

J1939 Router/B

Datasheet

A-J1939R/B

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1. PREFACE

1.1. ABOUT THIS DOCUMENT

This document contains the technical data for the J1939 Router/B.

1.2. INTRODUCTION TO THE J1939 ROUTER/B

The J1939 Router/B, (hereafter referred to as the **module**) provides intelligent data routing between either EtherNet/IP or Modbus TCP/RTU and a J1939 network. This allows the user to integrate J1939 devices into a Rockwell Automation Logix platform (e.g., ControlLogix or CompactLogix) or any Modbus Client or Server device with minimal effort.

The SAE J1939 protocol is primarily used in the heavy/industrial vehicle industry. It is used for communication and diagnostics between various components and/or sensors used in the vehicle system (e.g. Engine Controller). Due to its widespread popularity it is also used in diesel-power applications, marine propulsion, power generation, and industrial pumping. J1939 provides the user with Parameter Group Numbers (PGNs) which consists of various Suspect Parameter Numbers (SPNs). Numerous PGNs and SPNs are defined by the SAE group and are used to define the data received, scaling, ranges, etc. *[Source: www.sae.org]*

The module can be configured to produce and consume PGNs allowing the user to not only integrate J1939 devices into a Logix or Modbus system, but to also allow the user to use EtherNet/IP or Modbus devices in an existing J1939 network.

Primary Interface:

The module can use one of four Primary Interface modes:

EtherNet/IP Target

Here a remote EtherNet/IP device (e.g. a Logix controller) establishes a number of Class 1 connections to the module. J1939 data can be mapped into two separate input and output class 1 cyclic connections to the Logix controller (allowing up to 2KB input and 2KB output to be exchanged at the requested packet interval – RPI).

EtherNet/IP Originator

As an EtherNet/IP originator, the module can use one of two methods to read and write data to and from the J1939 network:

- **EtherNet/IP Explicit Messaging**

This allows J1939 devices to exchange data with up to 10 EtherNet/IP devices. The module can use either Class 3 or Unconnected Messaging (UCMM) to Get and Set data in the remote EtherNet/IP devices.

- **Direct-To-Tag technology**

This allows the J1939 devices to exchange data with a Logix controller without the need to write any application code (e.g. ladder) in Studio 5000. The J1939 data is directly read from, or written to, Logix tags.

- **EtherNet/IP Class 1 connection**

J1939 data can be mapped to a maximum of 10 EtherNet/IP devices using input and output class 1 cyclic connections. This will allow the J1939 Router/B to “own” the EtherNet/IP target device and exchange J1939 data using the EtherNet/IP device’s input and output assemblies.

Modbus Server

The diagnostics and J1939 data will be written to, or read from, the module’s internal Modbus Registers (Holding or Input Registers). These registers can be accessed by a remote Modbus Client using either Modbus TCP, Modbus RTU232, or Modbus RTU485.

Modbus Client

The diagnostics and J1939 data will be written to, or read from, the module’s internal Modbus Registers (Holding or Input Registers). The Modbus Auxiliary Map can then be used to configure the Modbus data exchange between multiple remote Modbus Server devices and the module’s internal Modbus registers. The Modbus communication can be via Modbus TCP, Modbus RTU232, or Modbus RTU485.

The J1939 Router provides auto extraction and scaling of SPNs for standard SAE defined PGNs. These SPNs can then be mapped to Logix UDTs Tags which can also be automatically generated by the Slate software. This allows the user to create a J1939 Router project with all the required PGNs and then export a Logix L5X file which contains all the required Tags and UDTs for that specific J1939 Router project. This L5X file can be imported into Logix removing the hassle of creating UDTs for the numerous PGNs.

The J1939 Router/B is configured using the Aparian Slate application. This program can be downloaded from www.aparian.com free of charge.

The J1939 Router allows the user to select standard specification defined PGNs (e.g. PGN 61444 – Electronic Engine Controller 1) from a list in the Slate software. This will automatically build the mapping and scaling for each SPN which can be downloaded to the module. The user can then export a Logix UDT from the Slate software which maps the PGN selected. This can be imported into a Logix application and used as a destination tag for the configured PGN (greatly simplifying the application setup).

Slate also allows the user to map custom and/or propriety PGNs to a SINT array allowing the user to format the response data in the Logix environment. The module can be configured to either consume data from J1939 devices or produce data for other J1939 devices.

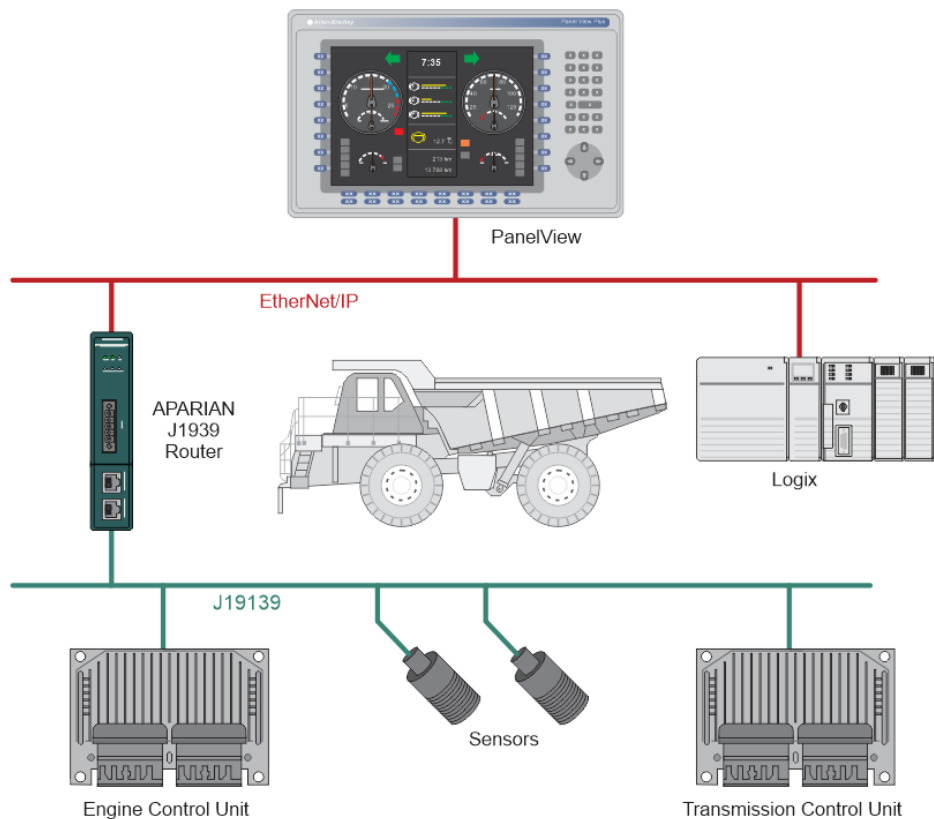


Figure 1.1. – Example of a typical network setup for connecting J1939 device to Logix

The module also provides a range of statistics, J1939 and Modbus packet capture functions, and internal Modbus and Data table reads to simplify the diagnostic process for remote diagnosis.

The module has two Ethernet ports and supports Device-Level-Ring (DLR) architectures.

A built-in webserver provides detailed diagnostics of system configuration and operation, including the display of J1939 operation and communication statistics, without the need for any additional software.

1.3. FEATURES

- Module can consume and produce up to 100 x J1939 PGNs.
- Auto SPN extraction and scaling for standard SAE defined PGNs
- Logix L5X generation - Ready for import
- Supports PGN Request Passthrough Messaging from Logix
- Module has various Primary Interfaces:
 - EtherNet/IP Target (Class 1 connection)
 - Modbus Server (TCP, RTU232, and RTU485)
 - Modbus Client (TCP, RTU232, and RTU485)
 - EtherNet/IP Originator (Class 1 connection with up to 10 EtherNet/IP devices and Explicit Messaging, including Direct-To-Tag Logix tag access, with up to 10 EtherNet/IP devices).
- Slate software provides a J1939 and Modbus packet capture utility for better diagnosis of issues.
- Supports J1939 PGN live list.
- Supports all J1939 Baud Rates (250k, 500k).
- Dual Ethernet ports which support Device-Level-Ring (DLR).
- Network Time Protocol (NTP) supported for external time synchronization.
- Small form factor – DIN rail mounted.

1.4. ARCHITECTURE

The figures below provide an example of the typical network setup for connecting J1939 devices to either EtherNet/IP or Modbus TCP/RTU232/RTU485.

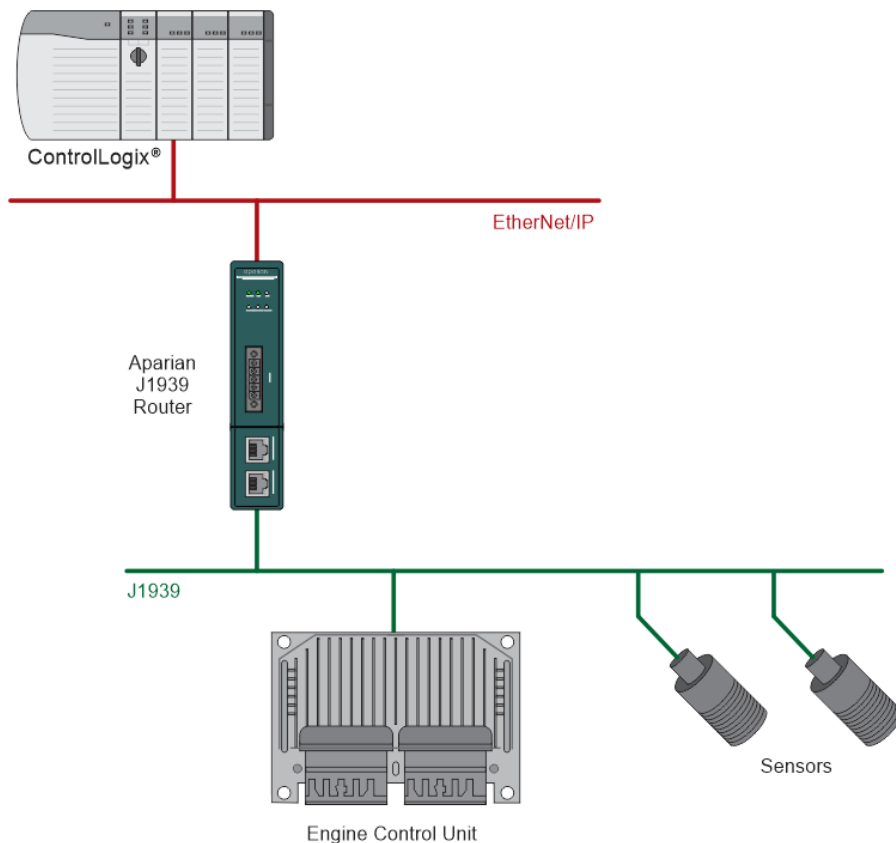


Figure 1.2. – Example of connecting J1939 Devices to a Logix Controller

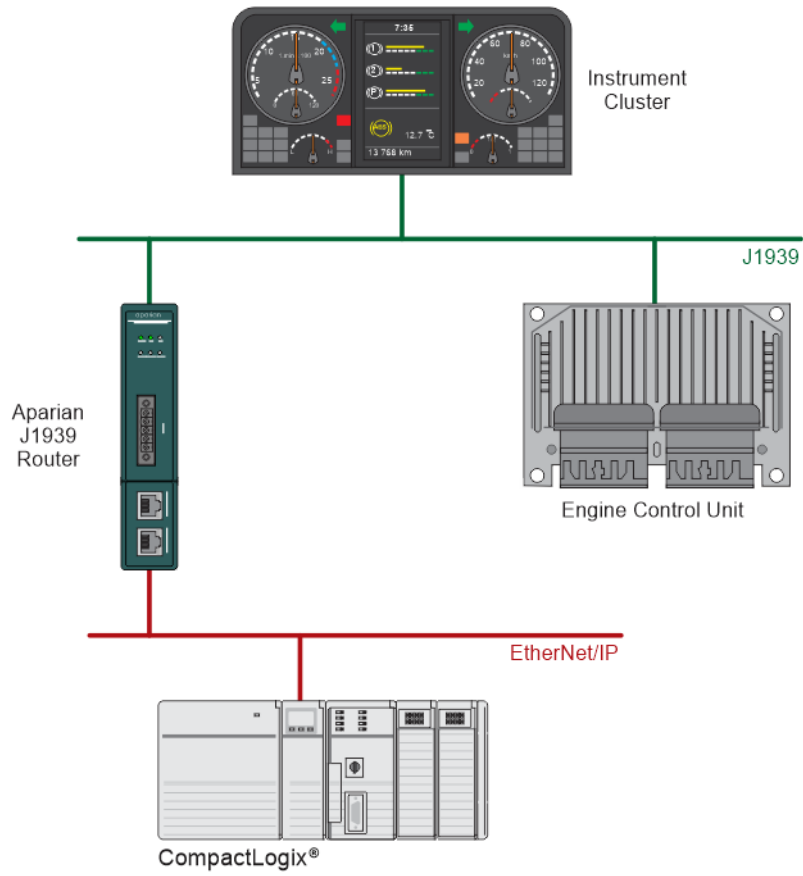


Figure 1.3. – Example of connecting a Logix Controller to and existing J1939 network

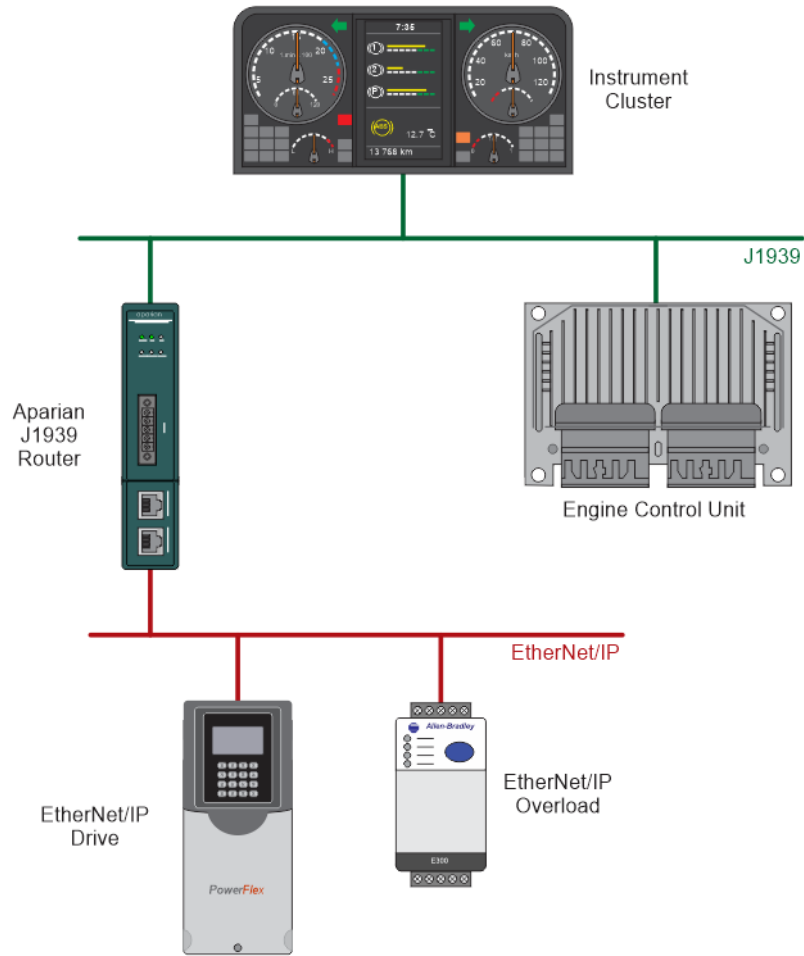


Figure 1.4. – Example of connecting EtherNet/IP IO to and existing J1939 network

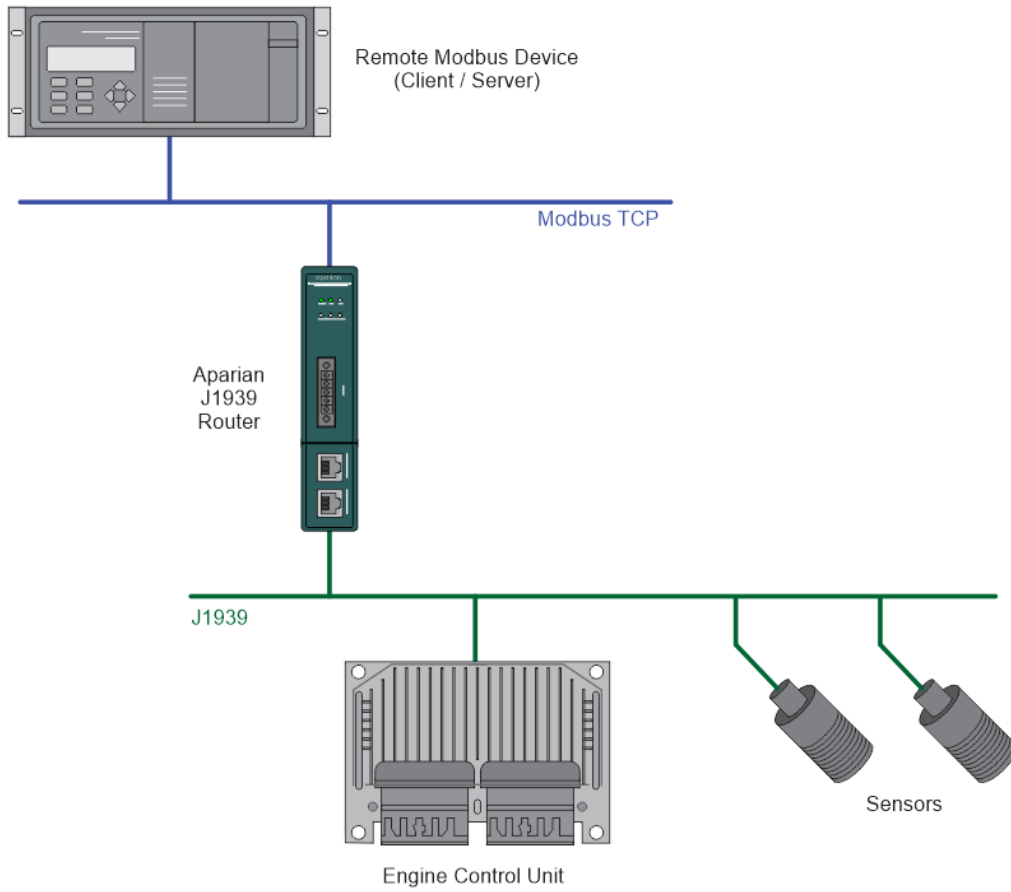


Figure 1.5. - Example of connecting J1939 Devices to a Modbus TCP Client or Server

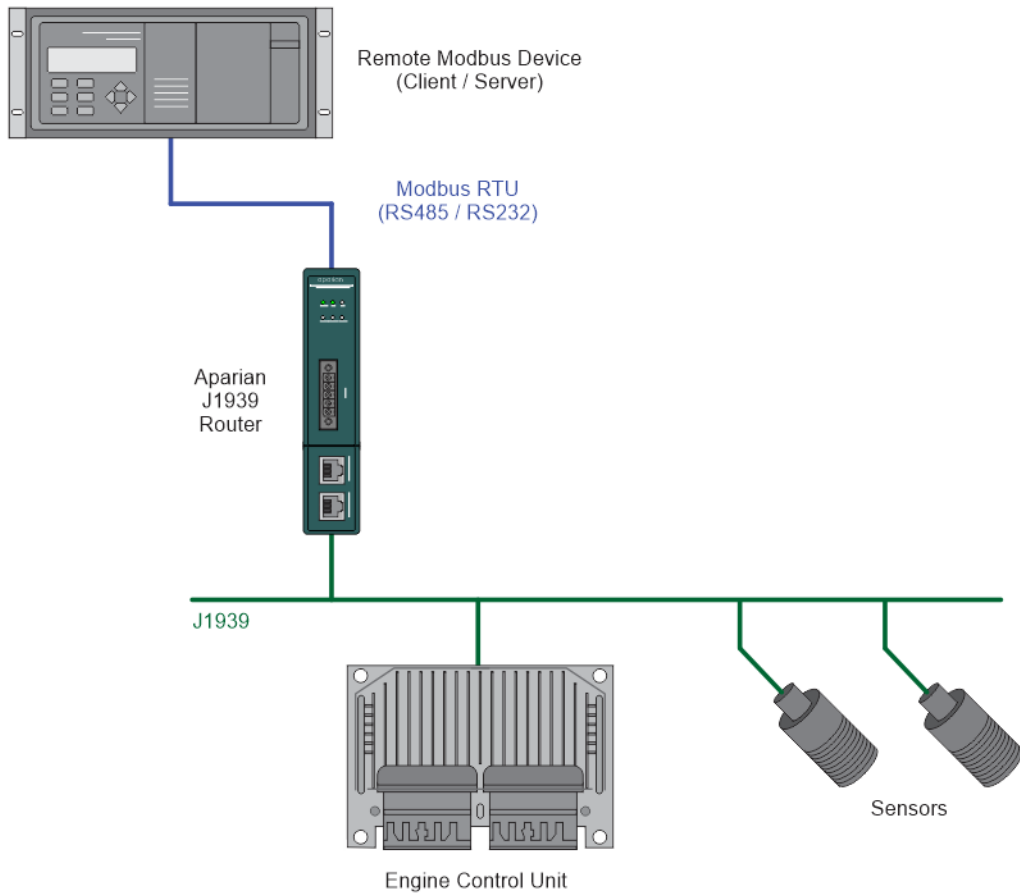


Figure 1.6. - Example of connecting J1939 Devices to a Modbus RTU Client or Server

2. TECHNICAL SPECIFICATIONS

2.1. DIMENSIONS

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

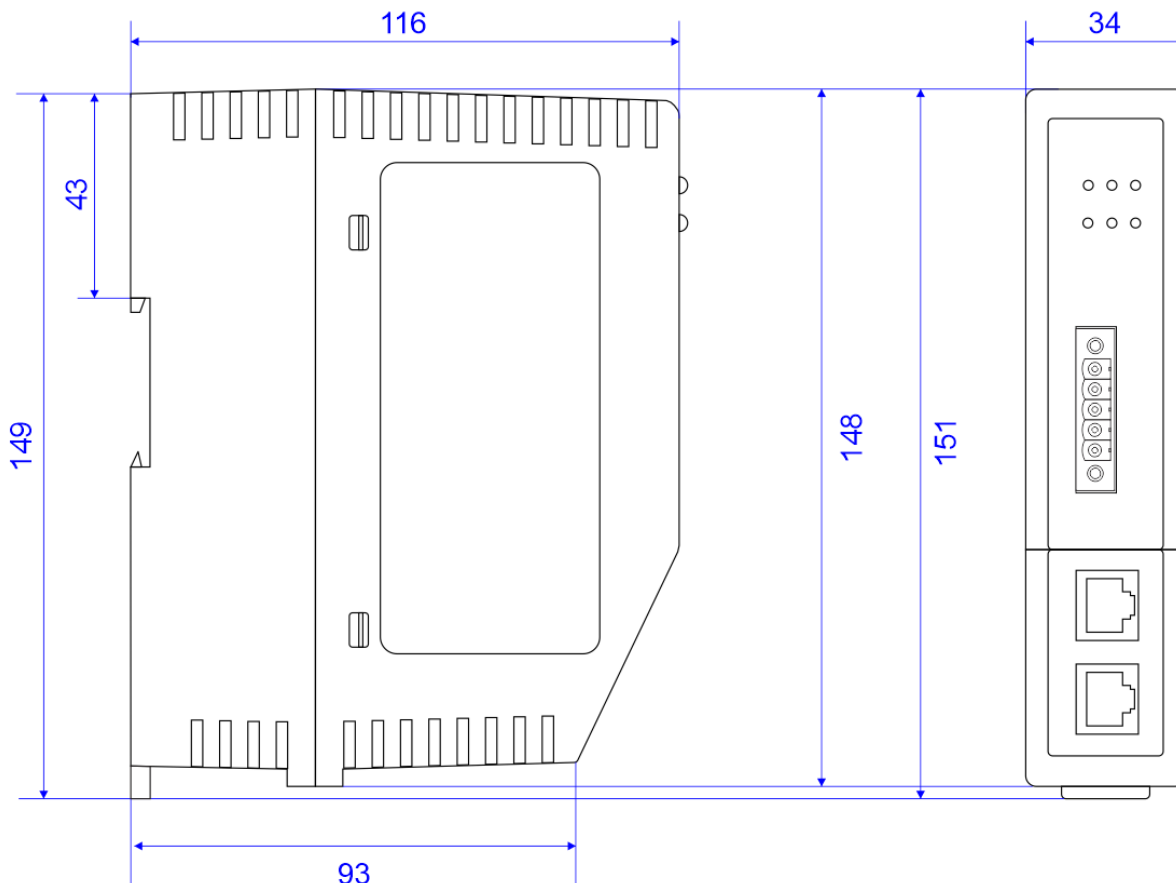


Figure 2.1 – J1939 Router/B enclosure dimensions

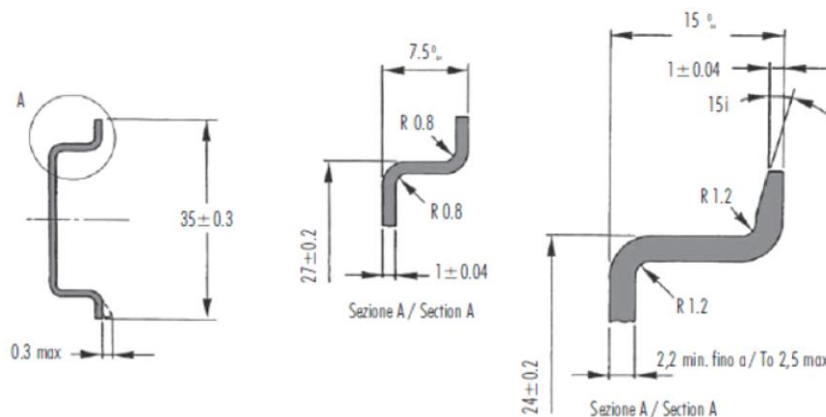


Figure 2.2 - Required DIN dimensions

2.2. ELECTRICAL

Specification	Rating
Power requirements	Input: 10 – 32V DC
Power consumption	2.2 W (Max.) Current: 180 mA @ 10 V Current: 85 mA @ 24 V
Connector	3-way terminal
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 2.1 - Electrical specification

2.3. ETHERNET

Specification	Rating
Connector	RJ45
Conductors	CAT5 STP/UTP
ARP connections	Max 100
TCP connections	Max 100
CIP connections	Max 15
Communication rate	10/100Mbps
Duplex mode	Full/Half
Auto-MDIX support	Yes
Embedded switch	Yes, 2 x Ethernet ports

Device Level Ring (DLR)	Supported
Network Time Protocol (NTP)	Supported

Table 2.2 - Ethernet specification

2.4. SERIAL PORT (RS232)

Specification	Rating
RS232 Connector	9-way terminal (shared with RS485)
RS232 Conductor	24 – 18 AWG
Electrical Isolation	1000 Vdc
BAUD	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
Parity	None, Even, Odd
Data bits	8
Stop bits	1

Table 2.3 – RS232 Serial Port specification

2.5. SERIAL PORT (RS485)

Specification	Rating
RS485 Connector	9-way terminal (shared with RS485)
RS485 Conductor	24 – 18 AWG
Electrical Isolation	1500 Vrms for 1 minute.
BAUD	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
Parity	None, Even, Odd
Data bits	8
Stop bits	1

Table 2.4 – RS485 Serial Port specification

2.6. J1939

Specification	Rating
Connector	5-way terminal, 5.08mm pitch.
Functions	Produce Consume
Max PGN Mapping	100 (produce and consume)
Passthrough Messaging	Supported
Supported Baud Rates	250k 500k
CAN Terminator	120 Ω - Software Enabled
Arbitrary Address Capable	Yes
Support for multi-packets	Yes
Configurable J1939 Name	Yes
PGN Live List	Supported

Table 2.5 – J1939 specification

2.7. ETHERNET/IP TARGET

Specification	Rating
Class 1 Cyclic connection count	4
Logix Direct-to-Tag Supported	Yes

Table 2.6 – EtherNet/IP Target specification

2.8. ETHERNET/IP ORIGINATOR

Specification	Rating
Class 1 Cyclic Connections Supported	Yes
Class 3 / UCMM Connections Supported	Yes
Class 1 Connection Count	10
Class 3 / UCMM Target Device Count	10
Class 3 / UCMM Mapping Count	50

Table 2.7 – EtherNet/IP Originator specification

2.9. MODBUS CLIENT

Specification	Rating
Modes Supported	Modbus TCP, Modbus RTU232, Modbus RTU485
Modbus RTU485 Termination	125 Ω - Software Enabled
Max. Modbus Server Devices	20
Max. Modbus Mapping	100
Mapping Ranges	Holding Register 0 – 65535 Input Register 0 – 65535 Input Status 0 – 65535 Coil Status 0 – 65535
Base Offset	Modbus (Base 0) PLC (Base 1)
Configurable Modbus TCP Port	Yes
Data Reformatting Supported	BB AA BB AA DD CC CC DD AA BB DD CC BB AA

Table 2.8 – Modbus Client specification

2.10. MODBUS SERVER

Specification	Rating
Modes Supported	Modbus TCP, Modbus RTU232, Modbus RTU485 (simultaneous)
Modbus RTU485 Termination	Software set
Mapping Ranges	Holding Register 0 – 65535 Input Register 0 – 65535 Input Status 0 – 65535 Coil Status 0 – 65535
Base Offset	Modbus (Base 0) PLC (Base 1)
Configurable Modbus TCP Port	Yes

Table 2.9 – Modbus Server specification

2.11. CERTIFICATIONS


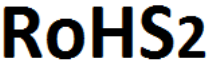


Certification	Mark
CE Mark	
RoHS2 Compliant	
UL Mark File: E494895	
UKCA	

Table 2.10 – Certifications