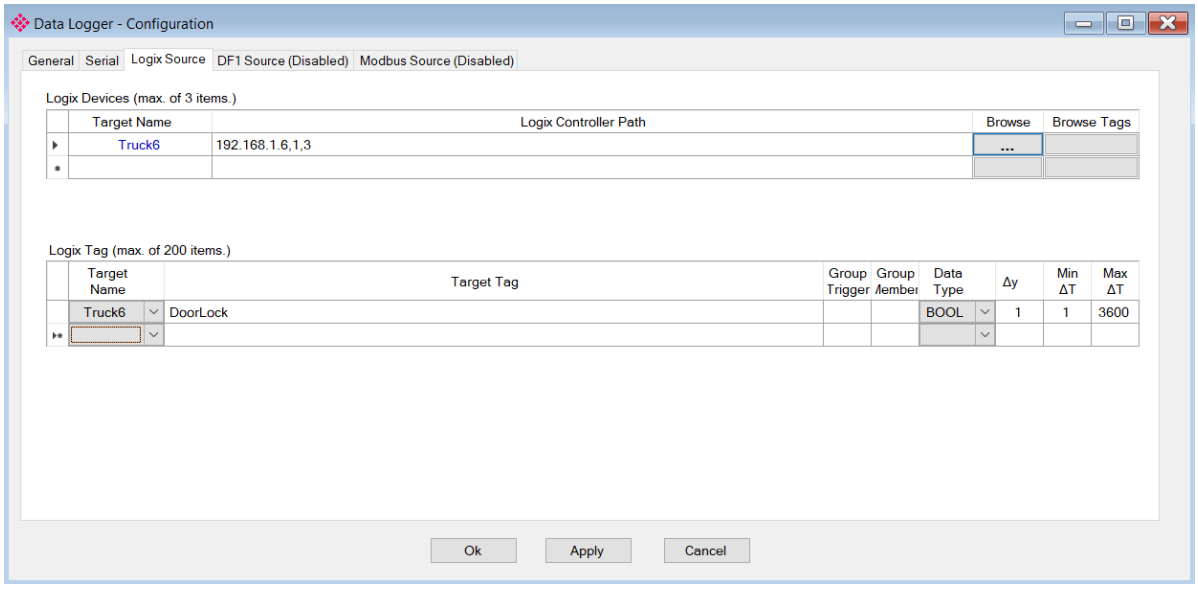



Figure 3.17 – Logix Source Configuration Tab

6 Click the **BROWSE** button in the browse column to launch the *Target Browser*. The *Target Browser* opens and automatically scans for all available EtherNet/IP devices.

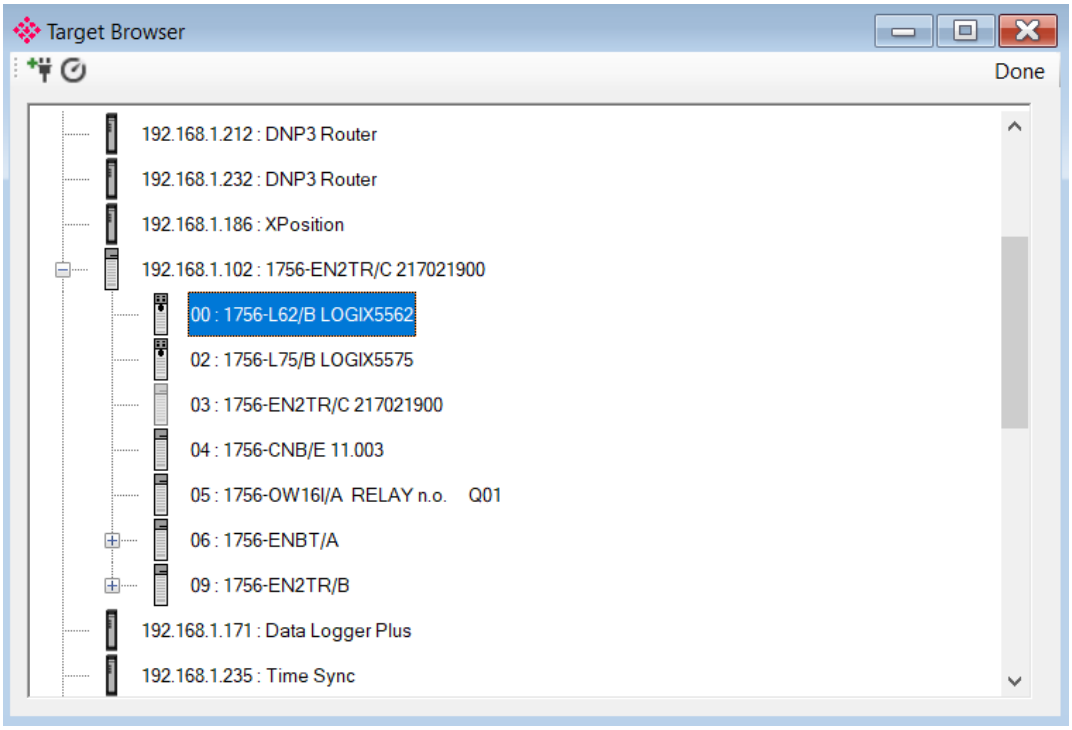



Figure 3.18 – Target Browser Window

7 If the Ethernet/IP module is a bridge module, it can be expanded by right-clicking on the PLX51-DL-232 icon and selecting the *Scan* option.

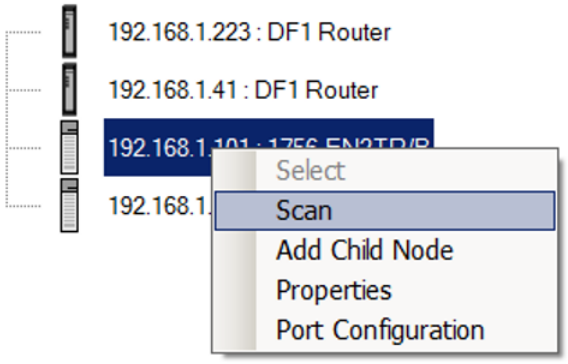



Figure 3.19 - Scanning node in the Target Browser

8 The Logix controller can be selected by clicking the **Ok** button, or by double-clicking on the controller module.

**9** Once the controller references have been configured, the individual Logix tags can be added. Tags can either be entered manually or selected by using the *Tag Browser* associated with each controller.

Logix Tag (max. of 200 items.)

| | Target Name | Target Tag | Group Trigger | Group Member | Data Type | Digital Set | Δy | Min ΔT | Max ΔT |
|---|---|---|---|---|---|---|---|---|---|
| ▶ | Truck6 | DoorLock | | | BOOL | NO_YES | 1 | 30 | 3600 |
| | Truck6 | RunTime | | | DINT | | 600 | 600 | 3600 |
| | Truck6 | Direction | | A | REAL | | 5 | 30 | 1800 |
| | Truck6 | Speed | A | A | SINT | | 5 | 30 | 1800 |
| * | | | | | | | | | |

Figure 3.20 - Logix Tag configuration

**Important:** Tag names need to match in order for the PLX51-DL-232 to correctly identify the tag. Full tag names are needed for tags to be located in program scopes.

**10** To launch the *Tag Browser*, click the **BROWSE TAGS** button associated with the controller. Tags that are were already selected and identified are highlighted in green. See Fig 3.24.

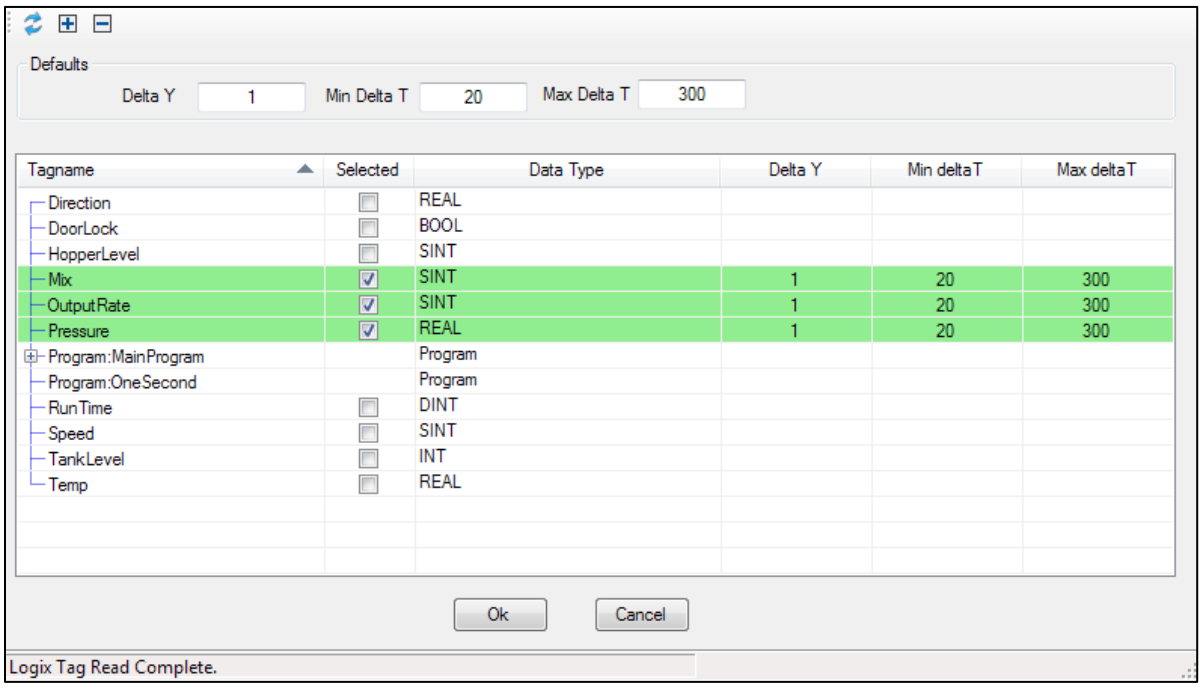



Figure 3.21 – Tag Browser Selection

**11** Tags can be removed by selecting the rows in the left margin, and right-clicking to display the **DELETE** option.

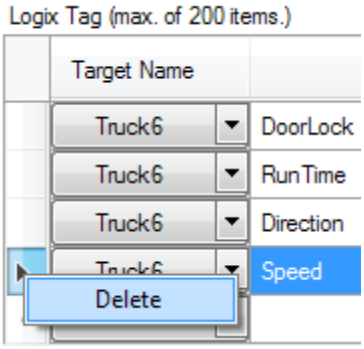



Figure 3.22 – Deleting Tags

### *3.5.3 DF1 Source*

A maximum of three DF1 Sources can be configured. The configuration of each source requires a *Device Name* (used as a reference for tag data sources), the *Device Type* (either PLC5 or SLC), and a *Node Address*.

Each DF1 Tag requires a unique *Tagname* and *Data Address*.

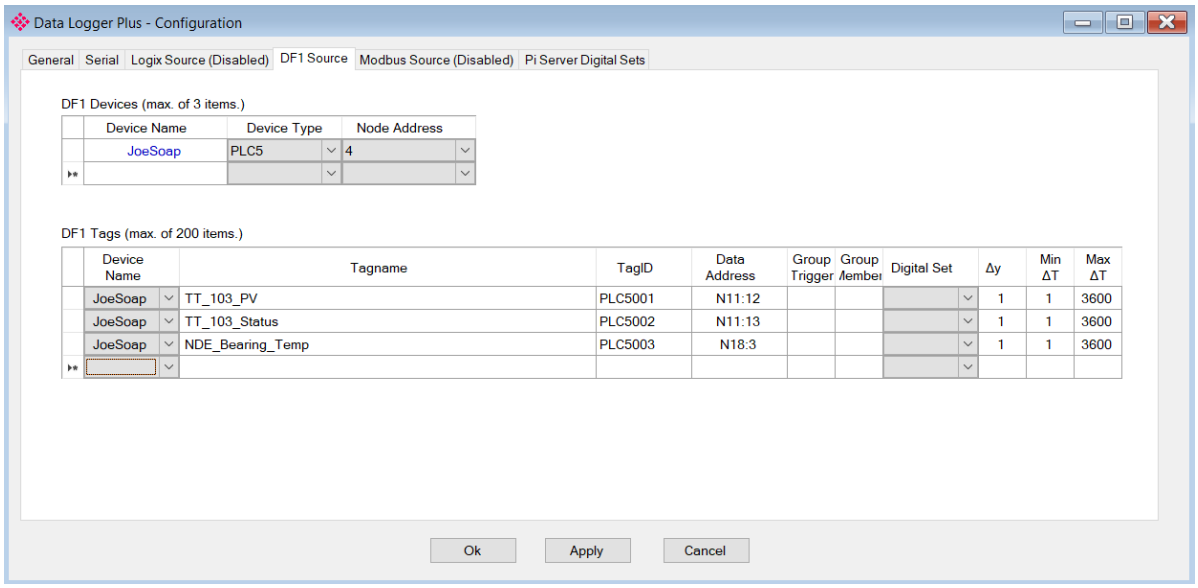



Figure 3.23 – DF1 Source configuration

### 3.5.4 Modbus Source

Both Modbus RTU and Modbus TCP/IP are configured using the *Modbus Source* tab. For Modbus RTU, a maximum of three Modbus sources can be configured. The configuration of each source requires a *Device Name* (used as a reference for tag data sources), the *IP Address* (Modbus TCP/IP only), and a *Node Address*.

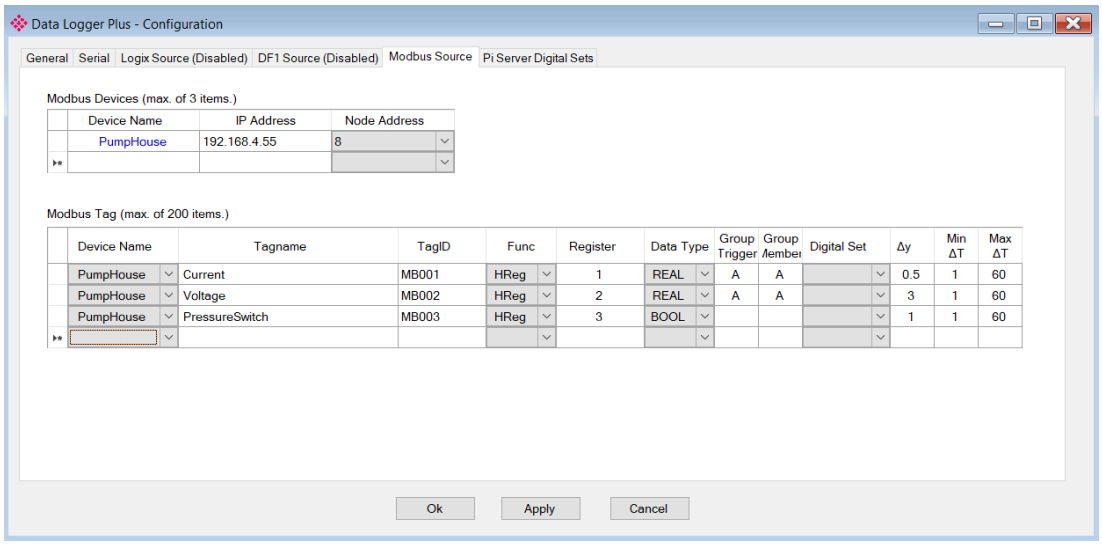



Fig 3.24 – Modbus Source Configuration

## 3.6 Module Download

Once the configuration is complete, it must be downloaded to the PLX51-DL-232.

Before downloading, the connection path of the PLX51-DL-232 should be set. This path automatically defaults to the PLX51-DL-232 IP address, as set in the PLX51-DL-232 configuration. It can be modified if the PLX51-DL-232 is not on a local network.

**1** The connection path can be set by right-clicking on the PLX51-DL-232 icon and selecting the *Connection Path* option.

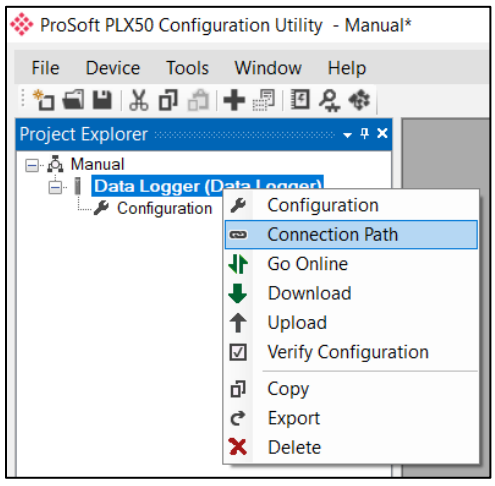



Fig 3.25 – Modbus Source Configuration

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

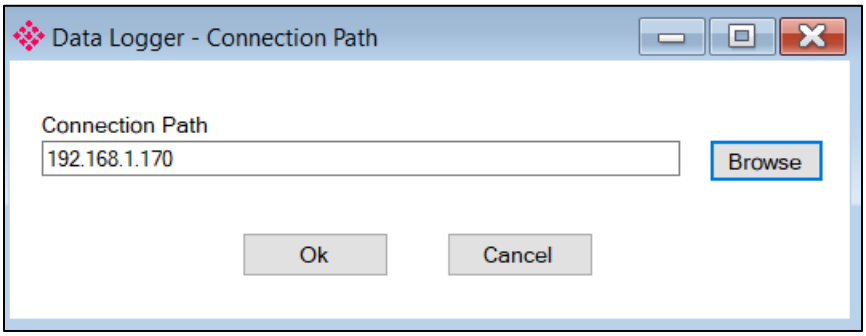



Figure 3.26 - Connection Path

**3** To initiate the download, right-click on the PLX51-DL-232 icon and select *Download*.

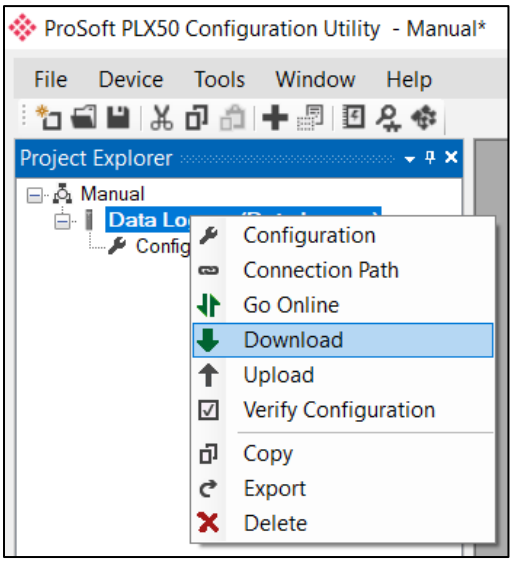



Figure 3.27 - Connection Path

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

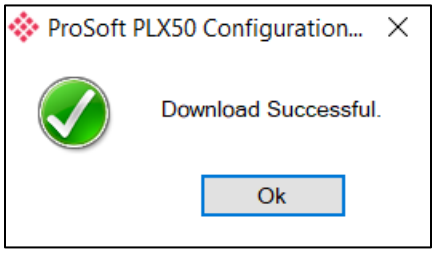



Figure 3.28 - Successful download

**5** During the download process, the PLX51-DL-232's time will be compared to that of the PC's time. Should the difference be greater than 30 seconds, you will be prompted to set the PLX51-DL-232 time to that of the PC time.

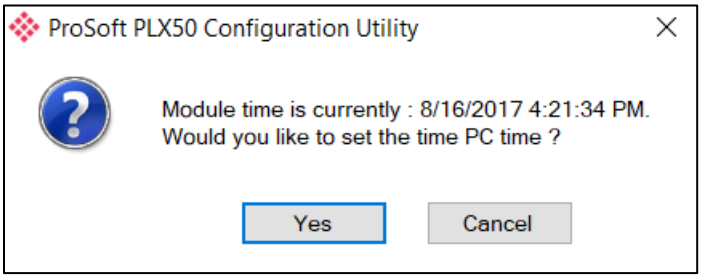



Figure 3.29 – Setting module time

**6** The PLX51-DL-232 time is used only for the event log. Within the PLX50 Configuration Utility environment, the PLX51-DL-232 will be in the *Online* state, indicated by the green circle around the PLX51-DL-232 icon.

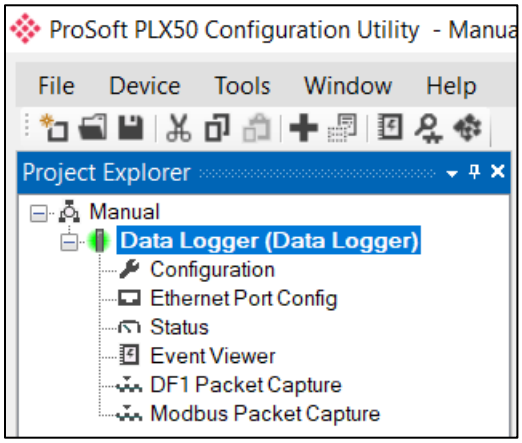



Figure 3.30 - Module Online

**7** The PLX51-DL-232 is now configured.

# 4 RSLogix 5000 Configuration

## 4.1 Add Module to I/O Configuration

The PLX51-DL-232 can operate in both a Logix “owned” and standalone mode. When the PLX51-DL-232 operates in a Logix “owned” mode, the PLX51-DL-232 needs to be added to the RSLogix 5000 / Studio5000 IO tree, as a generic Ethernet module.

**1** Right-click on the Ethernet Bridge in RSLogix 5000 and select *New Module*. Then select *ETHERNET-MODULE* and click **Ok**.

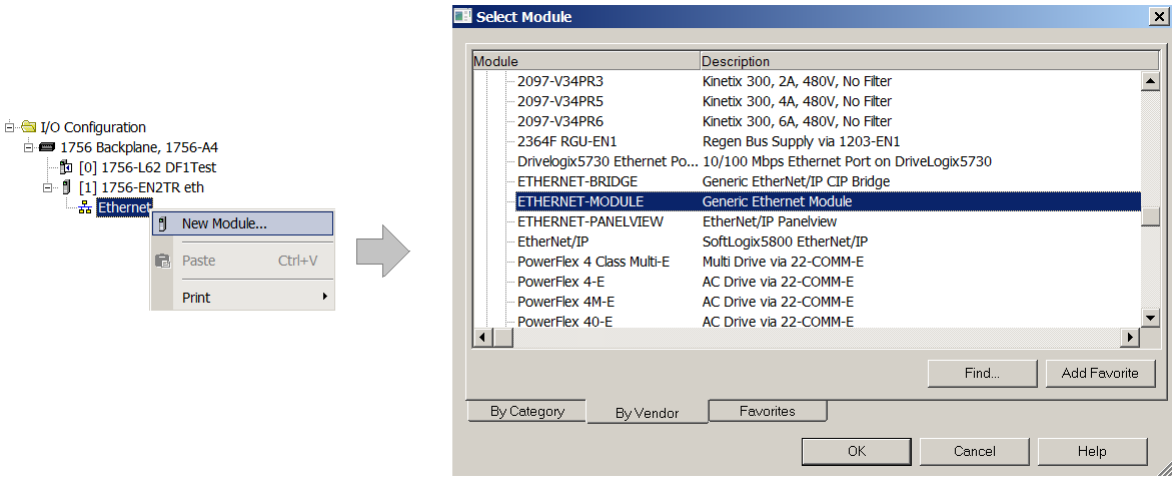



Figure 4.1 - Add a Generic Ethernet Module in RSLogix 5000

**2** Enter the IP address of the PLX51-DL-232. The *Assembly Instance* and *Size* must also be added for the input, output, and configuration in the *Connection Parameters* section. Below are the required connection parameters.

Table 4.1 - RSLogix class 1 connection parameters for the Data Logger

| Connection Parameter | Assembly Instance | Size |
|---|---|---|
| Input | 103 | 29 (32-bit) |
| Output | 104 | 1 (32-bit) |
| Configuration | 102 | 0 (8-bit) |

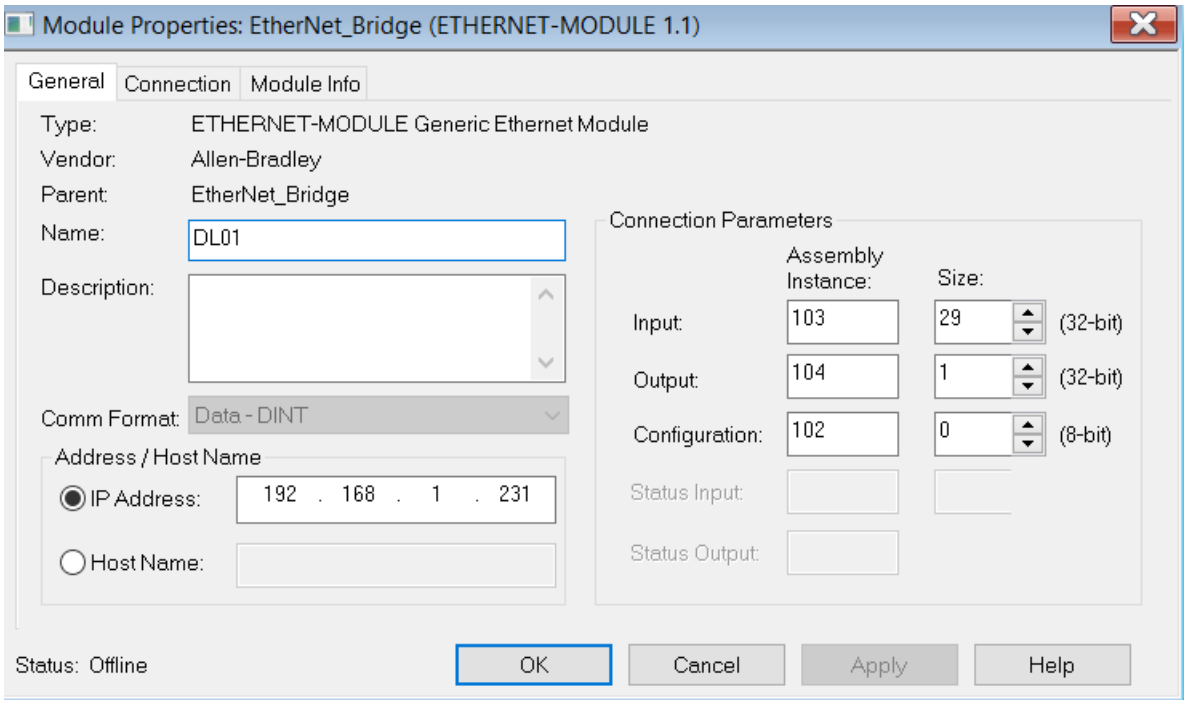



Figure 4.2 - RSLogix General module properties in RSLogix 5000

**3** Add the connection requested packet interval (RPI). This is the rate at which the input and output assemblies are exchanged. The recommended value is 500 ms. Refer to the technical specification section in this document for further details on the limits of the RPI.

**Important:** Although the PLX51-DL-232 is capable of running with an RPI of 10 ms, it is recommended to set the RPI to 500 ms to avoid unnecessary overloading of the PLX51-DL-232 processor.

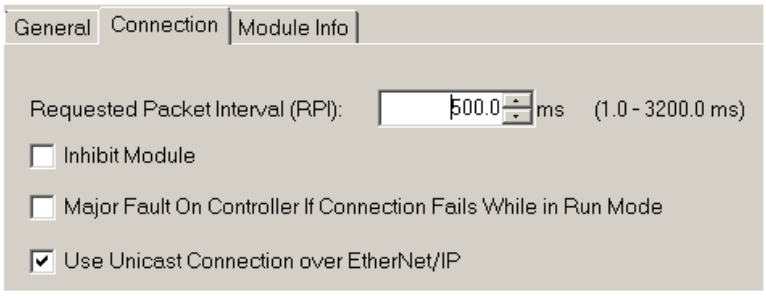



Figure 4.3 - Connection module properties in RSLogix 5000

**4** Once the PLX51-DL-232 has been added to the RSLogix 5000 IO tree, assign the User Defined Types (UDTs) to the input and output assemblies. You can import the required UDTs by right-clicking on the *User-Defined* sub-folder in the *Data Types* folder and selecting *Import Data Type*. The assemblies are then assigned to the UDTs with a ladder copy instruction (COP).

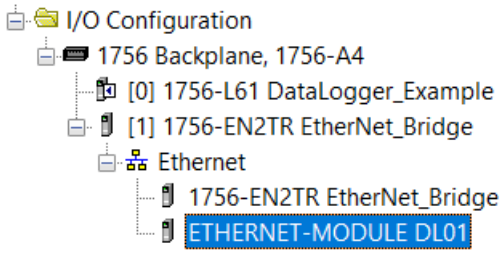



Figure 4.4 – RSLogix 5000 I/O module tree

## 4.2 Importing UDT's and Mapping Routines

To simplify the mapping of the input image, an RSLogix 5000 Routine Partial Import (.L5X) file is provided.

**1** Right-click on the required Program and select the *Import Routine* option.

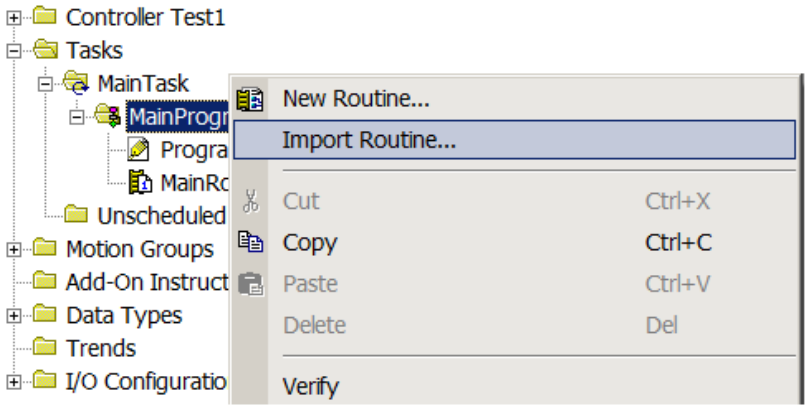



Figure 4.5 – RSLogix 5000 Importing Data Logger specific routine and UDTs

**2** Select the proper .L5X file.

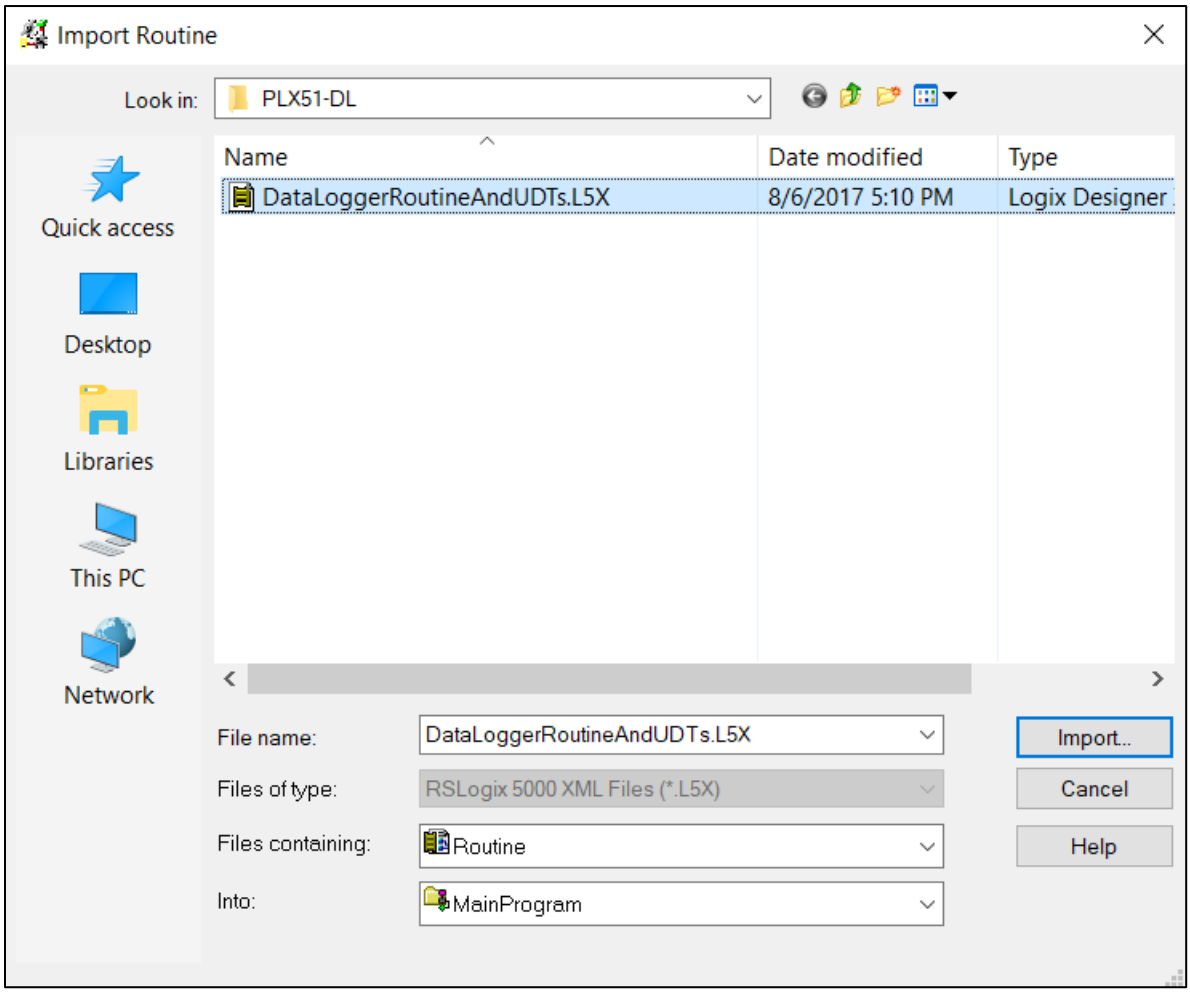



Figure 4.6 - Selecting partial import file

The import creates the following:

- The required UDTs (user defined data types)
- Controller tags representing the Input Assembly.
- A routine mapping the PLX51-DL-232 to the aforementioned tag.

**3** You may need to change the routine to map to the correct PLX51-DL-232 instance name. Make sure that the mapping routine is called by the Program's Main Routine.

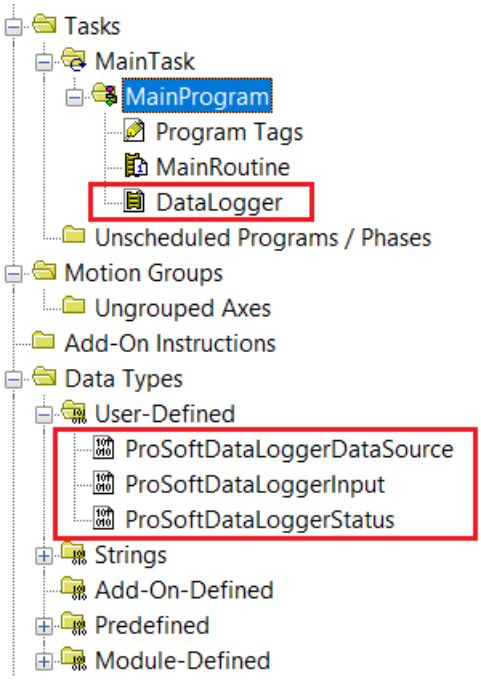



Figure 4.7 - Imported RSLogix 5000 objects

Refer to the Additional Information section of this document for an RSLogix 5000 project example, as well as the required UDTs.

## 4.3 RSLogix 5000 assemblies

When the PLX51-DL-232 operates in a Logix “owned” mode, the Logix controller establishes a class 1 cyclic communication connection with the PLX51-DL-232. An input assembly is exchanged at a fixed interval. The provided UDTs convert the input arrays into tag-based assemblies. Refer to the Additional Information section in this document for more information on the input UDTs. There are no Output or Configuration assemblies.

| | | | | |
|---|---|---|---|---|
| DataLoggerInput | {...} | {...} | | ProSoftDataLoggerInput |
| DataLoggerInput.Instance | '' | {...} | | STRING |
| DataLoggerInput.Status | {...} | {...} | | ProSoftDataLoggerStatus |
| DataLoggerInput.Status.Running | 1 | | Decimal | BOOL |
| DataLoggerInput.Status.ConfigurationValid | 0 | | Decimal | BOOL |
| DataLoggerInput.Status.ContinuousLogging | 0 | | Decimal | BOOL |
| DataLoggerInput.Status.LoggingInhibited | 0 | | Decimal | BOOL |
| DataLoggerInput.Status.LoggingStopped | 0 | | Decimal | BOOL |
| DataLoggerInput.CachePercentageUsed | 0.0 | | Float | REAL |
| DataLoggerInput.CacheRecordCount | 0 | | Decimal | DINT |
| DataLoggerInput.TotalRecordCount | 0 | | Decimal | DINT |
| DataLoggerInput.ActiveTagCount | 0 | | Decimal | DINT |
| DataLoggerInput.DataSource | {...} | {...} | | ProSoftDataLoggerDataSource |
| DataLoggerInput.DataSource.EtherNetIP | 1 | | Decimal | BOOL |
| DataLoggerInput.DataSource.DF1 | 1 | | Decimal | BOOL |
| DataLoggerInput.DataSource.ModbusRTU | 1 | | Decimal | BOOL |
| DataLoggerInput.DataSource.ModbusTCP | 1 | | Decimal | BOOL |
| DataLoggerInput.DataSourceReadCount | 0 | | Decimal | DINT |

Figure 4.8 - Input assembly UDT structure

### *4.3.1 Input Assembly*

The following parameters are used in the input assembly of the PLX51-DL-232.

Table 4.2 - RSLogix 5000 input assembly parameters

| Parameter | Datatype | Description |
|---|---|---|
| Instance | STRING | Instance name of the PLX51-DL-232 that was configured under the *General Configuration* tab in the PLX50 Configuration Utility. |
| Status.Running | BOOL | Set if the PLX51-DL-232 has a valid configuration and is reading tags. |
| Status.ConfigValid | BOOL | Set if a valid configuration is executing in the PLX51-DL-232. |
| Status.ContinuousLogging | BOOL | Set if *Logging Mode* is set to Overwrite, clear for Hold. |
| Status.ConfigurationValid | BOOL | Set if a valid configuration is executing in the PLX51-DL-232. |
| Status.LoggingInhibited | BOOL | Not Used. |
| Status.LoggingStopped | BOOL | Not Used. |
| CachePercentage | REAL | The number of cached records not yet uploaded, as a percentage of the total record capacity of 16,777,216. |
| CacheRecordCount | DINT | The number of cached records not yet uploaded. |
| TotalRecordCount | DINT | The total number of cached records uploaded or not. |
| ActiveTagCount | DINT | The number of individual tags configured to be read. |
| DataSource.EtherNetIP | BOOL | Set if the data source is set to Logix. |
| DataSource.DF1 | BOOL | Set if the data source is set to DF1. |

| Parameter | Datatype | Description |
|---|---|---|
| DataSource.ModbusRTU | BOOL | Set if the data source is set to Modbus RTU. |
| DataSource.ModbusTCP | BOOL | Set if the data source is set to Modbus TCP/IP. |
| DataSourceReadCount | DINT | The number of tag reads from the configured data source. |

**Important**: The PLX51-DL-232 can poll single BOOL tags only. It cannot poll from an array of BOOL's.

# 5 Diagnostics

## 5.1 LEDs

The PLX51-DL-232 provides three LEDs for diagnostics purposes as shown below.

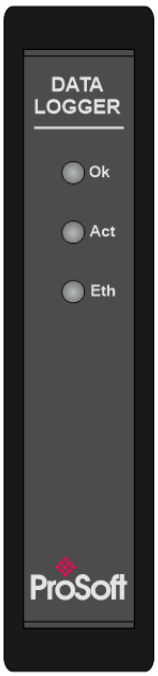



Figure 5.1 - Data Logger front view

Table 5.1 - Module LED operation

| LED | Description |
|---|---|
| Ok | The **Ok** LED provides information of the system-level operation of the PLX51-DL-232.<br>If the LED is green, then the PLX51-DL-232 has booted and is running correctly.<br>If the LED is red, then the PLX51-DL-232 is not operating correctly. For example, if the PLX51-DL-232 application firmware has been corrupted or there is a hardware fault, **Ok** LED will be red. |
| Act | The **Act** LED is used for the RS232 serial port. For every successful received DF1 or Modbus-RTU packet, the **Act** LED toggles green. The LED toggles red if a corrupted packet is received (eg. failed checksum). |
| Eth | The **Eth** LED illuminates when an Ethernet link is detected (by plugging in a connected Ethernet cable). The LED flashes when traffic is detected. |

## 5.2 Module Status Monitoring

The PLX51-DL-232 provides a range of statistics that can assist with module operation, maintenance, and troubleshooting. The statistics can be accessed by the PLX50 Configuration Utility or using the PLX51-DL-232 web server.

**1** To view the PLX51-DL-232's status in the PLX50 Configuration Utility, the PLX51-DL-232 must be online. If the PLX51-DL-232 is not Online (following a recent configuration download), right-click on the PLX51-DL-232 icon and select the *Go Online* option.

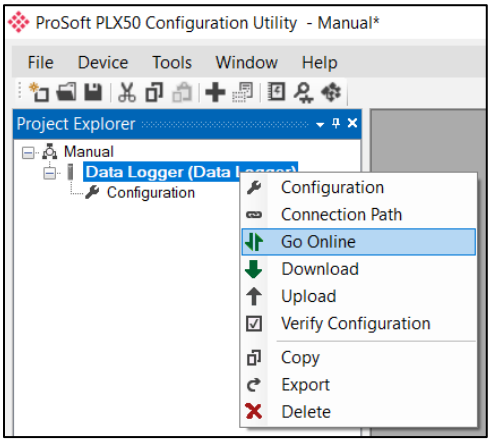



Figure 5.2 - Selecting to Go Online

**2** The *Online* mode is indicated by the green circle behind the PLX51-DL-232 in the Project Explorer tree.

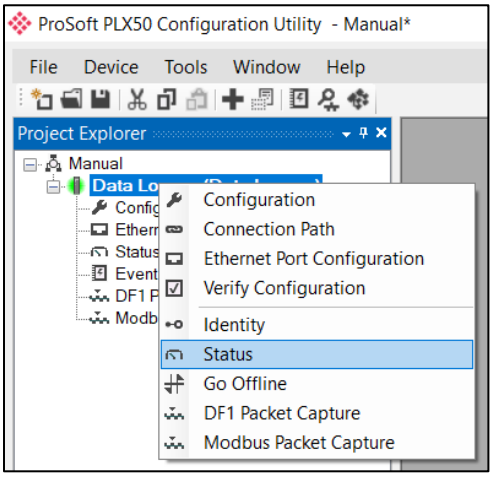



Figure 5.3 - Selecting online Status

**3** The *Status* window is opened by either double-clicking on the *Status* option in the Project Explorer tree, or by right-clicking on the PLX51-DL-232 icon and selecting *Status*.

**4** The *Status* window contains multiple tabs to display the current status of the PLX51-DL-232.

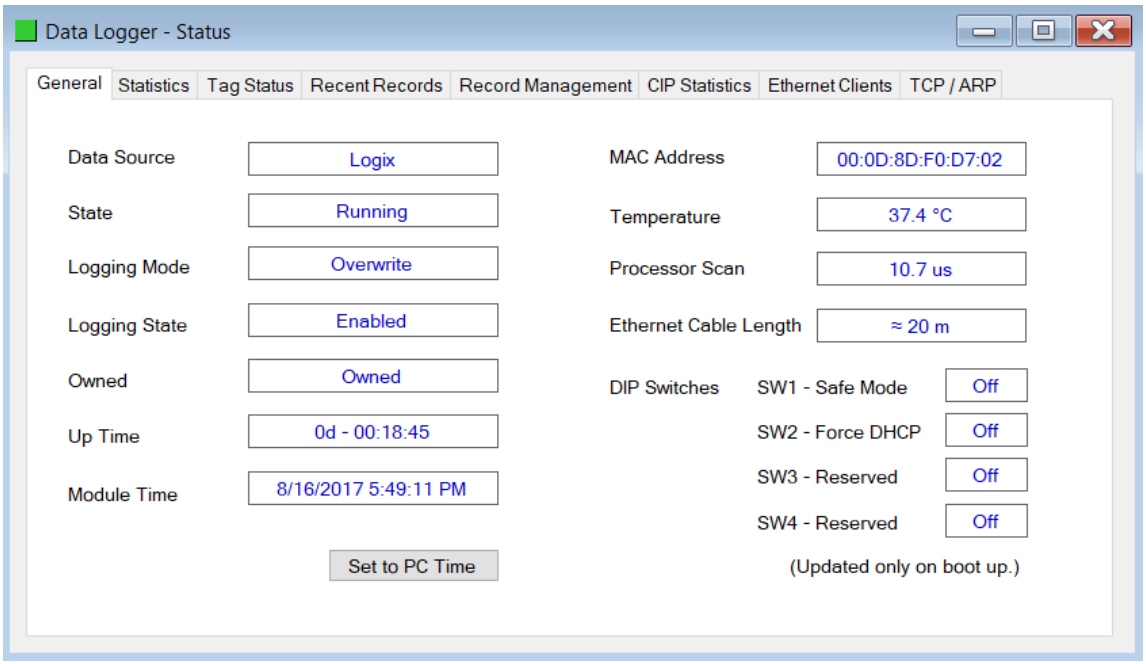



Figure 5.4 - Status monitoring - General

### *5.2.1 General Tab*

The *General* tab displays the following general parameters as well as setting the PLX51-DL-232 time to the PC time:

Table 5.2 - Parameters displayed in the Status Monitoring – General Tab

| Parameter | Description |
|---|---|
| Data Source | Logix, DF1, Modbus RTU, Modbus TCP/IP |
| State | This is the current state of the module.<br>**Running**<br>The module is reading tags and logging to the log.<br>**Stopped**<br>The module is idle and not reading tags or logging data. |
| Logging Mode | Hold or Overwrite – determines if records are overwritten when the cache is full. |
| Logging State | This is the current state of the logging in the module.<br>**Running**<br>Data is being read from the source and logged if the criteria is met.<br>**Running Rollover**<br>Data is being read from the source and logged if the criteria is met. In this state the event index has rolled over at least once.<br>**Inhibited**<br>The module has stopped reading and logging data, because the user has inhibited it from Logix.<br>**Stopped**<br>The module has stopped logging data, because it has reached maximum events and the module is set to not overwrite. |
| Owned | Indicates whether or not the PLX51-DL-232 is currently owned (Class 1) by a Logix controller. |
| Up Time | Indicates the elapsed time since the PLX51-DL-232 was powered up. |
| Module Time | Indicates the PLX51-DL-232's internal time. The PLX51-DL-232 time is stored in UTC (Universal Coordinate Time) but displayed on this page according to the local PC Time Zone settings |
| MAC Address | Displays the PLX51-DL-232's unique Ethernet MAC address. |
| Temperature | Internal temperature of the PLX51-DL-232. |
| Processor Scan | Amount of time (microseconds) taken by the PLX51-DL-232's processor in the last scan. |
| DIP Switch Position | Status of the DIP switches when the PLX51-DL-232 booted.<br>Note that this status will not change if the DIP switches are altered when the PLX51-DL-232 is running. |

### 5.2.2 Statistics tab

The *Statistics* tab displays the statistics of the record cache and data source.

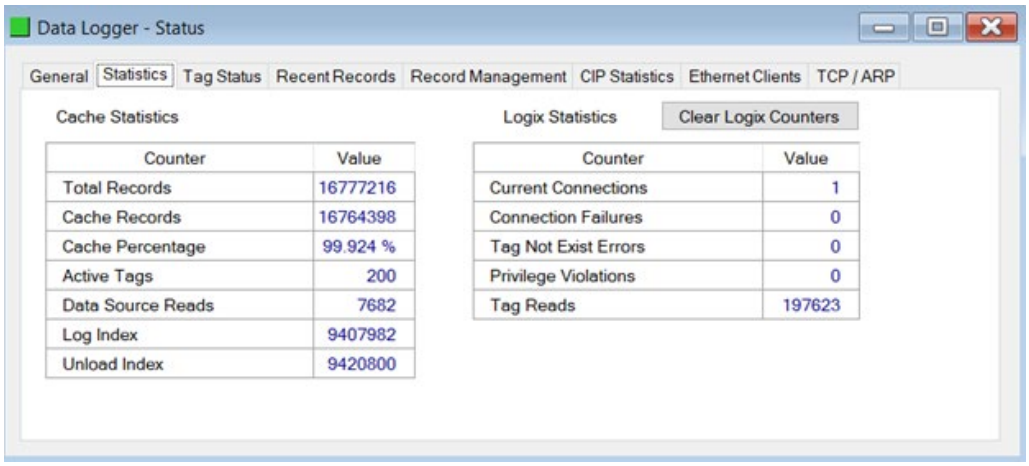



Figure 5.5 - Status monitoring - Transactions

Table 5.3 – Cache Statistics

| Statistic | Description |
|---|---|
| Total Records | The total number of cached records, uploaded or not. |
| Cache Records | The number of cached records not yet uploaded. |
| Cache Percentage | The number of cached records not yet uploaded, as a percentage of the total record capacity of 16,777,216. |
| Active Tags | The number of individual tags configured to be read. |
| Data Source Reads | The number of tag reads from the configured data source. |
| Log Index | The current record index being written to. |
| Unload Index | The upload record index. Managed by the Unload Service. |

Table 5.4 – Logix statistics

| Statistic | Description |
|---|---|
| Current Connections | The number of current open class 3 connections. |
| Connection Failures | The number of failed attempts at establishing a class 3 connection with a Logix controller. |
| Tag Not Exist Errors | The number of failed tag read/write transactions due to a non-existent destination tag. |
| Privilege Violations | The number of failed tag read/write transactions due to a privilege violation error.<br>This may be caused by the *External Access* property of the Logix tag being set to either **None** or **Read Only**. |
| Tag Reads | The number of tag read transactions executed by the PLX51-DL-232. |

### 5.2.3 Tag Status Tab

The *Tag Status* tab provides current values for all tags, along with their trigger settings. The following tag mapping statistics are only relevant when the PLX51-DL-232 is running in either *Reactive Tag* or *Scheduled Tag* mode.

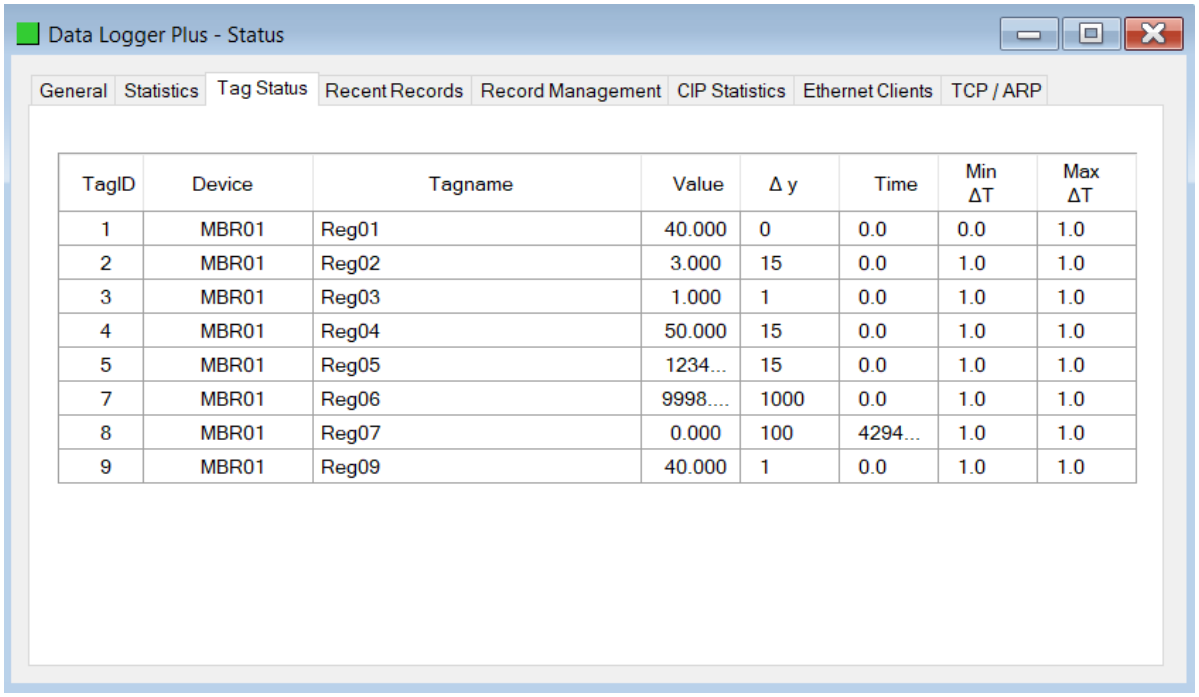



Figure 5.6 – Tag Status

Table 5.5 – Tag Status

| Statistic | Description |
|---|---|
| TagID | Configured Tag ID for the specific Tag/Register/File. |
| Device | The configured source device where the tag is extracted. |
| Tagname | The Tagname configured for the specific tag. |
| Value | The last read value from the specific tag. |
| Delta Y | Configured deadband for the tag value. |
| Time | The time in seconds since the last data was logged. |
| Min Delta Time | Minimum time in seconds between consecutive data logging. |
| Max Delta Time | Maximum time in seconds between consecutive data logging. |

### 5.2.4 Recent Records Tab

The *Recent Records* tab provides a list of the last records recorded with their time stamp and value.

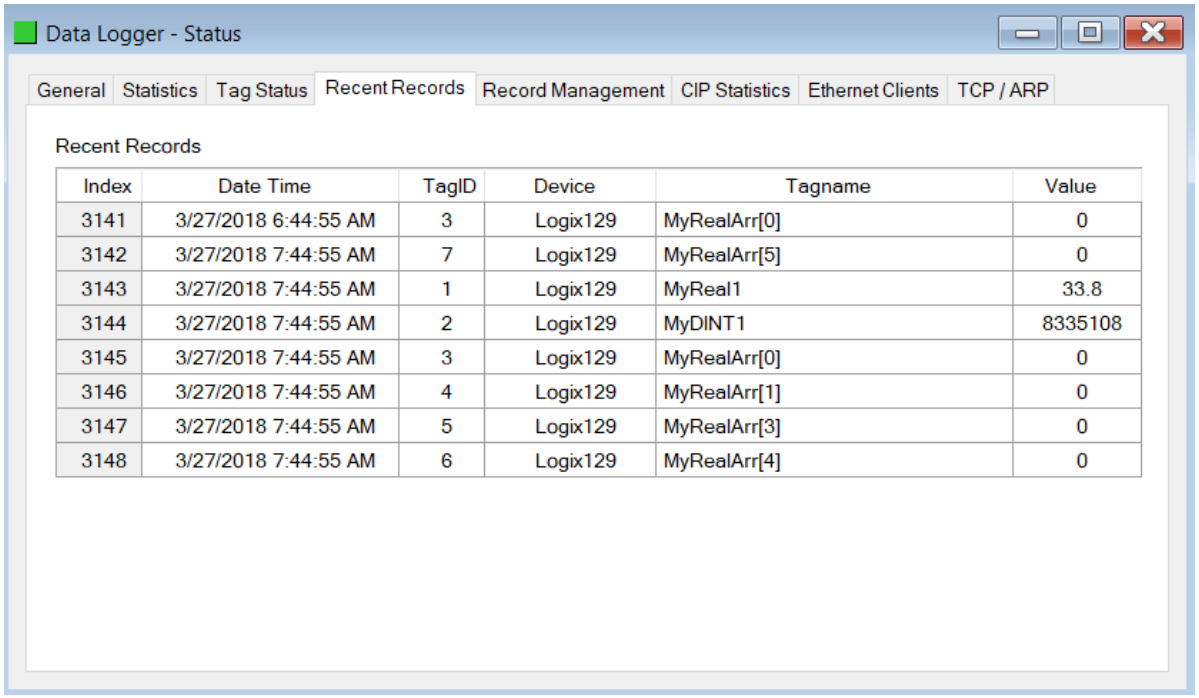



Figure 5.7 – Recent Records

Table 5.6 – Recent Records

| Statistic | Description |
|---|---|
| Index | Logged data index. |
| Date Time | The time stamp when the data was logged. |
| Tag ID | Configured Tag ID for the specific Tag/Register/File. |
| Device | The configured source device where the tag is extracted. |
| Tagname | The Tagname configured for the specific tag. |
| Value | The last logged value from the specific tag. |

### 5.2.5 Record Management Tab

The *Record Management* tab manages the PLX51-DL-232 records. Records can be downloaded to a (.csv) file format. Options to reset the log indices and erasing the cache are also available.

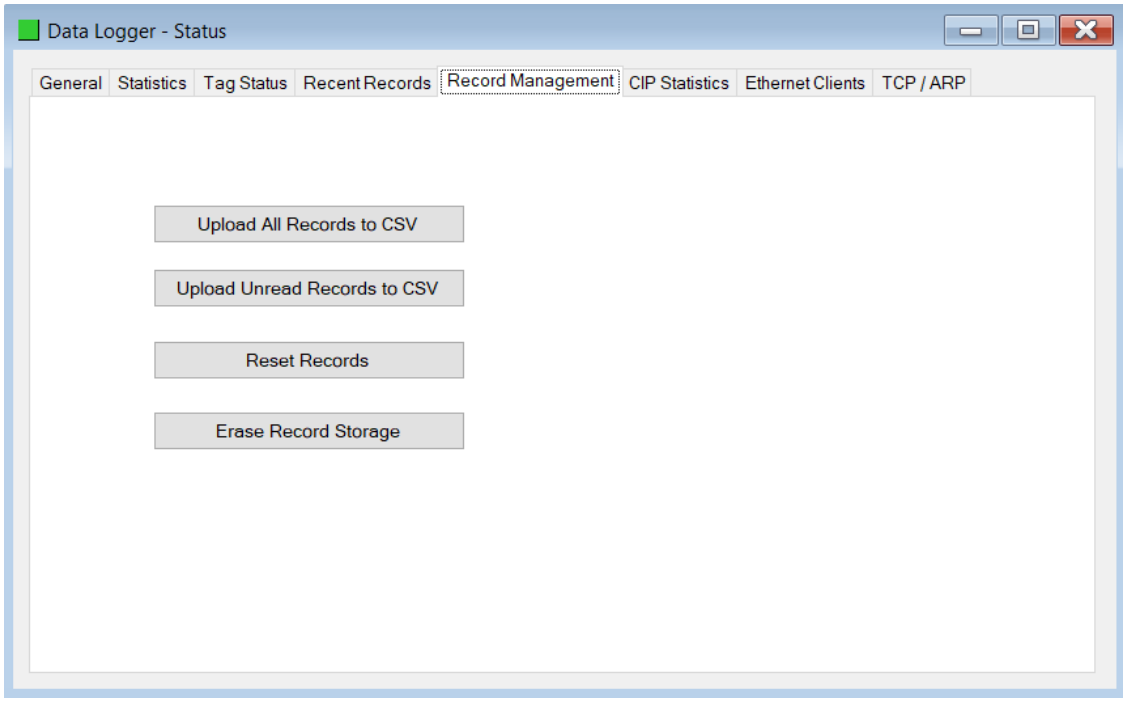



Figure 5.8 – Record Management

Table 5.7 – Record Management

| Parameter | Description |
|---|---|
| Upload All Records to CSV | Upload all records currently in the module. |
| Upload Unread Records to CSV | Upload unread records currently in the module. |
| Reset Records | Resets the log indices |
| Erase Record Storage | Erases the cache of all records |

### 5.2.6 CIP Statistics Tab

The *CIP Statistics* tab provides a set of Common Industrial Protocol (CIP) communication statistics.

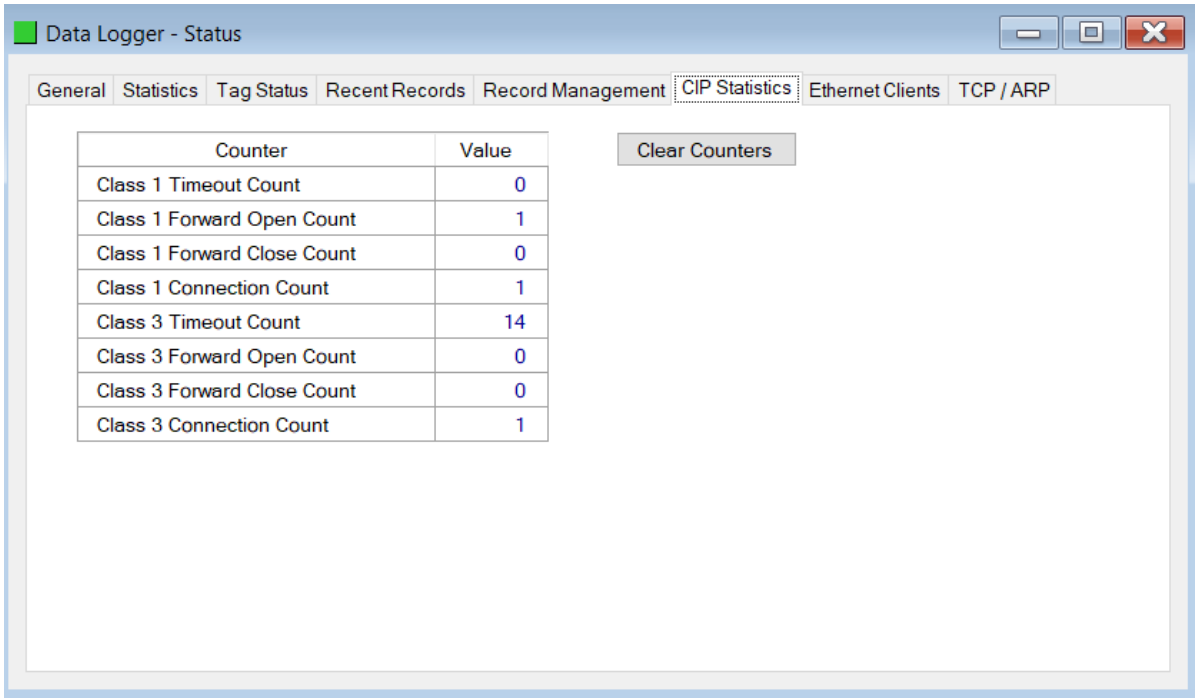



Figure 5.9 – CIP Statistics

Table 5.8 – CIP Statistics

| Statistic | Description |
|---|---|
| Class 1 Timeout Count | Number of times a Class 1 connection has timed out |
| Class 1 Forward Open Count | Number of Class 1 Connection establish attempts |
| Class 1 Forward Close Count | Number of Class 1 Connection close attempts |
| Class 1 Connection Count | Number of Class 1 Connections currently active |
| Class 3 Timeout Count | Number of times a Class 3 connection has timed out |
| Class 3 Forward Open Count | Number of Class 3 Connection establish attempts |
| Class 3 Forward Close Count | Number of Class 3 Connection close attempts |
| Class 3 Connection Count | Number of Class 3 Connections currently active |

### 5.2.7 Ethernet Clients Tab

The *Ethernet Clients* tab provides a count of EtherNet Client and EtherNet/IP connections.

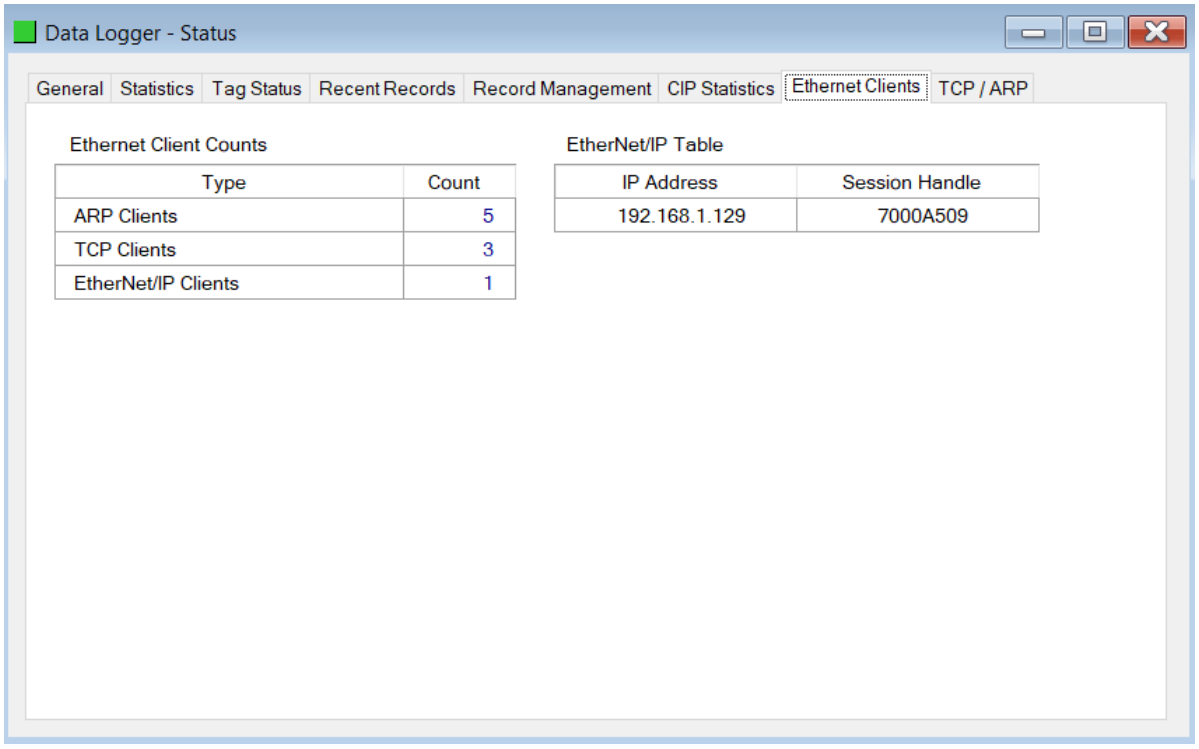



Figure 5.10 – Ethernet Connection Counts

Table 5.9 – CIP Statistics

| Statistic | Description |
|---|---|
| ARP Clients | Number of active clients in the ARP table |
| TCP Clients | Number of active connections in the TCP client table |
| EtherNet/IP Clients | Number of active connections in the ENIP client table |

Table 5.10 – EtherNet/IP Table

| Statistic | Description |
|---|---|
| IP Address | IP address of the client in the ENIP client table |
| Session Handle | Session handle in the ENIP client table |

### 5.2.8 TCP / ARP Tab

The *TCP / ARP* tab lists the ARP and TCP/IP information associated with the known MAC addresses in the network. Parameters include the *IP Address*, *Remote Port* number, and *Local Port* number.

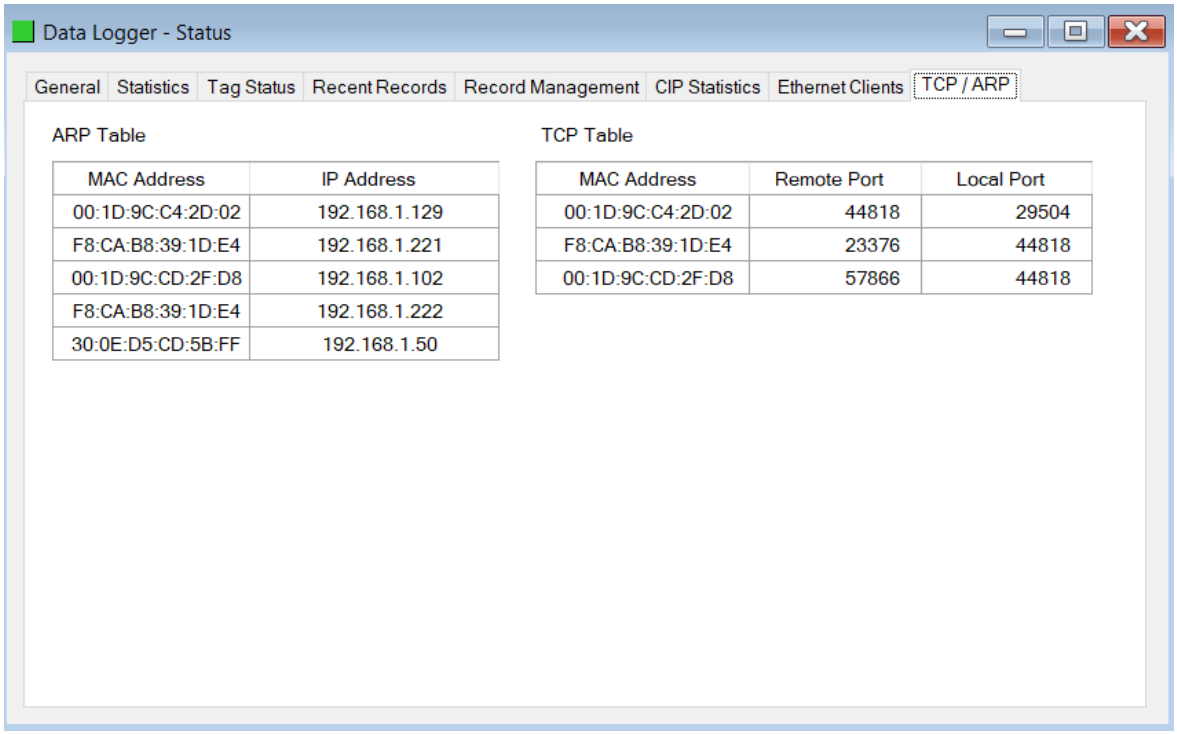



Figure 5.11 – TCP and ARP Table Entries

Table 5.11 – ARP Table

| Statistic | Description |
|---|---|
| MAC Address | MAC address of the client in the ARP Table |
| IP Address | IP address of the client in the ARP Table |

Table 5.12 – TCP Table

| Statistic | Description |
|---|---|
| MAC Address | MAC address of the client in the TCP Table |
| Remote Port | Remote TCP port of the client in the TCP Table |
| Local Port | Local TCP port of the client in the TCP Table |

## 5.3 DF1 Packet Capture

The PLX51-DL-232 provides the capability to capture the DF1 traffic for analysis.

1 To begin the packet capture of the PLX51-DL-232, double-click on the *DF1 Packet Capture* selection in the Project Explorer tree.

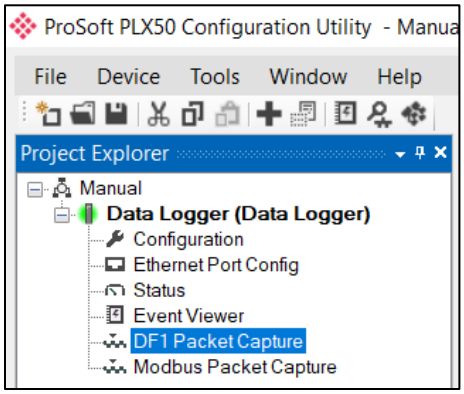



Figure 5.12 - Selecting DF1 Packet Capture

2 The *DF1 Packet Capture* window opens and automatically starts capturing all DF1 packets.

**Note**: The PLX51-DL-232 keeps a circular buffer of the last twenty DF1 packets. Thus, there may be up to 20 packets in the capture that were received / sent before the capture was initiated.

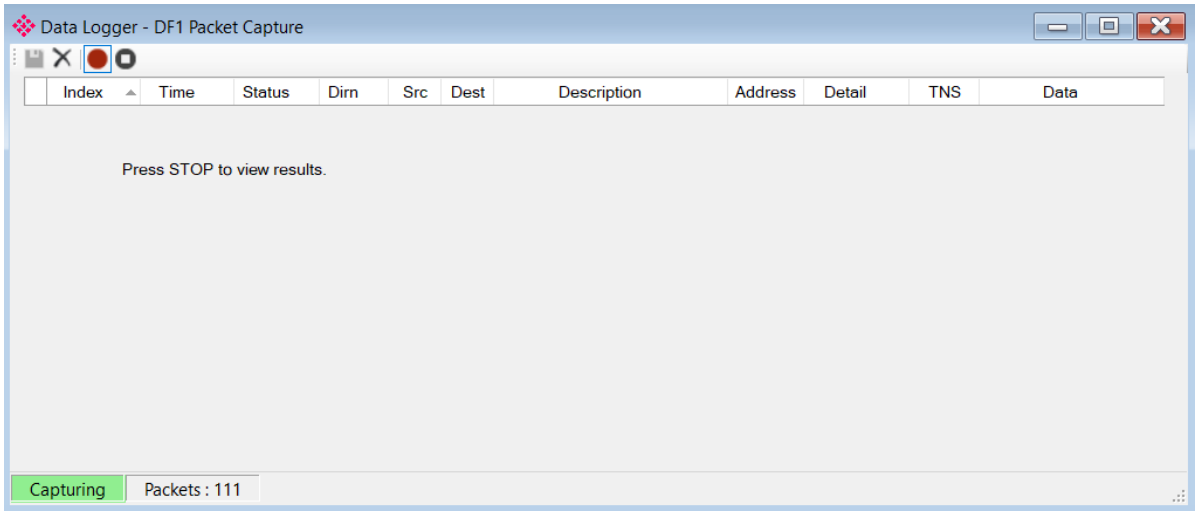



Figure 5.13 - DF1 packet capture

**3** To display the captured DF1 packets, the capture process must first be stopped by pressing the **STOP** button.

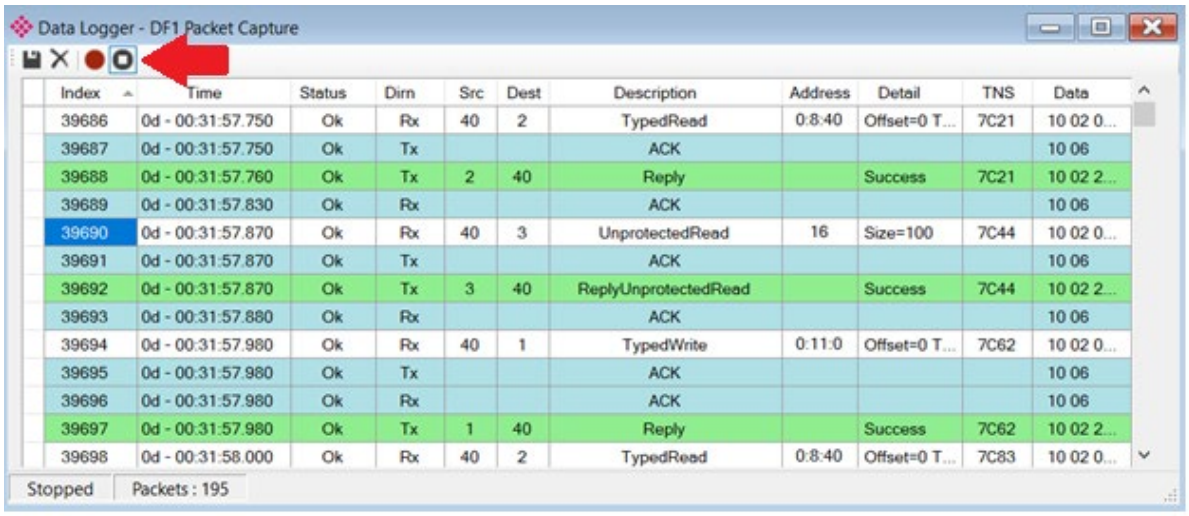



Figure 5.14 - DF1 Packet Capture complete

The captured DF1 packets are listed as follows:

Table 5.13 - DF1 Packet Capture fields

| Statistic | Description |
|---|---|
| Index | The packet index, incremented for each packet sent or received. |
| Time | The elapsed time since the PLX51-DL-232 was powered up. |
| Status | The status of the packet. Received packets are checked for valid DF1 constructs and valid checksums. |
| Dirn | The direction of the packet, either transmitted (Tx) or received (Rx). |
| Src | DF1 node address of the message source. |
| Dest | DF1 node address of the message destination. |
| Description | Brief description of the packet, usually the command. |
| Address | The string representing a PLC data address, where applicable. |
| Detail | Additional details associated with command. |
| TNS | Transaction number. Used to match request and reply messages. |
| Data | The packet's raw data displayed in space delimited hex. |

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

**5** Previously saved DF1 Packet Capture files can be viewed by selecting the *DF1 Packet Capture Viewer* option in the *Tools* menu.

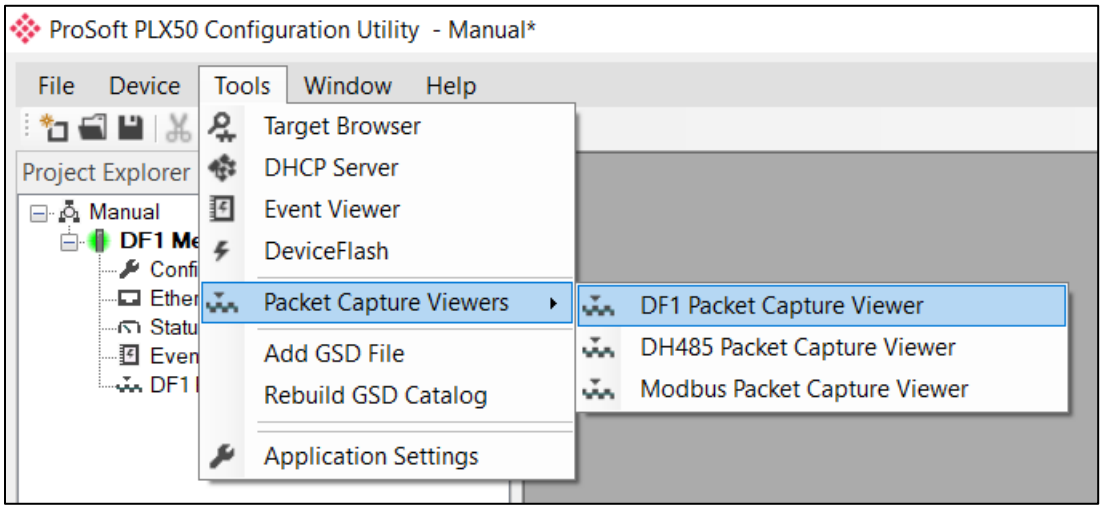



Figure 5.15 - Selecting the DF1 Packet Capture Viewer

## 5.4 Modbus Packet Capture

The PLX51-DL-232 provides the capability to capture the Modbus traffic for analysis.

**1** To begin the capture of the PLX51-DL-232, double-click on the *Modbus Packet Capture* selection in the Project Explorer tree.

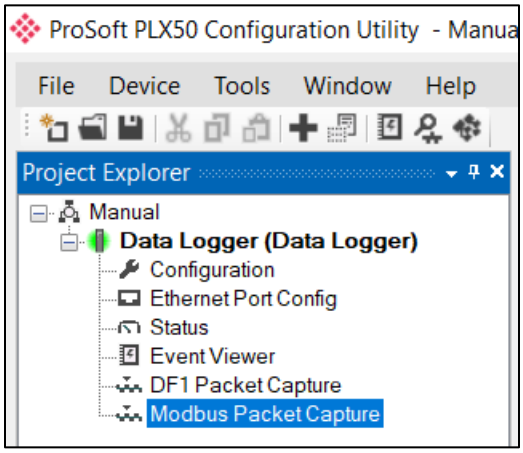



Figure 5.16 - Selecting Modbus Packet Capture

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

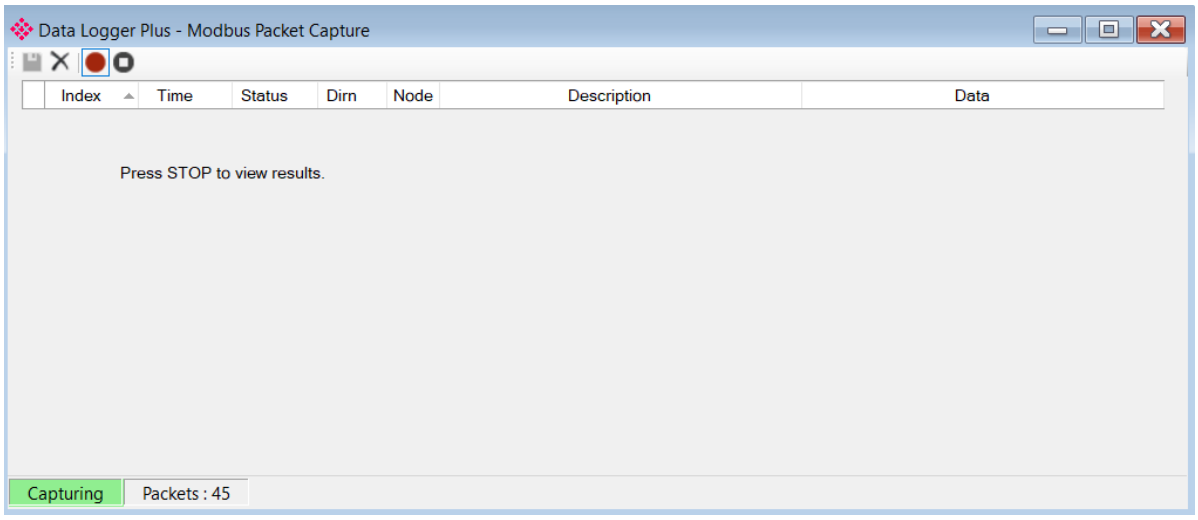



Figure 5.17 – Modbus packet capture

**3** To display the captured Modbus packets, the capture process must first be stopped by pressing the **STOP** button.

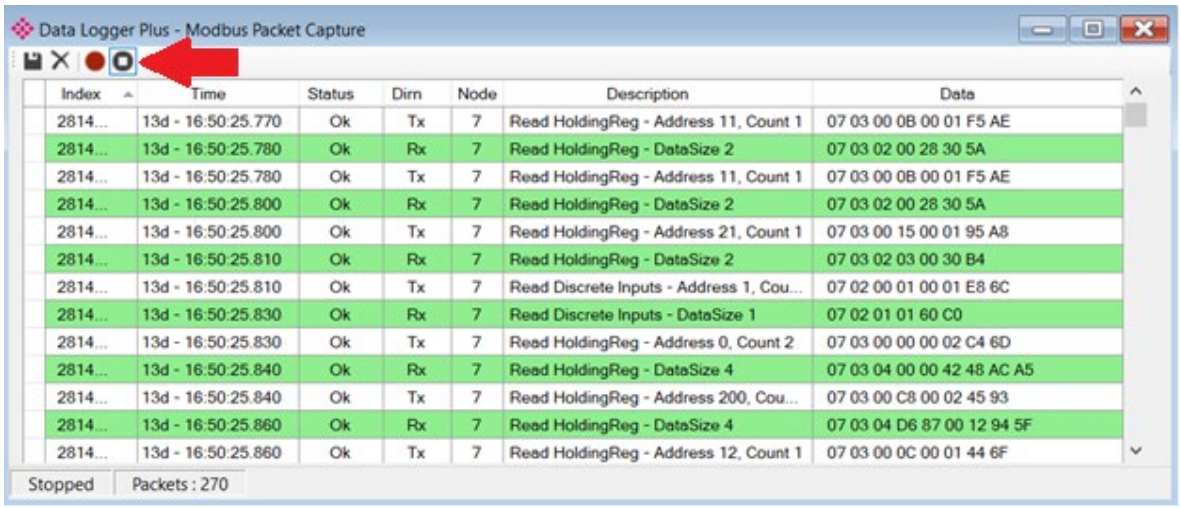



Figure 5.18 – Modbus Packet Capture complete

The captured Modbus packets are tabulated as follows:

Table 5.14 – Modbus Packet Capture fields

| Statistic | Description |
|---|---|
| Index | The packet index, incremented for each packet sent or received. |
| Time | The elapsed time since the PLX51-DL-232 was powered up. |
| Status | The status of the packet. Received packets are checked for valid Modbus constructs and valid checksums. |
| Dirn | The direction of the packet, either transmitted (Tx) or received (Rx). |
| Node | Modbus node address of the message destination. |
| Description | A brief description of the packet, showing the function and register range if applicable. |
| Data | The raw packet data. |

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

**5** Previously saved Modbus Packet Capture files can be viewed by selecting the *Modbus Packet Capture Viewer* option in the *Tools* menu.

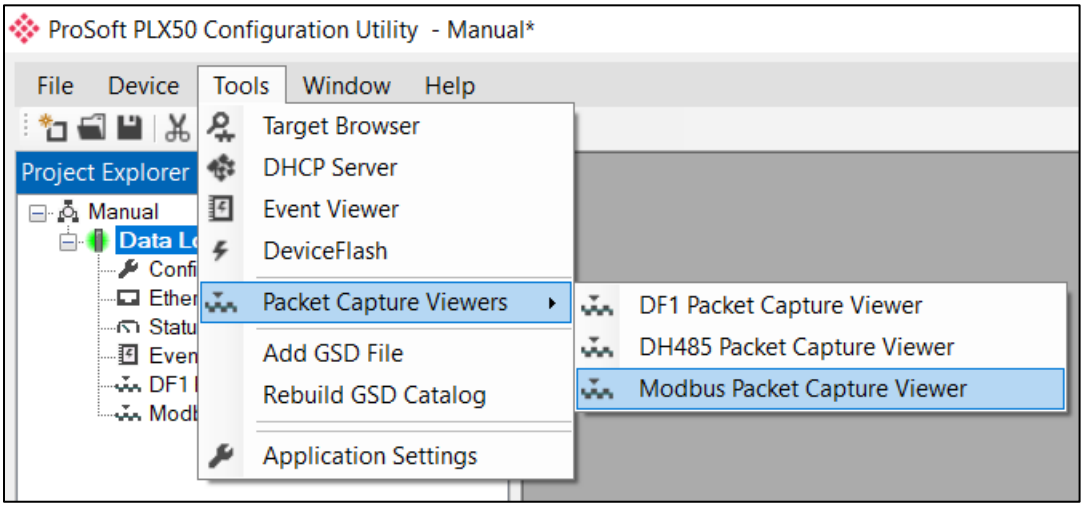



Figure 5.19 - Selecting the Modbus Packet Capture Viewer

## 5.5 Module Event Log

The PLX51-DL-232 logs various diagnostic records to an internal event log. These logs are stored in non-volatile memory and can be displayed in the PLX50 Configuration Utility or the web server.

To view them in the PLX50 Configuration Utility, select the *Event Viewer* option in the Project Explorer tree.

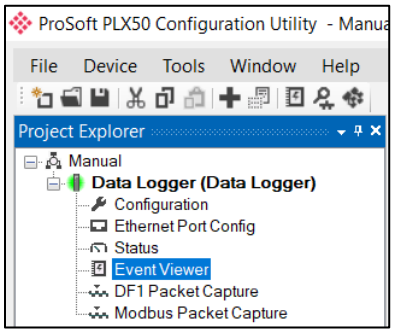
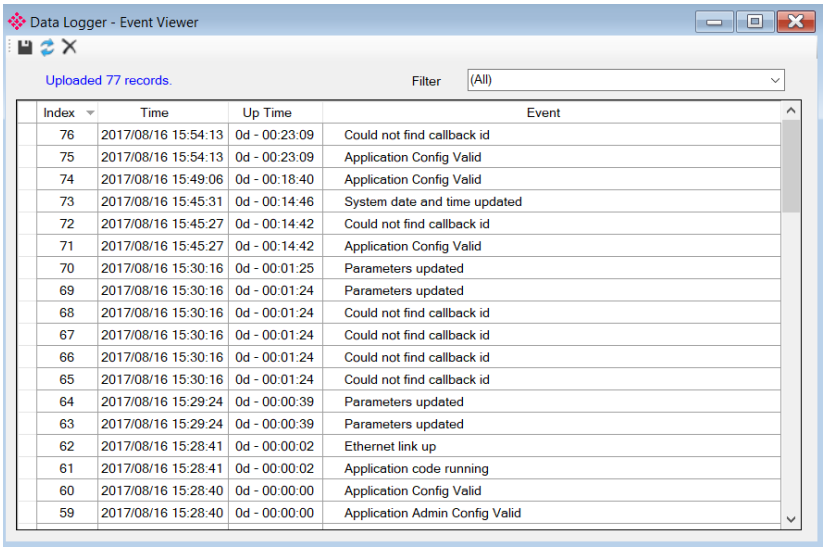



Figure 5.20 - Selecting the PLX51-DL-232 Event Log

**6** The *Event Log* window opens and automatically reads all the events from the PLX51-DL-232.

**7** The log entries are listed with the latest record at the top. Custom sorting is achieved by double-clicking on the column headings.




| Index | Time | Up Time | Event |
|---|---|---|---|
| 76 | 2017/08/16 15:54:13 | 0d - 00:23:09 | Could not find callback id |
| 75 | 2017/08/16 15:54:13 | 0d - 00:23:09 | Application Config Valid |
| 74 | 2017/08/16 15:49:06 | 0d - 00:18:40 | Application Config Valid |
| 73 | 2017/08/16 15:45:31 | 0d - 00:14:46 | System date and time updated |
| 72 | 2017/08/16 15:45:27 | 0d - 00:14:42 | Could not find callback id |
| 71 | 2017/08/16 15:45:27 | 0d - 00:14:42 | Application Config Valid |
| 70 | 2017/08/16 15:30:16 | 0d - 00:01:25 | Parameters updated |
| 69 | 2017/08/16 15:30:16 | 0d - 00:01:24 | Parameters updated |
| 68 | 2017/08/16 15:30:16 | 0d - 00:01:24 | Could not find callback id |
| 67 | 2017/08/16 15:30:16 | 0d - 00:01:24 | Could not find callback id |
| 66 | 2017/08/16 15:30:16 | 0d - 00:01:24 | Could not find callback id |
| 65 | 2017/08/16 15:30:16 | 0d - 00:01:24 | Could not find callback id |
| 64 | 2017/08/16 15:29:24 | 0d - 00:00:39 | Parameters updated |
| 63 | 2017/08/16 15:29:24 | 0d - 00:00:39 | Parameters updated |
| 62 | 2017/08/16 15:28:41 | 0d - 00:00:02 | Ethernet link up |
| 61 | 2017/08/16 15:28:41 | 0d - 00:00:02 | Application code running |
| 60 | 2017/08/16 15:28:40 | 0d - 00:00:00 | Application Config Valid |
| 59 | 2017/08/16 15:28:40 | 0d - 00:00:00 | Application Admin Config Valid |

Figure 5.21 – Module Event Log

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

## 5.6 Web Server

The PLX51-DL-232 provides a web server allowing you to view various diagnostics of the PLX51-DL-232 without the PLX50 Configuration Utility or RSLogix 5000. This includes Ethernet parameters, system event log, advanced diagnostics, and application diagnostics (DF1 diagnostics).

**Note:** The web server is read-only, no parameters or configuration can be altered from the web interface.

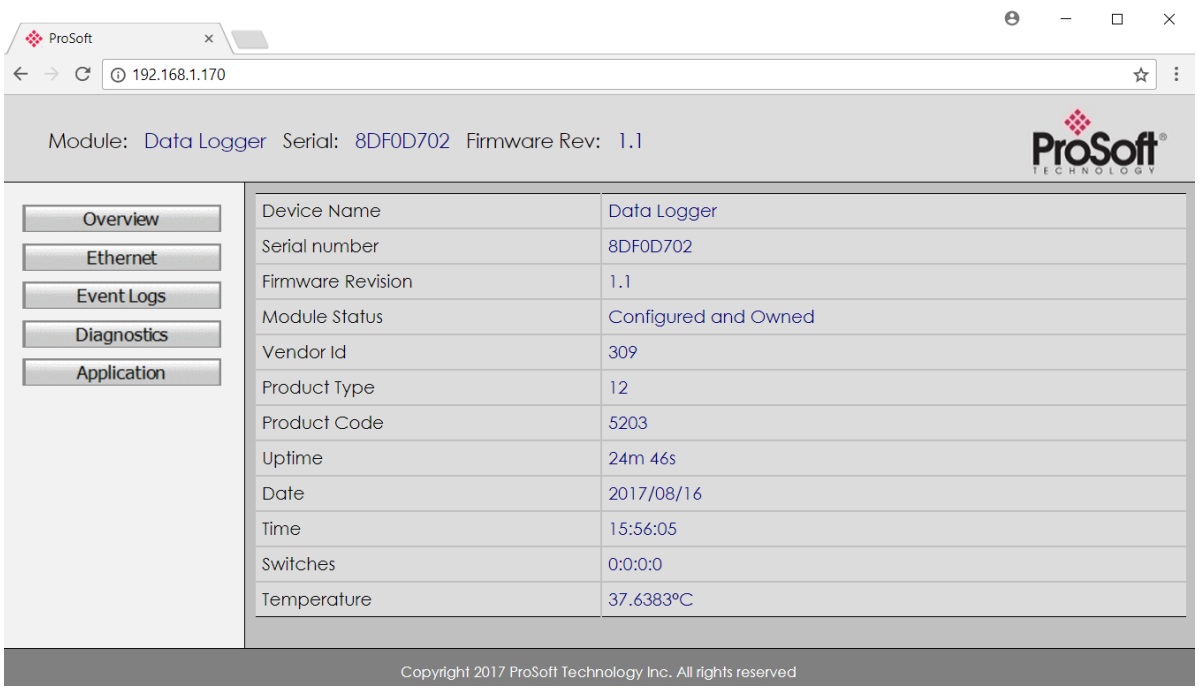



Figure 5.22 - Web interface

# 6 Technical Specifications

## 6.1 Dimensions

Below are the PLX51-DL-232 enclosure and DIN rail dimensions. All dimensions are in millimeters.

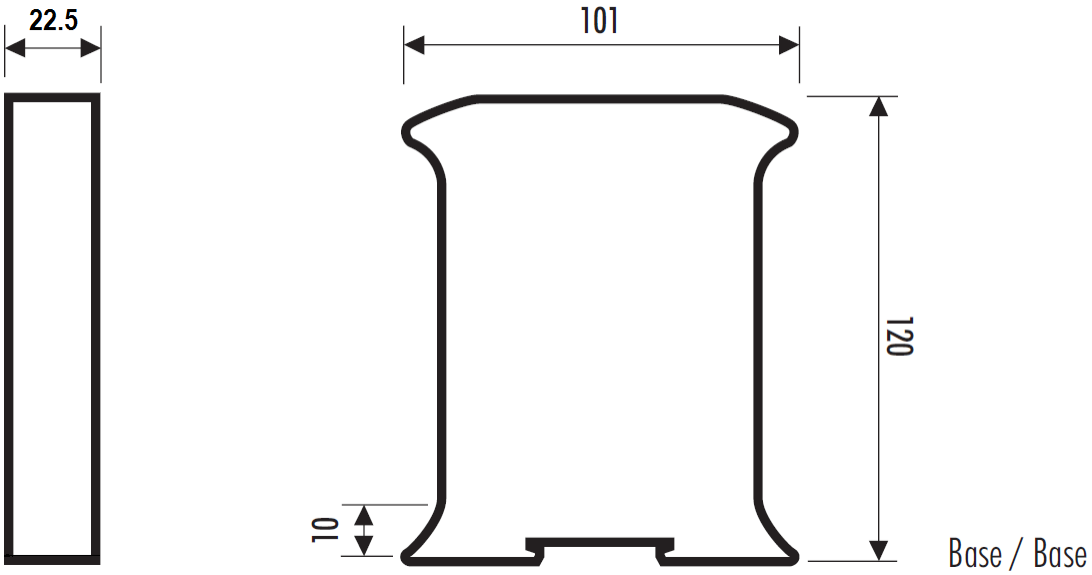



Figure 6.1 - Module Enclosure Dimensions

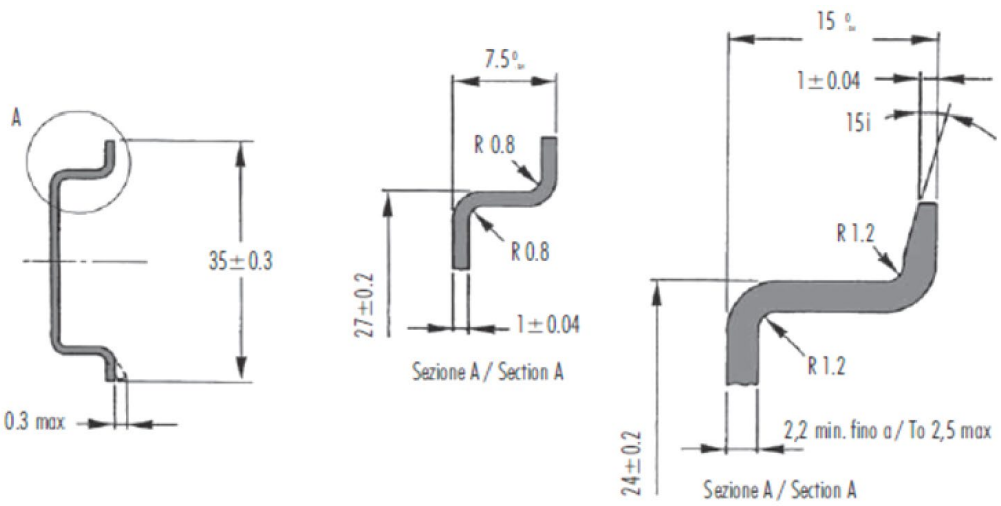



Figure 6.2 - Required DIN dimensions

## 6.2 Electrical

Table 6.1 - Electrical specification

| Specification | Rating |
|---|---|
| Power requirements | Input: 10 to 28V DC, (70 mA @ 24 VDC) |
| Power consumption | 1.7 W |
| Connector | 3-way terminal |
| Conductors | 24 to 18 AWG |
| Enclosure rating | IP20, NEMA/UL Open Type |
| Temperature | -20 to 70 °C |
| Earth connection | Yes, terminal based |
| Emissions | IEC61000-6-4 |
| ESD Immunity | EN 61000-4-2 |
| Radiated RF Immunity | IEC 61000-4-3 |
| EFT/B Immunity | EFT: IEC 61000-4-4 |
| Surge Immunity | Surge: IEC 61000-4-5 |
| Conducted RF Immunity | IEC 61000-4-6 |

## 6.3 Ethernet

Table 6.2 - Ethernet specification

| Specification | Rating |
|---|---|
| Connector | RJ45 |
| Conductors | CAT5 STP/UTP |
| ARP connections | Max 20 |
| TCP connections | Max 20 |
| CIP connections | Max 10 |
| Communication rate | 10/100 Mbps |
| Duplex mode | Full/Half |
| Auto-MDIX support | Yes |

## 6.4 Data Cache

Table 6.3 – Data Cache specification

| Specification | Rating |
|---|---|
| Max Record Count | 16,777,216 |
| Maximum tag count | 200 |
| Log criteria supported | Delta change<br>Heart beat<br>Tag Triggers |
| Minimum Log Interval | 50 ms |
| Data Types Supported | BOOL, SINT, INT, DINT, or REAL |
| Cached Records Non-Volatile | Yes |
| Log triggers supported | Yes |
| Data Sources | Logix Tags<br>DF1 Files<br>Modbus (RTU and TCP/IP) registers |

## 6.5 Serial Port

Table 6.4 – Serial Port specification

| Specification | Rating |
|---|---|
| Connector | 4-way terminal |
| Conductor | 24 to 18 AWG |
| Isolation voltage | 2.5 kV |
| BAUD | 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 |
| Parity | None, Even, Odd |

## 6.6 DF1

Table 6.5 - DF1 specification

| Specification | Rating |
|---|---|
| Duplex | Full/Half |
| Error detection | CRC, BCC |
| Embedded response | Auto, On |

## 6.7 Modbus

Table 6.6 - Modbus specification

| Specification | Rating |
|---|---|
| Supported Ports | Modbus RTU<br>Modbus TCP/IP |
| Functions Supported | Read Coils (Function Code 1)<br>Read Discrete Inputs (Function Code 2)<br>Read Holding Register (Function Code 3)<br>Read Input Register (Function Code 4) |

# 7 Support, Service & Warranty

## 7.1 Contacting Technical Support

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

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

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

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

**Note:** *For technical support calls within the United States, ProSoft's 24/7 after-hours phone support is available for urgent plant-down issues.*

| **North America (Corporate Location)** | **Europe / Middle East / Africa Regional Office** |
|---|---|
| Phone: +1.661.716.5100<br>info@prosoft-technology.com<br>Languages spoken: English, Spanish<br>REGIONAL TECH SUPPORT<br>support@prosoft-technology.com | Phone: +33.(0)5.34.36.87.20<br>france@prosoft-technology.com<br>Languages spoken: French, English<br>REGIONAL TECH SUPPORT<br>support.emea@prosoft-technology.com |
| **Latin America Regional Office** | **Asia Pacific Regional Office** |
| Phone: +52.222.264.1814<br>latinam@prosoft-technology.com<br>Languages spoken: Spanish, English<br>REGIONAL TECH SUPPORT<br>support.la@prosoft-technology.com | Phone: +60.3.2247.1898<br>asiapc@prosoft-technology.com<br>Languages spoken: Bahasa, Chinese, English, Japanese, Korean<br>REGIONAL TECH SUPPORT<br>support.ap@prosoft-technology.com |

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

## 7.2 Warranty Information

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