DeviceNet Router User Manual

A-DNTR

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Revision History

Revision	Date	Comment
1.0	29 April 2016	Initial document
1.1	27 June 2016	Adjusted temperature range
1.2	5 June 2017	Add Scheduled mode to configuration
		Update certification
1.3	5 October 2017	Added UL Class 1 Division 2

1. PREFACE

1.1. INTRODUCTION TO THE DEVICENET ROUTER

This manual describes the installation, operation, and diagnostics of the Aparian DeviceNet Router. The DeviceNet Router provides intelligent data routing between DeviceNet and EtherNet/IP or Ethernet PCCC (CSP). The later allows the module to emulate a PLC5 providing a legacy interface for PanelViews and other devices (as shown below).



Figure 1.1. – Typical Setup

The DeviceNet Router can also be used in Scheduled Mode allowing the user to extract parameters from various DeviceNet devices and write them directly into Logix tags. The DeviceNet Router will also apply the necessary scaling to the values per EDS file or custom user configuration.

1.2. FEATURES

The DeviceNet Router is able to asynchronously exchange data between a DeviceNet polling master (scanner) and an Ethernet PCCC device. The sizes of the DeviceNet's produced and consumed data are independently configurable from 0 to 128 bytes each.

The consumed (DeviceNet) data can then be mapped to a PLC5 type address file, e.g. N33, and then read by an Ethernet device e.g. a PanelView. Similarly, the produced data (DeviceNet) can also be mapped to a PLC5 type address file, to which an Ethernet device could write.

In addition, the DeviceNet Router can be used to transfer parameters of a DeviceNet device directly to Logix tags. The scaling of the parameter values will either be extracted from the EDS file imported or can be manually updated by the user.

The module also provides a range of statistics and an on-board DeviceNet traffic analyser to assist with fault finding.

A built-in webserver provides detailed diagnostics of system configuration and operation, including the display of DeviceNet operation and communication statistics, without the need for any additional software.

The DeviceNet Router is configured using the Aparian Slate application. This program can be downloaded from <u>www.aparian.com</u> free of charge.

1.3. ARCHITECTURE

The figure below provides an example of the typical network setup in PLC Emulation mode, where the DeviceNet Router acts as a DeviceNet slave device.



Figure 1.2. - Example of a typical network setup in PLC Emulation mode

In this example, the DeviceNet Router provides the PanelView data access to the PLC5's DeviceNet scanner module (SDN).

In the next example the DeviceNet Router is used to extract parameters from various DeviceNet devices (running in conjunction with the DeviceNet Scanner – e.g. DNB).



Figure 1.3. - Example of a typical network setup in Scheduled Parameter Mode

1.4. ADDITIONAL INFORMATION

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

Resource	Link
Slate Installation	http://www.aparian.com/software/slate
DeviceNet Router User Manual DeviceNet Router Datasheet Example Code & UDTs	http://www.aparian.com/products/devicenetrouter
Ethernet wiring standard	www.cisco.com/c/en/us/td/docs/video/cds/cde/cde205_220_420/installation/gui de/cde205_220_420_hig/Connectors.html
CIP Routing	The CIP Networks Library, Volume 1, Appendix C:Data Management
DeviceNet	http://www.odva.org

Table 1.1 Additional In	formation
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1.5. SUPPORT

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

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

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

Table 1.2. – Support Details

2. INSTALLATION

2.1. MODULE LAYOUT

The module has two ports at the bottom of the enclosure as shown in the figure below. The ports are used for Ethernet and DeviceNet. The 5-way DeviceNet connector also provides power to the module. 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. – DeviceNet Router side and bottom view

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



Figure 2.2. – DeviceNet Router front and top view

The module provides four DIP switches at the top of the enclosure as shown in the top view figure above.

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	This will force the module into DHCP mode which is useful when the user has forgotten the IP address of the module.
DIP Switch 3	Reserved
DIP Switch 4	Applies the 120 Ω terminating resistor across the DeviceNet network. Switched between Can-H and Can-L.

Table 2.1. - DIP Switch Settings

2.2. MODULE MOUNTING

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



Figure 2.4 - DIN rail mouting

2.3. DEVICENET

A five-way DeviceNet connector is used to connect the DeviceNet CAN interface (Can-L, Can-H), 24Vdc power, and Shield.



Figure 2.5 - DeviceNet connector



NOTE: It is important that the shield is connected to earth at only one end of the cable to avoid current loops.

2.4. 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

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. NETWORK PARAMETERS

The module will have DHCP (Dynamic Host Configuration Protocol) enabled as factory default. Thus a DHCP server must be used to provide the module with the required network parameters (IP address, subnet mask, etc.). There are a number of DHCP utilities available, however it is recommended that the DHCP server in Slate be used. Within the Slate environment, the DHCP server can be found under the Tools menu.

File Device	Tools	Window Help				
3 🖬 🗎 🗶	📓 😹 🧏 Target Browser					
	💠 DI	HCP Server				
	E EV	vent Viewer				
	5 De	eviceFlash				
	ŵ Di	F1 Packet Capture Viewer				
	» At	plication Settings				

Figure 3.2. - Selecting DHCP Server

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

MAC Address	Vendor	Requests	Elapsed	Assigned IP	Assign	Status	Identity
0:60:35:1F:FA:E0	Aparian	2	1		Assign	Discover	





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

To assign an IP address, click on the corresponding "Assign" button. The IP Address Assignment window will open.

MAC Address	Vendor	Requests	Elapsed	Assigned IP	Assign	Status	Identity
00:60:35:1F:FA:E0	Aparian	5	1		Assign	Discover	
	IP Addres	1940	. 180	5:1F:FA:E0 Recent 192:168 192:168 192:168 192:168 192:168 192:168 192:168	1.150 1.152 1.250 1.151	X	
			k	Cancel			

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, then the IP address will be set to static after the IP assignment, thereby disabling future DHCP requests.

Once the IP address window has been accepted, the DHCP server will automatically assign the IP address to the module and then read the Identity object Product name from the device. The successful assignment of the IP address by the device is indicated by the green background of the associated row.

MAC Address	Vendor	Requests	Elapsed	Assigned IP	Assign	Status	Identity
0:60:35:1F:FA:E0	Aparian	7	2	192.168.1.180	Assign	Set Static	DeviceNet Router

Figure 3.5. - Successful IP address assignment

It is possible to force the module back into DHCP mode by powering up the device with DIP switch 2 set to the On position. A new IP address can then be assigned by repeating the previous steps.



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

If the module's DIP switch 2 is in the On position during the address assignment, the user will be warned by the following message.



Figure 3.6. - Force DHCP warning

In addition to the setting the IP address, a number of other network parameters can be set during the DHCP process. These settings can be viewed and edited in Slate's Application Settings, in the DHCP Server tab. Once the DHCP process has been completed, the network settings can be set using the Ethernet Port Configuration via the Target Browser. The Target Browser can be accessed under the Tools menu.



Figure 3.7. - Selecting the Target Browser

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

S Target	Browser	_ 0 ×
i *¥ ⊙		Done
-	192.168.1.229 : DF1 Router	
	192.168.1.238 : Modbus Router	
	192.168.1.232 : DNP3 Router	
	192.168.1.234 : Process Cache	
	192.168.1.224 : DF1 Router	
	192.168.1.151 : IP Point HART Out	
	192.168.1.180 : DeviceNet Router	
	192.168.1.235 : Time Sync	
	192.168.1.102 : 1756-EN2TR/C	
	192.168.1.129 : 1756-EN2TR/B	
	1	

Figure 3.8. - Target Browser

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

0			Do
-	192,168,1.229 : DF1 Router		
	192,168,1.238 : Modbus Router		
	192,168,1.232 : DNP3 Router		
	192,168,1.234 : Process Cache		
	192,168,1.224 : DF1 Router		
	192,168,1,151 : IP Point HART Ou	t	
	192.168.1.180 : DeviceNet Rou	Select	
	192.168.1.235 : Time Sync	Scan	
	192.168.1.102 : 1756-EN2TR/C	Add Child Node	
<u>国</u>	<u></u>	Properties	
	192.168.1.129 : 1756-EN2TR/B		
÷	192.168.1.129 : 1756-EN2TR/B	Port Configuration Reset Module	

Figure 3.9. - Selecting Port Configuration

All the relevant Ethernet port configuration parameters can be modified using the Port Configuration window.

Network Configuration T	/ne							Speed / Duplex Configuration
 Dynamic Static Static Configuration 	,pc	r	Metho	d	DHC	2	×	Auto-negotiate Manual Manual Manual
IP Address	192	24	168	54	1	-	180	Port Speed 100 V
Subnet Mask	255		255		255		0	Duplex Full Duplex V
Default Gateway	0	81	0		0		0	
Primary NS	0		0	24	0		0	General
Secondary NS Domain Name Host Name	0		0	12	0	1	0	MAC Address 00:60:35:1F:FA:E0
							26	Refresh

Figure 3.10. - Port Configuration

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

3.3. CREATING A NEW PROJECT

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

File	Device	Tools	Window	Help
	New	D)	+ 5 0	を会
7	<u>O</u> pen			
з	Close	- 11		
a)	Save			
	Save <u>A</u> s	- 11		
	Recent	•		
	Exit			

Figure 3.11. - 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.

a ≤ + Add + I Add + Add	File De	evice Tools	Window Help
 Export X Cut ロ Copy Paste 	1 5 +	Add	▶ ₽ I ₽ ₽ �
C Export み Cut 日 Copy 日 Paste	oject 💪	Import	- # X
상 Cut 리 Copy 리 Paste		Export	
다 Copy		Cut	
A Paste		Сору	
X Delete	1000		
	×	Delete	
			-

Figure 3.12. - Adding a new device

In the Add New Device window select the DeviceNet Router, and click the Ok button.

mage	Device Name	Description					
	DeviceNet Router	DeviceNet to AB-Ethernet PCCC Module					
T and	DF1 Router	DF1 to Logix Communication Module					
	DHCP Manager	Managed DHCP Module					
	DNP3 Router	DNP3 to Logix Communication Module					
	Hart 4In	HART 4-Channel Input Communication Module					
	Hart 4Out	HART 4-Channel Output Communication Module					
2	IP Point Hart In	HART Single Channel Input Communication Module					

Figure 3.13 – Selecting a new DeviceNet Router

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*.

Instance Name	DeviceNet Router		
Description			
IP Address	192 . 168 . 1 . 185	Major Revision 1 v	
Mapping Mode	PLC5 Emulation		
PLC5 Emulation		Logix Configuration	
IP Address	192 . 168 . 1 . 180	Logix Path 192.168.1.129.1.0	
		ENIP Retry Limit [0-5]	
		ENIP TimeOut 600 ms	

Figure 3.14 - DeviceNet Router configuration

3.4. GENERAL PARAMETERS

The DeviceNet 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 DeviceNet and mapping configuration.

The general configuration consists of the following parameters:

Parameter	Description
Instance Name	This parameter is a user defined name to identify between various DeviceNet Routers.
Description	This parameter is used to provide a more detail description of the application for the module.
Major Revision	The major revision of the module
IP Address	The IP address of the target module. The user can use the target browse button to launch the target browser to the select the DeviceNet Router on the network.
Mapping Mode	There are two mapping modes to choose from: PLC5 Emulation When in this mode the DeviceNet Router will produce and consume data on the DeviceNet network and emulate a PLC5 Controller (as a PCCC Ethernet slave) over Ethernet. This will, for example, allow the user to connect a newer "Ethernet only" PanelView to a DeviceNet network.
	Scheduled Parameter When in this mode the DeviceNet Router will request parameters from various DeviceNet nodes, scale them to engineering units and write them into Logix tags. This will allow the user to extract additional parameters from DeviceNet devices without making use of Logix message blocks.
PLC5 Emulation	The IP Address used to emulate a PLC5 controller. This IP address will be seen as the IP address of the PLC5 controller that the DeviceNet Router is emulating. Therefore, there will be two IP addresses on the network when in PLC5 Emulation mode. One for the actual target module and one for the emulated PLC5 controller.
	Logix Path:
	The Logix path is the CIP path to the Logix controller which will be used to exchange data with the various DeviceNet devices. The user can use the browse button to launch the target browser to the select the Logix controller on the network.
	ENIP Retry Limit
Logix Configuration	The amount of EtherNet/IP retries the module will make once no response was received from the Logix Controller.
	ENIP TimeOut
	The time in milliseconds after which a retry is sent. Once the first retry is sent the next retry will be sent after the same amount of time. This will repeat until the ENIP Retry Limit is reached.

Table 3.1 - General configuration parameters

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

Instance Name	DeviceNet Router	
Description		
IP Address	192 . 168 . 1 . 185	Major Revision 1 V
Mapping Mode	PLC5 Emulation	
PLC5 Emulation		Logix Configuration
IP Address	192 168 1 180	Logix Path 192.168.1.129.1,0
		ENIP Retry Limit [0-5]
		ENIP TimeOut 600 ms

Figure 3.15 - General Configuration

The DeviceNet configuration consists of the following parameters:

Parameter	Description				
Node Address	This is the node address of the DeviceNet Router on the DeviceNet network.				
BAUD	 This is the baud rate at which the CAN bus is operating. The options are: 125k 250k 500k 				
Message Timeout	This is the DeviceNet message request timeout for Scheduled mode. When no response has been received from a DeviceNet device within this time the response will be seen as a failed no-response.				

Table 3.2 - General configuration parameters

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

DeviceNet	5				
Node Address	7	~			
BAUD	500k	~			
Message Timeout	500	[10-1000] ms			
	12				

Figure 3.16 - General Configuration

3.5. PLC5 MAPPING

The PLC5 Mapping configuration consists of the following parameters:

Parameter	Description
Produced Size	The size (bytes) of the data to be produced on DeviceNet. The data originates from the Ethernet (PCCC) client.
PLC5 Produced File	The "PLC5" data file emulation to be used for the DeviceNet produced data.
Consumed Size	The size (bytes) of the data to be consumed on DeviceNet. The data is usually read by the Ethernet (PCCC) client.
PLC5 Consumed File	The "PLC5" data file emulation to be used for the DeviceNet consumed data.
Diagnostic File	The "PLC5" data file emulation to be used to expose the module's diagnostic data.

Table 3.3 – DeviceNet configuration parameters

The PLC5 Mapping configuration is shown in the figure below. The PLC5 Mapping configuration window is opened by either double clicking on the module in the tree or rightclicking the module and selecting *Configuration*. Once in the configuration window select the second tab at the top *PLC5 Mapping*.

DeviceNet Router - Configuration	
General DeviceNet PLC5 Mapping Scheduled Devices (Disabled) Scheduled Parameters (Disabled)	
DeviceNet Router Produced (Ethernet> Router> DeviceNet Scanner) Produced Size 128 [0-128] bytes 'PLC5' Produced File N	
DeviceNet Router Consumed (Ethernet < Router < DeviceNet Scanner) Consumed Size 128 [0-128] bytes 'PLC5' Consumed File N 11	
Diagnostic File 'PLC' Diagnostic File N 77	
Ok Apply Cancel	

Figure 3.17 – PLC5 Mapping Configuration

3.6. SCHEDULED PARAMETER MAPPING

The scheduled parameter mapping allows the user to extract parameters from various DeviceNet devices and write the data into Logix tags (as shown below).



Figure 3.18 - DeviceNet Scheduled Mapping Configuration

There are two configuration steps required; configuring the device followed by configuring the parameters for the device.

NOTE: It is not required for the user to add a Scheduled Device for using the Scheduled Parameter mode. The user can simply add the parameter details directly into the Scheduled Parameter configuration. However, mapping the Scheduled Devices, which links the node to an EDS file, will provide the user the ability to browse for the device parameters and simplify the configuration process.

3.6.1. SCHEDULED DEVICES

First the user will need to select the target DeviceNet device. This is achieved by selecting a node number from the drop-down list followed by selecting the EDS file browse option.

	DeviceNet PLC5 M	apping (Disabled) Scheduled Devices	Scheduled Parameters	
Devic	es (max. of 64 items.)			
	Node	Description	EDS File	Browse
14	~			
	~			

Figure 3.19 - DeviceNet Scheduled Mapping Configuration

i

NOTE: If the EDS catalog does not yet exist the user will be prompted to build the EDS catalog (as shown below). Alternatively, the user can select *Build EDS Catalog* option from the Tools menu.







Figure 3.21 – EDS Catalog building

Building EDS	Catalog Suc	cessful:
	Ok	
	Building EDS	Building EDS Catalog Suc

Figure 3.22 – EDS Catalog building finished

S Aparian-Slate - <New Project>*



Figure 3.23 - DeviceNet EDS catalog building

Once the EDS catalog has been built the user can select a DeviceNet device from the EDS catalog. This will provide the user with a list of parameters from the device which can be selected in the Scheduled Parameters.

Criteria								
Vendor Name	Device Type		Cat	alog				
*	Motor Overloa	d	*				Refresh	
Showing 144 of 11239 items.								
Vendor Name	Device Type	Catalog	Vendor ID	Device Type ID	Product Code	Revision	Filename	2
Rockwell Automation/Allen-Bradley	Motor Overload	193/592-EC2Z	1	3	32	2.001	0001000300200200.eds	
Rockwell Automation/Allen-Bradley	Motor Overload	193/592-EC2Z	1	3	32	3.001	0001000300200300.eds	
Rockwell Automation/Allen-Bradley	Motor Overload	193/592-EC3A	1	3	36	4.001	0001000300240400.eds	
Rockwell Automation/Allen-Bradley	Motor Overload	193/592-EC3A	1	3	36	5.002	0001000300240500.eds	
Rockwell Automation/Allen-Bradley	Motor Overload	193/592-EC3B	1	3	38	4.001	0001000300260400.eds	
Rockwell Automation/Allen-Bradley	Motor Overload	193/592-EC3B	1	3	38	5.002	0001000300260500.eds	
Rockwell Automation/Allen-Bradley	Motor Overload	193/592-EC3C				4.001	0001000300280400.eds	
Rockwell Automation/Allen-Bradley	Motor Overload	193/592-EC3C	1	3	40	5.002	0001000300280500.eds	
Rockwell Automation/Allen-Bradley	Motor Overload	193/592-EC3D	1	3	42	4.001	00010003002A0400.eds	
Rockwell Automation/Allen-Bradley	Motor Overload	193/592-EC3D	1	3	42	5.002	00010003002A0500.eds	
Rockwell Automation/Allen-Bradley	Motor Overload	193/592-EC3E	1	3	44	4.001	00010003002C0400.eds	
Rockwell Automation/Allen-Bradley	Motor Overload	193/592-EC3E	1	3	44	5.002	00010003002C0500.eds	2

Figure 3.24 – EDS File selection

ene	ral De	viceNet	PLC5 Mapping (Disabled)	Scheduled Devices S	cheduled Parameters		
De	vices (r	max. of 6	4 items.)				
	1	lode		Description		EDS File	Browse
	4	~	193/592-EC3C		0001000300280400.eds		
*		~					

Figure 3.25 – Configured Scheduled Device

Below is an explanation of various fields in the Scheduled Parameter t	ab.
--	-----

Parameter	Description
Node	The node address of the device selected
Description	The user description of the device. This will default to the device's catalog number from the EDS file, but can be changed as required.
EDS File	The selected EDS file

Table 3.4 – DeviceNet Scheduled Devices

3.6.2. Scheduled Parameters

Once a device has been configured, the user can select the device Node number in the Scheduled Parameter mapping and access the parameters contained within the associated EDS file.

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NOTE: It is not required for the user to add a Scheduled Device for using the Scheduled Parameter mode. The user can simply add the parameter details directly into the Scheduled Parameter configuration. However, mapping the Scheduled Devices, which links the node to an EDS file, will provide the user the ability to browse for the device parameters and simplify the configuration process.

If the user has defined a Scheduled device the Parameter browse button can be used to select a parameter from the EDS file.

General	DeviceNet	PLC5 Mapping (Disab	led) Sched	uled Devi	ces Schedu	ed Parameters	5						
-		(100.3											
Para	meters (max.	of 100 items.)											
	Node	Parameter Name	Browse	Class ID	Instance ID	Attribute ID	Data Size	Data Type	Interval (ms)	Scaling Multiplier	Scaling Offset	Target Tag	Browse

Figure 3.26 – Configured Scheduled Parameter Browse

Parameter Index	Parameter Name	Units	Multiplier	Offset	Help String
1	L1 Current	Amps	1	0	The actual L1 Phase Current.
2	L2 Current	Amps			The actual L2 Phase Current.
3	L3 Current	Amps	1	0	The actual L3 Phase Current.
4	Average Current	Amps	1	0	Average of Phase Currents
5	L1 FLA		1	0	L1 Current in FLA
6	L2 FLA		1	0	L2 Current in FLA
7	L3 FLA		1	0	L3 Current in FLA
8	Average FLA		1	0	Average Current in FLA
9	Therm Utilized		1	0	Thermal Capacity Used
10	GF Current	Amps	1	0	The Ground Fault Current.
11	Current Imbal		1	0	Percent Current Imbalance
12	OL Time To Trip	Sec.	1	0	Time until an overload trip

Figure 3.27 – Device Parameter List

Once a parameter has been selected from the parameter list the parameter fields will automatically populated as show below. The user will simply need to select the Target Tag by either typing in the Logix tag name or selecting it from the tag browser.

eneral DeviceNet PLC5 Mapping (Disabled) Scheduled Devices Scheduled Parameters Parameters (max. of 100 items.) Node Parameter Name Browse Class ID Instance Attribute ID Data Size Data Type Interval (ms) Scaling Multiplier Caling Offset Target Tag	
Parameters (max. of 100 items.)	
Nado Berameter Name Brauno Class Instance Attribute Data Date Tupo Interval Scaling Scaling Terrart Terr	
	et Tag Brows
▶ 4 ∨ L2 Current	er rag brows

Figure 3.28 – Configured Scheduled Parameter populated

⊉ ⊞ ⊟	
Tagname ^	Data Type
+ DeviceNetDataIn	INT[100]
+ DeviceNetDataOut	INT[100]
+ DeviceNetRouter:C	AB:ETHERNET
DeviceNetRouter:	AB:ETHERNET
DeviceNetRouter:O	AB:ETHERNET
E3OverloadL2Current	INT
+ J1939R01:C	AB:ETHERNET
+ J1939R01:I	AB:ETHERNET
+ J1939R01:O	AB:ETHERNET
-J1939R01Conn	DINT
J1939R01ConnCnt	COUNTER
+ J1939R01Input	AparianJ1939RIn
+ 11939R02·C	

Figure 3.29 – Tag Browser

Par	amete	ers (n	nax. of 100 items.)												
	No	ode	Parameter Name	Browse	Class ID	Instance ID	Attribute ID	Data Size	Data Type		Interval (ms)	Scaling Multiplier	Scaling Offset	Target Tag	Browse
	4	~	L2 Current		44	1	194	2	INT	~	1000	1	0	E3OverloadL2Current	
*		~								~					

Figure 3.30 – Scheduled Parameter completed

Below is an explanation of various fields in the Scheduled Parameter tab.

Parameter	Description						
Node	Node Address of the DeviceNet device from which the data will be requested						
Parameter Name	Name of the parameter (extracted from EDS if used)						
Class ID	CIP Class ID for the data request						
Instance ID	CIP Instance ID for the data request						
Attribute ID	CIP Attribute ID for the data request						
Data Size	Size (bytes) of the DeviceNet data being received.						

Data Type	The data type of the DeviceNet data being received.
Interval	The interval of the request in milliseconds.
Scaling Multiplier	The data scaling multiplier. This is applied before the data is written to the Logix Tag.
Scaling Offset	The data scaling offset. This is applied before the data is written to the Logix Tag.
Target Tag	The Logix Tag to which the data will be written.

Table 3.5 – DeviceNet Scheduled Parameter

3.7. MODULE DOWNLOAD

Once the DeviceNet Router configuration has been completed, it must be downloaded to the module. Before downloading the Connection Path of the module should be set. This path will automatically default to the IP address of the module, as set in the module configuration. It can however be modified, if the DeviceNet Router is not on a local network.

The Connection path can be set by right-clicking on the module and selecting the Connection Path option.



Figure 3.31 - Selecting Connection Path

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

MyDNTR - Connection Path	
Connection Path 192.168.1.180	Browse
Ok Cancel	

Figure 3.32 - Connection Path

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

S Aparian-Slate - DeviceNet	
File Device Tools Window	
Project Explorer	- 4 ×
🖃 🗛 DeviceNet	
MyDNTR (DeviceNet Rou Configuration	Configuration
,	Connection Path
	I Go Online
	Download
	1 Upload
	Verify Configuration
	б Сору
	C Export
	X Delete

Figure 3.33 - Selecting Download

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



Figure 3.34 - 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 3.35 - Module online

3.8. LOGIX 5000 CONFIGURATION

3.8.1. ADD MODULE TO I/O CONFIGURATION

When the module operates in a Logix "owned" mode the DeviceNet Router will need to be added to the Logix 5000 I/O tree. The module will need to be added as a generic Ethernet module. This is done by right clicking on the Ethernet Bridge in the Logix 5000 and selecting *New Module* after which the *ETHERNET-MODULE* is selected to be added as shown in the figure below.



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

			Module	Description	
			-2097-V34PR3	Kinetix 300, 2A, 480V, No Filter	<u> </u>
			2097-V34PR5	Kinetix 300, 4A, 480V, No Filter	
I/O Configuration				Kinetix 300, 6A, 480V, No Filter	
■ 1756 Backplane,	1756-A4			Regen Bus Supply via 1203-EN1	
-10 [0] 1756-L62	DF1Test			Po 10/100 Mbps Ethernet Port on DriveLogix57	/30
E [[1] 1756-EN2	TR eth		ETHERNET-BRIDGE	Generic EtherNet/IP CIP Bridge	
- Hernet			ETHERNET-MODULE	Generic Ethernet Module	
1	New Module	N	- ETHERNET-PANELVIEW		
1.1			EtherNet/IP	SoftLogix5800 EtherNet/IP	
6	Paste Ctrl+V		- PowerFlex 4 Class Multi-	E Multi Drive via 22-COMM-E	
	Tana a	P	PowerFlex 4-E	AC Drive via 22-COMM-E	
	Print •		PowerFlex 4M-E	AC Drive via 22-COMM-E	1000
			PowerFlex 40-E	AC Drive via 22-COMM-E	
				F	ind Add Favorite
			By Category By Vend	lor Favorites	
					1
				OK Ca	ncel Help

Figure 3.36 - Add a Generic Ethernet Module in Logix 5000

The user must enter the IP address of the DeviceNet Router that will be used. 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.

Connection Parameter	Assembly Instance	Size
Input	117	47 (32-bit)
Output	101	1 (32-bit)
Configuration	102	0 (8-bit)

Table 3.6 - Logix class 1 connection parameters for the DeviceNet Router

	ection Module Info					
Type:	ETHERNET-MODULE Generic Ethernet Module					
Vendor:	Allen-Bradley					
Parent	EnetBridge Connection Parameters					
Name:	DNTR01	Connection Fala	Assembly			
Description:			Instance:	Size:		
Depenpuen		Input:	117	47	(32-bit)	
	×	Output:	101	1	(32-bit)	
Comm Format	Data - DINT 🗸 🗸	Canformation	102	0	• /0 L:0	
Address / Ho	st Name	Configuration:	102		(8-bit)	
IP Addres	ss: 192 168 1 185	Status Input:				
O Host Nan	ne:	Status Output:				

Figure 3.37 - Logix General module properties in Logix 5000



NOTE: The user will need to enter the exact connection parameters before the module will establish a class 1 connection with the Logix controller.

Next the user needs to add the connection requested packet interval (RPI). This is the rate at which the input and output assemblies are exchanged. The recommended value is 200ms. Refer to the technical specification section in this document for further details on the limits of the RPI.



NOTE: Although the module is capable of running with an RPI of 10ms, it is recommended to set the RPI to 200ms, to avoid unnecessary loading of the module processor.

General	Connection*	Module Info		
	sted Packet Int oit Module	erval (RPI):	200.0 🖨 ms	(1.0 - 3200.0 ms)
🗌 Мај	or Fault On Coi	ntroller If Conne	ection Fails While in R	un Mode
🗸 Use	Unicast Conn	ection over Etł	nerNet∕IP	

Figure 3.38 - Connection module properties in Logix 5000

Once the module has been added to the Logix 5000 I/O tree the user must assign the User Defined Types (UDTs) to the input and output assemblies. The user can import the required UDTs by right-clicking on *User-Defined* sub-folder in the *Data Types* folder of the IO tree and selecting *Import Data Type*. The assemblies are then assigned to the UDTs with a ladder copy instruction (COP) as shown in the figure below.



3.8.2. IMPORTING UDTS AND MAPPING ROUTINES

To simplify the mapping of the input image, a Logix 5000 Routine Partial Import (L5X) file is provided. This file can be imported by right-clicking on the required Program and selecting the Import Routine option.

Controller Orga	nizer	• 4 X	
🗐 😂 Controlle	r DeviceNetRouterTest		
🖉 Contro	oller Tags		
Contro	oller Fault Han <mark>d</mark> ler		
Power-	-Up Handler		
🖨 🖾 Tasks			
🗎 🛱 MainT			
	New Routine		
	Import Routine		
	Cut	Ctrl+X	
🖻 🔤 Motic	Сору	Ctrl+C	
🗌 🗋 Un 📾	Paste	Ctrl+V	

Figure 3.40 – Logix 5000 Importing DeviceNet Router specific routine and UDTs

	n: 🧧 DeviceNet Ro	uter	✓ Ø Ø Ø III▼	
1	Name	^	Date modified	Туре
X	DeviceNetRo	outerRoutineAndUDTs.L5X	6/6/2017 12:01 PM	Logix Designe
ick access				
Desktop				
-				
Libraries				
IDIAIICS				
_				
This PC				
Network	<			>
Network	<	DeviceNetRouterRoutineAndUD	Ts.L5X V	> Import
Network		DeviceNetRouterRoutineAndUD RSLogix 5000 XML Files (*.L5X)	Ts.L5X ~	-
Network	File name:		Ts.L5X ~	Import

Figure 3.41 - Selecting partial import file

The import will create the following:

- The required UDTs (user defined data types)
- Two controller tags representing the Input and Output assemblies.
- A routine mapping the DeviceNet Router module to the aforementioned tags.

The user may need to change the routine to map to the correct DeviceNet Router module instance name, and make sure that the mapping routine is called by the Program's Main Routine.



Refer to the additional information section of this document for an example Logix 5000 project as well as the required UDTs.

4. DEVICENET CONFIGURATION – RSNETWORX

The DeviceNet IO messaging scheduling is typically configured using **RSNetworx for DeviceNet** and is required when using the PLC5 Emulation mode.

Open RSNetWorx, create a new project and browse to the DeviceNet network. The software will scan the network for all the devices. Additional devices can be added (offline) if required.



Figure 4.1 – RSNetWorx for DeviceNet

To schedule the master (scanner) module (e.g. 1771-SDN, 1756-DNB) right-click on the scanner module and select **Properties**.

Select the *Scanlist* tab. The DeviceNet Router should be shown in the Available Devices (left) list box. Use the ">" (add) button to add it to the Scanlist (right).

Available Devices:	t Output ADR Summary Scanlist:
A07, DeviceNet Router	> < < > «
Automap on Add Upload from Scanner Download to Scanner Edit 1/0 Parameters	Node Active Electronic Key: Current Code Product Code Major Revision Non or or higher

Figure 4.2 – Add device to Scanlist


NOTE: When the DeviceNet Router is added to the Scanlist, a dialog may appear, warning of no I/O Data. This is normal, because the DeviceNet Router's I/O data sizes are dynamically configured, and thus are not fixed in the EDS file.

anner Configuration Applet		2
WARNING: Node '07, DeviceNet Rou	iter' does not contain any I/O data!	
To supply I/O data for this device, cli	lick Edit I/O Parameters and then specify th	he I/O type(s) and size(s).
If this is a bridge device, associate th	is file to the scanner side of the device to	obtain I/O data,
	ОК	

Figure 4.3 – I/O Data Warning

The DeviceNet Router will now appear in the Scanlist.

Available Devices:	Scanlist
	A07, DeviceNet Router
	Vode Active
Automap on Add Upload from Scanner Download to Scanner	Electronic Key: Device Type Vendor Product Code

Figure 4.4 – Updated Scanlist

To configure the I/O data sizes, click on the *Edit I/O Parameters* button near the bottom of the *Scanlist* tab. The *Edit I/O Parameters* dialog will appear. The DeviceNet Router supports either *Polled* or *Change of State* (COS) data exchanges.



NOTE: Only one mode should be selected. Do not select both polled and Change of State.

4.1. POLLED METHOD

To schedule the data transfer using the polling method, select the Polled option.

Strobed:	Change of State / Cyclic Change of State C Cyclic
∐se Dutput Bit: 🗖	Inpu <u>t</u> Size:
Z Polled:	Output Size: 0 Bytes
I <u>n</u> put Size: 16 📑 Bytes	Heart <u>b</u> eat Rate: 250 🚊 msec
Output Size: 120 📩 Bytes	Advanced
Poll Rate: Every Scan 💌	

Figure 4.5 – Polled Configuration

The Input and Output sizes are specified in bytes, and should match the DeviceNet Router's configuration, as described the previous chapter.

Edit I/O Parameters : A07, DeviceNet Router	MyDNTR - Configuration
Strobed: Change of State / Cyclic	W Mybrink - Conngulation
Input Size: 0 🚔 Bytes C Change of State C Cyclic	General DeviceNet Mapping
Lise Output Bit. Input Size: D = Bytes	DeviceNet Produced (PV> Module> DeviceNet Scanner)
✓ Polled: Output Size: 0 2 Bytes Input Size: 16 2 Bytes 16 2 10 10	Produced Size 16 bytes 'PLC5' Inpu
Qutput Size 120 - Bytes	
Poll Bate: Every Scan	DeviceNet Consumed (PV < Module < DeviceNet Scanner)
Cancel Restore I/O Sizes	Consumed Size 120 bytes 'PLC5' Out

Figure 4.6 – Configuring Polled I/O Sizes

Once configured, click the Ok button.



NOTE: A dialog may again appear, warning that the configured size does not match that of the EDS file. This warning can be ignored.

4.2. CHANGE OF STATE METHOD

To schedule the data transfer using the *Change of State* method, select the "*Change of State* / *Cyclic*" option.

Strobed:	Change of Stat	
Use Output Bit: 🗖	Input Size:	16 🛨 Bytes
Polled:	Output Size:	120 📑 Bytes
Input Size: 0 📑 Bytes	Heartbeat Rate:	5000 📑 msec
Output Size: 🕴 📑 Bytes		Advanced
Poll Rate: Every Scan 💌		

Figure 4.7 – Change of State Configuration

As with the polled configuration, The Input and Output sizes are specified in bytes, and should match the DeviceNet Router's configuration, as described earlier in this chapter. Once configured, click the Ok button.



NOTE: A dialog may again appear, warning that the configured size does not match that of the EDS file. This warning can be ignored.

4.3. INPUT AND OUTPUT MAPPING

The scanner module typically transfers a large block of data to the host controller (PLC / PAC). The Input and Output mapping allows the user to specify where in this block the DeviceNet Router's data will appear. To map the Input data, select the *Input* tab.

🚺 A07, D	ouiochl	Type		Map No		AutoMap
I gove	BWIGEN		10	NU		Unmap
						Advanced
•		1			F	Options
Memory:	lock Xfer	60 💌] St	art Word:	0	-
		Los Los I			e la la	2 2 1 0
Bits 15 - 0	5 14 13	12111	10191	8 7 6	5 4 3	
Bits 15 - 0	15 14 13	12 11	10 9	8 / [6]	5 4 .	
N9:123	15 14 13	12111	10[9]	8 7 6	5 4 ,	
N9:123 N9:124	15 14 13	12[11]	10[9]	8 / 6	5 4 ,	
	15 14 13	12 11	10[9]	8 7 6	5 4	
N9:123 N9:124 N9:125	15 14 13	12 11	10[9]	8 7 6	54	
N9:123 N9:124 N9:125 N9:126	15 14 13	12 11	10[9]	8 7 6	5 4	
N9:123 N9:124 N9:125 N9:126 N9:127	15 14 13	12[11]	10[9]	8 7 [6]	54,	

Figure 4.8 – Input Mapping

Select the *DeviceNet Router* in the "Node" items and click on the *Advanced* button. The *Advanced Mapping* dialog will appear.

Map	Message	Offs	set	Memory	Offse	et Bit	Leng
1	<not mapp<="" td=""><td>ed></td><td></td><td></td><td></td><td></td><td></td></not>	ed>					
2 3 4	<not mapp<="" td=""><td></td><td></td><td></td><td></td><td></td><td></td></not>						
3	<not mapp<="" td=""><td></td><td></td><td></td><td></td><td></td><td></td></not>						
4	<not mapp<="" td=""><td>ed></td><td></td><td></td><td></td><td></td><td>4</td></not>	ed>					4
•							•
1.1	_		1012-001				
Mapl	-rom:			Map To: -			
CONTRACTORS -	and the second						
Mes	sage: Po	lled 🔼 💌		Memory:	Block	Xfer 6	0 🔻
	-			0.000 - 20. 1910 - 20.	-		0 💌
Mes Byte	-			Memory: Word:	Block	Xfer 6	0 🗾
Byte	e 0	<u>.</u>		Word:	0	-	0 🗾
	-			0.000 - 20. 1910 - 20.	-		0 🗾
Byte	e 0	<u>.</u>		Word: Bit:	0		0 💌
Byte	e 0		В	Word:	0	-	0 💌

Figure 4.9 – Advanced Mapping – Input

Depending on the previously selected exchange method, the "Map From" Message, will either be **Polled** or **COS**. In the "Map To" group box, enter the appropriate **Memory** (Xfer block), **Word** and **Bit** Offset. Not that the mapping **Length** is in bits. In this example, we enter 128 (16 bytes * 8).

Click the *Apply Mapping* to accept the configuration. The configured mapping will be illustrated in the lower section of the Input tab.

A07.	Type Size MapAutoMap
	Unmap
	Advanced
•	Options
Memory:	Block Xfer 60 💌 Start Word: 0
Bits 15 - 0	15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
N9:123	A07. DeviceNet Router
N9:124	A07. DeviceNet Router
	A07, DeviceNet Router
N9:125	
N9:125 N9:126	
	A07, DeviceNet Router
N9:126	A07, DeviceNet Router A07, DeviceNet Router
N9:126 N9:127	A07, DeviceNet Router

Figure 4.10 – Mapped Input Data

The output data is mapped in a similar method, by selecting the *Advanced* button on the *Output* tab.

Node 1 A07	⊥ Type Size Map Device Polled 120 No	AutoMap
		Unmap
		Advanced
•		Options
Memory: Bits 15 - 0		0 ± 4 3 2 1 0 4
20 	15 14 13 12 11 10 9 8 7 6 5	
Bits 15 - 0	,	
Bits 15 - 0 N10:0	15 14 13 12 11 10 9 8 7 6 5	
Bits 15 - 0 N10:0 N10:1	15 14 13 12 11 10 9 8 7 6 5	
Bits 15 - 0 N10:0 N10:1 N10:2	15 14 13 12 11 10 9 8 7 6 5	
Bits 15 - 0 N10:0 N10:1 N10:2 N10:3	15 14 13 12 11 10 9 8 7 6 5	
Bits 15 - 0 N10:0 N10:1 N10:2 N10:3 N10:4	15 14 13 12 11 10 9 8 7 6 5	

Figure 4.11 – Output Mapping

Map	Message	Offset	Memory	Offset	Bit Lengt	
1	<not mapped:<="" td=""><td>></td><td></td><td></td><td></td></not>	>				
2	<not mapped:<="" td=""><td>></td><td></td><td></td><td></td></not>	>				
2 3 4	<not mapped=""></not>					
4	<not mapped:<="" td=""><td>></td><td></td><td></td><td></td></not>	>				
4					•	
Byte Bit:		3 3	Word: Bit:	0		
	Apply Mapping	.	Bit Length:	960 -	3	

Figure 4.12 – Advanced Mapping – Output

Depending on the previously selected exchange method, the "Map To" Message, will either be **Polled** or **COS**. In the "Map From" group box, enter the appropriate **Memory** (Xfer block), **Word** and **Bit** Offset. Not that the mapping **Length** is in bits. In this example we enter 960 (120 bytes * 8). Click the *Apply Mapping* to accept the configuration. The configured mapping will be illustrated in the lower section of the Output tab.

Node	▲ Type Size Map AutoMap
J AU7, I	Device Polled 120 N10:123.0
	Unmap
	Advanced.
	Options
41	Epidenom
M <u>e</u> mory:	Block Xfer 60 💌 Start Word: 0 🛒
M <u>e</u> mory:	
1	Block Xfer 60 💌 Start Word: 0 📑
Bits 15 - 0	Block Xfer 60 🗾 Start Word: 0 📑
Bits 15 - 0 N10:123	Block Xfer 60 Start Word: 0
Bits 15 - 0 N10:123 N10:124	Block Xfer 60 Start Word: 0 3 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 A07, DeviceNet Router A07, DeviceNet Router
Bits 15 - 0 N10:123 N10:124 N10:125	Block Xfer 60 Start Word: 0 5 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 5 A07, DeviceNet Router A07, DeviceNet Router A07, DeviceNet Router
Bits 15 - 0 N10:123 N10:124 N10:125	Block Xfer 60 ▼ <u>S</u> tart Word: 0 → 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 3 A07, DeviceNet Router A07, DeviceNet Router A07, DeviceNet Router A07, DeviceNet Router
Bits 15 - 0 N10:123 N10:124 N10:125 N10:126 N10:127	Block Xfer 60 Start Word: 0 3 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 3 A07. DeviceNet Router A07. DeviceNet Router A07. DeviceNet Router A07. DeviceNet Router A07. DeviceNet Router A07. DeviceNet Router
Bits 15 - 0 N10:123 N10:124 N10:125 N10:126 N10:127 N10:128	Block Xfer 60 Start Word: 0

Figure 4.13 – Mapped Output Data

Once the mapping has been configured, select the Ok button on the scanner configuration dialog. The user will then be prompted to download the configuration changes to the scanner. Select the **Yes** option.



Figure 4.14 – Scanner Configuration Download Prompt

5. FTVIEW CONFIGURATION

The DeviceNet Router can be interfaced directly to FTView using PCCC (PLC5 Ethernet emulation). This is illustrated in the following example where a PanelView is configured to read data from the DeviceNet Router.

Using FTView Studio (Machine Edition) create a new project.



Figure 5.1 - FTView project

5.1. COMMUNICATION

To configure the communication link to the DeviceNet Router, select the **Communication Setup** under the **RSLinx Enterprise** section. If the RSLinx Enterprise heading does not appear, then it should be added by right-clicking on the project and selecting **Add New Server**.



Figure 5.2 – Adding RSLinx Enterprise Server

The *Communication Setup* dialog will open. Under the *Device Shortcuts* group box, click on the *Add* button to create a new shortcut. Rename the shortcut as required. In this example the shortcut is renamed to "DNR".

R Communication	Setup - RNA://\$Local/PV1/F	RSLinx Enterprise	_ _ _×
Add Remove	Apply	Design (Local) Runtime (Target)	Copy from Design to Runtime
Offline Tag File		Mode: Online Not Browsing	Browse
Shortcut Type	Dueses		
phorecut type	Processor		<u> </u>
			OK Cancel Verify Help

Figure 5.3 – Adding Device Shortcut

With the newly created device shortcut selected, right-click on the *Ethernet* network and select the *Add Device* option.



Figure 5.4 – Adding Ethernet Device

The *Add Device* dialog will open. Under the *Ethernet PLC devices* section, select the *1785-L40E PLC-5/40 Processor with an Ethernet interface* option.

i

NOTE: The DeviceNet Router supports a PLC5 emulation mode, allowing it to be accessible by RSLinx Enterprise.

dd Device Selection	
Available Devices	
🗂 词 GenericDevice, Generic Device From EDS File	
🗄 🔚 EtherNetIP Devices	
🗄 🔚 Ethernet PLC devices	
😟 🛲 1753-L28BBBx, GuardPLC 1600	
庄 🚥 1753-L32BBBx-8A, GuardPLC 1800	
1785-L20E, PLC-5/20E Processor with an E	thernet interface
1785-L40E, PLC-5/40 Processor with an Et	nernet interface
1785-L26E, PLC-5/26E Processor with an E	thernet interface
🚽 📲 1785-L46E, PLC-5/46E Processor with an E	thernet interface
1785-L80E, PLC-5/80E Processor with Ethe	rnet interface
- 🐠 SoftLogix5, Allen-Bradley SoftLogix5	
- 📶 1785-L20C15, PLC-5/20C	
- 1785-L40C15, PLC-5/40C	
1785-L60C15, PLC-5/60C	15
1785-180C15 PLC-5/80C	1
DS File:	
	100
OK Cancel	Help

Figure 5.5 – Ethernet Device Selection

In the *Device Properties* page, enter the DeviceNet Router's IP address, and then click on the Ok button.



NOTE: The user will need to enter the PLC5 emulation IP address for the PLC5 shown below, and not the DeviceNet Router's primary (EtherNet/IP) IP

address.

Name	PLC-5/4	0 Proce:	ssor wi	ith an E	
Address [192 .	168 .	1	. 180	

Figure 5.6 – Device Properties

At the top of the *Communication Setup* dialog, select the *Copy from Design to Runtime* button. As the name implies, this copies the configuration to be used by the PanelView at runtime. Select the *Ok* button to close the *Communication Setup* dialog.

5.2. ANIMATION

Once the communication has been correctly configured, objects can be linked to the DeviceNet Router data points. Create a new graphic Display by right-clicking on the **Display** item, under the **Graphics** section.



Figure 5.7 – Adding a Graphical Display

A blank Display dialog will be created. To display a number, select the *Numeric Display* object, from either the toolbar or from the *Numeric and String* menu, located under in *Objects* menu.

Untitled - /P¥1// (Displa	у)					_
	Numeric Dis	splay Prope	erties		×	
	General	Common Co	onnections			
NININININI	Name		Tag / Expression	Tag	Exprn	
NNNNN	Value	+			••••	
	Polarity	+				

Figure 5.8 – Numeric Display Connections

The Numeric Display can now be linked to a DeviceNet Router data point using the *Connections* tab. Select the *Tag* (...) button adjacent to the *Value* item. The FTView Tag Browser dialog will open. To view all the available data points select the *Refresh All Folders* button.

NOTE: The DeviceNet Router must be online for the tag browsing option to work.

Folders	Contents of V::DNR/C)nline/N33'		
🖃 📸 PV1	Name	Access Rights	Description	-
🗄 🧰 DNR	🔗 N33:0	ReadWrite	ichi. Di	
🕀 🦲 Diagnostics	🔗 N33:1	ReadWrite		
🖻 🧰 Online	🧬 N33:10	ReadWrite		
🕀 🦲 N31	🧬 N33:11	ReadWrite		
	🧬 N33:12	ReadWrite		
🚊 🚊 N77	🧬 N33:13	ReadWrite		
🗄 📄 system	🧬 N33:14	ReadWrite		
	🔗 N33:15	ReadWrite		
	J Ø №33-16	DasdWrita		1
Refresh All Folders Tag filte	er: KNone>			2
elected Tag [DNR]N33				
Home area: /				

Figure 5.9 – Browsing Data Points

The data files, as configured in the DeviceNet Router, will appear under the **Online** section. Select the required data point to be connected to the Numeric Display. In this example, N31 and N33 represent the Input and Output data respectively and N77 represents the diagnostic data.

5.3. DIAGNOSTIC DATA

Various diagnostic items can be displayed in the FTView using the Diagnostic File. The diagnostic file number (e.g. N77) is configured in the DeviceNet Router as shown in chapter 3. The meaning of each diagnostic data point is tabulated below.

Offset	Group	Description
		DeviceNet Polling Status
0		Bit 0 – Connection Active - Poll
0		Bit 1 – Connection Standby
		Bit 2 – Connection Active - COS
1		Rx Can Packet Count
2		Tx Can Packet Count
3		CAN CRC Errors
4	5	CAN Bit Errors
5	DeviceNet	Can Stuff Errors
6	svio	UCCM Connection Open
7	Ď	UCCM Connection Close
8		IO Connections
9		Poll Commands
10		Fragment Ack Errors
11		Explicit Fragment Error
12		Poll Fragment Error
13		Explicit Client Not Found
14		Duplicate Node Detected
15		PCCC Connection Requests
16		PCCC Read Requests
17	Jet	PCCC Write Requests
18	PCCC - Ethernet	PCCC Unsupported Command
19	E	PCCC Unsupported FNC Code
20		PCCC Client Not Found
21	PCC	PCCC Client Max Reached
22		PCCC File Not Found
23		Current Connections
24	Module	DeviceNet Router Internal Temperature

Table 5.1 - Diagnostic File

6. OPERATION

6.1. MESSAGE ROUTING

When the module has been correctly setup the DeviceNet message initiator will send read commands to a certain DeviceNet addresses which will then be routed to a Logix tag. The messages send by the initiator must be completed with the correct data for successful operation. There are various indicators to determine if the mapping is routing the DeviceNet messages correctly. Once a transaction has been successfully completed the *Transaction Ok* bit in the mapped items status will be set. Refer to the diagnostics section of this document for a more detailed explanation of the various indicators that can be used to diagnose the module.

6.2. LOGIX 5000 ASSEMBLIES

When the module operates in a Logix "owned" mode the Logix controller will establish a class 1 cyclic communication connection with the DeviceNet Router. An input and output assembly is exchanged at a fix interval (RPI). The UDTs provided will convert the input and output arrays into tag based assemblies. Refer to the additional information section in this document for the input and output UDTs.

6.2.1. INPUT ASSEMBLY

The following parameters are used in the input assembly of the module.

Parameter	Datatype	Description
Instance	STRING	This parameter is the instance name of the module that was configured under the general DeviceNet configuration in Slate.
Status.PLCEmulationMode	BOOL	Set if the module is operating in PLC Emulation Mode.
Status.ScheduledParameterMode	BOOL	Set if the module is operating in Scheduled Parameter mode.
Status.ConfigValid	BOOL	Set if a valid configuration is executing in the module.
MappedItemStatus	BOOL[128]	Each mapped item has a status bit to provide feedback of its operation.
		BOOL – Transaction Ok
		If this bit is set it means that the specific mapped item is successfully communicating between the DeviceNet device and the Logix controller.
TransactionRate	DINT	The transaction rate is the number of DeviceNet messages per second that the module is currently routing.

DeviceTemperature	REAL	The internal temperature of the DeviceNet Router module.
DeviceNetRxCount	DINT	The number of CAN packets received.
DeviceNetTxCount	DINT	The number of CAN packets transmitted.
DeviceNetCrcCount	DINT	The number of detected CAN CRC errors.
DeviceNetBitError	DINT	The number of detected CAN Bit errors.
DeviceNetStuffError	DINT	The number of detected CAN Stuff errors.
DeviceNetUCMMOpenCount	DINT	The number of UCCM (Unconnected Message Manager) Open requests
DeviceNetUCMMCloseCount	DINT	The number of UCCM (Unconnected Message Manager) Close requests
DeviceNetIOConnections	DINT	The number of current IO connections
DeviceNetPollCommandCount	DINT	The number of Poll Commands received.
DeviceNetFragmentAckErrors	DINT	The number of detected Fragment Acknowledge errors.
DeviceNetExplicitFragmentErrors	DINT	The number of detected Explicit Fragment errors.
DeviceNetPollFragmentErrors	DINT	The number of detected Poll fragment errors.
DeviceNetExplicitClientNotFound	DINT	The number of explicit requests received without a matching connection.
DeviceNetDuplicateNode	DINT	The number of duplicate node detections.
TagReads	DINT	The total number of Logix tag reads executed by the module.
TagWrites	DINT	The total number of Logix tag writes executed by the module.
ConnectionFailures	DINT	The number of failed class 3 connection attempts.
		Note: Logix tag reading and writing requires the module to first establish a class 3 connection with the Logix Controller.
TagErrors	DINT	The number of failed tag access (read/write) requests.
		These may include privileged violations, non-existing tags, etc.

Table 6.1 - Logix 5000 input assembly parameters

6.2.2. OUTPUT ASSEMBLY

The following parameters are used in the output assembly of the module.

Parameter	Datatype	Description		
Reserved	DINT	This DINT is reserved for future use.		
Table 6.2 - Logix 5000 output assembly parameters				

Table 6.2 - Logix 5000 output assembly parameters

An excerpt of the Input Image is shown in the following figure.

DNTR01Input	{}	{}		AparianDNTRInput
+ DNTR01Input.Instance	'DeviceNet Router'	{}		STRING
DNTR01Input.Status	{}	{}		AparianDNTRStatu
DNTR01Input.Status.PLCEmulationMode	0		Decimal	BOOL
DNTR01Input.Status.ScheduledParameterMode	1		Decimal	BOOL
DNTR01Input.Status.ConfigurationValid	1		Decimal	BOOL
DNTR01Input.MappedItemStatus	{}	{}	Decimal	BOOL[128]
DNTR01Input TransactionRate	0		Decimal	DINT
DNTR01Input.Temperature	68.70213		Float	REAL
DNTR01Input.DeviceNetRxCount	473673		Decimal	DINT
DNTR01Input.DeviceNetTxCount	22706		Decimal	DINT
+ DNTR01Input.DeviceNetCRCError	0		Decimal	DINT
+ DNTR01Input.DeviceNetBitError	0		Decimal	DINT
+ DNTR01Input.DeviceNetStuffError	0		Decimal	DINT
DNTR01Input.DeviceNetUCMMOpenCount	119		Decimal	DINT
DNTR01Input.DeviceNetUCMMCloseCount	0		Decimal	DINT
DNTR01Input DeviceNetIOConnections	119		Decimal	DINT
DNTR01Input.DeviceNetPollCommandCount	0		Decimal	DINT
DNTR01Input.DeviceNetFragmentAckErrors	0		Decimal	DINT
+ DNTR01Input.DeviceNetExplicitFragmentErrors	0		Decimal	DINT
+ DNTR01Input.DeviceNetPollFragmentErrors	0		Decimal	DINT
DNTR01Input.DeviceNetExplicitClientNotFound	0		Decimal	DINT
DNTR01Input DeviceNetDuplicateNode	0		Decimal	DINT
DNTR01Input TagReads	0		Decimal	DINT
	6809		Decimal	DINT
+ DNTR01Input TagConnectionErrors	0		Decimal	DINT
DNTR01Input TagErrors	0		Decimal	DINT

Figure 6.1 – DeviceNet Router Input Assembly

7. DIAGNOSTICS

7.1. LEDS

The module provides three LEDs for diagnostics purposes as shown in the front view figure below. A description of each LED is given in the table below.



Figure 7.1 - DevicNetRouter front view

LED	Description
Ok	The module's Ok LED will provide information regarding the system-level operation of the module. Thus 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 then the module has booted and is running correctly.
Eth	The Ethernet LED will light up when an Ethernet link has been detected (by plugging in a connected Ethernet cable). The LED will flash every time traffic was detected.
DNet	The DNet LED shows the activity on the DeviceNet network. Green indicating valid packets, and red indicating corrupt packets.

Table 7.1 - Module LED operation

7.2. MODULE STATUS MONITORING IN SLATE

The DeviceNet Router can provide a range of statistics which can assist with module operation, maintenance, and fault finding. The statistics can be accessed in full by Slate or using the web server in the module.

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.

S Aparian-Slate - I	DeviceNet
1 1 1 1 1 1 1 1	ols Window Help 라 🕇 🗐 🖪 🗶 💠
Project Explorer	- 4 ×
MyDNTP /	Configuration Connection Path Go Online Download Upload Verify Configuration Copy
۵. ۲	Export Delete

Figure 7.2 - Selecting to Go Online

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



Figure 7.3 - Selecting online Status

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

neral DeviceNet PCCC	C Ethernet Clients TCP / ARP		
Owned	Not Owned	MAC Address	00:60:35:1F:FA:E0
Up Time	0d - 00:37:19	Temperature	33.4 °C
Transaction Rate	0	Processor Scan	8.6 us
DeviceNet Node	7	Ethernet Cable Length	<5 m
DeviceNet BAUD	Baud125k	DIP Switches SW1 -	Safe Mode Off
DeviceNet Status	Poll Active	SW2 -	Force DHCP Off
Non-second address in the second s		SW3 -	Reserved Off
		(Ur	dated only on boot up.)

Figure 7.4 - Status monitoring – General

The General tab displays the following general parameters:

Parameter	Description
Owned	Indicates whether or not the module is currently owned (Class 1) by a Logix controller.
Up Time	Indicates the elapsed time since the module was powered-up.
Transaction Rate	The transaction rate is the number of DeviceNet messages per second that the module is currently routing. This parameter is valid only for Logix tag mapping.
DeviceNet Node Number	The current DeviceNet node number, as configured by the rotary DIP switches.
DeviceNet BAUD Rate	The actual DeviceNet BAUD rate.
DeviceNet Status	The current DeviceNet status:
	Inactive – No valid polling by scanner.
	Standby – Polling is in standby. (PLC in program mode.)
	Poll Active – Active polling by scanner.
	COS Active – Active Change-of-State by scanner.
MAC Address	Displays the module's unique Ethernet MAC address.
Temperature	The internal temperature of the module.
Processor Scan	The amount of time (microseconds) taken by the module's processor in the last scan.
Ethernet Cable Length	Indicates the estimated length of the Ethernet cable attached to the module. (Accuracy of 5m)

DIP Switch Position	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 7.2 - Parameters displayed in the Status Monitoring – General Tab

DeviceNet Statistics			
Counter	Value	Counter	Value
Rx Can Packet Count	1560046	IO Connections	1
Tx Can Packet Count	260057	Poll Commands	1559604
CAN CRC Errors	0	Fragment Ack Errors	0
CAN Bit Errors	0	Expilict Fragment Error	0
Can Stuff Errors	0	Poll FragmentError	0
UCCM Connection Open	1	Explicit Client Not Found	0
UCCM Connection Close	1	Duplicate Node Detected	0

Figure 7.5 - Status monitoring – DeviceNet Statistics

The DeviceNet Statistics tab displays the statistics associated with the DeviceNet communication and mapping.

Statistic	Description
Rx Can Packet Count	The number of CAN packets received.
Tx Can Packet Count	The number of CAN packets transmitted.
CAN CRC Errors	The number of detected CAN CRC errors.
CAN Bit Errors	The number of detected CAN Bit errors.
Can Stuff Errors	The number of detected CAN Stuff errors.
UCCM Connection Open	The number of UCCM (Unconnected Message Manager) Open requests
UCCM Connection Close	The number of UCCM (Unconnected Message Manager) Close requests
IO Connections	The number of current IO connections
Poll Commands	The number of Poll Commands received.
Fragment Ack Errors	The number of detected Fragment Acknowledge errors.
Explicit Fragment Error	The number of detected Explicit Fragment errors.

Poll Fragment Error	The number of detected Poll fragment errors.
Explicit Client Not Found	The number of explicit requests received without a matching connection.
Duplicate Node Detected	The number of duplicate node detections.

Table 7.3 – DeviceNet statistics

The PCCC tab displays the Ethernet PCCC statistics.

neral DeviceNet PCCC Etherne	t Clients TCP / AR	
PCCC Statistics		
Counter	Value	
Connection Requests	2	
Read Requests	7794	
Write Requests	0	
Unsupported Commands	0	
Unsupported FNCs	0	
Client Not Found	243	
Client Max Reached	0	
Current Connections	1	Clear Counters

Figure 7.6 - Status monitoring – PCCC Statistics

Statistic	Description
Connection Requests	The number of PCCC connection establishment requests received.
Read Requests	The number of Read requests received.
Write Requests	The number of Write requests received.
Unsupported Commands	The number of requests rejected due to an unsupported command.
Unsupported FNC Code	The number of requests rejected due to an unsupported function code.
Client Not Found	The number of requests rejected due to no matching connection.
Client Max Reached	The number of connection request rejections due to maximum connection count reached.
File Not Found	The number of requests rejected due to an unsupported PLC file number.
Current Connections	The current number of active connections.

Table 7.4 – PCCC statistics

The Map Item tab displays the Mapped Item statistics.

neral	DeviceNet Statistics	PCCC Statistics	Logix Statistics	Scheduled Parameters	Ethernet Clients	TCP / ARP	
						Clear	Counters
Nod	e Par	ameter	Interve	al Tag	name	Tra	ansactions
4	L1 Current		1000	MyE3Parameters.L	MyE3Parameters.L1Current		
4	L2 Current		1000	MyE3Parameters.L	MyE3Parameters.L2Current		
4	L3 Current		1000	MyE3Parameters.L		634	
4	Average FLA		1000	MyE3Parameters.A		632	
4	Warning Status		1000	MyE3Parameters.W	/arningStatus		631

Figure 7.7 - Status monitoring – Mapped Item Statistics

Statistic	Description
Node	Node address of the mapped item
Parameter	Parameter Name of the mapped item.
Interval	Configured interval (ms) to read the parameter.
Tagname	Configured target Logix tagname
Transactions	Succesful transaction count.

Table 7.5 – Mapped Item statistics

Gener	al DeviceNet Statistics	PCCC Statistics	Logix Statistics	Scheduled Parameters	Ethernet Clients	TCP / ARP
Lo	gix Statistics	Clear Cou	inters			
	Counter	V	alue			
	Current Connections	1	1			
	Connection Failures		0			
	Tag Not Exist Errors	1	0			
	Privilege Violations	(<u>).</u>	0			
	Tag Reads	1	0			
	Tag Writes	(<u>).</u>	793			
	ENIP Retries	1.	0			
	ENIP Failures	1 Å.	0			
	General Access Errors	4	0			
		· · ·				

Figure 7.8 - Status monitoring – Logix Statistics

The Logix Statistics tab displays the following general parameters:

Parameter	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 tag read and tag write transactions that failed due to the destination tag not existing.
Privilege Violations	The number of tag read and tag write transactions that failed due to a privilege violation error.
	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 DeviceNet Router module.
Tag Writes	The number of tag write transactions executed by the DeviceNet Router module.
ENIP Retries	This count increases when no response was received from the Logix Controller by the time the ENIP timeout is reached.
ENIP Failures	This count increases when the ENIP Retry Limit is reached and no response has been received from the Logix Controller.
Tag Access General Error	This count increases when a tag cannot be accessed for any other reason not reported above.

Table 7.6 - Parameters displayed in the Status Monitoring – Logix Statistics Tab

7.3. DEVICENET PACKET CAPTURE

The module provides the capability to capture the DeviceNet traffic for analysis. The will allow the user and the support team to resolve any possible issues on site. To invoke the capture of the module double-click on the DeviceNet Packet Capture item in the Project Explorer tree.



Figure 7.9 - Selecting DeviceNet Packet Capture

The DeviceNet Packet Capture window will open and automatically start capturing all DeviceNet packets.



Figure 7.10 - DeviceNet packet capture

To display the captured DeviceNet packets, the capture process must first be stopped, by pressing the Stop button.

× O											
Index 🔺	Time	Status	Dirn	MacID	Group	MsgID	GroupFunction	AltMac	Description	Data	
2243146	0d - 00:50:16.880	Ok	Rx	7	Group2	5	IO Poll Cmd			4E 5F 00 37 00 8E 02 0F	
2243147	0d - 00:50:16.880	Ok	Rx	7	Group2	5	IO Poll Cmd			4F 00 14 00 24 00 4A 01	
2243148	0d - 00:50:16.890	Ok	Rx	7	Group2	5	IO Poll Cmd			50 8C 00 10 00 15 00 43	
2243149	0d - 00:50:16.890	Ok	Rx	7	Group2	5	IO Poll Cmd			91 00	
2243150	0d - 00:50:16.890	Ok	Tx	7	Group1	15	IO Poll Resp			00 00 00 00 00 00 00 00	
2243151	0d - 00:50:16.890	Ok	Tx	7	Group1	15	IO Poll Resp			41 00 00 00 00 00 00 00 00	
2243152	0d - 00:50:16.890	Ok	Tx	7	Group1	15	IO Poll Resp			82 00 00	
2243153	0d - 00:50:16.890	Ok	Rx	10	Group3	4	- 24	7	GetSingleAttribute ClassID=1 InstanceID=1 Data: 01	07 0E 01 00 01 00 01	
2243154	0d - 00:50:16.890	Ok	Tx	7	Group3	0	12	10	Reply to GetSingleAttribute Data : 5A 05	0A 8E 5A 05	
2243155	0d - 00:50:16.900	Ok	Rx	10	Group3	4	100	7	GetSingleAttribute ClassID=1 InstanceID=1 Data: 02	07 0E 01 00 01 00 02	
2243156	0d - 00:50:16.900	Ok	Tx	7	Group3	0	1020	10	Reply to GetSingleAttribute Data: 0C 00	0A 8E 0C 00	
2243157	0d - 00:50:16.900	Ok	Rx	7	Group2	5	IO Poll Cmd			00 64 00 64 00 64 00 64	
2243158	0d - 00:50:16.900	Ok	Rx	7	Group2	5	IO Poll Cmd			41 00 64 00 09 00 0A 00	



The captured DeviceNet packets are tabulated as follows:

Statistic	Description
Index	The packet index, incremented for each packet sent or received.
Time	The elapsed time since the module powered up.
Status	The status of the packet. Received packets are checked for valid DeviceNet constructs and valid checksums.
Dirn	The direction of the packet, either transmitted (Tx) or received (Rx).
MacID	The DeviceNet MAC ID (0-63) of the packet. This is usually the source MAC, but with IO connection data can be the destination MAC.
Group	The message group number. Either Group 1,2,3 or 4.
MsgID	The Message ID is used to identify a message within a particular group. Can be used to indicate specific types of messages, or specific (previously established) connections.
Group Function	The Group Function. Certain Group and Message ID combination have specific meanings which are displayed here.
Alt MAC	The alternate MAC, depending on the type of message. This is usually the destination MAC ID.
Description	A brief description of the packet.
Data	The raw packet data.

Table 7.7 – DeviceNet Packet Capture fields

The packet capture can be saved to a file for further analysis, by selecting the *Save* button on the toolbar. Previously saved DeviceNet Packet Capture files can be viewed by selecting the *DeviceNet Packet Capture Viewer* option in the tools menu.



Figure 7.12 - Selecting the DeviceNet Packet Capture Viewer

7.4. MODULE EVENT LOG

The DeviceNet Router 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 in the Project Explorer tree.



Figure 7.13 - 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.

2X				
Uploaded 8	87 records.	Filter (A)	~
Index 💌	Up Time	Eve	nt	
86	0d - 00:00:13	DeviceNet Node Changed to 7		
85	0d - 00:00:12	Config valid		
84	0d - 00:00:01	Ethemet link up		
83	0d - 00:00:01	Application code running		
82	00:00:00 - b0	DeviceNet Node is 7		
81	0d - 00:00:00	Config CRC fail		
80	0d - 00:05:42	Module reset		
79	0d - 00:05:42	Firmware update started		
78	e0:00:00 - b0	DeviceNet Node Changed to 7		

Figure 7.14 - Module Event Log

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.

7.5. WEB SERVER

The DeviceNet Router provides a web server allowing a user without Slate to view various diagnostics of the module. This includes Ethernet parameters, system event log, advanced diagnostics, and application diagnostics (DeviceNet diagnostics).



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

🜓 Aparian	× +		- 🗆 ×
\leftrightarrow \rightarrow 0 (分 192.168.1.180		
Module: DeviceN	let Router Serial: 351FFAE0	Firmware Rev: 1.1	8 aparian
Overview	Device Name	DeviceNet Router	
Ethernet	Serial number	351FFAE0	
Event Logs	Firmware Revision	1.1	
Diagnostics	Module Status	Configured	
Application	Vendor Id	1370	
www.aparian.com	Product Type	12	
	Product Code	122	
	Uptime	55m 40s	
	Switches	0:0:0:0	
	Temperature	32.3191°C	

Figure 7.15 – Web interface

8. TECHNICAL SPECIFICATIONS

8.1. DIMENSIONS

Below are the enclosure dimensions as well as the required DIN rail dimensions. All dimensions are in millimetres.



Figure 8.2 - Required DIN dimensions

8.2. ELECTRICAL

Specification	Rating
Power requirements	Input: 10 – 28V DC, (70 mA @ 24 VDC)
Power consumption	1.7 W
Connector	5-way terminal, 5.08mm pitch.
Conductors	24 – 18 AWG
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

8.3. ETHERNET

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

Table 8.2 - Ethernet specification

8.4. DEVICENET

Specification	Rating
Connector	5-way terminal, 5.08mm pitch.
Conductors	12 – 30 AWG
BAUD	125k
	250k
	500k
IO Messaging	Polled
	Change of State (COS)
Unconnected Message Manager (UCMM)	Yes
Max Explicit Connections	5

Table 8.3 – DeviceNet specification

8.5. PCCC

Specification	Rating
Max PCCC Connections	10
Max PCCC Payload	1000 bytes

Table 8.4 – PCCC specification

8.6. CERTIFICATIONS

Certification	Mark
CE Mark	CE
RoHS2 Compliant	RoHS ₂
UL Mark File: E494895	CLASS 1, DIV 2, GROUPS A, B, C, D

Table 8.5 – Certifications

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