4 DIGITAL INPUTS WITH ETHERNET AND CAN, SAE J1939

USER MANUAL

P/N: AX032150

In Europe:
Axiomatic Technologies Oy
Höytämöntie 6
33880 LEMPÄÄLÄ - Finland
Tel. +358 103 375 750
Fax. +358 3 3595 660
www.axiomatic.fi

In North America:
Axiomatic Technologies Corporation
5915 Wallace Street
Mississauga, ON Canada L4Z 1Z8
Tel. 1 905 602 9270
Fax. 1 905 602 9279
www.axiomatic.com

VERSION HISTORY

Version	Date	Author	Modification
1.0.0.	Apr. 3, 2020	Antti Keränen	Initial Draft
1.0.1.	Apr. 9, 2020	Antti Keränen	EA setpoint description updated, available configuration options in web server updated, drawing and technical data updated.
1.0.2	Apr. 27, 2020	Antti Keränen	Controller pin-out description updated in appendix A.
1.0.3	Sep. 23, 2020	Antti Keränen	TCP frame contents description updated in section 4. Compatible EA version info not yet available. References to higher baud rate versions removed (auto baud rate supported).

ACCRONYMS

ACK	Positive Acknowledgement (from SAE J1939 standard)
BATT +/-	Battery positive (a.k.a. Vps) or Battery Negative (a.k.a. GND)
DIN	Digital Input used to measure active high or low signals
DM	Diagnostic Message (from SAE J1939 standard)
DTC	Diagnostic Trouble Code (from SAE J1939 standard)
EA	Electronic Assistant®, p/n AX070502 (A Service Tool for Axiomatic ECUs)
ECU	Electronic Control Unit (from SAE J1939 standard)
GND	Ground reference (a.k.a. BATT-)
I/O	Inputs and Outputs
MAP	Memory Access Protocol
NAK	Negative Acknowledgement (from SAE J1939 standard)
PDU1	A format for messages that are to be sent to a destination address, either specific or global (from SAE J1939 standard)
PDU2	A format used to send information that has been labeled using the Group Extension technique, and does not contain a destination address.
PGN	Parameter Group Number (from SAE J1939 standard)
PropA	Message that uses the Proprietary A PGN for peer-to-peer communication
PropB	Message that uses a Proprietary B PGN for broadcast communication
PWM	Pulse Width Modulation
RPM	Rotations per Minute
SPN	Suspect Parameter Number (from SAE J1939 standard)
TP	Transport Protocol
UIN	Universal input used to measure voltage, current, frequency or digital inputs
Vps	Voltage Power Supply (a.k.a. BATT+)
%dc	Percent Duty Cycle (Measured from a PWM input)

TABLE OF CONTENTS

List of Figures

List of Tables

REFERENCES

J1939	Recommended Practice for a Serial Control and Communications Vehicle Network, SAE, April 2011
J1939/21	Data Link Layer, SAE, December 2010
J1939/71	Vehicle Application Layer, SAE, March 2011
J1939/73	Application Layer-Diagnostics, SAE, February 2010
J1939/81	Network Management, SAE, May 2003
TDAX032150	Technical Datasheet, 4 Digital Inputs with Ethernet and CAN, Axiomatic Technologies 2020
UMAX07050x	User Manual V4.10.77, Electronic Assistant and USB-CAN, Axiomatic Technologies, July 2014

This document assumes the reader is familiar with the SAE J1939 standard. Terminology from the standard is used, but not described in this document.

NOTE: This product is supported by Electronic Assistant® V5.?.?.0 and higher

1. OVERVIEW OF CONTROLLER

The 4 Digital Input with Ethernet and CAN (later 4DIN-ENET-CAN) electronic control unit (ECU) is a device that measures inputs and sends the data to an SAE J1939 CAN and/or Ethernet network. Its flexible circuit design gives the user a wide range of configurable input types. The sophisticated control algorithms allow the user to program the controller for a wide range of applications without the need for custom software.

The Axiomatic Electronic Assistant® is used to configure the 4DIN-ENET-CAN ECU. Programming configurable properties, EA setpoints, are listed in chapter 4. Setpoint configuration can be saved in a file which can then be utilized to program the same configuration to another 4DIN-ENET-CAN controller. Throughout this document EA setpoint names are referred with bolded text in double-quotes and the setpoint option is referred with italicized text in single-quotes. For example, "**Input Sensor Type**" setpoint set to option '*Digital Input*'.

The configuration can also be done using the Ethernet interface. The controller has a web server running on port 80. The web server configuration supports the key configuration parameters.

In this document the configurable properties of the ECU are divided into function blocks, namely Input Function Block, Ethernet Configuration Block, CAN Transmit Message Function Block and CAN Receive Message Function Block. Input function block includes properties used to select input sensor functionality. The CAN transmit message and receive message function blocks configure properties of the messages sent to and received from the CAN bus. These function blocks are presented in detail in next subchapters.

The 4DIN-ENET-CAN ECU is auto CAN baud rate capable.

1.1. Input Function Blocks

The controller has four fully programmable digital inputs that can be setup to read: PWM, frequency, or digital input signals. The "**Input Sensor Type**" setpoint is used to configure input type. Selecting input type effects on other setpoints and how they are interpreted and should thus be selected first on this block. The input sensor types are listed in Table 1.

0	*Disabled*
40	*Frequency 0.5 to 50 Hz*
41	*Frequency 10 Hz to 1 kHz*
42	*Frequency 100 Hz to 10 kHz*
50	*PWM Low Frequency (<1kHz)*
51	*PWM High Frequency (>100Hz)*
60	*Digital (normal)*
62	*Digital (latched)*

Table 1 – Digital Input Type Options

Input Sensor Type	**Error Threshold units**	**Transmit data resolution**	**Transmit data offset units**
Disabled	N/A	N/A	N/A
Frequency 0.5 to 50 Hz	Hz(RPM)	1 Hz/Bit (RPM/Bit)	HZ(RPM)
Frequency 10 Hz to 1 kHz	Hz(RPM)	1 Hz/Bit (RPM/Bit)	HZ(RPM)
Frequency 100 Hz to 10 kHz	Hz(RPM)	1 Hz/Bit (RPM/Bit)	HZ(RPM)
PWM Low Frequency (<1kHz)	%dc	0.1 %dc/Bit	%dc
PWM High Frequency (>100Hz)	%dc	0.1 %dc/Bit	%dc
Digital (normal)	N/A	1 State/Bit	State
Digital (latched)	N/A	1 State/Bit	

Table 2 - Input Sensor types effect on other setpoints

Frequency/RPM or Pulse Width Modulated (PWM) inputs are connected to 16-bit timer pins on the processor. "**Debounce Time**" setpoint is used to select an input capture filter for the timer pin in question.

0	*None*
1	*111ns*
2	*1.78us*
3	*14.22us*

Table 3 – Debounce Time Options

An additional software debounce filter can be used with Digital Input types for filtering the inputs using longer time constants than with the default debounce filter. The available software implemented debounce times are listed in Table 4.

0	*0ms*
1	*10ms*
2	*20ms*
3	*40ms*
4	*100ms*
5	*200ms*
6	*400ms*
7	*1000ms*

Table 4 - Software Debounce Filter Times

The "**Pulses Per Revolution**" setpoint is only associated with the frequency input type. If a non-zero Pulse/Rev is selected, then the input data will be reported as in rotations-per-minute (RPM). Otherwise, frequency inputs are measured in Hertz.

There are two digital "**Input Sensor Type**" options: Normal and Latched. With digital input sensor types the input measurement is given either 1 (ON) or 0 (OFF). Input voltage is measured with 3V threshold.

On Frequency, PWM and digital input modes 10kΩ pull-up or pull-down resistors can be enabled or disabled by setting the value of the "**Pullup/Pulldown Resistor**" setpoint. Setpoint options are given in Table 5. By default, pull-down resistors are enabled for all inputs.

0	*Pullup/down Off*
1	*10 kΩ Pullup*
2	*10 kΩ Pulldown*

Table 5 – Pullup/Pulldown Resistor Options

"**Active High/Active Low**" setpoint is used to configure how signal high and low are interpreted. Setpoint options are given in Table 6. By default, all inputs are selected to be Active High, which means that signal high is interpreted as 1(ON) and signal low as 0(OFF).

0	*Active High*
1	*Active Low*

Table 6 – Active High/Low Options

Table 7 shows the effect of different digital input types on input signal measurement interpretation with recommended "**Pullup/Pulldown Resistor**" and "**Active High/Low**" combinations.

Input Sensor Type		**Pulldown Active High**	**Pullup Active Low**	**Input measured (state)**
6	*Digital (normal)*	High	Low or Open	1 (ON)
		Low or Open	High	0 (OFF)
62	*Digital (latched)*	High to Low	Low to High	0 (no change)
		Low to High	High to Low	1 (state change)

Table 7 – Digital Input Sensor Type versus Input State

The “**Minimum Range**” and “**Maximum Range**” setpoints are used to define range of the signal input outputs as a control source. For example, if “**Maximum Range**” is set to 900 for a ‘*Frequency 10…1000Hz*’, the control signal is saturated at 900 if input signal rises above 900Hz. The “**Minimum Range**” and “**Maximum Range**” setpoints are interpreted in input types units, thus they should be re-adjusted after editing “**Input Sensor Type**”.

Software filters can be applied to the measured input signal. Setpoints “**Software Filter Type**” and “**Software Filter Constant**” are used to configure the software filter. By default, no filter is applied to the signal. Software filtering is described in detail in next section.

1.2. Input filtering

Measured input data from universal inputs can be filtered to form desired CAN message data. Input filters are configured with “**Filter Type**” and “**Filter Constant**” setpoints. Filters are configured for each input individually.

“**Filter Type**” setpoint defines the type of software filter used. Setpoint options are ‘*No Filtering’*, ‘*Moving Average’* and ‘*Repeating Average’*. The ‘*No Filtering’* option applies no filtering to the measured input data. The ‘*Moving Average* option applies the transfer function below to the measured input data, where $Value_N$ is the current value of the CAN message data, $Value_{N-1}$ is the previous CAN message data and Filter Constant is the value of the “**Filter Constant setpoint**”.

Equation 1 - Moving Average Transfer Function:

$$Value_N = Value_{N-1} + \frac{(Input - Value_{N-1})}{Filter\ Constant}$$

Equation 2 - Repeating Average Transfer Function:

$$Value = \frac{\sum_0^N Input_N}{N}$$

The ‘*Repeating Average’* option applies the transfer function above to the measured input data, where N is value of the **“Filter Constant”** setpoint. At every reading of the input value, the value is added to the sum. At every N^{th} read, the sum is divided by N, and the result is new CAN message data. The sum is set to zero for the next read and summing is started again.

1.3. CAN Transmit Message Function Block

The CAN Transmit function block is used to send any output from another function block (i.e. input, CAN receive) to the J1939 network. The AX032150 ECU has four CAN Transmit Messages and each message has four completely user defined signals.

1.3.1. CAN Transmit Message Setpoints

Each CAN Transmit Message setpoint group includes setpoints that affect the whole message and are thus mutual for all signals of the message. These setpoints are presented in this section. The setpoints that configure an individual signal are presented in next section.

The "**Transmit PGN**" setpoint sets PGN used with the message. **User should be familiar with the SAE J1939 standard and select values for PGN/SPN combinations as appropriate from section J1939/71**.

"**Repetition Rate**" setpoint defines the interval used to send the message to the J1939 network. If the "**Repetition Rate**" is set to zero, the message is disabled unless it shares its PGN with another message. In case of a shared PGN repetition rate of the LOWEST numbered message are used to send the message 'bundle'.

At power up, transmitted message will not be broadcasted until after a 5 second delay. This is done to prevent any power up or initialization conditions from creating problems on the network.

1.3.2. CAN Transmit Signal Setpoints

Each CAN transmit message has four associated signals, which define data inside the Transmit message. "**Control Source**" setpoint together with "**Control Number**" setpoint define the signal source of the message. "**Control Source**" and "**Control Number**" options are listed in Table 8. Setting "**Control Source**" to '*Control Not Used'* disables the signal.

"**Transmit Data Type**" setpoint selects the data type from options "not used", "discrete" and "continuous". Continuous data is scaled using the min, max, resolution and offset parameters whereas the discrete type is written to the CAN message as unsigned value without scaling. "**Transmit Data Width**" setpoint determines how many bits signal reserves from the message. "**Transmit Data Index in Array**" determines in which of 8 bytes of the CAN message LSB of the signal is located. Similarly, "**Transmit Bit Index in Byte**" determines in which of 8 bits of a byte the LSB is located. These setpoints are freely configurable, thus **it is the User's responsibility to ensure that signals do not overlap and mask each other**.

"**Transmit Data Resolution**" setpoint determines the scaling done on the signal data before it is sent to the bus. "**Transmit Data Offset**" setpoint determines the value that is subtracted from the signal data before it is scaled. Offset and Resolution are interpreted in units of the selected source signal.

1.4. CAN Receive Function Block

The CAN Receive function block is designed to read in any SPN from the J1939 network and use it as an input to another function block.

The “**Receive Message Enabled**” is the most important setpoint associated with this function block and it should be selected first. Changing it will result in other setpoints being enabled/disabled as appropriate. By default, ALL receive messages are disabled.

Once a message has been enabled, a Lost Communication fault will be flagged if that message is not received from the bus within the “**Receive Message Timeout**” period. In order to avoid timeouts on a heavily saturated network, it is recommended to set the period at least two times longer than the expected update rate. To disable the timeout feature, simply set this value to zero, in which case the received message will never trigger a Lost Communication fault.

By default, all control messages are expected to be sent to the 4DIN-ENET-CAN controller using Proprietary B PGNs. However, should a PDU1 message be selected, the 4DIN-ENET-CAN controller can be setup to receive it from any ECU by setting the “**Specific Address that sends the PGN**” to the Global Address (0xFF). If a specific address is selected instead, then any other ECU data on the PGN will be ignored.

The “**Receive Data Type**” defines if the data received is handled as “discrete” or “continuous” data. Continuous data is scaled using the min, max, resolution and offset parameters whereas the discrete type is read in as unsigned value without scaling. The “**Receive Data Width**”, “**Receive Data Index in Array (LSB)**”, “**Receive Bit Index in Byte (LSB)**”, “**Receive Resolution**” and “**Receive Offset**” can all be used to map any SPN supported by the J1939 standard to the output data of the Received function block.

As mentioned earlier, a CAN receive function clock can be selected as the source of the control input for the output function blocks. When this is case, the “**Received Data Min (Off Threshold)**” and “**Received Data Max (On Threshold)**” setpoints determine the minimum and maximum values of the control signal. As the names imply, they are also used as the On/Off thresholds for digital output types. These values are in whatever units the data is AFTER the resolution and offset is applied to CAN receive signal.

The 4DIN-ENET-CAN controller supports up to four unique CAN Receive Messages.

1.5. Available Control Sources

Many of the Function Blocks have selectable input signals, which are determined with "**[Name] Source**" and "**[Name] Number**" setpoints. Together, these setpoints uniquely select how the I/O of the various function blocks are linked together. "**[Name] Source**" setpoint determines the type of the source and "**[Name] Number**" selects the actual source if there is more than one of the same type. Available "**[Name] Source**" options and associated "**[Name] Number**" ranges are listed in Table 8. All sources, except "CAN message reception timeout", are available for all blocks, including CAN Transmit messages. Although Input Sources are freely selectable, not all options would make sense for all inputs, and it is up to the user to program the controller in a logical and functional manner.

Sources	Number Range	Notes
0: Control Not Used	N/A	When this is selected, it disables all other setpoints associated with the signal in question.
1: Received CAN Message	1 to 4	
2: Digital Input Measured	1 to 4	
3: Control Constant Data	1 to 15	1 = FALSE, 2 = TRUE, 3 to 15 = User Selectable
4: CAN Reception Timeout	N/A	

Table 8 – Available Control Sources and Numbers

2. INSTALLATION INSTRUCTIONS

2.1. Dimensions and Pinout

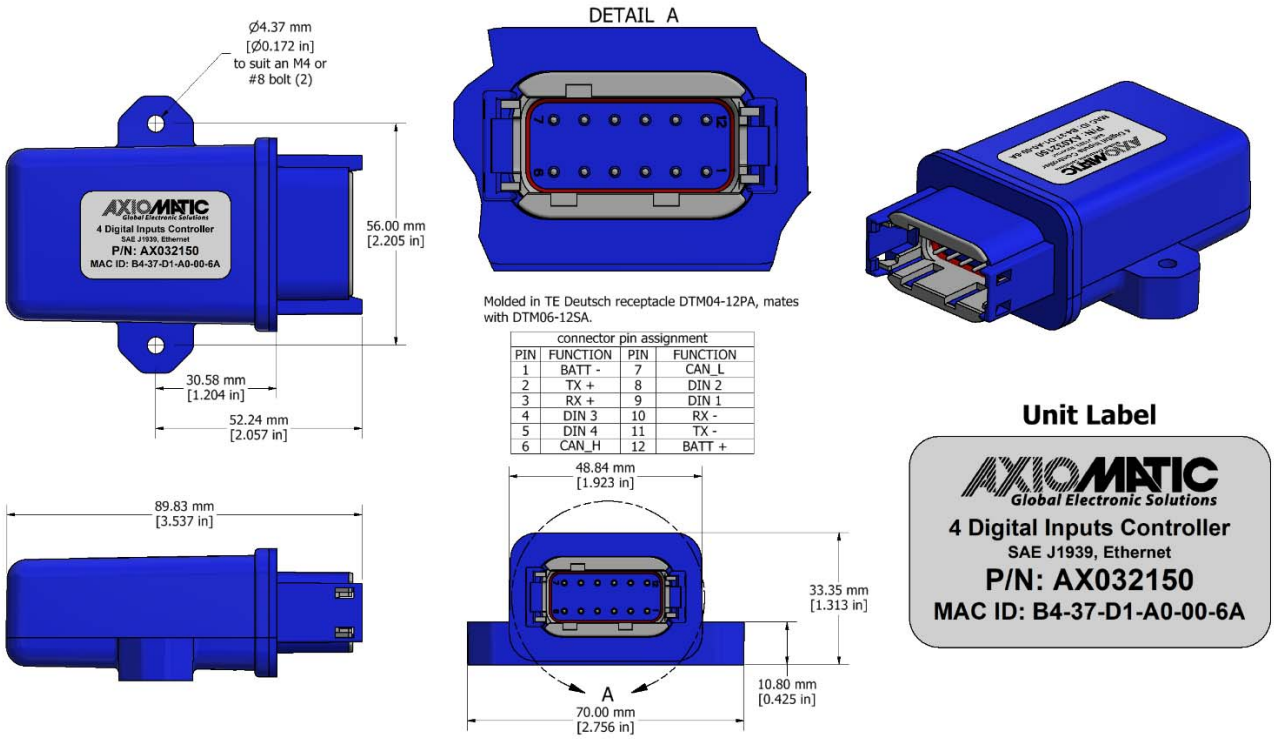


Figure 1 – Controller Dimensions and Label

(Grey) Connector	
Pin #	**Function**
1	Battery -
2	Ethernet TX +
3	Ethernet RX +
4	DIN #3
5	DIN #4
6	CAN Hi
7	CAN Lo
8	DIN #2
9	DIN #1
10	Ethernet RX -
11	Ethernet TX -
12	Battery +

Table 9 - AX032150 Connector Pinout

3. OVERVIEW OF J1939 FEATURES

The software was designed to provide flexibility to the user with respect to messages sent from the ECU by providing:

- Configurable ECU Instance in the NAME (to allow multiple ECUs on the same network)
- Configurable Input Parameters
- Configurable PGN and Data Parameters
- Configurable Diagnostic Messaging Parameters, as required
- Diagnostic Log, maintained in non-volatile memory

3.1. Introduction to Supported Messages

The ECU is compliant with the standard SAE J1939, and supports following PGNs from the standard.

From J1939-21 – Data Link Layer

• Request		59904	0x00EA00
• Acknowledgement		59392	0x00E800
• Transport Protocol – Connection Management		60416	0x00EC00
• Transport Protocol – Data Transfer Message		60160	0x00EB00
• Proprietary B	from	65280	0x00FF00
	to	65535	0x00FFFF

From J1939-73 – Diagnostics

• DM1 – Active Diagnostic Trouble Codes	65226	0x00FECA
• DM2 – Previously Active Diagnostic Trouble Codes	65227	0x00FECB
• DM3 – Diagnostic Data Clear/Reset for Previously Active DTCs	65228	0x00FECC
• DM11 – Diagnostic Data Clear/Reset for Active DTCs	65235	0x00FED3

From J1939-81 – Network Management

• Address Claimed/Cannot Claim	60928	0x00EE00
• Commanded Address	65240	0x00FED8

From J1939-71 – Vehicle Application Layer

• ECU Identification Information	64965	0x00FDC5
• Software Identification	65242	0x00FEDA
• Component Identification	65259	0x00FEEB

None of the application layer PGNs are supported as part of the default configurations, but they can be selected as desired for transmit function blocks.

Setpoints are accessed using standard Memory Access Protocol (MAP) with proprietary addresses. The Electronic Assistant® (EA) allows for quick and easy configuration of the unit over CAN network.

3.2. NAME, Address and Identification Information

The 4DIN-ENET-CAN ECU has the following default for the J1939 NAME. The user should refer to the SAE J1939/81 standard for more information on these parameters and their ranges.

Arbitrary Address Capable	Yes
Industry Group	0, Global
Vehicle System Instance	0
Vehicle System	0, Non-specific system
Function	126, Axiomatic I/O Controller
Function Instance	22, Axiomatic AX032150
ECU Instance	0, First Instance
Manufacture Code	162, Axiomatic Technologies
Identity Number	Variable, uniquely assigned during factory programming for each ECU

The ECU Instance is a configurable setpoint associated with the NAME. Changing this value will allow multiple ECUs of this type to be distinguishable from one another when they are connected on the same network.

The default value of the “ECU Address” setpoint is 128 (0x80), which is the preferred starting address for self-configurable ECUs as set by the SAE in J1939 tables B3 and B7. The EA will allow the selection of any address between 0 and 253. ***It is user’s responsibility to select an address that complies with the standard***. The user must also be aware that since the unit is arbitrary address capable, if another ECU with a higher priority NAME contends for the selected address, the 10 Analog input will continue select the next highest address until it finds one that it can claim. See J1939/81 for more details about address claiming.

ECU Identification Information

PGN 64965		ECU Identification Information	-ECUID
Transmission Repetition Rate:		On request	
Data Length:		Variable	
Extended Data Page:		0	
Data Page:		0	
PDU Format:		253	
PDU Specific:		197 PGN Supporting Information:	
Default Priority:		6	
Parameter Group Number:		64965 (0x00FDC5)	
Start Position	Length	Parameter Name	SPN
a	Variable	ECU Part Number, Delimiter (ASCII “*”)	2901
b	Variable	ECU Serial Number, Delimiter (ASCII “*”)	2902
c	Variable	ECU Location, Delimiter (ASCII “*”)	2903
d	Variable	ECU Type, Delimiter (ASCII “*”)	2904
e	Variable	ECU Manufacturer Name, Delimiter (ASCII “*”)	4304
(a)*(b)*(c)*(d)*(e)*			

Software Identifier

PGN 65242		Software Identification	-SOFT
Transmission Repetition Rate:		On request	
Data Length:		Variable	
Extended Data Page:		0	
Data Page:		0	
PDU Format:		254	
PDU Specific:		218 PGN Supporting Information:	
Default Priority:		6	
Parameter Group Number:		65242 (0x00FEDA)	
Start Position	Length	Parameter Name	SPN
1	1 Byte	Number of software identification fields	965
2-n	Variable	Software identification(s), Delimiter (ASCII “*”)	234

Byte 1 is set to 5, and the identification fields are as follows.

(Part Number)*(Version)*(Date)*(Owner)*(Description)

The EA shows all this information in “General ECU Information”, as shown in **Error! Reference source not found.**. *Note: The information provided in the Software ID is available for any J1939 service tool which supports the PGN -SOFT*

Component Identification

PGN 65259		Component Identification	-CI
Transmission Repetition Rate:		On request	
Data Length:		Variable	
Extended Data Page:		0	
Data Page:		0	
PDU Format:		254	
PDU Specific:		235 PGN Supporting Information:	
Default Priority:		6	
Parameter Group Number:		65259 (0x00FEEB)	
Start Position	Length	Parameter Name	SPN
a	1-5 Byte	Make, Delimiter (ASCII “*”)	586
b	Variable	Model, Delimiter (ASCII “*”)	587
c	Variable	Serial Number, Delimiter (ASCII “*”)	588
d	Variable	Unit Number (Power Unit), Delimiter (ASCII “*”)	233
(a)*(b)*(c)*(d)*(e)*			

4. ETHERNET COMMUNICATIONS AND CONTROLLER CONFIGURATION

The 4DIN-ENET-CAN controller supports input status reporting to Ethernet as TCP frames and configuration of the main parameters from Ethernet port using standard web browser.

4.1. Input status frames

The digital input status is sent as a proprietary TCP frame. A client can listen to these frames by initiating a TCP connection to port 4000 on the 4DIN-ENET-CAN. These custom messages are sent on input status changes. One message with the current status is sent upon opening the connection.

The *Message Header* contains:

4-byte *Axiomatic Tag,* AXIO in capital letters

2-byte *Protocol ID*, 19030 = 0x4A56

2-byte *Message ID*

1-byte *Message Version*, 0 (for future use)

2-byte *Message Data Length*

The proprietary messaging protocol *Message Header* format is presented below.

<table>
<tr><td>Octet
Offset Octet</td><td>0</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td rowspan="3">0</td><td>A</td><td>X</td><td>I</td><td>O</td></tr>
<tr><td>0x41</td><td>0x58</td><td>0x49</td><td>0x4F</td></tr>
<tr><td colspan="4">Axiomatic Tag</td></tr>
<tr><td rowspan="2">4</td><td>0x56</td><td>0x4A</td><td colspan="2" rowspan="2">Message ID</td></tr>
<tr><td colspan="2">Protocol ID (19030)</td></tr>
<tr><td rowspan="2">8</td><td>0x00</td><td colspan="2" rowspan="2">Message Data Length</td><td rowspan="2">Message Data</td></tr>
<tr><td>Message Version=0</td></tr>
</table>

Table 10 – TCP message header format

The *Axiomatic Tag* is used for the message header identification.

The *Protocol ID* defines a proprietary protocol carried by this message. This field allows different protocols to use the same protocol independent message structure. The AX032150 uses Protocol ID = 0x4A56

The *Message ID* defines the type of the Message Data:

Message ID	Message name
0	Undefined message
1	Digital input state byte
2	Measured input data

Table 11 – TCP message IDs

The message data in a frame with Message ID == 1 is an one byte value with current input states:

Bit in Message Data Byte	
0	Input #1 state
1	Input #2 state
2	Input #3 state
3	Input #4 state

Table 12 – TCP message data bytes

The message data in a frame with Message ID == 2 is one 16 bit value per input reporting the current input measurement:

16bit word in Message Data	
0	Measured Input #1 value
1	Measured Input #2 value
2	Measured Input #3 value
3	Measured Input #4 value

Table 13 – TCP message data values

In case all four Digital Inputs are configured to read in Digital ON/OFF values, the Status Byte message will be sent (Message ID == 1).

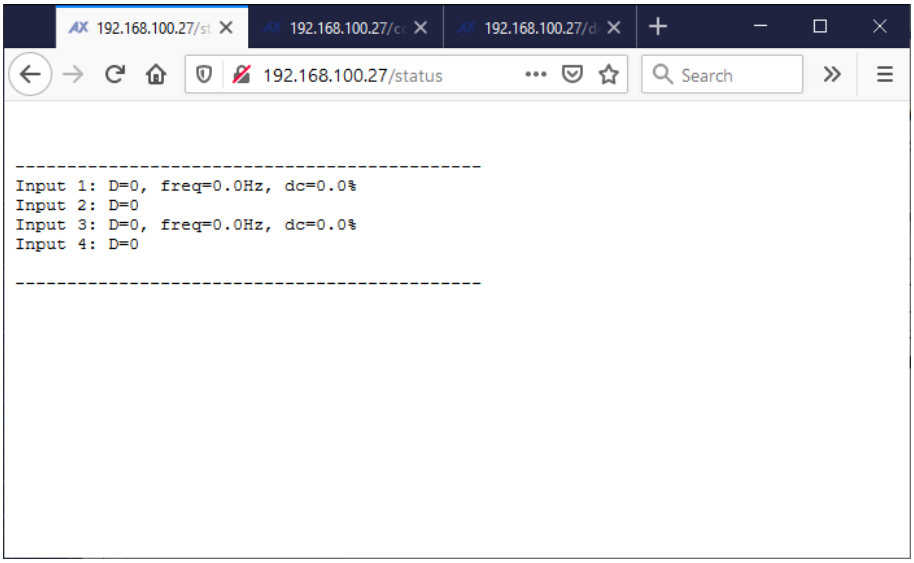
In case one or more of the inputs are configured to read in some other value, then the longer input measurement result message (Message ID == 2) is automatically sent.

4.2. Parameter editing

The 4DIN-ENET-CAN has a web server running on TCP port 80. This web server has the following pages implemented:

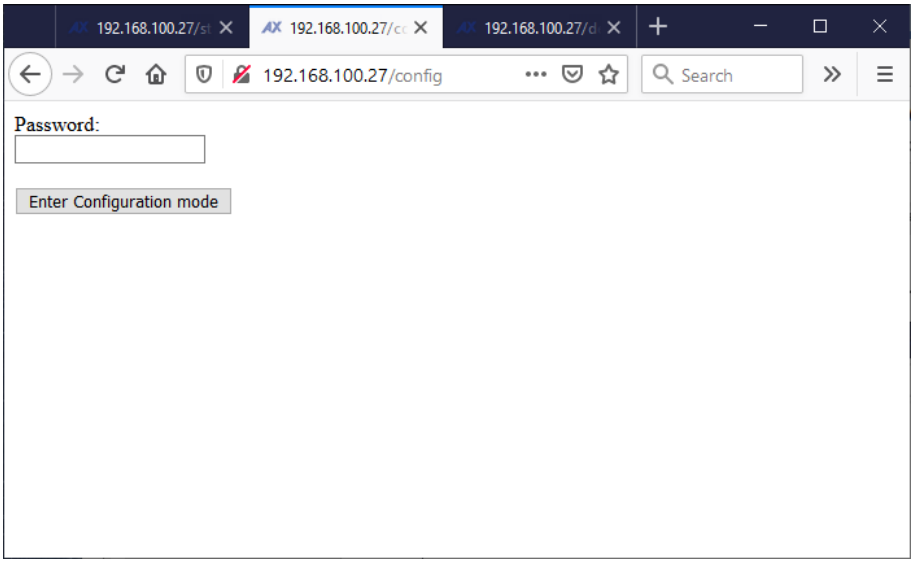
<configured ip>/status

This page shows the current status of the digital inputs.



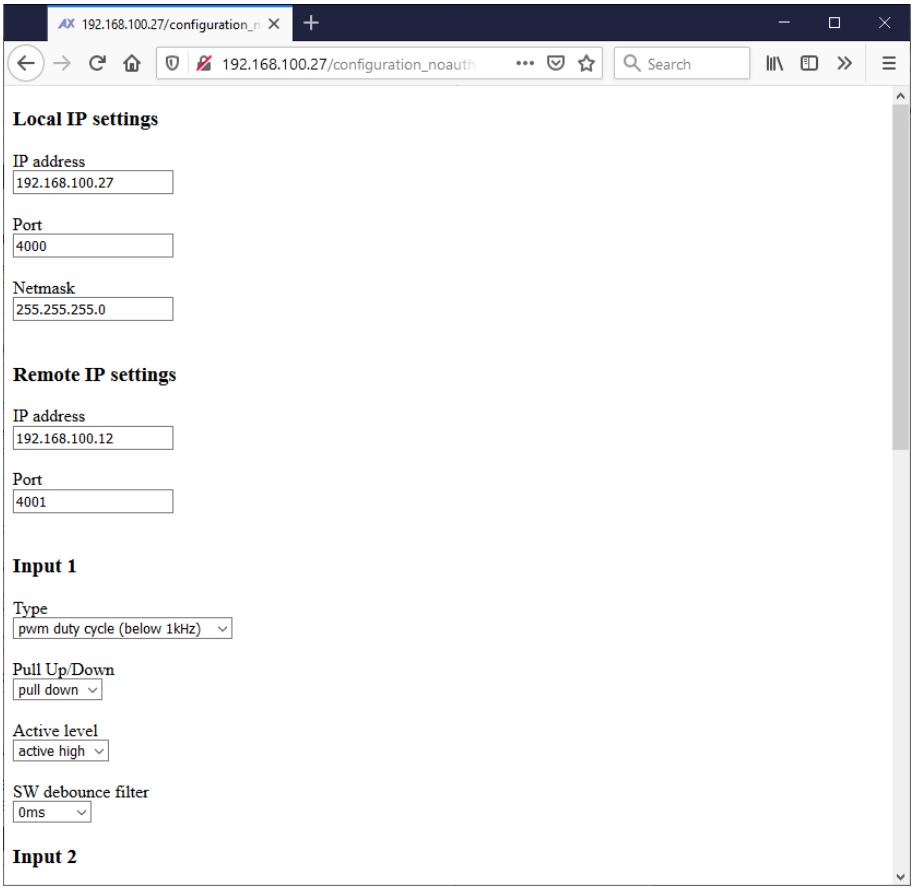
<configured ip>/config

The configuration page asks for a password. The default password is '**AX032150**' (this is case sensitive).



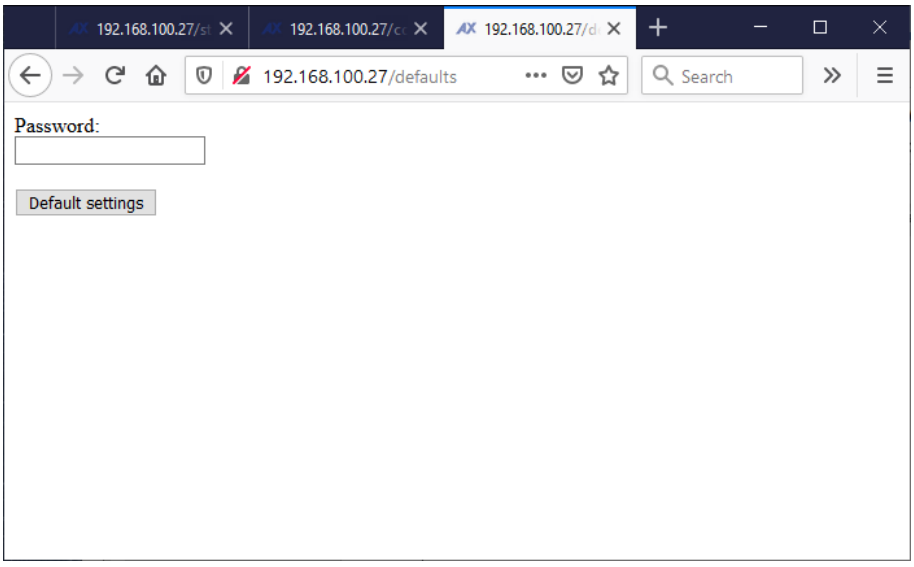
When the correct password is entered, the configuration page is opened. The settings can be applied by clicking the button at the bottom of the page. In case the user doesn't want to change settings, the connection can be closed.

The configuration page allows the user to modify the device's IP address, port and netmask settings and main configuration parameters for the Digital Inputs.



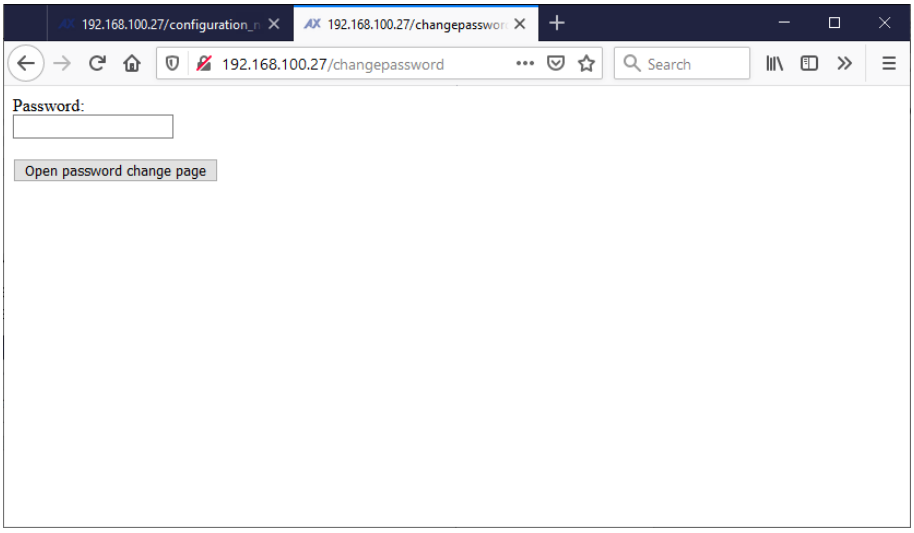
<configured ip>/defaults

The controller can be reverted to default settings using the '/defaults' page. The default password is '**AX032150**' (also case sensitive).

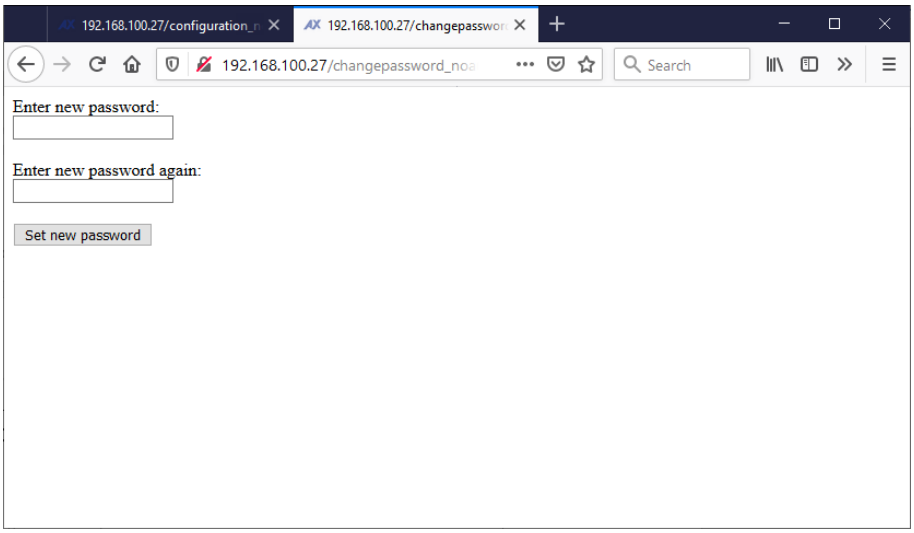


<configured ip>/changepassword

The configuration password can be changed using the '/changepassword' page. The default password is '**AX032150**' (also case sensitive).



Once a correct password is entered, the password modification dialog will open.

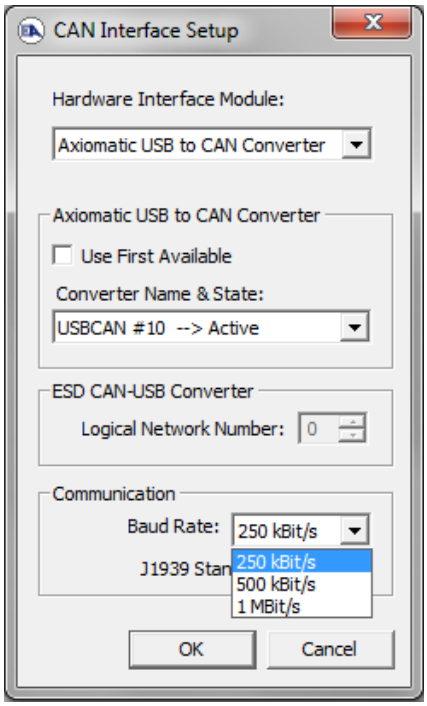


5. ECU SETPOINTS ACCESSED WITH ELECTRONIC ASSISTANT

This section describes in detail each setpoint, and their default and ranges. The setpoints are divided into setpoint groups as they are shown in EA. For more information on how each setpoint is used by 4DIN-ENET-CAN, refer to the relevant section in this user manual.

5.1. Accessing the ECU Using EA

ECU with P/N AX032150 does not need any specific setup for EA. In order to access the AX032150 ECU, the CAN bus Baud Rate needs to be set accordingly. The CAN Interface Setup can be found from “Options” menu in EA.



5.2. J1939 Setpoints

"**ECU Instance Number**" and "**ECU Address**" setpoints and their effect are defined in section 3.2.

Name	Range	Default	Notes
ECU Instance Number	0-7	0x00	Per J1939-81
ECU Address	0-253	0x80	Preferred address for a self-configurable ECU

Table 14 – J1939 Setpoints

If non-default values for the **"ECU Instance Number"** or **"ECU Address"** are used, they will be mirrored during a setpoint file flashing, and will only take effect once the entire file has been downloaded to the unit. After the setpoint flashing is complete, the unit will claim the new address and/or re-claim the address with the new NAME. If these setpoints are changing, it is recommended to close and re-open the CAN connection on EA after the file is loaded so that only the new NAME and address are showing in the J1939 CAN Network ECU list.

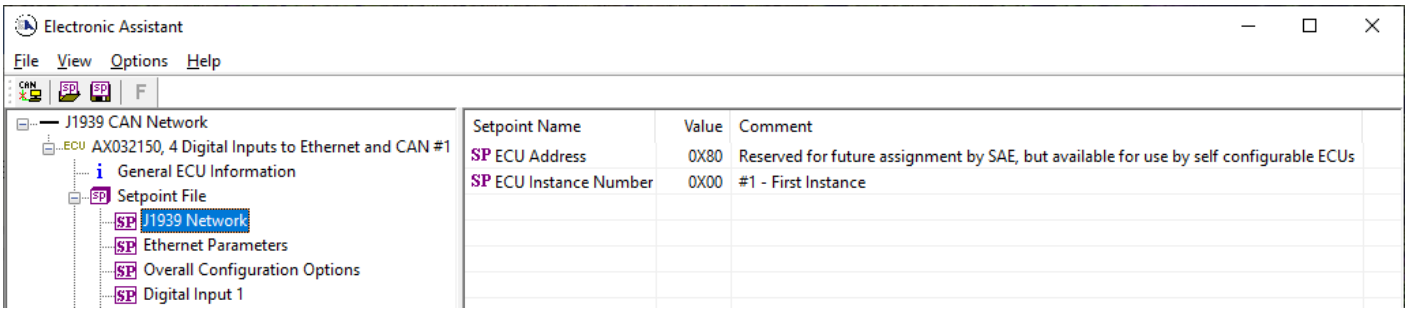


Figure 2 - Screen Capture of J1939 Setpoints

5.3. Ethernet Parameter Setpoints

The Ethernet parameters can be configured using EA. A power cycle is needed for taking the new settings into use.

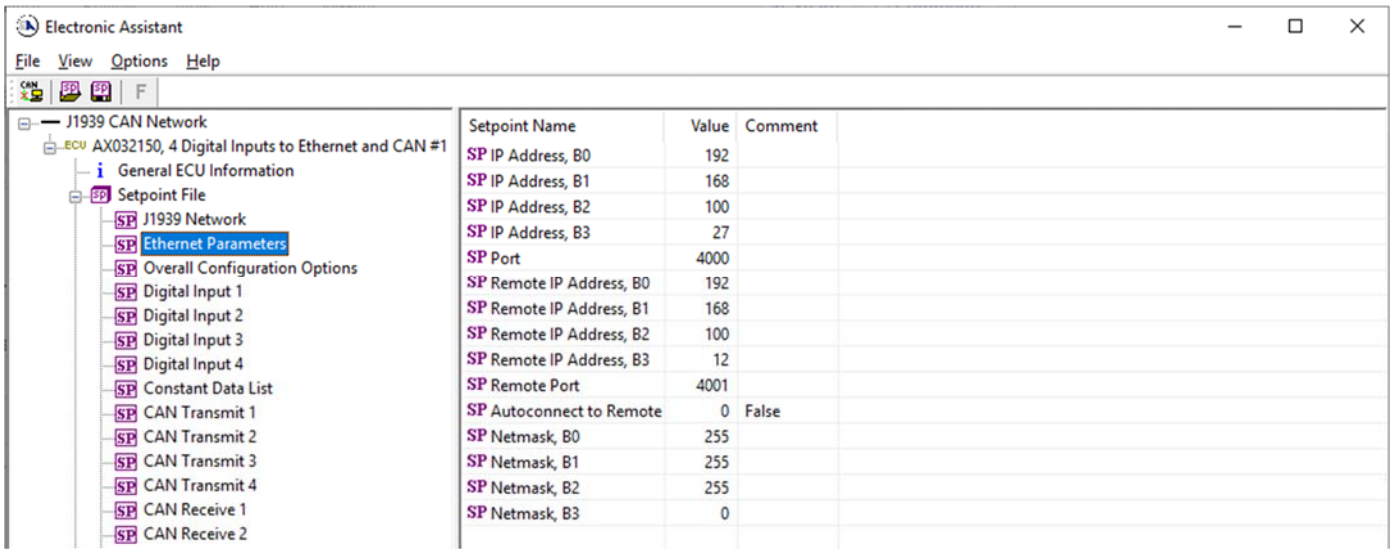


Figure 3 – Screen Capture of Ethernet Parameter Setpoints

Name	Range	Default	Notes
IP Address, B0	0…255	192	These settings define an IP address 192.168.100.27
IP Address, B1	0…255	168	
IP Address, B2	0…255	100	
IP Address, B3	0…255	27	
Port	0…65535	4000	The default port for input status frames.
Remote IP Address, B0	0…255	192	These settings define an IP address 192.168.100.12
Remote IP Address, B1	0…255	168	
Remote IP Address, B2	0…255	100	
Remote IP Address, B3	0…255	12	
Remote Port	0…65535	4001	
Autoconnect to Remote	Drop list	0 – False	
Netmask, B0	0…255	255	These settings define a netmask 255.255.255.0
Netmask, B1	0…255	255	
Netmask, B2	0…255	255	
Netmask, B3	0…255	0	

Table 15 – Ethernet Parameter Setpoints

5.4. Overall Configuration Option Setpoints

There are a few overall configuration options that can be used for enabling some special features.

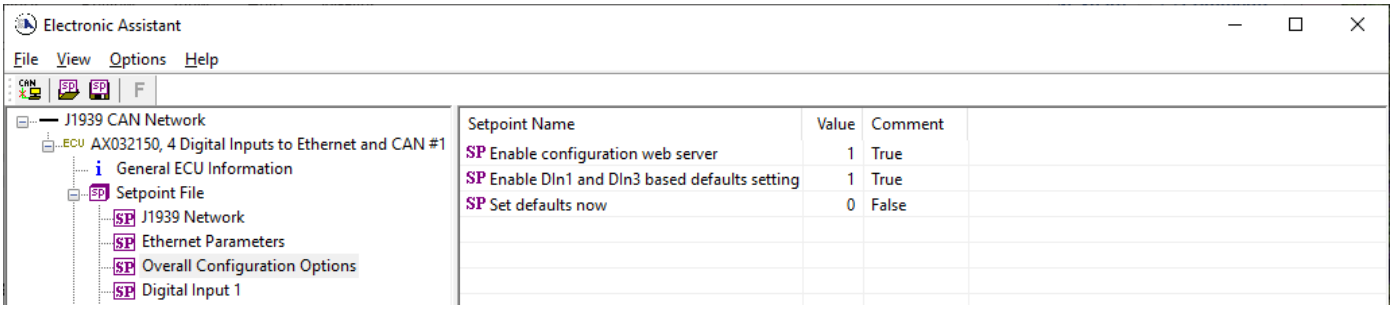


Figure 4 – Screen Capture of Overall Configuration Option Setpoints

Name	Range	Default	Notes
Enable configuration web server	Drop list	True	
Enable Din1 and Din3 based defaults setting	Drop list	False	If this is set to True, sourcing 500Hz PWM signal with 50% duty cycle for 10 seconds to DIn #1 and DIn #3 will revert all settings to defaults and reset the controller.
Set defaults now	Drop list	False	This setpoint is password protected. The password is '**SetDefaults**'.

Table 16 – Overall Configuration Option Setpoints

5.5. Input Setpoints

The Inputs are defined in section 0. Please refer there for detailed information about how all these setpoints are used.

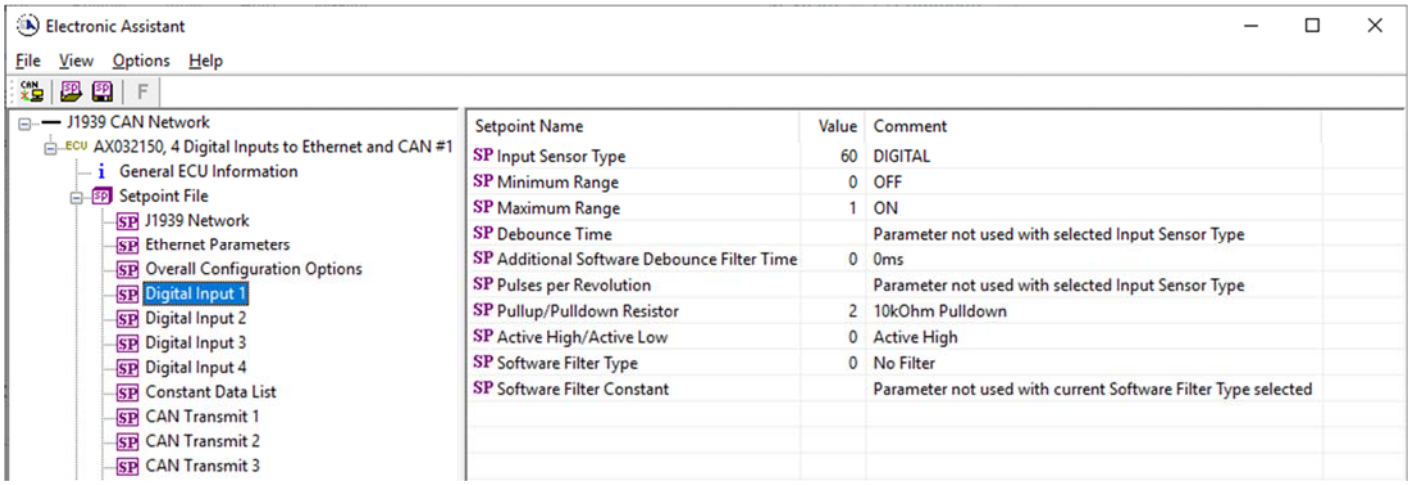


Figure 5 – Screen Capture of Input Setpoints

Name	Range	Default	Notes
Input Sensor Type	Drop List	DIGITAL INPUT	See Table 1
Minimum Range	Limit to Maximum Range	0	
Maximum Range	Minimum Range to Limit	1	
Debounce Time	Drop List	None	See Table 3
Additional Software Debounce Filter Time	Drop List	0ms	See Table 4
Pulses per Revolution	Drop List	FALSE	See Section 0
Pullup/Pulldown Resistor	Drop List	10kΩ pulldown	See Table 5
Active High/Active Low	Drop List	Active High	See Table 6
Software Filter Type	Drop List	No Filtering	See section 1.2
Software Filter Constant	1..1000	1	See section 1.2

Table 17 – Input Setpoints

5.6. Constant Data List

The Constant Data List Function Block is provided to allow the user to select values as desired for various logic block functions.

The first two constants are fixed values of 0 (False) and 1 (True) for use in binary logic. The remaining 13 constants are fully user programmable to any value between +/. 1 000 000. The default values (shown in Figure 6) are arbitrary and should be configured by the user as appropriate for their application.

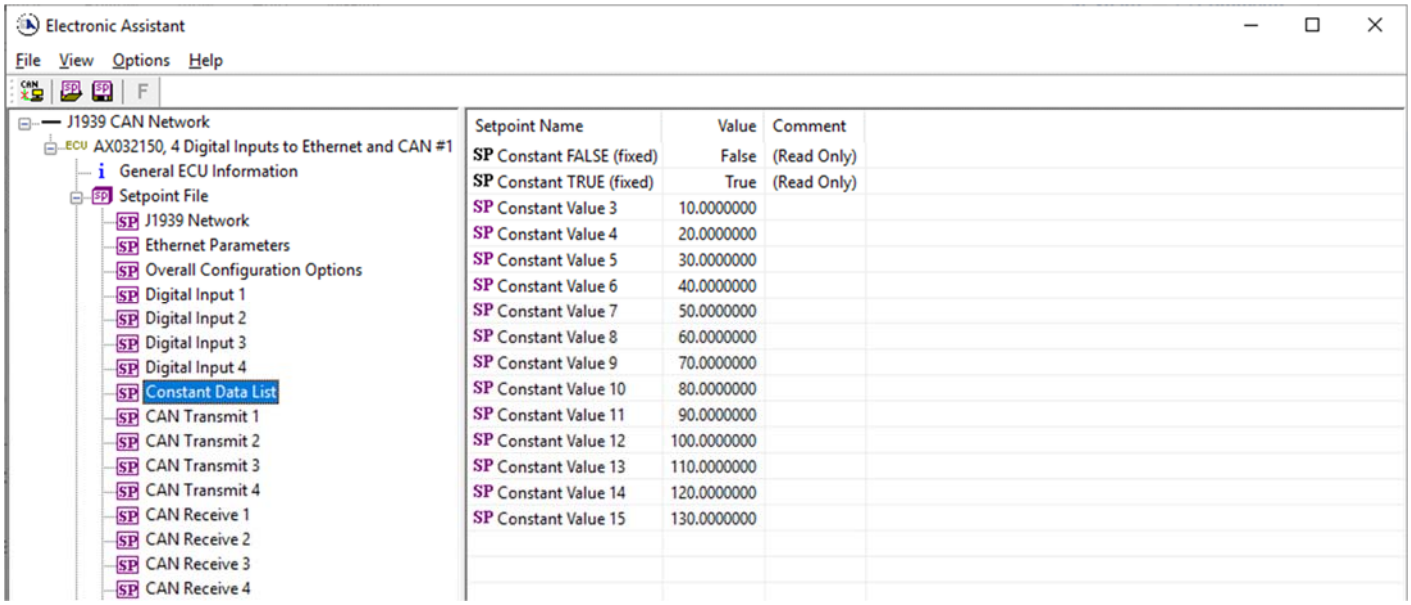


Figure 6 – Screen Capture of Constant Data List Setpoints

5.7. CAN Transmit Setpoints

CAN Transmit Message Function Block is presented in Section 1.3.1. Please refer there for detailed information how these setpoints are used. "**Transmit Repetition Rate**" is 0ms by default, thus no message will be sent.

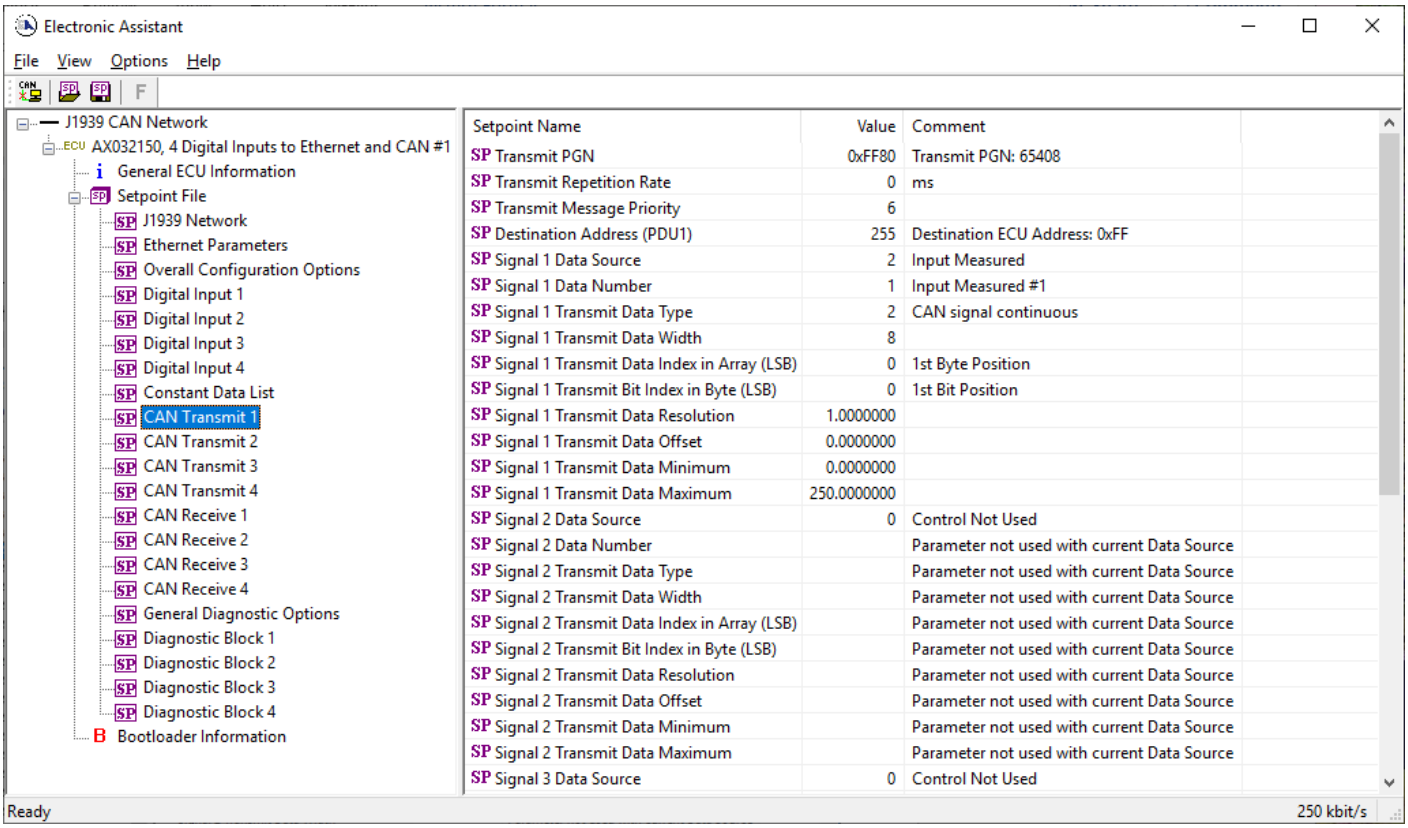


Figure 7 - Screen Capture of CAN Transmit Message Setpoints

Name	Range	Default	Notes
Transmit PGN	0xff00 … 0xffff	Different for each	See Section 1.3.1
Transmit Repetition Rate	0 … 65000 ms	0ms	0ms disables transmit
Transmit Message Priority	0...7	6	Proprietary B Priority
Destination Address	0...255	255	Not used by default
Signal 1 Control Source	Drop List	Different for each	See Table 8
Signal 1 Control Number	Drop List	Different for each	See 1.3.2
Signal 1 Transmit Data Type	Drop List	Continuous	
Signal 1 Transmit Data Width	1-32	16	
Signal 1 Transmit Data Index in Array	0-7	0	
Signal 1 Transmit Bit Index In Byte	0-7	0	
Signal 1 Transmit Data Resolution	-100000.0 to 100000	0.001	
Signal 1 Transmit Data Offset	-10000 to 10000	0.0	
Signal 2 Control Source	Drop List	Signal undefined	See Table 8
Signal 2 Control Number	Drop List	Signal undefined	See 1.3.2
Signal 2 Transmit Data Type	Drop List	Continuous	
Signal 2 Transmit Data Width	1-32	16	
Signal 2 Transmit Data Index in Array	0-7	2	
Signal 2 Transmit Bit Index In Byte	0-7	0	
Signal 2 Transmit Data Resolution	-100000.0 to 100000	0.001	
Signal 2 Transmit Data Offset	-10000 to 10000	0.0	
Signal 3 Control Source	Drop List	Signal undefined	See Table 8
Signal 3 Control Number	Drop List	Signal undefined	See 1.3.2
Signal 3 Transmit Data Type	Drop List	Continuous	
Signal 3 Transmit Data Width	1-32	16	
Signal 3 Transmit Data Index in Array	0-7	4	
Signal 3 Transmit Bit Index In Byte	0-7	0	
Signal 3 Transmit Data Resolution	-100000.0 to 100000	0.001	
Signal 3 Transmit Data Offset	-10000 to 10000	0.0	
Signal 4 Control Source	Drop List	Signal undefined	See Table 8
Signal 4 Control Number	Drop List	Signal undefined	See 1.3.2
Signal 4 Transmit Data Type	Drop List	Continuous	
Signal 4 Transmit Data Width	1-32	16	
Signal 4 Transmit Data Index in Array	0-7	6	
Signal 4 Transmit Bit Index In Byte	0-7	0	
Signal 4 Transmit Data Resolution	-100000.0 to 100000	0.001	
Signal 4 Transmit Data Offset	-10000 to 10000	0.0	

Table 18 – CAN Transmit Message Setpoints

5.8. CAN Receive Setpoints

The Math Function Block is defined in Section 1.3.2. Please refer there for detailed information about how these setpoints are used.

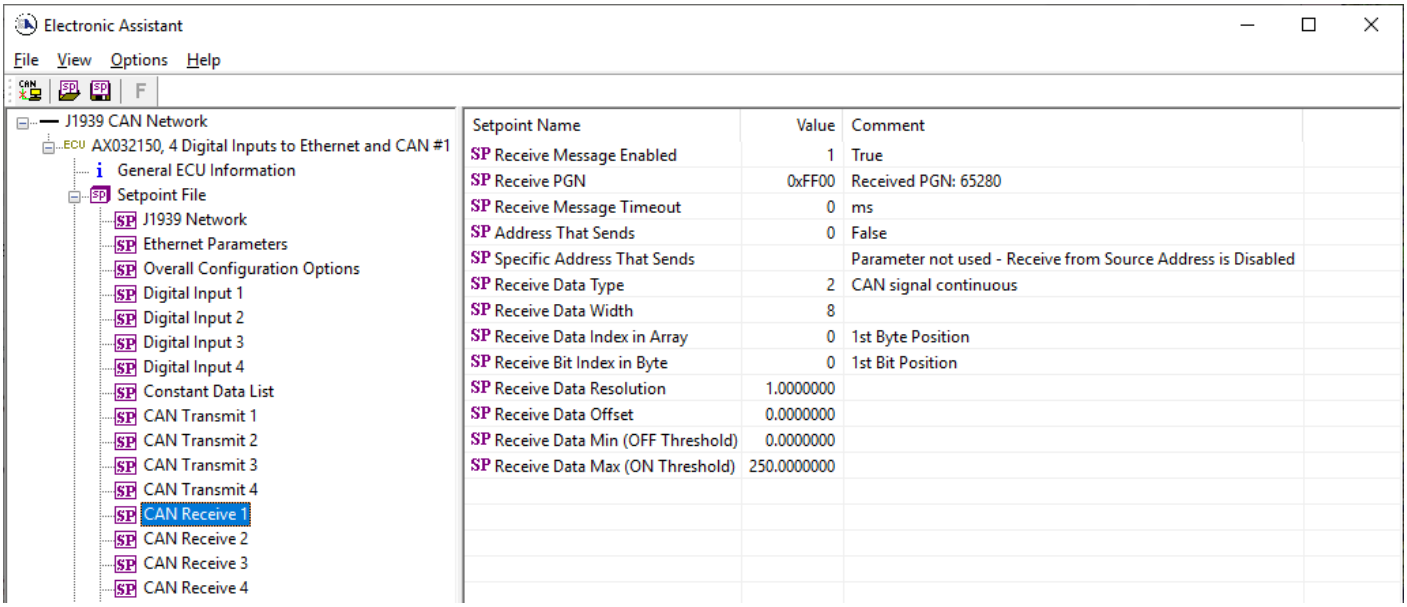


Figure 8 - Screen Capture of CAN Receive Message Setpoints

Name	Range	Default	Notes
Received Message Enabled	Drop List	False	
Received PGN	0 to 65536	Different for each	
Received Message Timeout	0 to 60 000	0ms	
Specific Address that sends PGN	Drop List	False	
Address That Sends	0 to 255	254 (0xFE, Null Addr)	
Receive Transmit Data Type	Drop List	Continuous	
Receive Transmit Data Width	1-32	8	
Receive Transmit Data Index in Array	0-7	0	
Receive Transmit Bit Index In Byte	0-7	0	
Receive Transmit Data Resolution	-100000.0 to 100000	1.0	
Receive Transmit Data Offset	-10000 to 10000	0.0	
Receive Data Min (Off Threshold)	-1000000 to Max	0.0	
Receive Data Max (On Threshold)	Min to 100000	250.0	

Table 19 – CAN Receive Setpoints

5.9. General Diagnostics Options

These setpoints control the shutdown of the ECU in case of CPU temperature related errors and whether to send DM1 messages when no errors are detected.

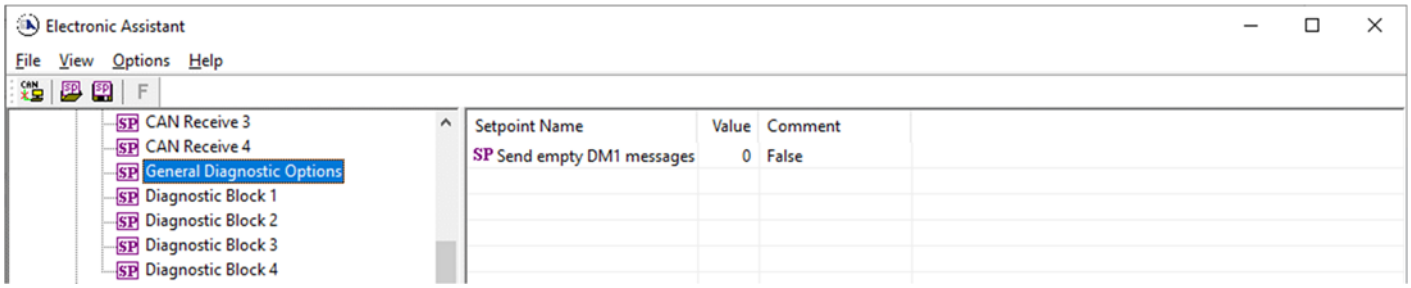


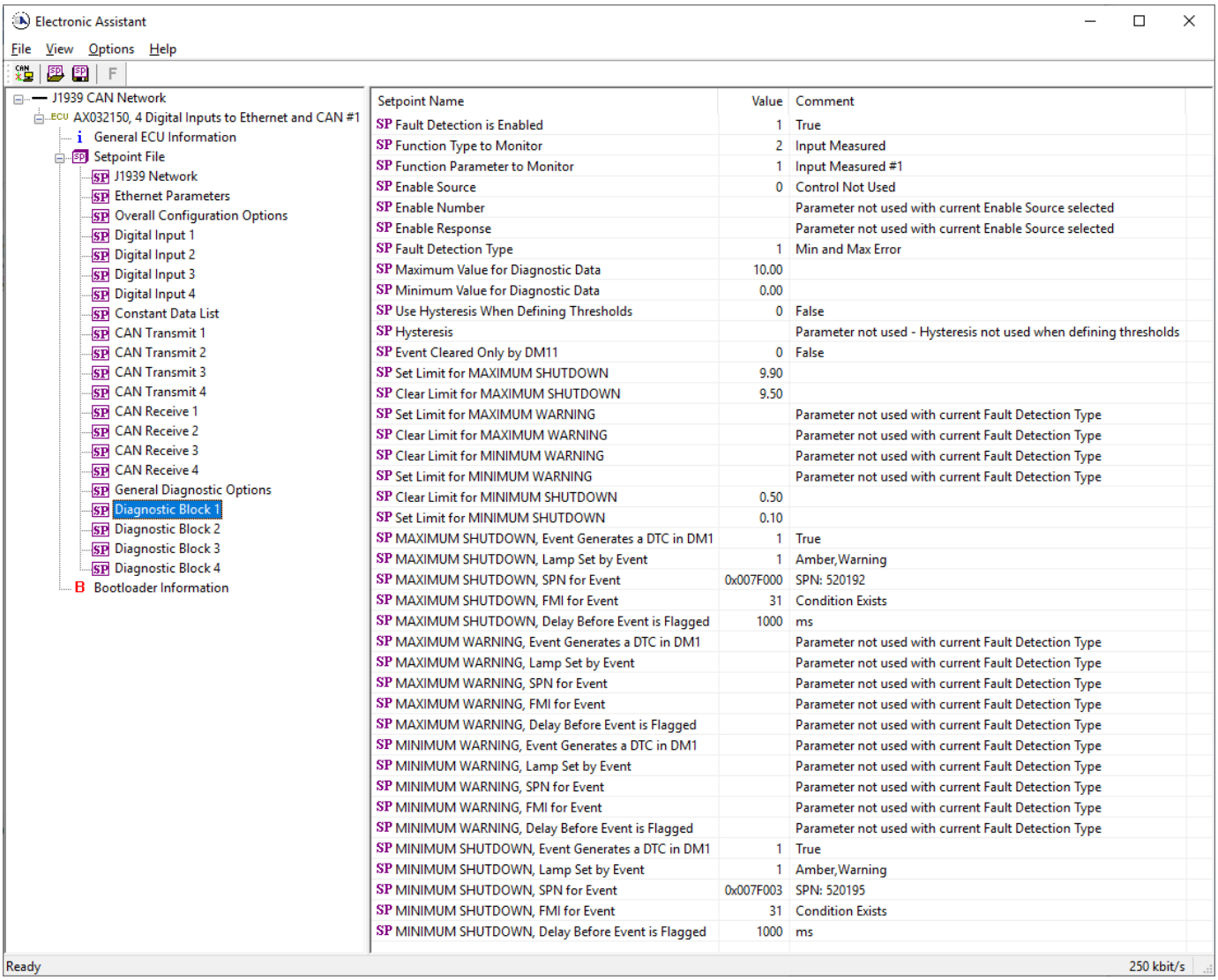
Figure 9 - Screen Capture of General Diagnostics Options Setpoints

Name	Range	Default	Notes
Send Empty DM1 Messages	Drop List	False	

Table 20 – General Diagnostics Options Setpoints

5.10. Diagnostics Blocks

There are 4 Diagnostics blocks that can be configured to monitor various parameters of the Controller.



Setpoint Name	Value	Comment
Fault Detection is Enabled	1	True
Function Type to Monitor	2	Input Measured
Function Parameter to Monitor	1	Input Measured #1
Enable Source	0	Control Not Used
Enable Number		Parameter not used with current Enable Source selected
Enable Response		Parameter not used with current Enable Source selected
Fault Detection Type	1	Min and Max Error
Maximum Value for Diagnostic Data	10.00	
Minimum Value for Diagnostic Data	0.00	
Use Hysteresis When Defining Thresholds	0	False
Hysteresis		Parameter not used - Hysteresis not used when defining thresholds
Event Cleared Only by DM11	0	False
Set Limit for MAXIMUM SHUTDOWN	9.90	
Clear Limit for MAXIMUM SHUTDOWN	9.50	
Set Limit for MAXIMUM WARNING		Parameter not used with current Fault Detection Type
Clear Limit for MAXIMUM WARNING		Parameter not used with current Fault Detection Type
Clear Limit for MINIMUM WARNING		Parameter not used with current Fault Detection Type
Set Limit for MINIMUM WARNING		Parameter not used with current Fault Detection Type
Clear Limit for MINIMUM SHUTDOWN	0.50	
Set Limit for MINIMUM SHUTDOWN	0.10	
MAXIMUM SHUTDOWN, Event Generates a DTC in DM1	1	True
MAXIMUM SHUTDOWN, Lamp Set by Event	1	Amber,Warning
MAXIMUM SHUTDOWN, SPN for Event	0x007F000	SPN: 520192
MAXIMUM SHUTDOWN, FMI for Event	31	Condition Exists
MAXIMUM SHUTDOWN, Delay Before Event is Flagged	1000	ms
MAXIMUM WARNING, Event Generates a DTC in DM1		Parameter not used with current Fault Detection Type
MAXIMUM WARNING, Lamp Set by Event		Parameter not used with current Fault Detection Type
MAXIMUM WARNING, SPN for Event		Parameter not used with current Fault Detection Type
MAXIMUM WARNING, FMI for Event		Parameter not used with current Fault Detection Type
MAXIMUM WARNING, Delay Before Event is Flagged		Parameter not used with current Fault Detection Type
MINIMUM WARNING, Event Generates a DTC in DM1		Parameter not used with current Fault Detection Type
MINIMUM WARNING, Lamp Set by Event		Parameter not used with current Fault Detection Type
MINIMUM WARNING, SPN for Event		Parameter not used with current Fault Detection Type
MINIMUM WARNING, FMI for Event		Parameter not used with current Fault Detection Type
MINIMUM WARNING, Delay Before Event is Flagged		Parameter not used with current Fault Detection Type
MINIMUM SHUTDOWN, Event Generates a DTC in DM1	1	True
MINIMUM SHUTDOWN, Lamp Set by Event	1	Amber,Warning
MINIMUM SHUTDOWN, SPN for Event	0x007F003	SPN: 520195
MINIMUM SHUTDOWN, FMI for Event	31	Condition Exists
MINIMUM SHUTDOWN, Delay Before Event is Flagged	1000	ms

Figure 10 - Screen Capture of Diagnostic Block Setpoints

Name	Range	Default	Notes
Fault Detection is Enabled	Drop List	False	
Function Type to Monitor	Drop List	0 – Control not used	
Function parameter to Monitor	Drop List	0 – No selection	
Fault Detection Type	Drop List	1 – Min and Max Error	
Maximum Value for Diagnostic Data	Minimum Value for Diagnostic Data … $4.28e^9$	5.0	
Minimum Value for Diagnostic Data	0.0 … Maximum Value for Diagnostic Data	0.0	
Use Hysteresis When Defining Thresholds	Drop List	False	
Hysteresis	0.0 … Maximum Value for Diagnostic Data	0.0	
Event Cleared only by DM11	Drop List	False	
Set Limit for MAXIMUM SHUTDOWN	Minimum Value for Diagnostic Data … Maximum Value for Diagnostics Data	9.90	
Clear Limit for MAXIMUM SHUTDOWN	Minimum Value for Diagnostic Data … Maximum Value for Diagnostics Data	9.50	
Set Limit for MAXIMUM WARNING	Minimum Value for Diagnostic Data … Maximum Value for Diagnostics Data	0.0	
Clear Limit for MAXIMUM WARNING	Minimum Value for Diagnostic Data … Maximum Value for Diagnostics Data	0.0	
Clear Limit for MINIMUM WARNING	Minimum Value for Diagnostic Data … Maximum Value for Diagnostics Data	0.0	
Set Limit for MINIMUM WARNING	Minimum Value for Diagnostic Data … Maximum Value for Diagnostics Data	0.0	
Clear Limit for MINIMUM SHUTDOWN	Minimum Value for Diagnostic Data … Maximum Value for Diagnostics Data	0.50	
Set Limit for MINIMUM SHUTDOWN	Minimum Value for Diagnostic Data … Maximum Value for Diagnostics Data	0.10	
MAXIMUM SHUTDOWN, Event Generates a DTC in DM1	Drop List	True	
MAXIMUM SHUTDOWN, Lamp Set by Event	Drop List	1 – Amber, warning	
MAXIMUM SHUTDOWN, SPN for Event	0...524287	520192 ($7F000)	It is the user's responsibility to select an SPN that will not violate the J1939 standard.

MAXIMUM SHUTDOWN, FMI for Event	Drop List	31, Condition exists	
MAXIMUM SHUTDOWN, Delay Before Event is Flagged	0...60000 ms	1000	
MAXIMUM WARNING, Event Generates a DTC in DM1	Drop List	True	
MAXIMUM WARNING, Lamp Set by Event	Drop List	1 – Amber, warning	
MAXIMUM WARNING, SPN for Event	0...524287	520193 ($7F001)	It is the user's responsibility to select an SPN that will not violate the J1939 standard.
MAXIMUM WARNING, FMI for Event	Drop List	31, Condition exists	
MAXIMUM WARNING, Delay Before Event is Flagged	0...60000 ms	1000	
MINIMUM WARNING, Event Generates a DTC in DM1	Drop List	True	
MINIMUM WARNING, Lamp Set by Event	Drop List	1 – Amber, warning	
MAXIMUM WARNING, SPN for Event	0...524287	520194 ($7F002)	It is the user's responsibility to select an SPN that will not violate the J1939 standard.
MINIMUM WARNING, FMI for Event	Drop List	31, Condition exists	
MINIMUM WARNING, Delay Before Event is Flagged	0...60000 ms	1000	
MINIMUM SHUTDOWN, Event Generates a DTC in DM1	Drop List	True	
MINIMUM SHUTDOWN, Lamp Set by Event	Drop List	1 – Amber, warning	
MINIMUM SHUTDOWN, SPN for Event	0...524287	520195 ($7F003)	It is the user's responsibility to select an SPN that will not violate the J1939 standard.
MINIMUM SHUTDOWN, FMI for Event	Drop List	31, Condition exists	
MINIMUM SHUTDOWN, Delay Before Event is Flagged	0...60000 ms	1000	

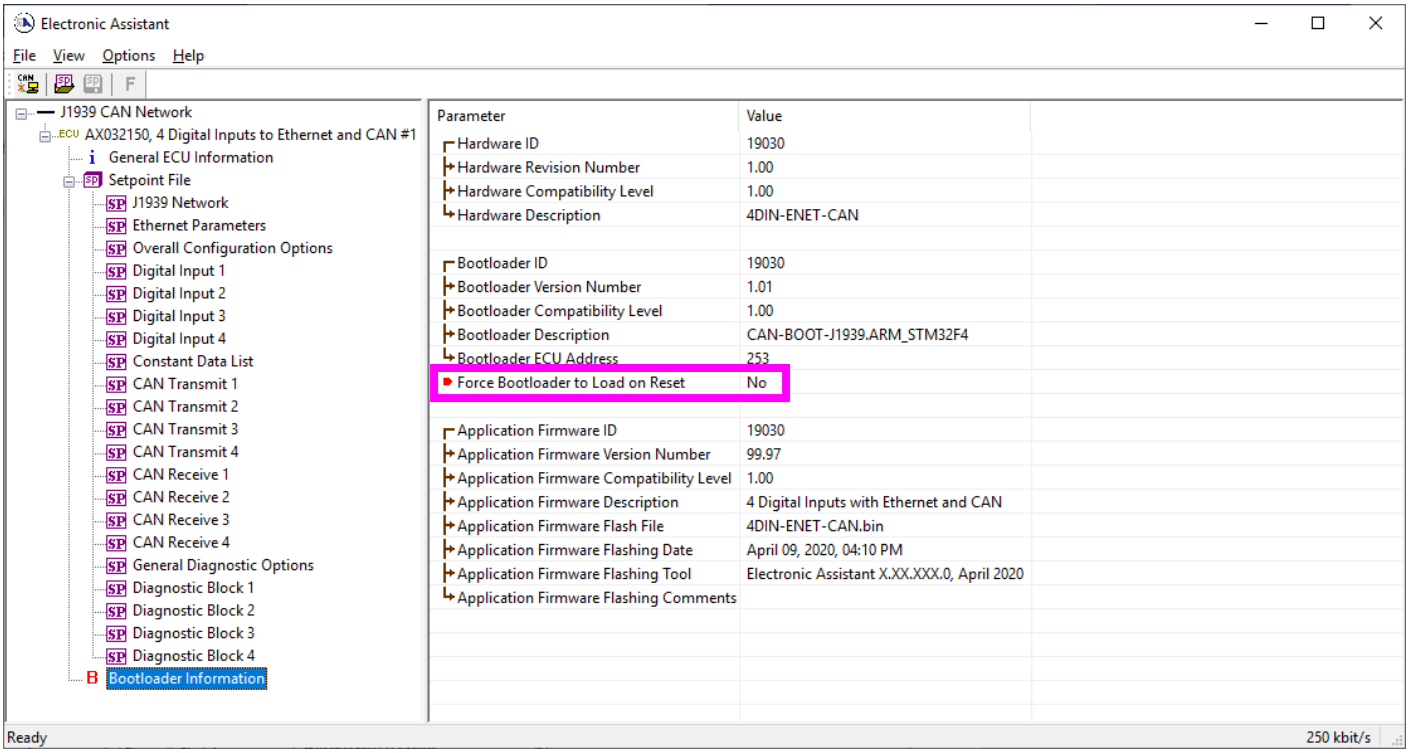
Table 21 – Diagnostic Block Setpoints

6. REFLASHING OVER CAN WITH EA BOOTLOADER

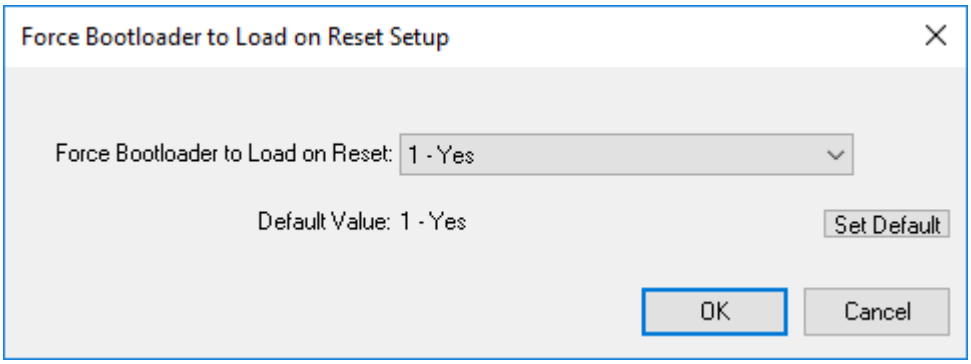
The AX032150 can be upgraded with new application firmware using the **Bootloader Information** section. This section details the simple step-by-step instructions to upload new firmware provided by Axiomatic onto the unit via CAN, without requiring it to be disconnected from the J1939 network.

Note: To upgrade the firmware use Electronic Assistant ® V5.?.?.0 or higher.

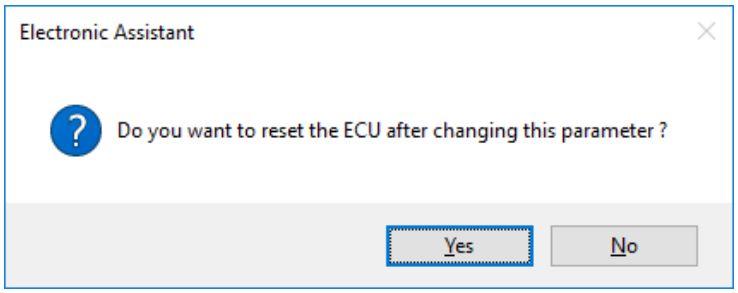
1. When EA first connects to the ECU, the **Bootloader Information** section will display the following information.



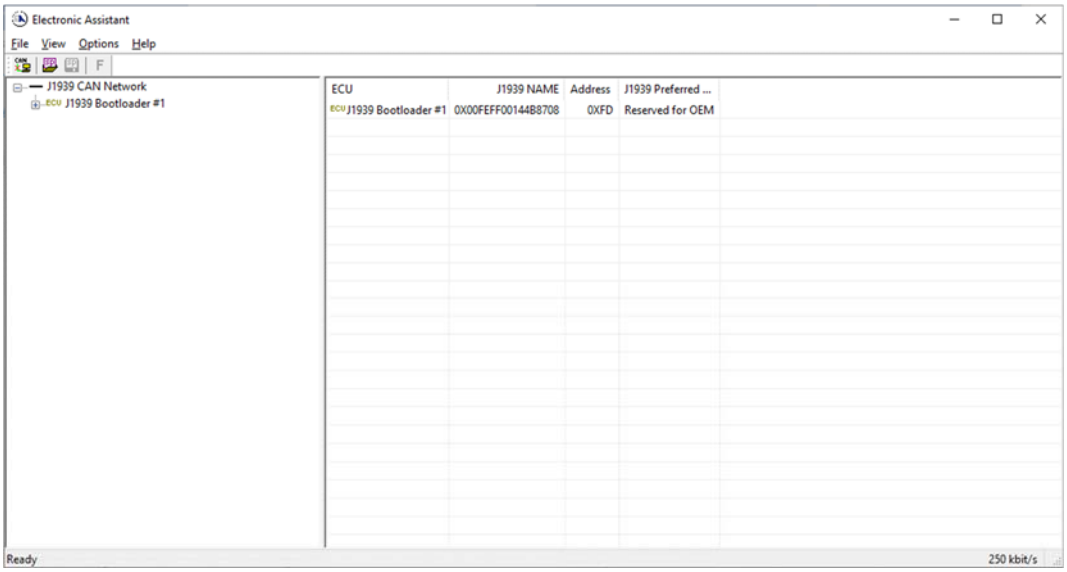
2. To use the bootloader to upgrade the firmware running on the ECU, change the variable **"Force Bootloader To Load on Reset"** to *Yes.*

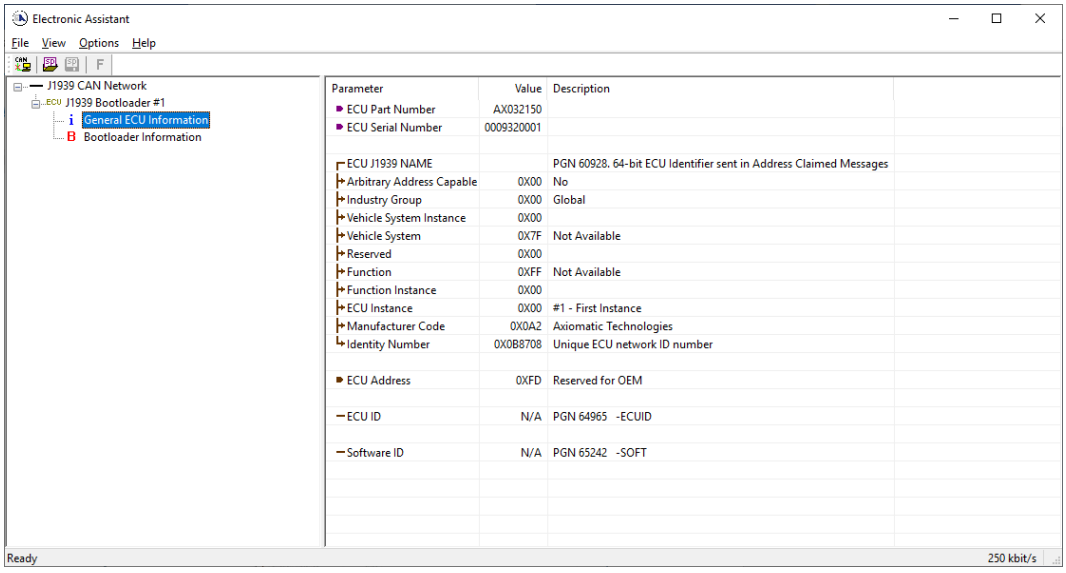


3. When the prompt box asks if you want to reset the ECU, select *Yes*.



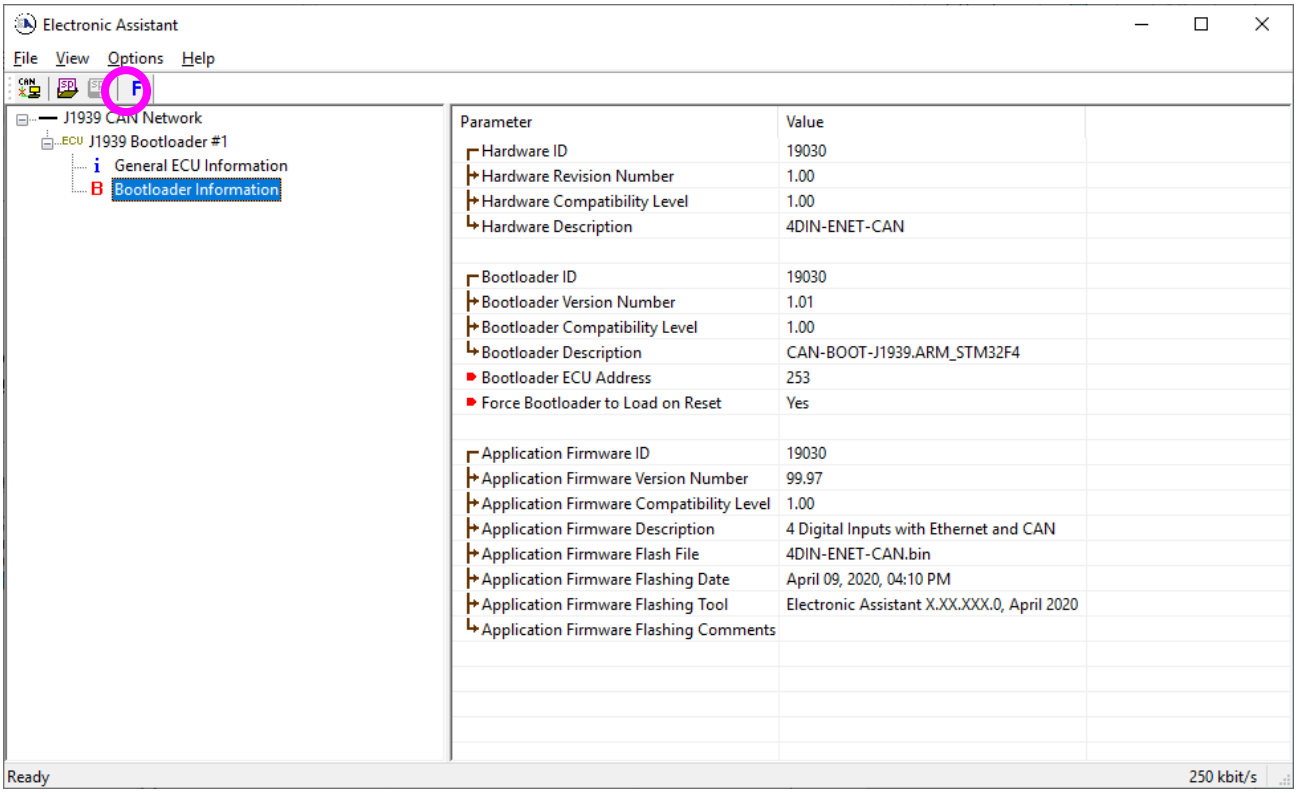
4. Upon reset, the ECU will no longer show up on the J1939 network as an AX032150 but rather as **J1939 Bootloader #1**.





Note that the bootloader is NOT Arbitrary Address Capable. This means that if you want to have multiple bootloaders running simultaneously (not recommended) you would have to manually change the address for each one before activating the next, or there will be address conflicts. And only one ECU would show up as the bootloader. Once the 'active' bootloader returns to regular functionality, the other ECU(s) would have to be power cycled to re-activate the bootloader feature.

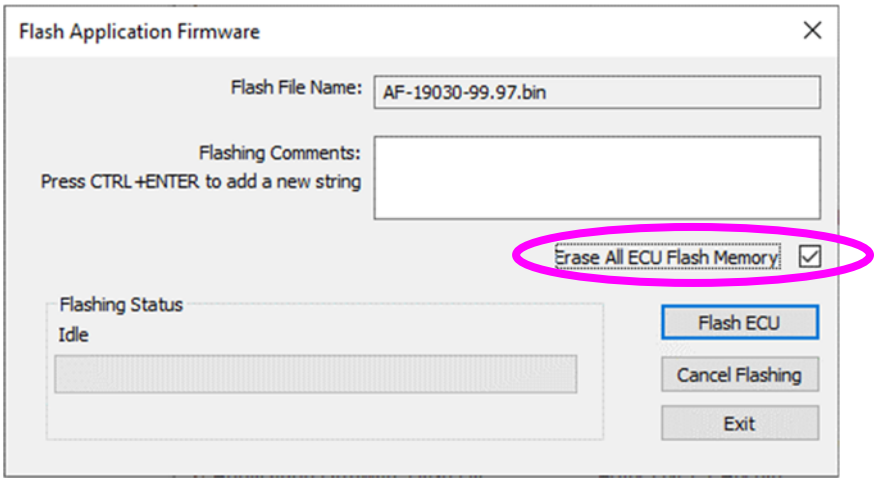
5. When the **Bootloader Information** section is selected, the same information is shown as when it was running the AX032150 firmware, but in this case the **F**lashing feature has been enabled.



6. Select the **F**lashing button and navigate to where you had saved the **AF-19030-x.xx.bin** file sent from Axiomatic. (Note: only binary (.bin) files can be flashed using the EA tool.)

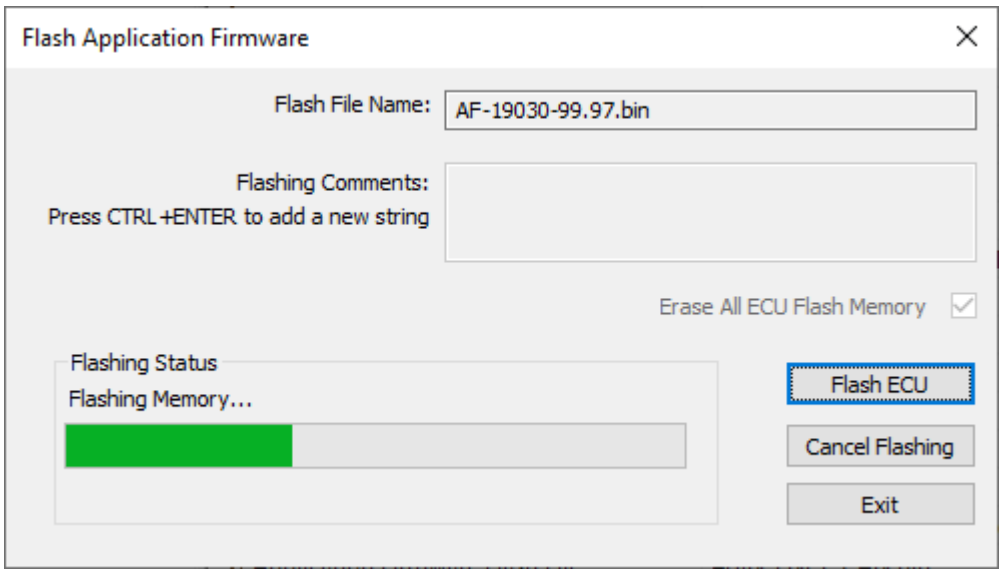
7. Once the Flash Application Firmware window opens, you can enter comments such as “Firmware upgraded by [Name]” if you so desire. This is not required, and you can leave the field blank if you do not want to use it.

   Note: You do not have to date/time-stamp the file, as the EA tool automatically does this when you upload the new firmware.

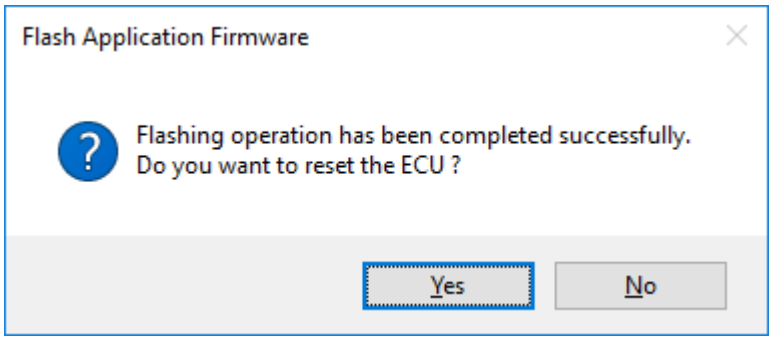


NOTE: It is good practice to tick the “Erase All ECU Flash Memory” box. Please note, that selecting this option will **erase ALL data stored in non-volatile flash**. It will also erase any configuration of the setpoints that might have been done to the ECU and reset all setpoints to their factory defaults. In case the controller contains custom settings, those settings need to be saved to PC before reflashing.

A progress bar will show how much of the firmware has been sent as the upload progresses. The more traffic there is on the J1939 network, the longer the upload process will take.



Once the firmware has finished uploading, a message will pop up indicating the successful operation. If you select to reset the ECU, the new version of the AX032150 application will start running, and the ECU will be identified as such by EA. Otherwise, the next time the ECU is power-cycled, the AX032150 application will run rather than the bootloader function.



Note: If at any time during the upload the process is interrupted, the data is corrupted (bad checksum) or for any other reason the new firmware is not correct, i.e. bootloader detects that the file loaded was not designed to run on the hardware platform, the bad or corrupted application will not run. Rather, when the ECU is reset or power-cycled the **J1939 Bootloader** will continue to be the default application until valid firmware has been successfully uploaded into the unit.

APPENDIX A - TECHNICAL SPECIFICATION

Power Supply

Power Supply Input	12 Vdc or 24 Vdc nominal 9…36 Vdc power supply range
Protection	Reverse polarity protection is provided up to -50V. Under-voltage protection is provided with hardware shutdown at 4V. Over-voltage protection is provided with hardware shutdown at 41V.

Inputs

Inputs	4 Digital Signal Inputs Active High or Active Low with user selectable pull-up (+5V)/pull-down (GND) through 10 kOhm resistor Digital input pairs (1&2 and/or 3&4) can be configured as standard A & B Phase Encoder inputs Frequency range: 0-100 kHz Amplitude: 0-32V The digital input return path should be connected to the Power Supply Negative pin.
Input Grounds	Provided

General Specifications

Microprocessor	STM32F407VGT7, 32-bit, 1MByte flash memory
Typical Quiescent Current	60 mA @ 12Vdc; 30 mA @ 24Vdc Typical
CAN Communications	1 CAN port (SAE J1939) Model: AX032150 – 250 kbps baud rate
Control Logic	Refer to the user manual.
Ethernet	One 10/100 Mbit Ethernet port 10BASE-T 100BASE-Tx (Auto-configuration and full duplex is supported.) Auto-MDIX
Software Reflashing	Electronic Assistant P/N: AX070502
User Interface	The Electronic Assistant, P/N: **AX070502**, for *Windows* operating systems comes with a royalty-free license for use on multiple computers. It includes an Axiomatic USB-CAN converter to link the device's CAN port to a *Windows*-based PC. The controller is also configurable via the Ethernet.
Operating Conditions	-40 to 85 °C (-40 to 185 °F)
Storage Temperature	-55 to 125 °C (-67 to 257°F)
Protection	IP67
Weight	0.15 lb. (0.068 kg)
Vibration	Random Vibration: 6.0 Grms peak Based on ISO16750-3, Section 4.1.2.7
Enclosure and Dimensions	Molded Enclosure, integral connector Nylon 6/6, 30% glass Ultrasonically welded 3.54 x 2.75 x 1.31 inches (90.09 x 70.00 x 33.35 mm) L x W x H including integral connector Refer to the dimensional drawing, Figure 2.0.

<table>
<tr><td>Electrical Connections</td><td>Integral TE Deutsch 12 pin receptacle (P/N: DTM04-12PA)
Mates to: PL-DTM06-12SA Mating Plug Kit :1 DTM06-12SA, 1 WM-12S, 12 0462-201-20141, 6 0413-204-2005 Sealing Plug

<table><tr><th>PIN #</th><th>FUNCTION</th></tr><tr><td>1</td><td>BATT-</td></tr><tr><td>2</td><td>TX+</td></tr><tr><td>3</td><td>RX+</td></tr><tr><td>4</td><td>Digital Input 3</td></tr><tr><td>5</td><td>Digital Input 4</td></tr><tr><td>6</td><td>CAN H</td></tr><tr><td>7</td><td>CAN L</td></tr><tr><td>8</td><td>Digital Input 2</td></tr><tr><td>9</td><td>Digital Input 1</td></tr><tr><td>10</td><td>RX-</td></tr><tr><td>11</td><td>TX-</td></tr><tr><td>12</td><td>BATT+</td></tr></table></td></tr>
<tr><td>Network Termination</td><td>It is necessary to terminate the network with external termination resistors. The resistors are 120 Ohm, 0.25W minimum, metal film or similar type. They should be placed between CAN_H and CAN_L terminals at both ends of the network.</td></tr>
<tr><td>Mounting</td><td>Mounting holes are sized for #8 or M4 bolts. The bolt length will be determined by the end-user’s mounting plate thickness. The mounting flange of the controller is 0.425 inches (10.8 mm) thick.

If the module is mounted without an enclosure, it should be mounted vertically with connectors facing left or right to reduce likelihood of moisture entry.

The CAN wiring is considered intrinsically safe. The power wires are not considered intrinsically safe and so in hazardous locations, they need to be located in conduit or conduit trays at all times. The module must be mounted in an enclosure in hazardous locations for this purpose.

No wire or cable harness should exceed 30 meters in length. The power input wiring should be limited to 10 meters.

All field wiring should be suitable for the operating temperature range.

Install the unit with appropriate space available for servicing and for adequate wire harness access (6 inches or 15 cm) and strain relief (12 inches or 30 cm).</td></tr>
</table>

OUR PRODUCTS

Actuator Controls

Automotive Ethernet Converters

Battery Chargers

CAN bus Controls

CAN/Wifi, CAN/Bluetooth

Current/Voltage Converters

DC/DC Power Converters

Engine Temperature Scanners

Ethernet/CAN Converters, Switches

Fan Drive Controllers

Gateways, CAN/Modbus Protocols

Gyroscope Inclinometers

Hydraulic Valve Controllers

Inclinometers, Triaxial

I/O Controls

LVDT Simulators

Machine Controls

Modbus Controls

Motor Controls

Power Supplies

PWM Signal Converters/Isolators

Resolver Signal Conditioners

Service Tools

Signal Conditioners, Converters

Strain Gauge CAN Controls

Surge Suppressors

OUR COMPANY

Axiomatic provides electronic machine controls, components, and systems to the off-highway, commercial vehicle, electric vehicle, power generator set, material handling, renewable energy and industrial OEM markets.

We innovate with engineered and off-the-shelf machine controls that add value for our customers. We emphasize service and partnership with our customers, suppliers, and employees to build long term relationships and mutual trust.

QUALITY DESIGN AND MANUFACTURING

Axiomatic in Canada operates an ISO 9001:2015 registered design and manufacturing facility.

SERVICE

All products to be returned to Axiomatic require a Return Materials Authorization Number (RMA#). Please request an RMA# from sales@axiomatic.com.

Please provide the following information when requesting an RMA number:

- Serial number, part number
- Axiomatic invoice number and date
- Hours of operation, description of problem
- Wiring set up diagram, application
- Other comments as needed

All products should be serviced by Axiomatic. Do not open the product and perform the service yourself.

DISPOSAL

Axiomatic products are electronic waste. Please follow your local environmental waste and recycling laws, regulations and policies for safe disposal or recycling of electronic waste.

WARRANTY, APPLICATION APPROVALS/LIMITATIONS

Axiomatic Technologies Corporation reserves the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. Users should satisfy themselves that the product is suitable for use in the intended application. All our products carry a limited warranty against defects in material and workmanship. Please refer to our Warranty, Application Approvals/Limitations and Return Materials Process as described on www.axiomatic.com/service.html.

CONTACTS

Axiomatic Technologies Corporation
5915 Wallace Street
Mississauga, ON
CANADA L4Z 1Z8
TEL: +1 905 602 9270
FAX: +1 905 602 9279
www.axiomatic.com

Axiomatic Technologies Oy
Höytämöntie 6
33880 Lempäälä
FINLAND
TEL: +358 103 375 750
FAX: +358 3 3595 660
www.axiomatic.fi