USER MANUAL UMAX080310
Version 1.0.2

Isolated 24V/24V, 350W DC-DC Converter

SAE J1939

USER MANUAL

P/N: AX080310

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VERSION HISTORY

Version	Date	Author	Modification
1.0.0	Dec. 16, 2025	Jordan Wilbur	Initial Draft
1.0.1	Dec. 19, 2025	M Ejaz	Updated technical specifications
1.0.2	Jan. 28, 2026	M Ejaz	Updated technical specifications

ACRONYMS

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	Axiomatic Electronic Assistant (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+)

TABLE OF CONTENTS

REFERENCES

J1939	Recommended Practice for a Serial Control and Communications Vehicle Network, SAE, February 2010
J1939/21	Data Link Layer, SAE, December 2006
J1939/71	Vehicle Application Layer, SAE, March 2011
J1939/73	Application Layer-Diagnostics, SAE, February 2010
J1939/81	Network Management, SAE, March 2017
TDAX031200	Technical Datasheet, Axiomatic Technologies
UMAX07050x	User Manual, Axiomatic Electronic Assistant and USB-CAN, Axiomatic Technologies

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 Axiomatic Electronic Assistant V5.18.149.0 and higher.

1. OVERVIEW OF CONTROLLER

This User Manual describes the architecture and functionality of the PS-24-24-350W-CAN controller.

The controller is designed to supply 24V output at a maximum of 350W power consumption. The controller has an onboard microcontroller which monitors the device inputs, controls the device outputs, and can communicate over a SAE J1939 network.

The various function blocks supported by the ECU are outlined in the following sections. All setpoints are user-configurable using the Axiomatic Electronic Assistant. Programming configurable properties, EA setpoints, are listed in chapter 4. 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, "**Software Filter Type**" setpoint set to option '*No Filter*. Model **AX080310** has an Auto Baud Rate feature.

In this document the configurable properties of the ECU are divided into function blocks, namely input function block, output function block, diagnostic function block, CAN transmit message function block and CAN receive message function block. Input function block includes properties used to select input sensor functionality. Diagnostic function block properties are used to configure fault detection and reaction functionalities. The CAN transmit message function block configures properties of the messages sent to the CAN busses. And the CAN receive message function block configures properties of the messages received from the CAN busses. These function blocks are presented in detail in next subchapters.

Figure 1 – The ECU Flowchart (Pending)

1.1. Power Supply Control Function Block

The Power Supply (PS) function block consists of the objects related to controlling/reading the power supply output/inputs.

1.1.1. Power Supply Output Control

The AX080310 controller is designed to output a 24V supply at a maximum 350W output. There are two internal signals for controlling the output voltage and current limit. Output voltage is not used by default, as early versions of the AX080310 do not have Output Voltage Adjust capability.

Output Current Limit contains the following setpoints:

Default Output Value – This value is used when there is no **control source** configured for Current Limit. By default, this is set to 15A.

Output at Minimum Command – This value is used when the current limit **control source** is set to *Received CAN Message*. By default, this is 0 amps. This value represents the output current limit when the CAN receive command is at or below its minimum (see CAN Receive block for more information).

Output at Maximum Command – This value is used when the current limit **control source** is set to *Received CAN Message*. By default, this is 15 amps. This value represents the output current limit when the CAN receive command is at or above its maximum (see CAN Receive block for more information).

Control Source & Control Number – The Current Limit can be controlled in 2 ways, or set to *No Control Source*, in which case the **default value** is used. If desired, the user can configure the current limit using CAN messages by switching the control source to *Received CAN message*, and the corresponding **control number** will choose which CAN receive signal is used. The default control configuration, which is recommended, is the internal *manufacturer specific profile*, which will be described more in detail below:

By default, the current limit is set to follow the *manufacturer specific profile*. This behaviour is controlled using the measured input voltage as shown in Figure 2. When input voltage is >18V, the current limit is set to max (15A). When input voltage is <18V, the current limit varies linearly with the input voltage. Note that the output voltage will still shut off below the fault threshold, despite the graph showing the linear relationship going from 0 to 18V.

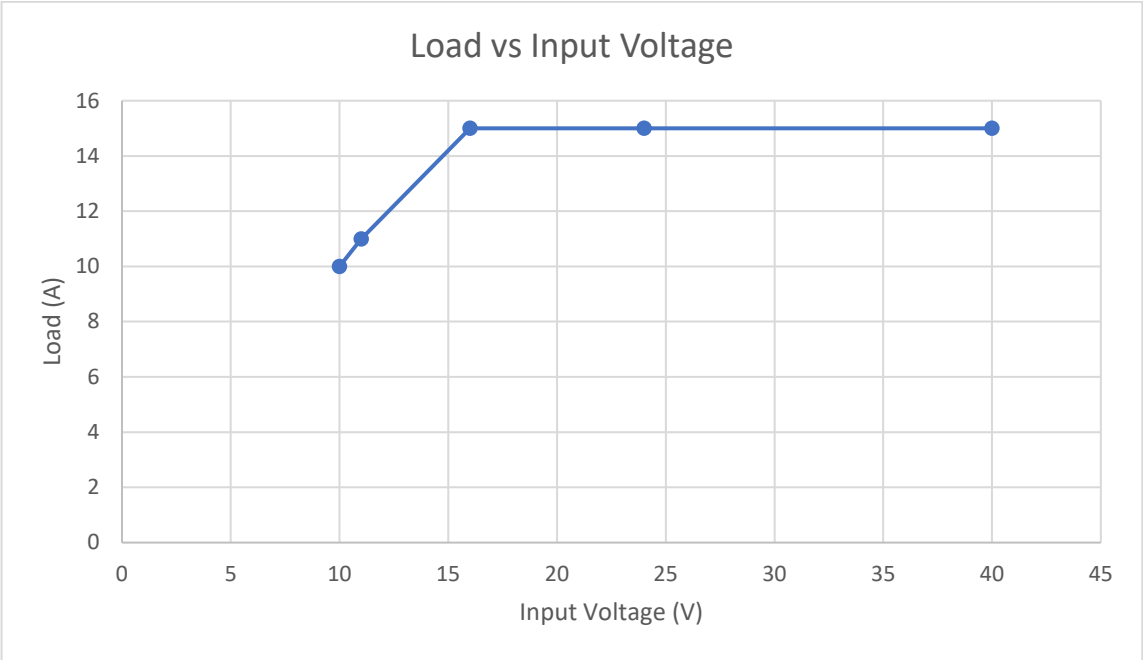


Figure 2 – Manufacturer Default Current Limit Behaviour

1.1.2. Input Supply Voltage Control

The AX080310 contains hardware safety features in the event of over/undervoltage (see APPENDIX A - for details). Limits can also be set in software by using the **Input Fault Minimum** and **Input Fault Maximum** setpoints. The 24V output will be disabled if these limits are exceeded, and the output will turn back on once the input voltage is within the acceptable range. By default the acceptable range configured by these setpoints is: [9.0V < Vin < 48.0V]. If desired, DM1 diagnostic messages can be sent using the Diagnostics block as described in section 0.

When using input voltage to control the current limit, it may be desirable to filter the input measurement to avoid the current limit following a ripple on the input voltage. This can be accomplished by using the **Software Filter Type** and **Software Filter Constant** setpoints. The options for the filtering are as follows:

Value	Meaning
0	No Filter
1	Moving Average
2	**Repeating Average**

Table 1 – Software Filter Type Options

Along with the filter constant, the filter type determines the processing done on the input measurement as per the descriptions below:

Calculation with no filter:
Value = Input
The data is simply a ‘snapshot’ of the latest value measured by the ADC or timer.

Calculation with the moving average filter:

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

The value FilterConstant is 200 by default.

Calculation with the repeating average filter:

$$Value = \frac{\sum Input_N}{N}$$

At every reading of the input value, it is added to the sum. At every N^{th} read, the sum is divided by N, and the result is the new input value. The value and counter will be set to zero for the next read. The value of N is 200 by default. This results in a default behaviour which averages the input voltage measurements every 200ms.

1.1.3. Misc Power Supply Controls

This group of setpoints contains general control options for the AX080310.

In general, the power supply can be turned ON/OFF using the physical Digital Enable input, or the Software Enable command. The **Command Mode** setpoint determines which behaviour is used. The options for this setpoint are as follows:
Hardware Enable Only – The 24V output can only be enabled through the hardware enable switch.
Software Enable Only – The 24V output can only be enabled through the software command.
Hardware or Software Enable – The 24V output can be enabled through either hardware or software sources. The ECU will react to whichever command was last received.

By default, the **software command source** and **software command number** are configured to use CAN receive #1. This configuration allows the user to send a value of 0 or 1 to the default CAN receive #1 signal to enable/disable the 24V output.

The **Hardware enable deglitch time** can be used to prevent accidental switching OFF of the hardware signal from shutting down the output. When the hardware signal goes from ON to OFF, the ECU will not consider this a shutdown command until the time in this setpoint (in milliseconds) has elapsed. This time is in addition to any configured shutdown delay, as described in section 1.1.3.1.

If the **Sleep Delay** setpoint is set to 0, sleep mode is disabled. Otherwise, if during regular operation the power supply is commanded OFF, the controller will wait the amount of time (in milliseconds) specified in this setpoint before going to sleep. The controller will wake upon receiving a CAN frame, or when the Remote Enable signal changes state. If the device is transmitting any CAN frames, the device will not go to sleep, to continue sending and receiving over the CAN bus.

1.1.3.1. Misc Power Supply Controls – Delayed Shutdown

The power supply can be configured to delay shutdown after receiving a command to disable the output (this applies to both CAN and the Enable Pin). The logic for this is shown in **Figure 3** below.

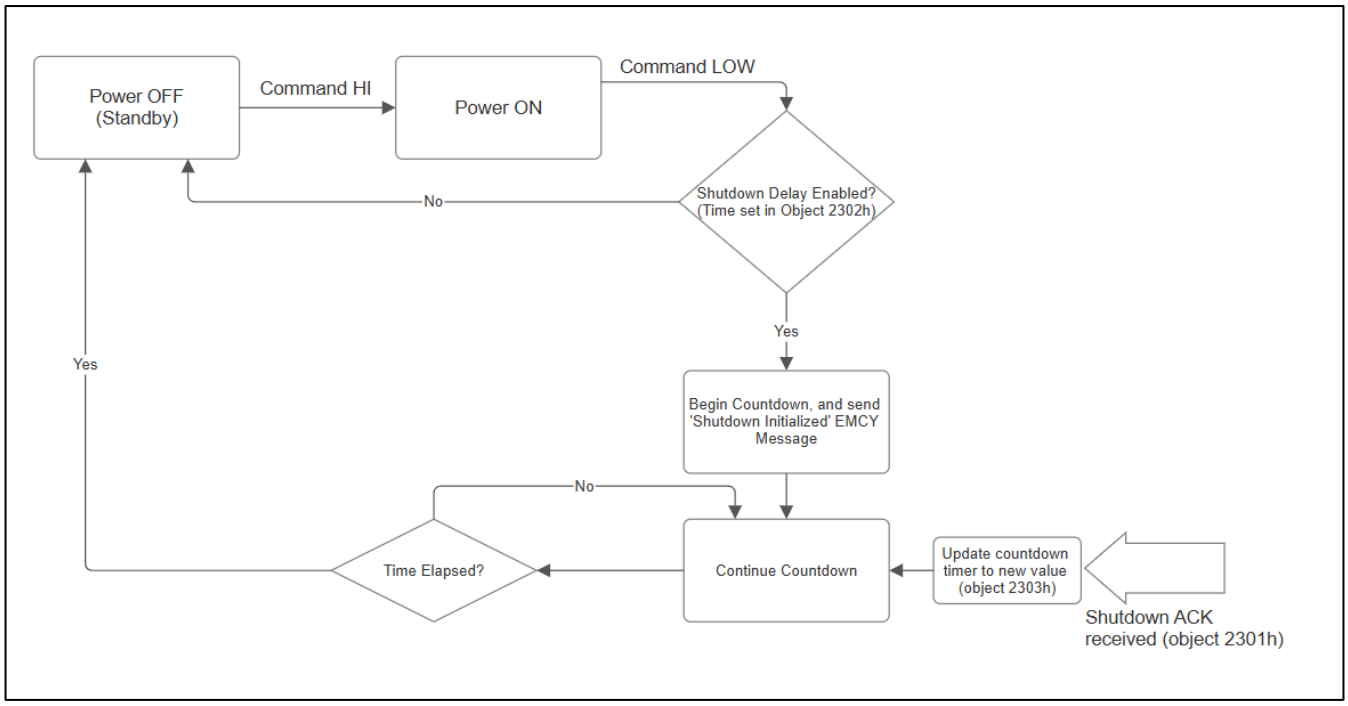


Figure 3 – Power Supply Control Block Diagram

The **Shutdown Delay - Base** and **Shutdown Delay - Acknowledged** setpoints can be used to modify the delay time before shutting down the output.

The value in **Shutdown Delay - Base** represents a delay time in milliseconds. When the power supply is commanded OFF, the controller begins counting down from this value. In addition, a DM1 message can be sent over the CAN network using the **Diagnostic Block** to alert any connected ECUs that a shutdown has started, by using the diagnostic control source *shutdown state*. Diagnostics are described in more detail in section 0.

To allow a faster shutdown time, connected ECUs can optionally send an acknowledge message to the CAN Receive message configured by the **shutdown acknowledge source** and **shutdown acknowledge number**. The countdown timer will be updated to the value (in milliseconds) set by the **Shutdown Delay - Acknowledged** setpoint. If the ongoing countdown is already lower than the time set in this setpoint, then no change will occur. When the countdown timer has elapsed, the power supply output will be disabled.

1.2. Diagnostic Function Blocks

The 24V/24V DC-DC Converter ECU supports diagnostic messaging. DM1 message is a message, containing Active Diagnostic Trouble Codes (DTC) that is sent to the J1939 network in case a fault has been detected. A Diagnostic Trouble Code is defined by the J1939 standard as a four byte value which is a combination of:

SPN	Suspect Parameter Number	(user defined)
FMI	Failure Mode Identifier	(see Table 4)
CM	Conversion Method	(always set to 0)
OC	Occurrence Count	(number of times the fault has happened)

In addition to supporting the DM1 message, 24V/24V DC-DC Converter also supports:

DM2	Previously Active Diagnostic Trouble Codes	Sent only on request
DM3	Diagnostic Data Clear/Reset of Previously Active DTCs	Done only on request
DM11	Diagnostic Data Clear/Reset for Active DTCs	Done only on request

Fault detection and reaction is a standalone functionality that can be configured to monitor and report diagnostics of various controller parameters. The 24V/24V DC-DC Converter supports 8 Diagnostics Definitions, each freely configurable by the user.

There are 4 fault types that can be used, “**Minimum and maximum error**”, “**Absolute value error**”, “**State error**” and “**Double minimum and maximum error**”.

Minimum and maximum error has two thresholds, “MIN Shutdown” and “MAX Shutdown” that have configurable, independent diagnostics parameters (SPN, FMI, Generate DTCs, delay before flagging status). In case the parameter to monitor stays between these two thresholds, the diagnostic is not flagged.

Absolute value error has one configurable threshold with configurable parameters. In case the parameter to monitor stays below this threshold, the diagnostic is not flagged.

State error is similar to the Absolute value error, the only difference is that State error does not allow the user to specify specific threshold values; thresholds ‘1’ and ‘0’ are used instead. This is ideal for monitoring state information, such as received message timeouts.

Double minimum and maximum error lets user to specify four thresholds, each with independent diagnostic parameters. The diagnostic status and threshold values is determined and expected as show in Figure 4 below.

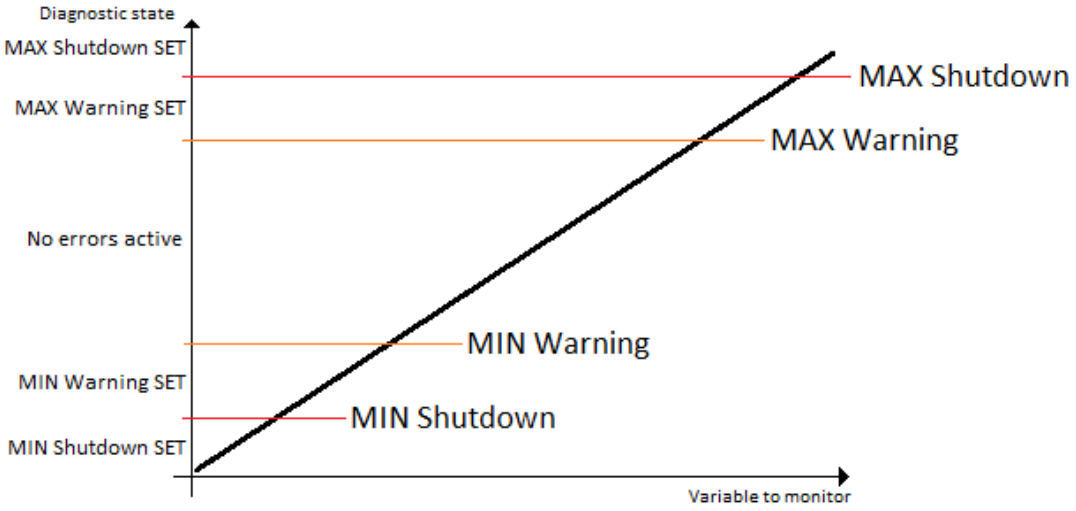


Figure 4 – Double Minimum and Maximum Error Thresholds

In case any of the Diagnostics blocks is configured to monitor Output Current Feedback, there is an internal error status flag maintained automatically for that particular output. This internal flag can be used for driving the particular output to a specified state in case of diagnostic event using Proportional Current Output setpoints “Control Fault Response”, “Output in Fault Mode” and “Fault Detection Enabled”.

There is also built in error status flags for power supply and CPU temperature monitoring. In case any of the diagnostics blocks is measuring these two parameters, the corresponding internal error status flags can be used for shutting down the unit in case of failure. The setpoints “**Power Fault Disables Outputs**” and “**Over Temperature Shutdown**” can be used for enabling the shutdown of the unit (shutdown == output driving is turned off).

While there are no active DTCs, the 24V/24V DC-DC Converter will send “No Active Faults” message. If a previously inactive DTC becomes active, a DM1 will be sent immediately to reflect this. As soon as the last active DTC goes inactive, a DM1 indicating that there are no more active DTCs will be sent.

If there is more than one active DTC at any given time, the regular DM1 message will be sent using a multipacket message to the Requester Address using the Transport Protocol (TP).

At power up, the DM1 message will not be broadcasted until after 5 second delay. This is done to prevent any power up or initialization conditions from being flagged as an active error on the network.

When the fault is linked to a DTC, a non-volatile log of the occurrence count (OC) is kept. As soon as the controller detects a new (previously inactive) fault, it will start decrementing the “**Delay before Event is flagged**” timer for that Diagnostic function block. If the fault has remained present during the delay time, then the controller will set the DTC to active, and will increment the OC in the log. A DM1 will immediately be generated that includes the new DTC. The timer is provided so that intermittent faults do not overwhelm the network as the fault comes and goes, since a DM1 message would be sent every time the fault shows up or goes away.

By default, the fault flag is cleared when error condition that has caused it goes away. The DTC is made Previously Active and is it is no longer included in the DM1 message. To identify a fault having happened, even if the condition that has caused is one away, the "**Event Cleared only by DM11**" setpoint can be set to '*True*'. This configuration enables DTC to stay Active, even after the fault flag has been cleared, and be included in DM1 message until a Diagnostic Data Clear/Reset for Active DTCs (DM11) has been requested.

As defined by J1939 Standard the first byte of the DM1 message reflects the Lamp status. "**Lamp Set by Event**" setpoint determines the lamp type set in this byte of DTC. "**Lamp Set by Event"** setpoint options are listed in Table 2. By default, the '*Amber, Warning'* lamp is typically the one set be any active fault.

Table 2 – Lamp Set by Event in DM1 Options

0	*Protect*
1	*Amber Warning*
2	*Red Stop*
3	*Malfunction*

"**SPN for Event**" defines suspect parameter number used as part of DTC. The default value zero is not allowed by the standard, thus no DM will be sent unless "**SPN for Event**" in is configured to be different from zero. **It is user's responsibility to select SPN that will not violate J1939 standard.** When the "**SPN for Event**" is changed, the OC of the associated error log is automatically reset to zero.

Table 3 – FMI for Event Options

0	*Data Valid But Above Normal Operational Range - Most Severe Level*
1	*Data Valid But Below Normal Operational Range - Most Severe Level*
2	*Data Intermittent*
3	*Voltage Above Normal, Or Shorted To High Source*
4	*Voltage Below Normal, Or Shorted To Low Source*
5	*Current Below Normal Or Open Circuit*
6	*Current Above Normal Or Grounded Circuit*
7	*Mechanical Error*
8	*Abnormal Frequency Or Pulse Width Or Period*
9	*Abnormal Update Rate*
10	*Abnormal Rate Of Change*
11	*Root Cause Not Known*
12	*Bad Component*
13	*Out Of Calibration*
14	*Special Instructions*
15	*Data Valid But Above Normal Operating Range – Least Severe Level*
16	*Data Valid But Above Normal Operating Range – Moderately Severe Level*
17	*Data Valid But Below Normal Operating Range – Least Severe Level*
18	*Data Valid But Below Normal Operating Range – Moderately Severe Level*
19	*Network Error*
20	*Data Drifted High*
21	*Data Drifted Low*
31	*Condition Exists*

Every fault has associated a default FMI with them. The used FMI can be configured with "**FMI for Event**" setpoint, presented in Table 3. When an FMI is selected from Low Fault FMIs in Table 4 for a fault that can be flagged either high or low occurrence, it is recommended that the user would select the high occurrence FMI from the right column of Table 4. There is no automatic setting of High and Low FMIs in the firmware, the user can configure these freely.

Table 4 – Low Fault FMIs and corresponding High Fault FMIs

Low Fault FMIs	High Fault FMIs
FMI=1, Data Valid But Below Normal Operation Range – Most Severe Level	*FMI=0, Data Valid But Above Normal Operational Range – Most Severe Level*
FMI=4, Voltage Below Normal, Or Shorted to Low Source	*FMI=3, Voltage Above Normal, Or Shorted To High Source*
FMI=5, Current Below Normal Or Open Circuit	*FMI=6, Current Above Normal Or Grounded Circuit*
FMI=17, Data Valid But Below Normal Operating Range – Least Severe Level	*FMI=15, Data Valid But Above Normal Operating Range – Least Severe Level*
FMI=18, Data Valid But Below Normal Operating Level – Moderately Severe Level	*FMI=16, Data Valid But Above Normal Operating Range – Moderately Severe Level*
FMI=21, Data Drifted Low	*FMI=20, Data Drifted High*

1.3. Constant Data

The Constant Data Block contains 2 fixed (False/True) and 13 configurable constant data setpoints which can be used as a control source for other functions. While they are available as a control source to all functions, it is recommended not to use constant data as a control source for the Set-Reset Latch Block.

1.4. 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 **AX080310** ECU has four CAN Transmit Messages and each message has four completely user defined signals.

1.1.1. CAN Transmit Message Setpoints

Each CAN Transmit Message setpoint group includes setpoints that effect 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 "**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.

By default, all messages are sent on Proprietary B PGNs as broadcast messages. Thus "**Transmit Message Priority**" is always initialized to 6 (low priority) and the "**Destination Address**" setpoint is not used. This setpoint is only valid when a PDU1 PGN has been selected, and it can be set either to the Global Address (0xFF) for broadcasts, or sent to a specific address as setup by the user.

1.1.2. CAN Transmit Signal Setpoints

Each CAN transmit message has four associated signals, which define data inside the Transmit message. "**Signal X Data Source**" setpoint together with "**Signal X Data Number**" setpoint define the signal source of the message. "**Signal X Data Source**" and "**Signal X Data Number**" options are listed in Table 5. Setting "**Signal X Data Source**" to '*Control Not Used'* disables the signal.

"**Signal X Data Size**" setpoint determines how many bits signal reserves from the message. "**Signal X Data Index in Array**" determines in which of 8 bytes of the CAN message LSB of the signal is located. Similarly "**Signal X Bit Index**" 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**.

“Signal X Resolution” setpoint determines the scaling done on the signal data before it is sent to the bus. “Signal X 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.

1.5. CAN Receive Function Block

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

The “**Receive 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 off the bud within the “**Message Timeout**” period. This could trigger a Lost Communication event as described in section 0. In order to avoid timeouts on a heavily saturated network, it is recommended to set the period at least three 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 24V/24V DC-DC Converter on Proprietary B PGNs. However, should a PDU1 message be selected, the Controller can be setup to receive it from any ECU by setting the “**Specific Address That Sends**” to the Global Address (0xFF). If a specific address is selected instead, then any other ECU data on the PGN will be ignored.

The “**Data Size**”, “**Byte Index**”, “**Bit Index**”, “**Resolution**” and “**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 “**Data Minimum**” and “**Data Maximum**” setpoints determine the minimum and maximum values of the control signal. As the names imply, they are also used as the On/Off thesholds 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 24V/24V DC-DC Converter supports up to ten unique CAN Receive Messages. Defaults setpoint values are listed in section 0.

1.6. 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 5. All sources, except "CAN message reception timeout", are available for all blocks, including output control blocks and CAN Transmit messages. Thought input Sources are freely selectable, not all options would make sense for any particular input, and it is up to the user to program the controller in a logical and functional manner.

Table 5 – Available Control Sources and Numbers

Control Source	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 10	
2: Measured Supply Voltage / Manufacturer Spec. Profile	1	Measured power supply value in Volts. The Parameter sets the threshold in Volts to compare with.
3: Constant Data	1 to 15	
4: DTC React	1 to 4	
5: Shutdown State	1	Internal Signal value 1 if shutdown has started with a delay. Value 0 otherwise.
6: CAN Receive Message Timeout	1 to 10	

Control Constant Data has no unit nor minimum and maximum assigned to it, thus user must assign appropriate constant values according to intended use.

2. INSTALLATION INSTRUCTIONS

2.1. Dimensions and Pinout

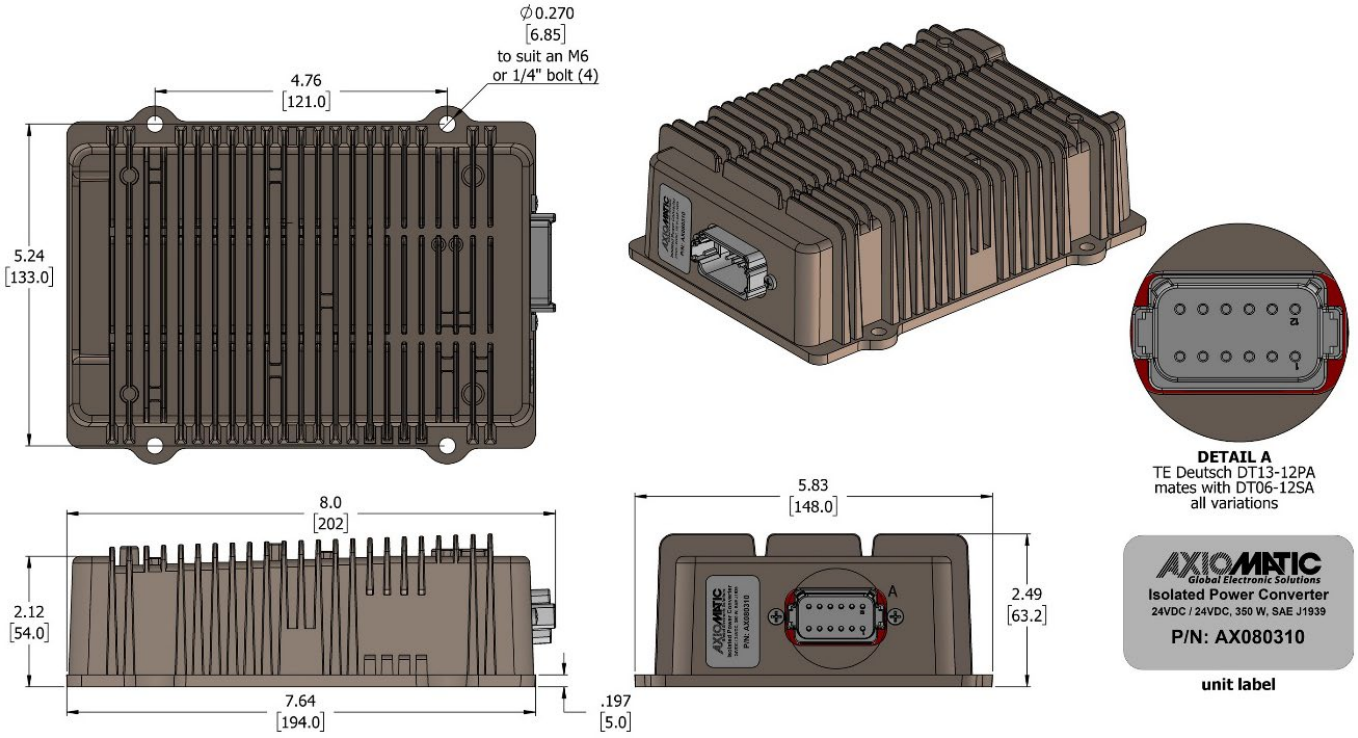


Figure 5 – AX080310 Dimensional Drawing

Table 6 – AX080310 Connector Pinout

12-pin receptacle (TE Deutsch P/N: DTM13-12PA)

Pin	Description
1	Output +
2	CAN High
3	Enable +
4	Input +
5	Input +
6	Input +
7	Input -
8	Input -
9	Input -
10	Enable -
11	CAN Low
12	Output -

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

• Software Identification	65242	0x00FEDA
• 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 Axiomatic Electronic Assistant (EA) allows for quick and easy configuration of the unit over CAN network.

3.2. NAME, Address and Software ID

The 24V/24V DC-DC Converter 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	67, Electrical System Controller
Function Instance	9, Axiomatic **AX080310**
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 ***"CAN Interface Baud-Rate"*** setpoints allows the ECU to control either the current CAN baud-rate state . If this setpoint is set to *'0, 'Auto Baud-Rate'*, the unit can perform an auto baud rate scan according to J1939/16 standard. In case when it set to any other value, the unit will be configured to stay at the chosen baud-rate.

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 24V/24V DC-DC Converter 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)*

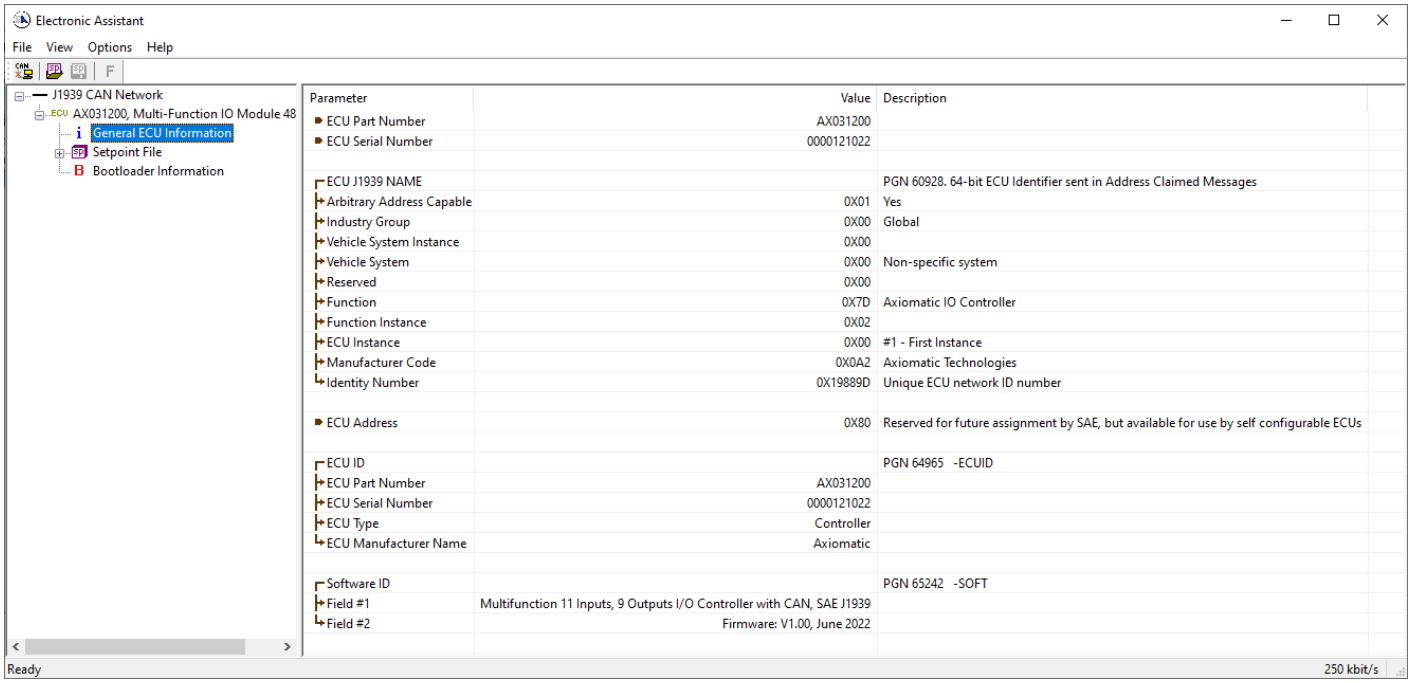


Figure 6 – General ECU Information

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 (0xFEDA)	
Start Position	Length	Parameter Name	SPN
1	1 Byte	Number of software identification fields	965
2-n	Variable	Software identification(s), Delimiter (ASCII “*”)	234

For the 24V/24V DC-DC Converter ECU, 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 below.

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)*			

3.3. Auto Baud-Rate

In the Network function block the ECU has an option to configure the auto baud-rate setting. It can be done by using the **"CAN Interface Baud-Rate"** setpoint. By default, this parameter is set to 0, *Auto Baud-Rate*. In this case, the unit will be able to reconfigure on the fly to communicate at any supported baud-rate. At power up, the ECU will listen to the bus before starting the communication. Also, the user is able to select the desired baud-rate from the drop list. In the table below, all the options are listed.

Table 7 – CAN Interface Baud-Rate Setpoint Options

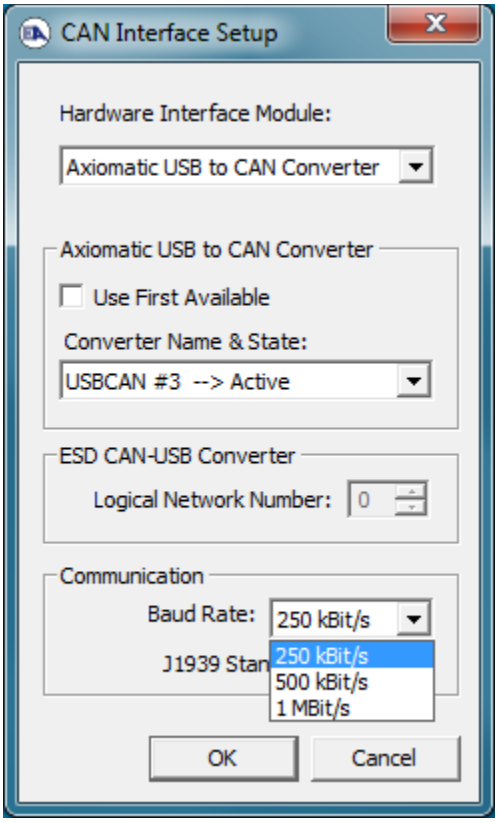
Value	Description
0	Auto Baud-Rate
1	1000 kb/s
2	667 kb/s
3	500 kb/s
4	250 kb/s
5	125 kb/s

4. ECU SETPOINTS ACCESSED WITH AXIOMATIC 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 setpoints, refer to the relevant section in this user manual.

4.1. Accessing the ECU Using Axiomatic Electronic Assistant

ECU with P/N **AX080310** does not need any specific setup for EA. In order to access the high speed versions, the CAN bus Baud Rate needs to be set accordingly. The CAN Interface Setup can be found from “Options” menu in EA. Please refer UMAX07050x **Connecting to the J1939 Bus** section for Axiomatic Electronic Assistant CAN Interface Setup instructions.



4.2. J1939 Network Parameters

“ECU Instance Number” and “ECU Address” setpoints and their effect are defined in section 3.2.

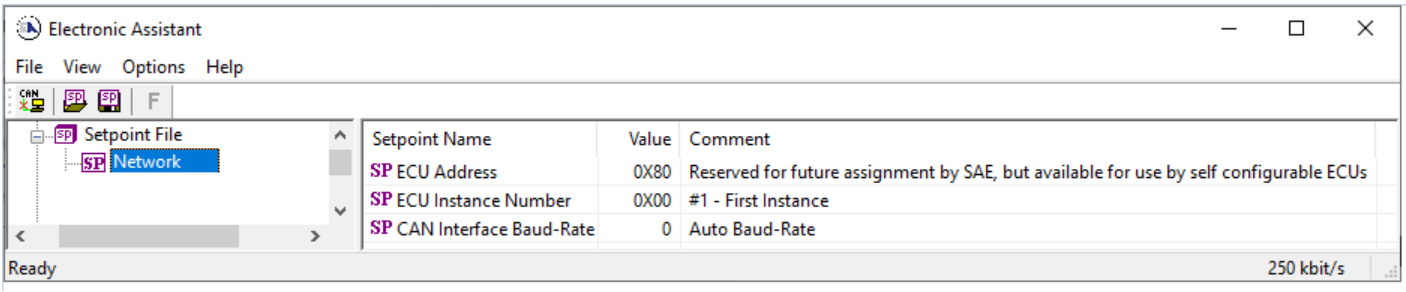


Figure 7 – Screen Capture of J1939 Setpoints

Table 8 – J1939 Network Setpoints

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

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.

4.3. Output Voltage Setpoints

The Output Voltage Control is defined in section 1.1.1.

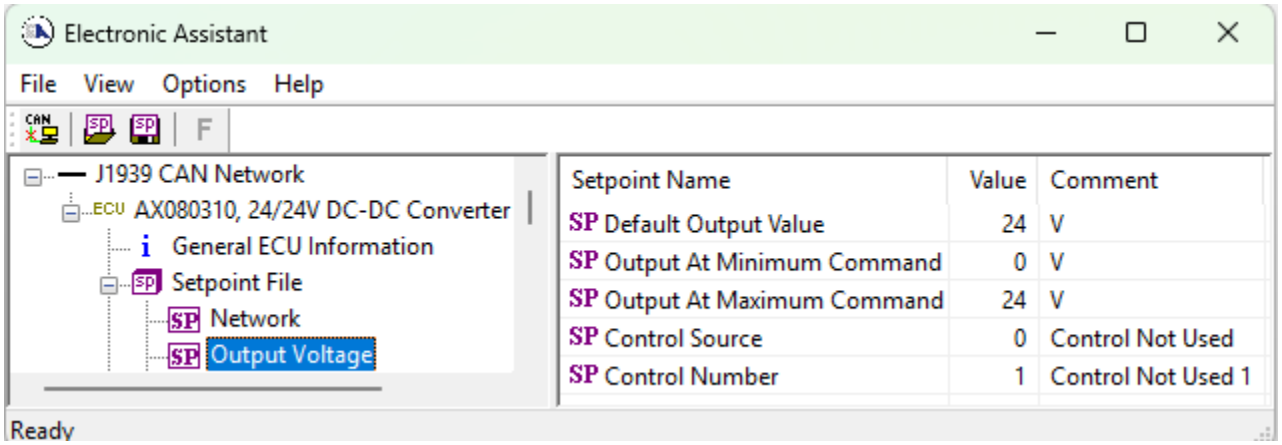


Figure 8 – Screen Capture of Output Voltage Setpoints

Table 9 – Output Voltage Setpoints

Name	Range	Default	Notes
Default Output Value	0..24V	24V	
Output at Min Command	0..24V	0V	
Output at Max Command	0..24V	24V	
Control Source	Drop List	0 – Control Not Used	
Control Number	Depends on Source	1	See Table 5

4.4. Current Limit Setpoints

The Current Limit Control is defined in section 1.1.1.

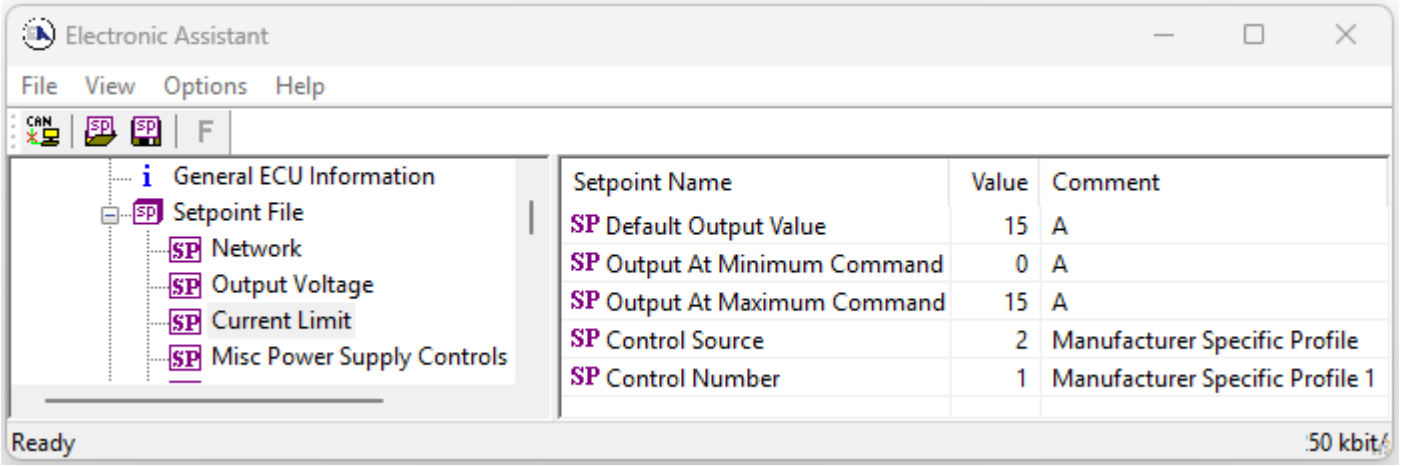


Figure 9 – Screen Capture of Current Limit Setpoints

Table 10 – Current Limit Setpoints

Name	Range	Default	Notes
Default Output Value	0..15A	15A	
Output at Min Command	0..15A	0A	
Output at Max Command	0..15A	15A	
Control Source	Drop List	2 – Manufacturer Spec. Profile	
Control Number	Depends on Source	1	See Table 5

4.5. Misc Power Supply Control Setpoints

The Misc Power Supply Control is defined in section 1.1.3.

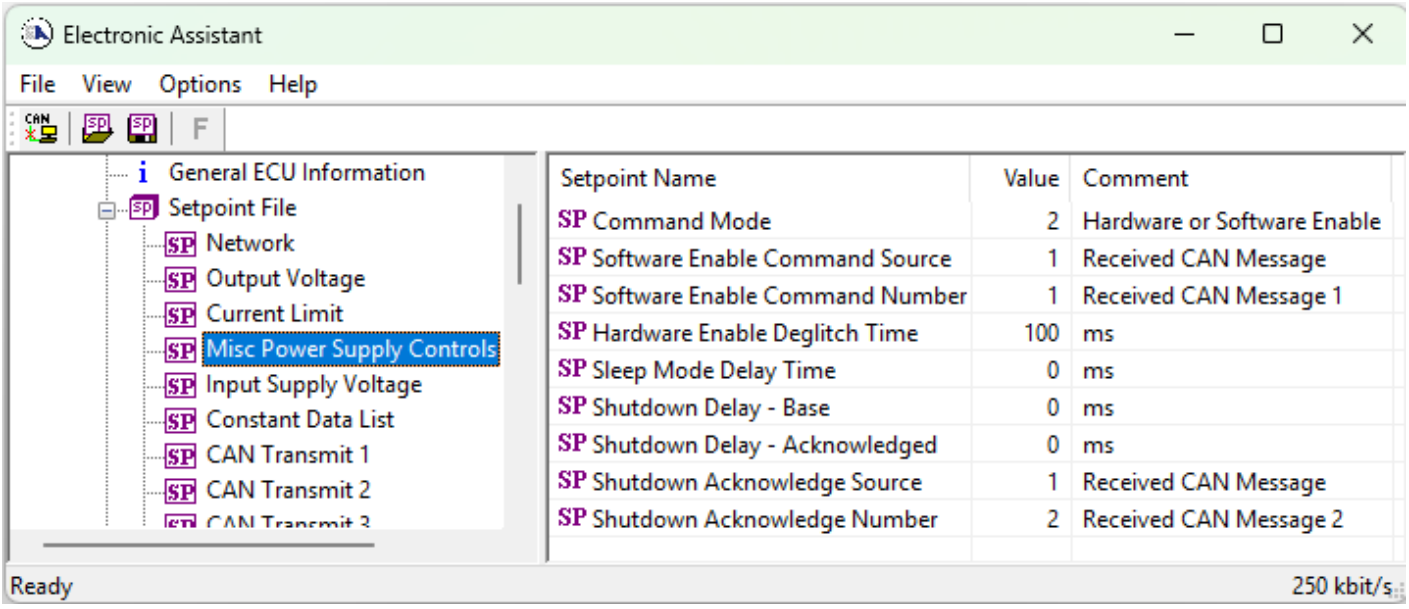


Figure 10 – Screen Capture of Misc Control Setpoints

Table 11 – Misc Control Setpoints

Name	Range	Default	Notes
Command Mode	Drop List	2 – Hardware or Software Enable	
Software Enable Command Source	Drop List	1 – Received CAN Message	
Software Enable Command Number	Depends on Source	1	See **Table 5**
Hardware Enable Deglitch Time	0..65,535	100 ms	
Sleep Mode Delay Time	0..65,535	0 ms	
Shutdown Delay - Base	0..3,600,000	0 ms	
Shutdown Delay - Acknowledge	0..3,600,000	0 ms	
Shutdown Acknowledge Source	Drop List	1 – Received CAN Message	
Shutdown Acknowledge Number	Depends on Source	2	See **Table 5**

4.6. Input Supply Voltage Setpoints

The Input Supply Control is defined in section 1.1.2.

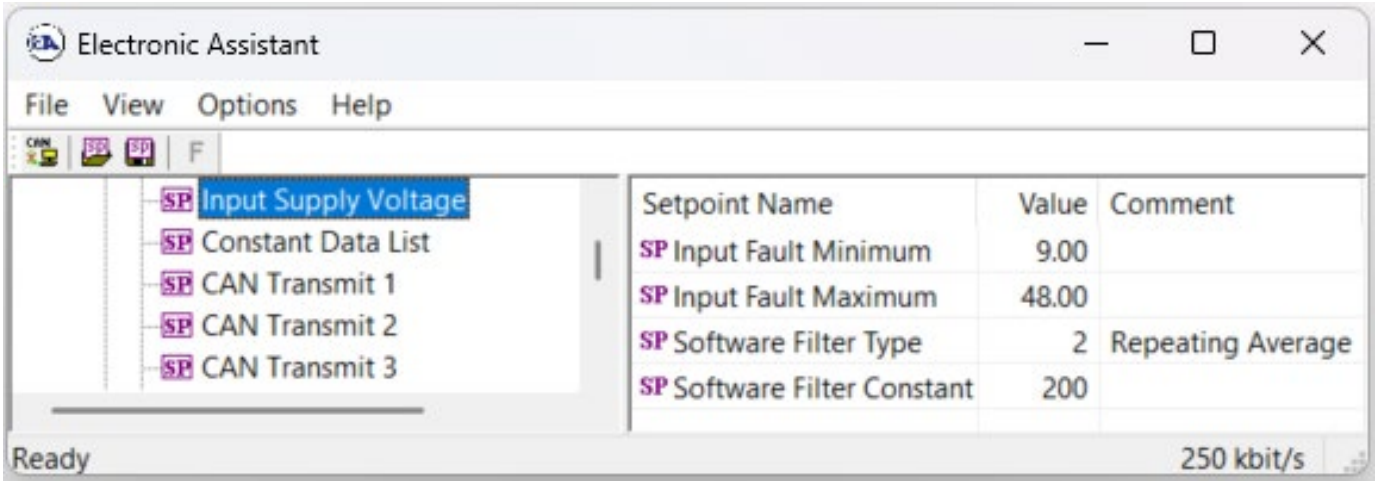


Figure 11 – Screen Capture of Input Supply Setpoints

Table 12 – Input Supply Setpoints

Name	Range	Default	Notes
Input Fault Minimum	0..48.0V	9.0V	
Input Fault Maximum	0..48.0V	48.0V	
Software Filter Type	Drop List	2 – Repeating Avg.	
Software Filter Constant	0..60,000	200	

4.7. 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 12) are arbitrary and should be configured by the user as appropriate for their application.

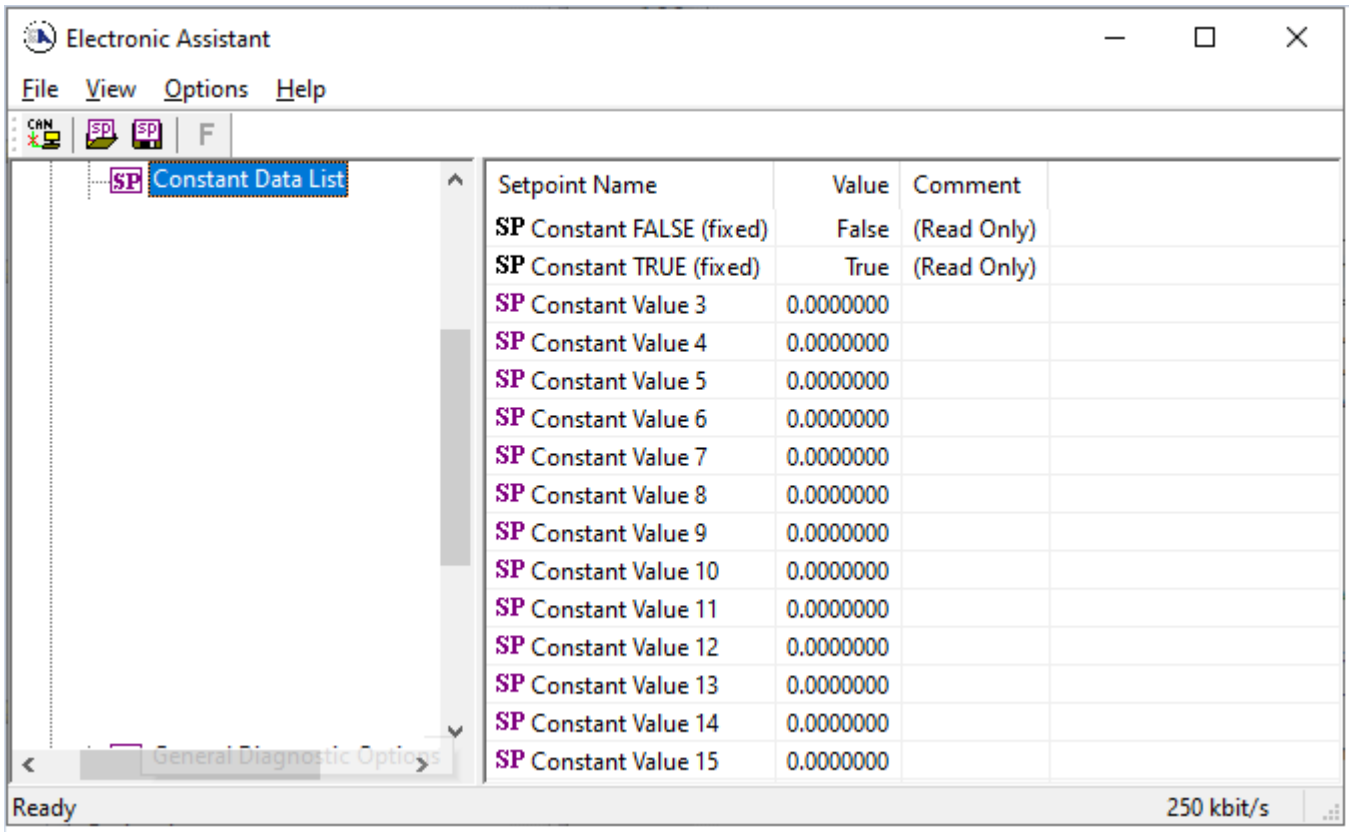


Figure 12 – Screen Capture of Constant Data List Setpoints

4.8. CAN Transmit Setpoints

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

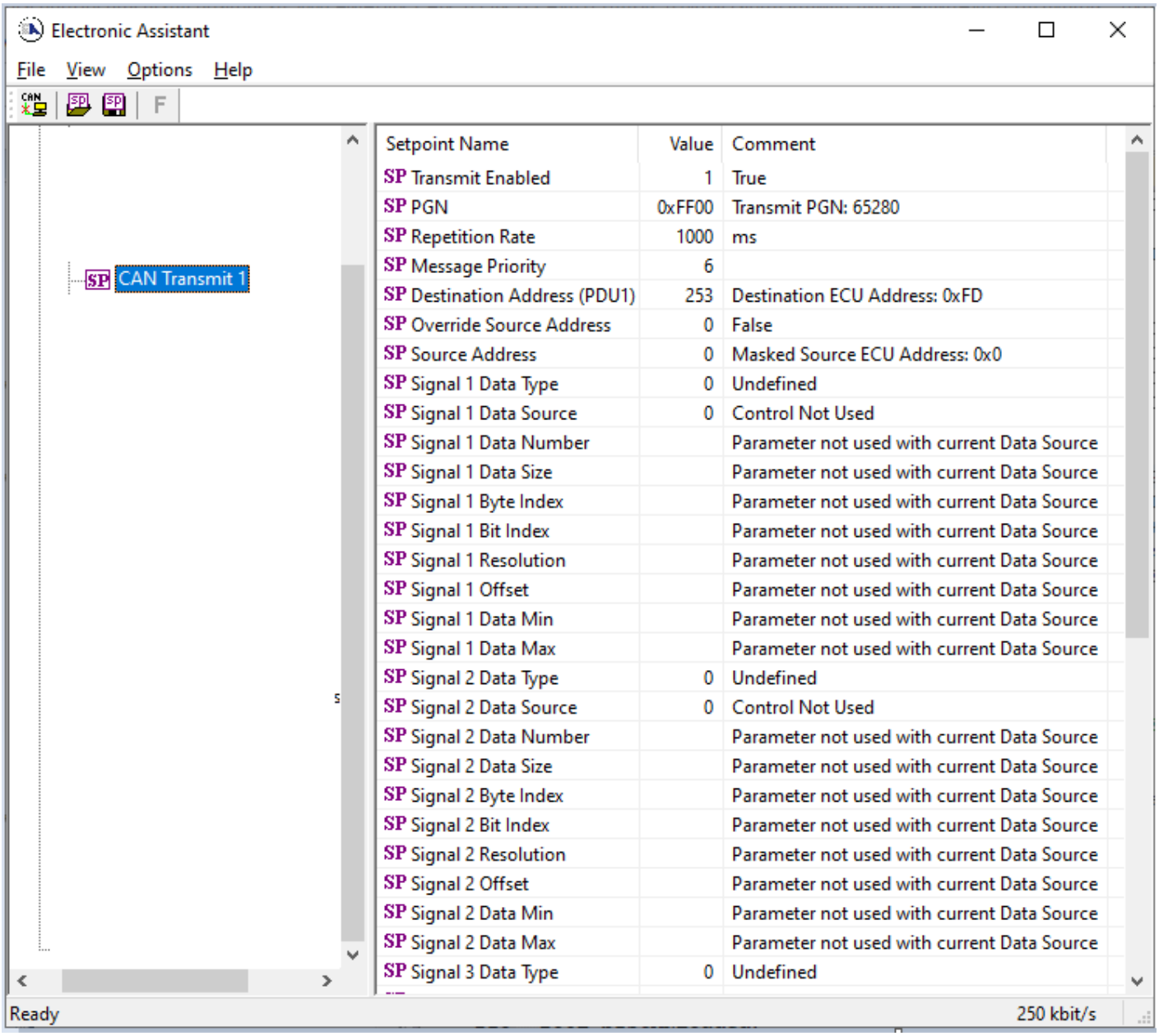


Figure 13 – Screen Capture of CAN Transmit Message Setpoints

Table 13 – CAN Transmit Message Setpoints

Name	Range	Default	Notes
Transmit Enabled	Drop List	0, False	
PGN	0xff00 … 0xffff	Different for each	See section 1.1.1
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 X Control Source	Drop List	Different for each	See Table 5
Signal X Control Number	Drop List	Different for each	See 1.1.2
Signal X Transmit Data Size	Drop List	2 bytes	
Signal X Transmit Data Index in Array	0-7	0	
Signal X Transmit Bit Index In Byte	0-7	0	
Signal X Transmit Data Resolution	-100000.0 to 100000	1/bits	
Signal X Transmit Data Offset	-10000 to 10000	0.0	
Signal X Transmit Data Minimum	-100000.0 to 100000	0.0	
Signal X Transmit Data Maximum	-100000.0 to 100000	65535.0	

4.9. CAN Receive Setpoints

The CAN Receive Block is defined in section 0. Please refer there for detailed information about how these setpoints are used. “**Receive Message Timeout**” is set to 0ms by default. To enable Receive message set “**Receive Message Timeout**” that differs from zero.

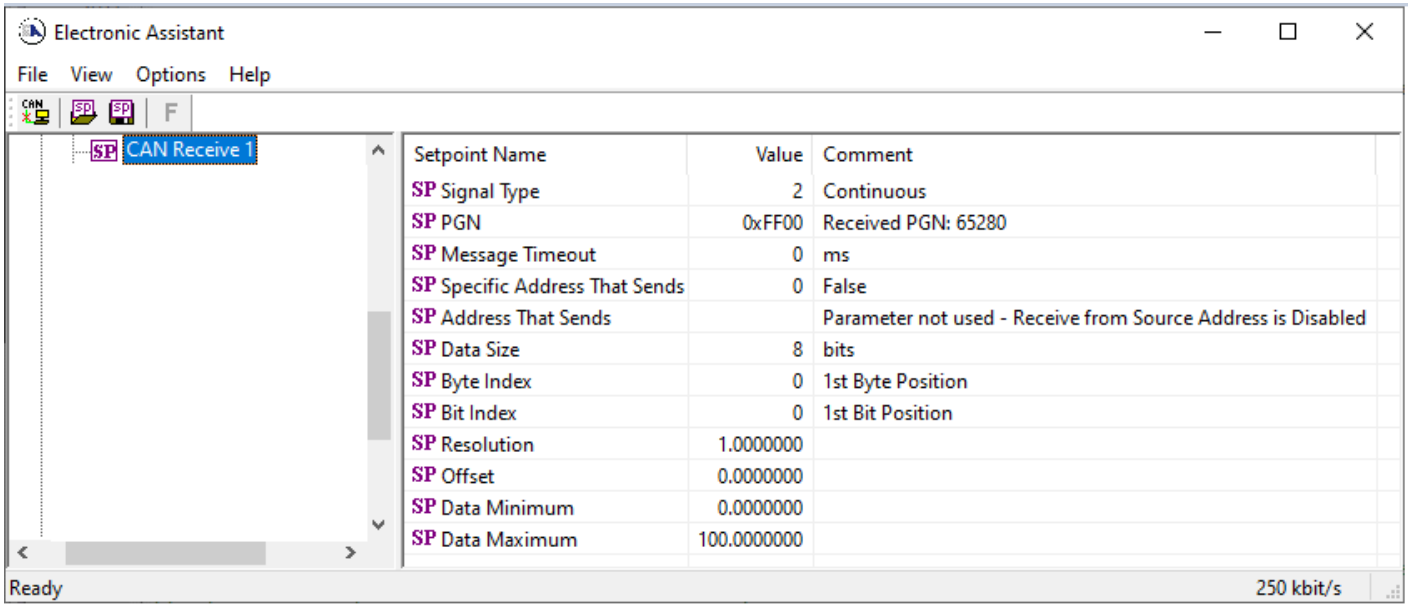


Figure 14 – Screen Capture of CAN Receive Message Setpoints

Table 14 – CAN Receive Setpoints

Name	Range	Default	Notes
Signal Type	Drop List	False	
PGN	0 to 65536	Different for each	
Message Timeout	0 to 60 000 ms	0ms	
Specific Address that sends PGN	0 to 255	254 (0xFE, Null Addr)	
Data Size	0-32	8 [bits]	
Byte Index	0-7	0	
Bit Index	0-7	0	
Resolution	0.0 to 100000	1	
Offset	-10000 to 10000	0.0	
Data Minimum	-1000000 to Max	0.0	
Data Maximum	-100000 to 100000	2.0	

4.10. General Diagnostics Options

These setpoints control the shutdown of the ECU in case of a power supply or CPU temperature related errors. Refer to section 0 for more info.

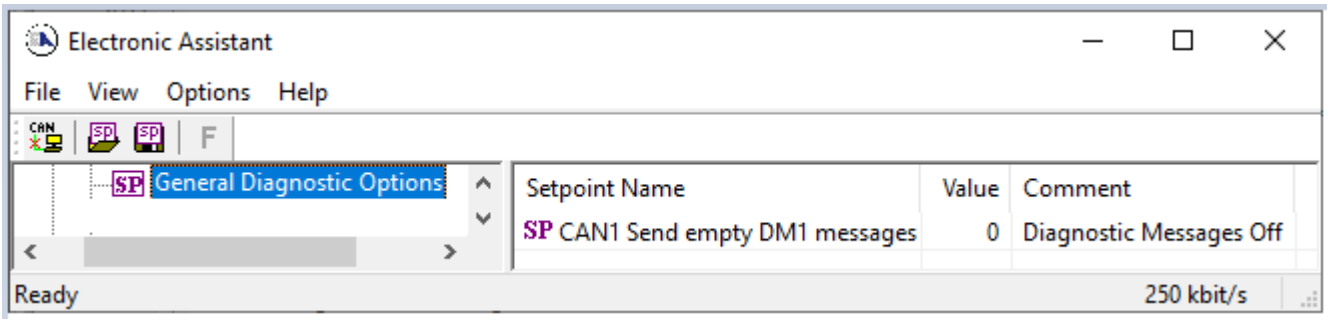


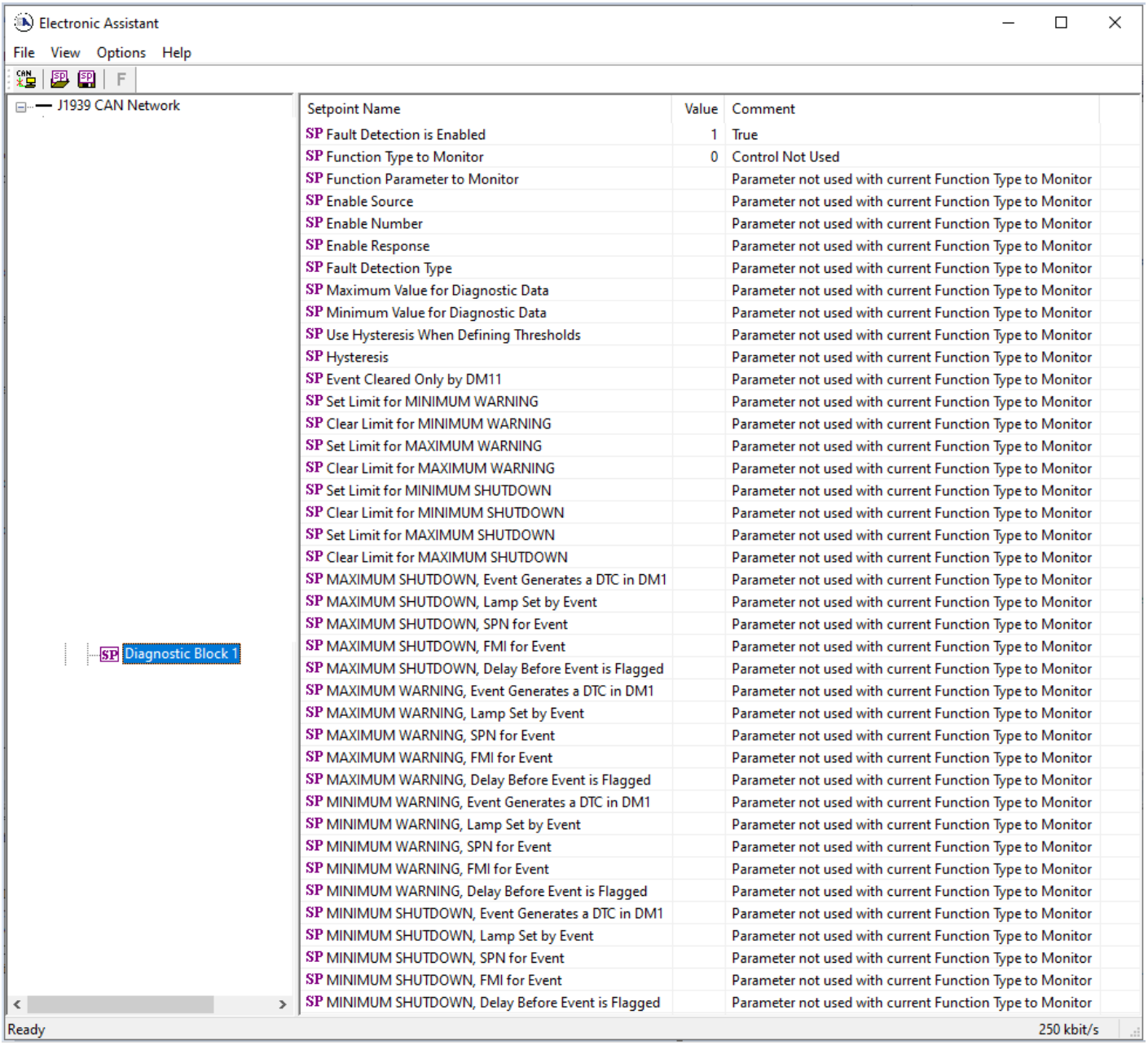
Figure 15 – Screen Capture of General Diagnostics Options Setpoints

Table 15 – General Diagnostics Options Setpoints

Name	Range	Default	Notes
CAN1 Send empty DM1 messages	Drop List	0	

4.11. Diagnostics Blocks

There are 8 Diagnostics blocks that can be configured to monitor various parameters of the Controller. The Diagnostic Function Block is defined in section 0. Please refer there for detailed information how these setpoints are used.



Setpoint Name	Value	Comment
SP Fault Detection is Enabled	1	True
SP Function Type to Monitor	0	Control Not Used
SP Function Parameter to Monitor		Parameter not used with current Function Type to Monitor
SP Enable Source		Parameter not used with current Function Type to Monitor
SP Enable Number		Parameter not used with current Function Type to Monitor
SP Enable Response		Parameter not used with current Function Type to Monitor
SP Fault Detection Type		Parameter not used with current Function Type to Monitor
SP Maximum Value for Diagnostic Data		Parameter not used with current Function Type to Monitor
SP Minimum Value for Diagnostic Data		Parameter not used with current Function Type to Monitor
SP Use Hysteresis When Defining Thresholds		Parameter not used with current Function Type to Monitor
SP Hysteresis		Parameter not used with current Function Type to Monitor
SP Event Cleared Only by DM11		Parameter not used with current Function Type to Monitor
SP Set Limit for MINIMUM WARNING		Parameter not used with current Function Type to Monitor
SP Clear Limit for MINIMUM WARNING		Parameter not used with current Function Type to Monitor
SP Set Limit for MAXIMUM WARNING		Parameter not used with current Function Type to Monitor
SP Clear Limit for MAXIMUM WARNING		Parameter not used with current Function Type to Monitor
SP Set Limit for MINIMUM SHUTDOWN		Parameter not used with current Function Type to Monitor
SP Clear Limit for MINIMUM SHUTDOWN		Parameter not used with current Function Type to Monitor
SP Set Limit for MAXIMUM SHUTDOWN		Parameter not used with current Function Type to Monitor
SP Clear Limit for MAXIMUM SHUTDOWN		Parameter not used with current Function Type to Monitor
SP MAXIMUM SHUTDOWN, Event Generates a DTC in DM1		Parameter not used with current Function Type to Monitor
SP MAXIMUM SHUTDOWN, Lamp Set by Event		Parameter not used with current Function Type to Monitor
SP MAXIMUM SHUTDOWN, SPN for Event		Parameter not used with current Function Type to Monitor
SP MAXIMUM SHUTDOWN, FMI for Event		Parameter not used with current Function Type to Monitor
SP MAXIMUM SHUTDOWN, Delay Before Event is Flagged		Parameter not used with current Function Type to Monitor
SP MAXIMUM WARNING, Event Generates a DTC in DM1		Parameter not used with current Function Type to Monitor
SP MAXIMUM WARNING, Lamp Set by Event		Parameter not used with current Function Type to Monitor
SP MAXIMUM WARNING, SPN for Event		Parameter not used with current Function Type to Monitor
SP MAXIMUM WARNING, FMI for Event		Parameter not used with current Function Type to Monitor
SP MAXIMUM WARNING, Delay Before Event is Flagged		Parameter not used with current Function Type to Monitor
SP MINIMUM WARNING, Event Generates a DTC in DM1		Parameter not used with current Function Type to Monitor
SP MINIMUM WARNING, Lamp Set by Event		Parameter not used with current Function Type to Monitor
SP MINIMUM WARNING, SPN for Event		Parameter not used with current Function Type to Monitor
SP MINIMUM WARNING, FMI for Event		Parameter not used with current Function Type to Monitor
SP MINIMUM WARNING, Delay Before Event is Flagged		Parameter not used with current Function Type to Monitor
SP MINIMUM SHUTDOWN, Event Generates a DTC in DM1		Parameter not used with current Function Type to Monitor
SP MINIMUM SHUTDOWN, Lamp Set by Event		Parameter not used with current Function Type to Monitor
SP MINIMUM SHUTDOWN, SPN for Event		Parameter not used with current Function Type to Monitor
SP MINIMUM SHUTDOWN, FMI for Event		Parameter not used with current Function Type to Monitor
SP MINIMUM SHUTDOWN, Delay Before Event is Flagged		Parameter not used with current Function Type to Monitor

Figure 16 – Screen Capture of Diagnostic Block Setpoints

Table 16 – 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	0 – Min and Max Error	See section 0
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	4.8	
Clear Limit for MAXIMUM SHUTDOWN	Minimum Value for Diagnostic Data … Maximum Value for Diagnostics Data	4.6	
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	0.4	
Set Limit for MINIMUM SHUTDOWN	Minimum Value for Diagnostic Data … Maximum Value for Diagnostics Data	0.2	
MAXIMUM SHUTDOWN, Event Generates a DTC in DM1	Drop List	True	
MAXIMUM SHUTDOWN, Lamp Set by Event	Drop List	0 – Protect	See Table 2
MAXIMUM SHUTDOWN, SPN for Event	0…524287	520448 ($7F100)	It is the user's responsibility to select an SPN that will not violate the J1939 standard.
MAXIMUM SHUTDOWN, FMI for Event	Drop List	3, Voltage Above Normal	See Table 3

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	0 – Protect	See Table 2
MAXIMUM WARNING, SPN for Event	0…524287	520704 ($7F200)	It is the user's responsibility to select an SPN that will not violate the J1939 standard.
MAXIMUM WARNING, FMI for Event	Drop List	3, Voltage Above Normal	See Table 3
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	0 – Protect	See Table 2
MAXIMUM WARNING, SPN for Event	0…524287	520960 ($7F300)	It is the user's responsibility to select an SPN that will not violate the J1939 standard.
MINIMUM WARNING, FMI for Event	Drop List	4, Voltage Below Normal	See Table 3
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	Amber Warning	See Table 2
MINIMUM SHUTDOWN, SPN for Event	0…524287	521216 ($7F400)	It is the user's responsibility to select an SPN that will not violate the J1939 standard.
MINIMUM SHUTDOWN, FMI for Event	Drop List	4, Voltage Below Normal	See Table 3
MINIMUM SHUTDOWN, Delay Before Event is Flagged	0…60000 ms	1000	

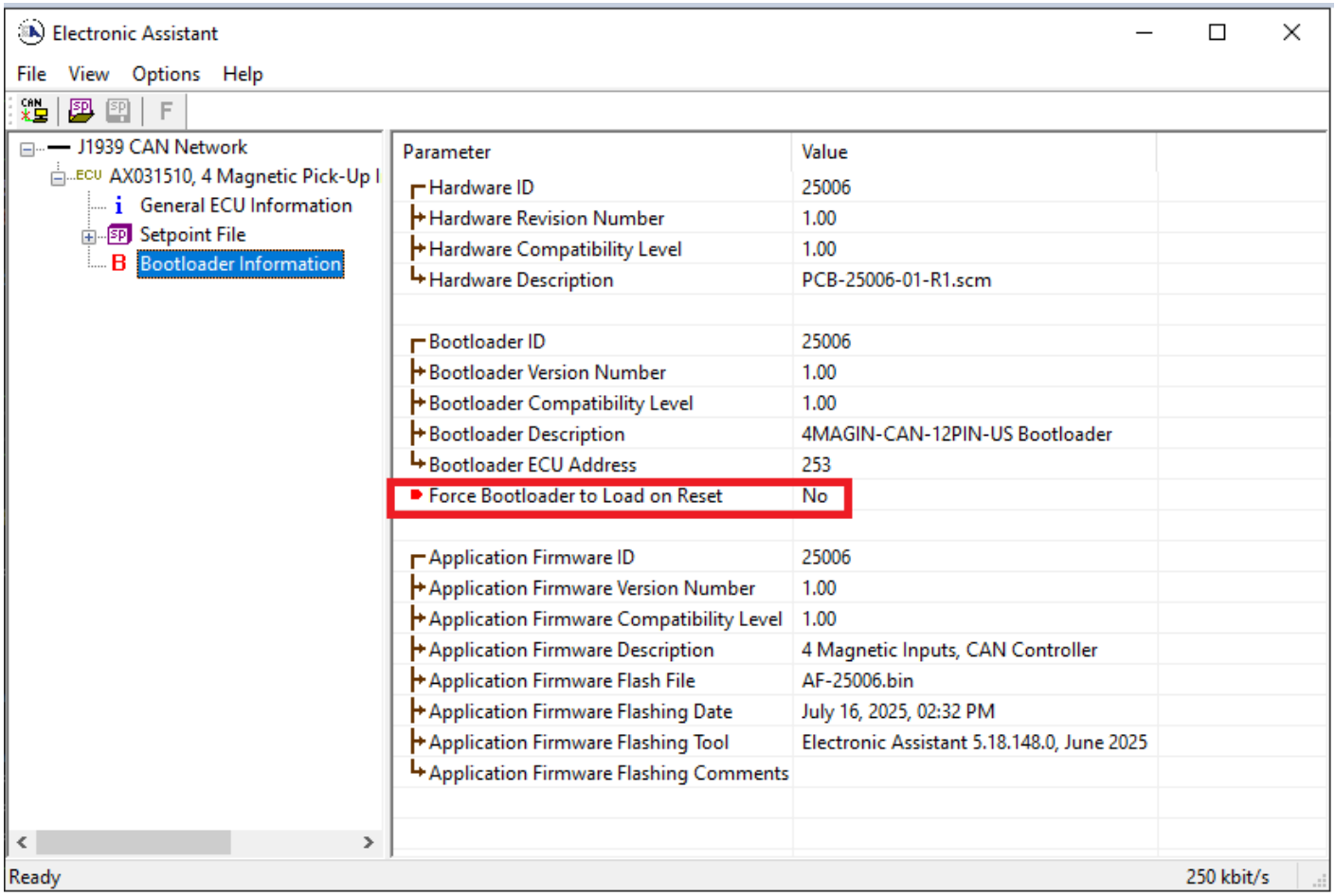
5. REFLASHING OVER CAN WITH EA BOOTLOADER

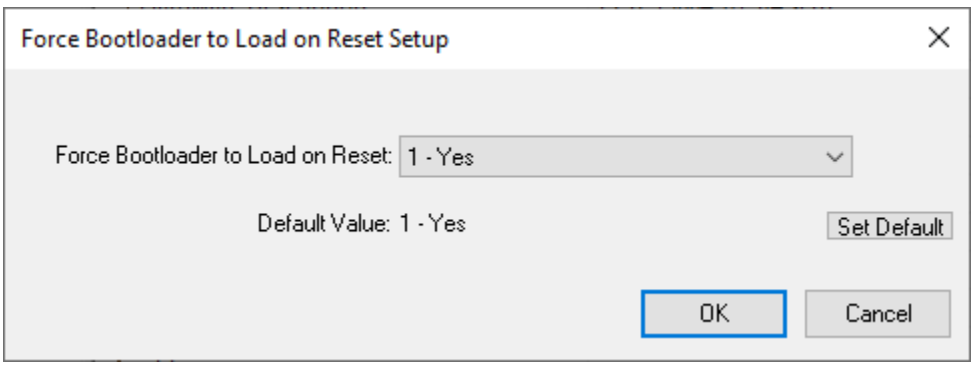
The AX080310 can be upgraded with new application firmware using the **Bootloader Information** section. This section details the simple step-by-step instructions to upload new firmware provided by Axiomatic onto the unit via CAN, without requiring it to be disconnected from the J1939 network.

Note: To upgrade the firmware, use Axiomatic Electronic Assistant V5.18.149.0 or higher.

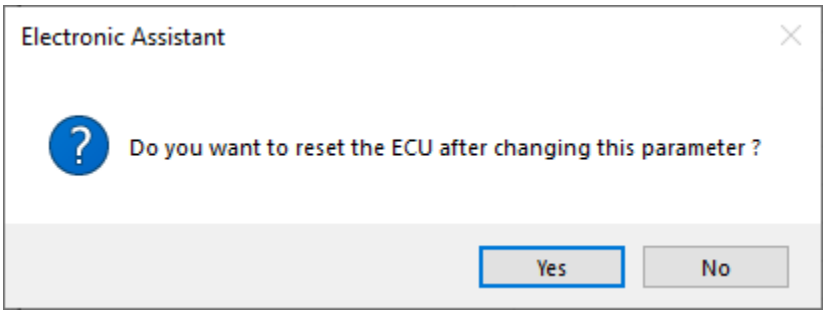
1. When EA first connects to the ECU, the **Bootloader Information** section will display the following information.

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

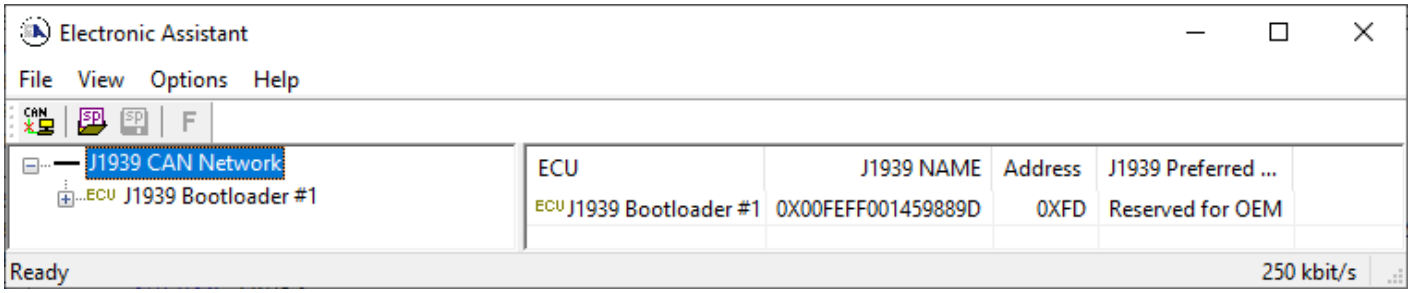


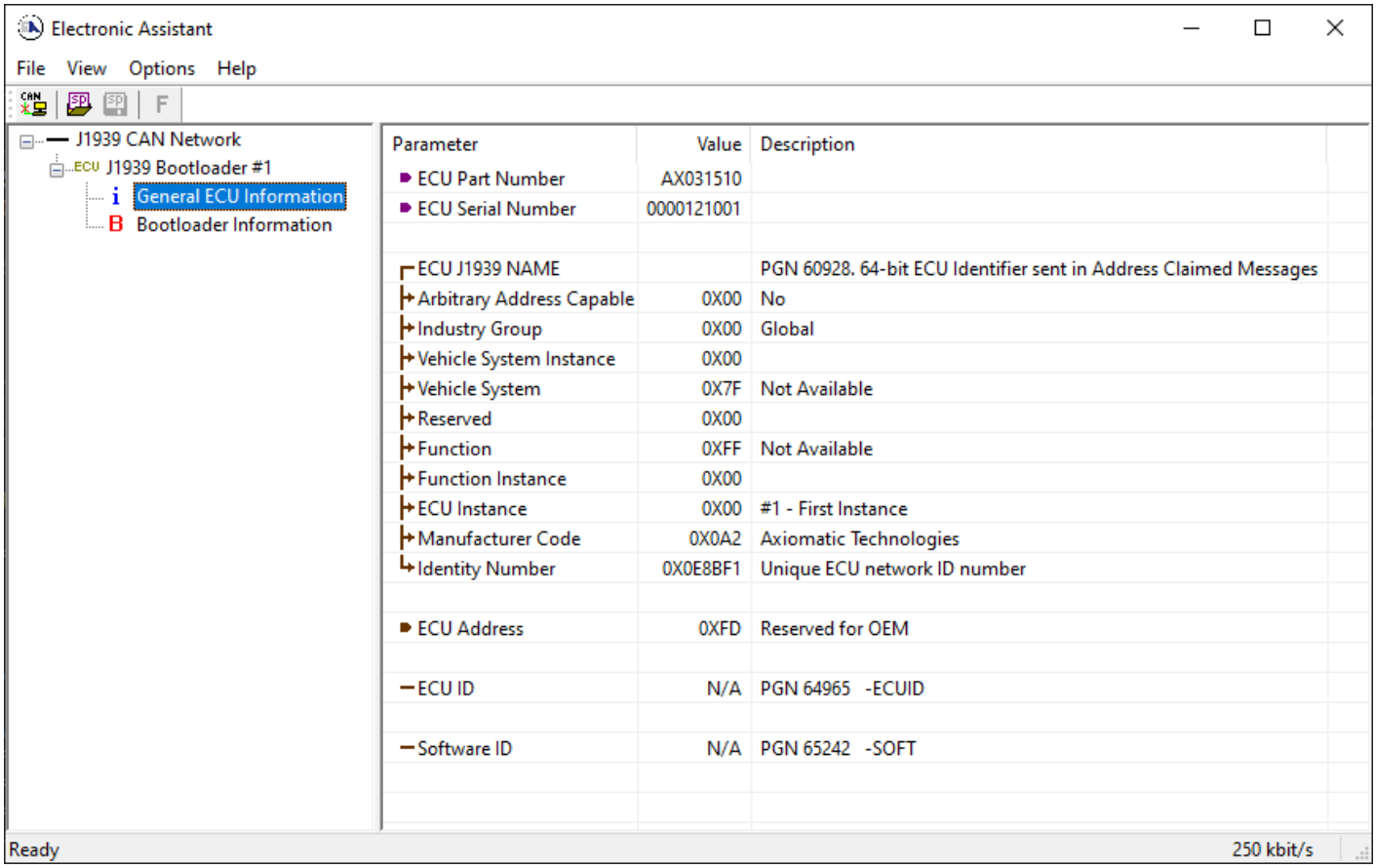


3. When the prompt box asks if you want to reset the ECU, select *Yes*.



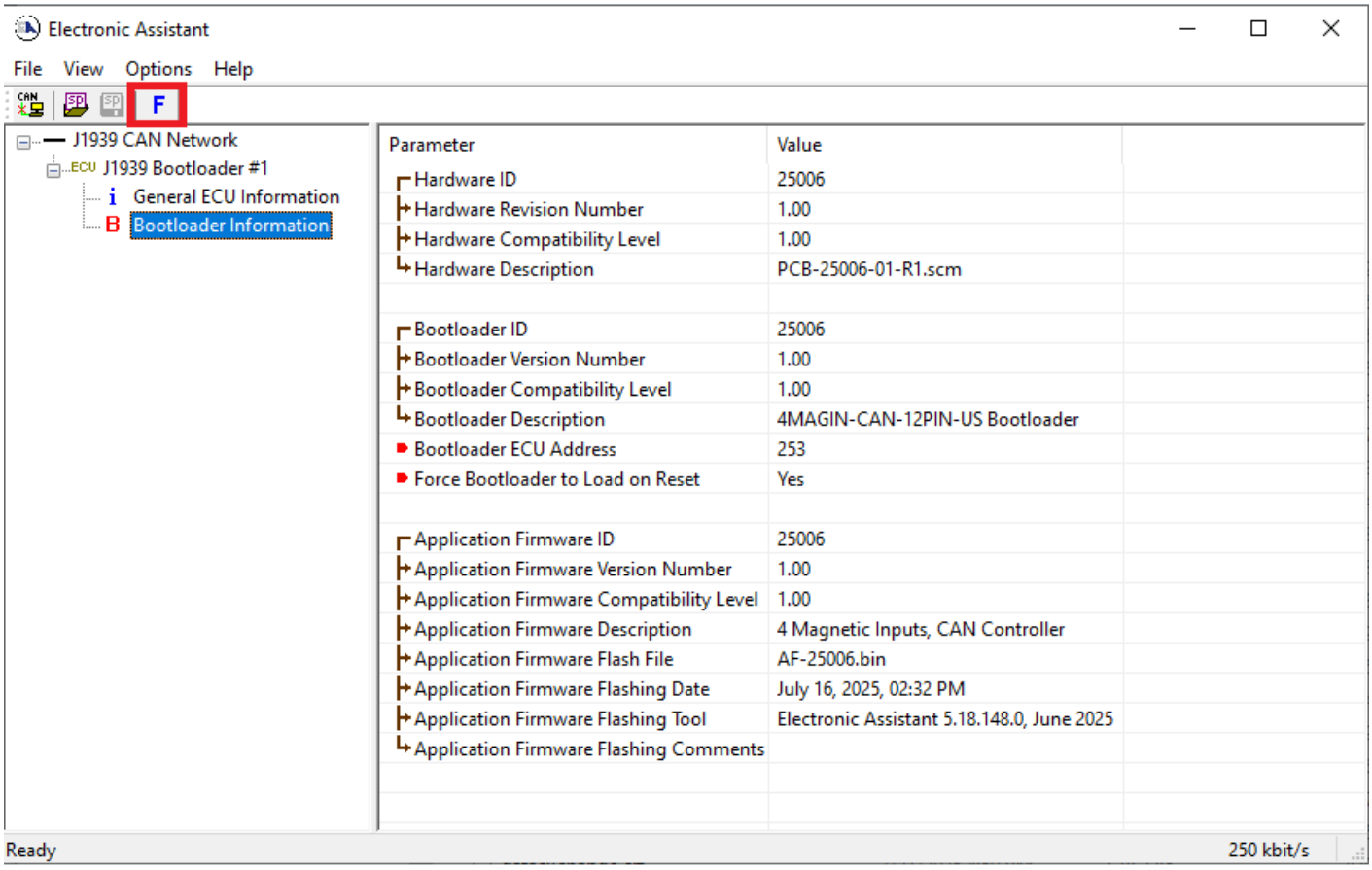
4. Upon reset, the ECU will no longer show up on the J1939 network as an AX080310 but rather as **J1939 Bootloader #1**.





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.

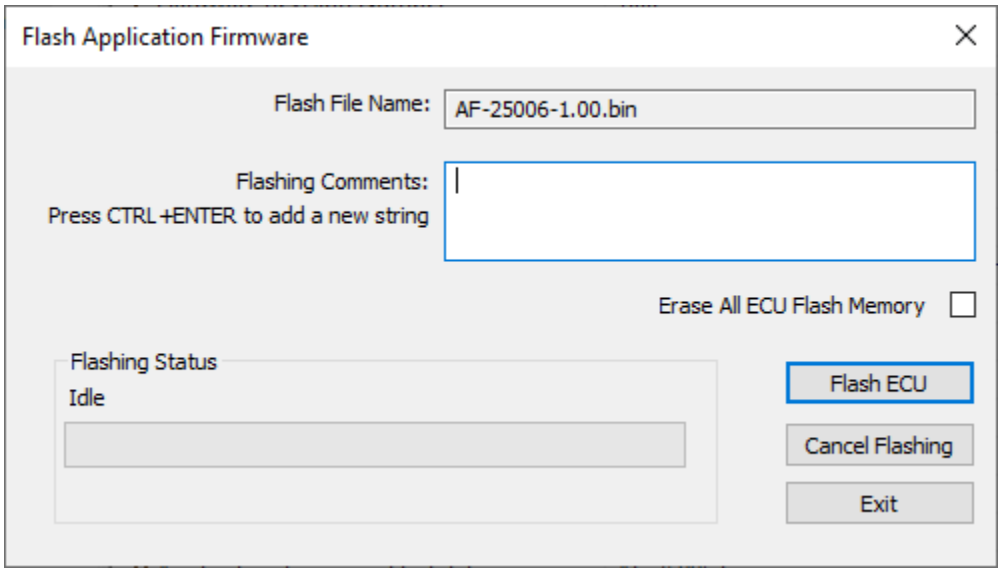
5. When the **Bootloader Information** section is selected, the same information is shown as when it was running the AX080310 firmware, but in this case the **F**lashing feature has been enabled.



6. Select the **F**lashing button and navigate to where you had saved the **AF-25006-X.XX.bin** file sent from Axiomatic. (Note: only binary (.bin) files can be flashed using the EA tool.)

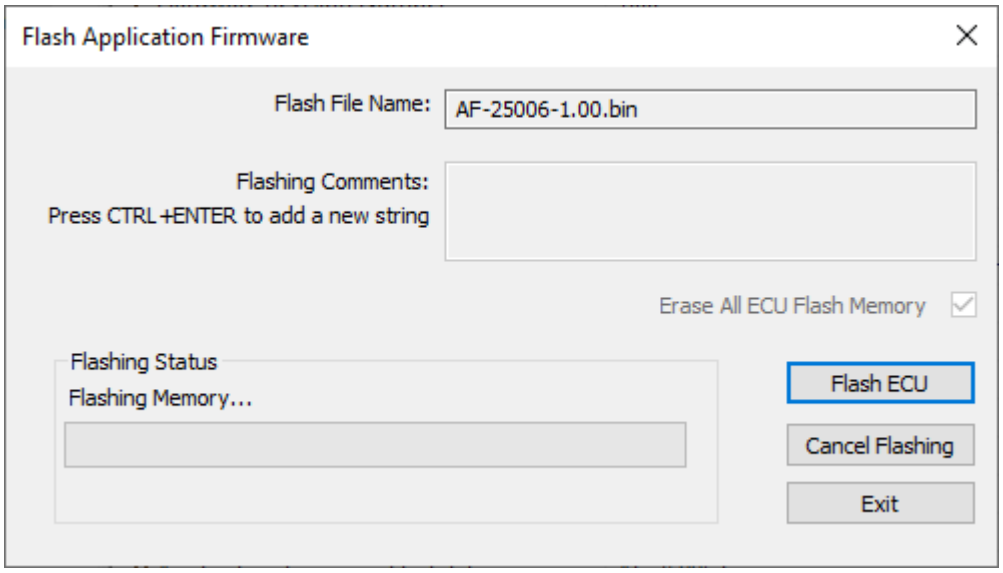
7. Once the Flash Application Firmware window opens, you can enter comments such as “Firmware upgraded by [Name]” if you so desire. This is not required, and you can leave the field blank if you do not want to use it.

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

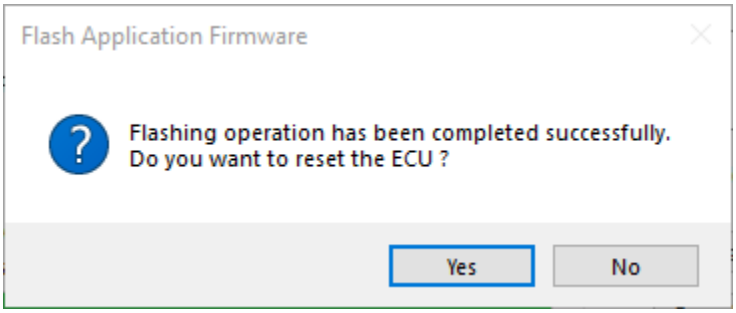


WARNING: Do not check the “Erase All ECU Flash Memory” box unless instructed to do so by your Axiomatic contact. Selecting this will erased ALL data stored in non-volatile flash, including the calibration done by Axiomatic during factory testing. It will also erase any configuration of the setpoints that might have been done to the ECU and reset all setpoints to their factory defaults. By leaving this box unchecked, none of the setpoints will be changed when the new firmware is uploaded.

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 application firmware will start running, and the ECU will be identified as such by EA. Otherwise, The next time the ECU is power-cycled, the application firmware 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

Specifications are indicative and subject to change. Actual performance will vary depending on the application and operating conditions. 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 Limitations & Return Materials Process as described on https://www.axiomatic.com/service/.

Input Specifications

Operating Voltage	24 VDC (nominal) 10 to 40 VDC (range)
Maximum Current	26 ADC @ 11 VDC and 11 A load 16 ADC @ 24 VDC and 15 A load 10 ADC @ 40 VDC and 15 A load
Reverse Polarity Protection	Provided
Undervoltage Protection	Shutdown at 8.5 VDC Recovers at 11.5 VDC
Overvoltage Protection	Shutdown at 44 VDC Recovers at 42 VDC
Enable Input	Isolated to primary and secondary Working range: 5 to 24 V (High) to turn on the unit. Current needed is typically 2 mA.

Output Specifications

Nameplate Rating (Power)	350 W (nominal)
Current	15 ADC (continuous) Derated for input voltage below 16 VDC due to thermal considerations (See Figure 18)
Voltage	24 VDC ±2 % @ 11 to 24 VDC input 23 to 24 VDC @ 10 to 11 VDC input
Ripple Voltage	$V_{O(RIPPLE)} \leq 0.1\ V_{PP}$
Turn-on-Time	600 ms typical (at full load)
Stability	Stable at all loads (no minimum load requirement)
Transient Response	500 mV/ms (50 to 100 % load)
Short Circuit Current	Protection provided Self-recovery 18 A current limit (Derated for input voltage below 16 VDC)

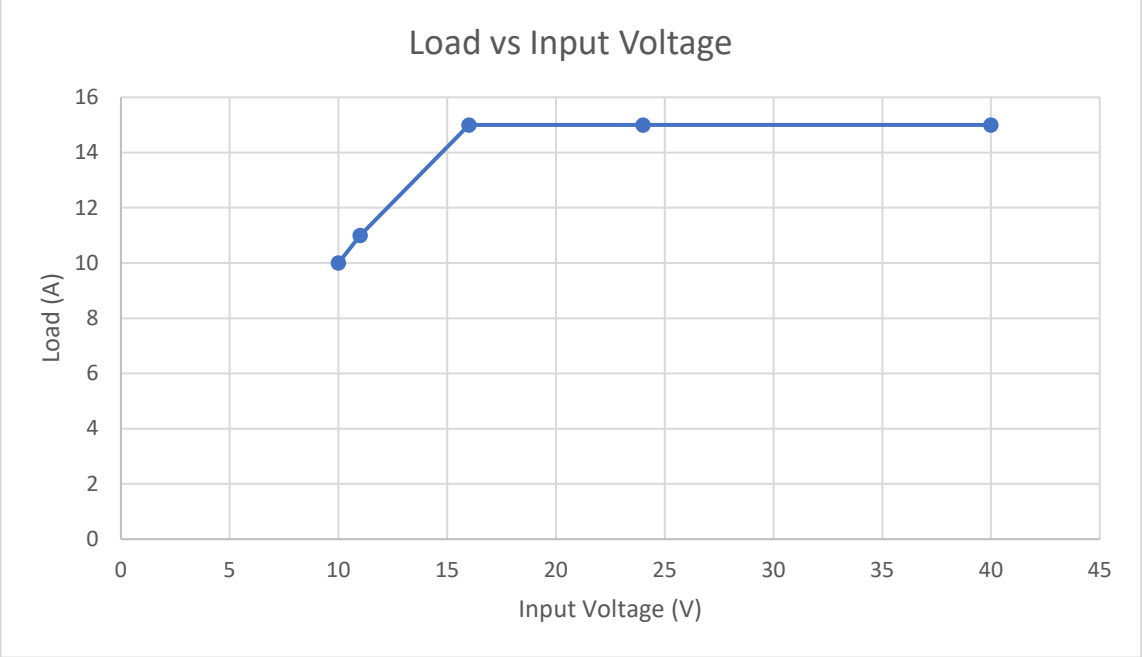


Figure 17 – Load vs Input Voltage

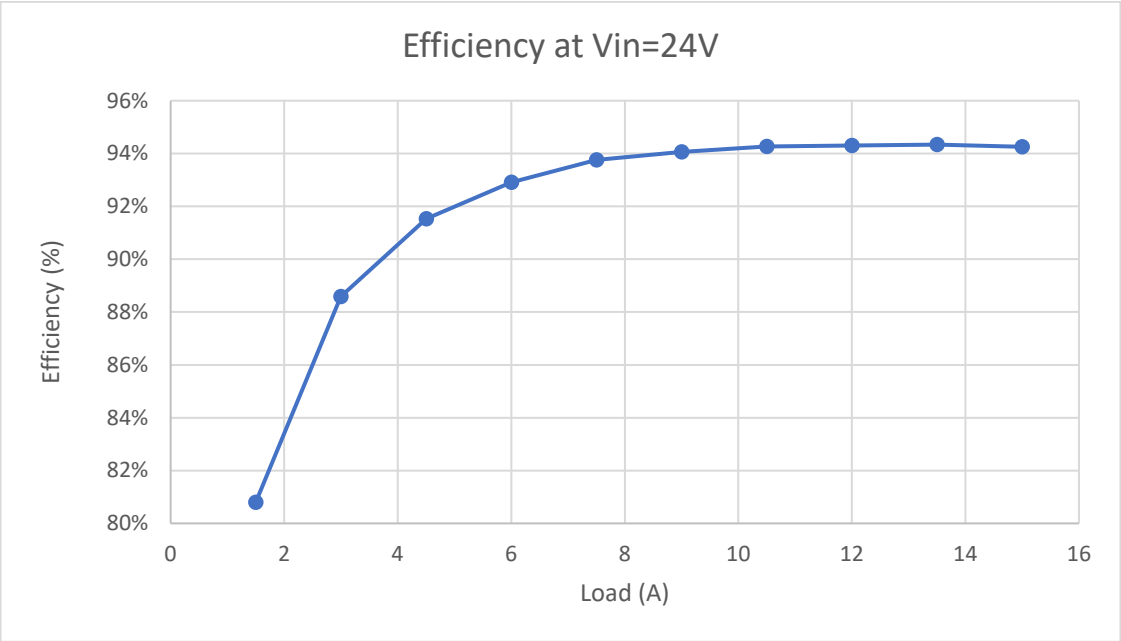


Figure 18 – Efficiency at 24 V input

General Specifications

Microcontroller	STM32G0B1KCU7 32 bit, 256 KB flash memory, 144 KB RAM
Efficiency	94 % (See Figure 19)
Isolation	700 VDC minimum (All to chassis) 700 VDC minimum (Primary to secondary)
Response Time	Inputs are measured and output is updated about every 1 ms
Communications	1 isolated CAN port (SAE J1939) Baud rates: 125 kbit/s, 250 kbit/s, 500 kbit/s, 667 kbit/s, and 1 Mbit/s and auto-baud-rate detection Auto-baud-rate detection can be disabled, and the baud rate can be selected through the user interface. Refer to user manual for details.
Network Termination	It is necessary to terminate the network with external termination resistors. The resistors are 120 Ω, 0.25 W minimum, metal film or similar type. They should be placed between CAN High and CAN Low terminals at both ends of the network.
User Interface	Axiomatic Electronic Assistant KIT – P/N: **AX070506K**
Compliance	RoHS
Protection	IP67
Operating Conditions	-40 to 85 °C (-40 to 185 °F)
Storage Temperature	-55 to 125 °C (-67 to 257 °F)
Enclosure	Cast aluminum enclosure 8 in. x 5.83 in. x 2.49 in. (202 mm x 148 mm x 63.2 mm) (L x W x H excluding mating plugs) Refer to the dimensional drawing.
Weight	3.953 lbs. (1.793 kg)
Mating Wire Harness	A mating wire harness is available from Axiomatic under P/N: **AX070173**. The wire harness comprises 14 AWG unterminated wires and TE Deutsch P/N DT06-12SA, W12S, and 12x 0462-201-16141. The pin out and respective colors of the wires are shown below.

Pin	Colors	Description
1	White/Red	Output +
2	Yellow	CAN High
3	Blue	Enable +
4	Red	Input +
5	Red	Input +
6	Red	Input +
7	Black	Input -
8	Black	Input -
9	Black	Input -
10	Green	Enable -
11	White/Green	CAN Low
12	White/Black	Output -

OUR PRODUCTS

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Fan Drive Controllers

Gateways, CAN/Modbus, RS-232

Gyroscopes, Inclinometers

Hydraulic Valve Controllers

Inclinometers, Triaxial

I/O Controls

LVDT Signal Converters

Machine Controls

Modbus, RS-422, RS-485 Controls

Motor Controls, Inverters

Power Supplies, DC/DC, AC/DC

PWM Signal Converters/Isolators

Resolver Signal Conditioners

Service Tools

Signal Conditioners, Converters

Strain Gauge CAN Controls

Surge Suppressors

OUR COMPANY

Axiomatic provides electronic machine control components 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.***

QUALITY DESIGN AND MANUFACTURING

We have an ISO9001:2015 registered design/manufacturing facility in Canada.

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 at https://www.axiomatic.com/service/.

COMPLIANCE

Product compliance details can be found in the product literature and/or on axiomatic.com. Any inquiries should be sent to sales@axiomatic.com.

SAFE USE

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

This product can expose you to chemicals which are known in the State of California, USA to cause cancer and reproductive harm. For more information go to www.P65Warnings.ca.gov.

SERVICE

All products to be returned to Axiomatic require a Return Materials Authorization Number (RMA#) from rma@axiomatic.com. Please provide the following information when requesting an RMA number:

- Serial number, part number
- Runtime hours, description of problem
- Wiring set up diagram, application and other comments as needed

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.

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