
SCI Hardware Manual

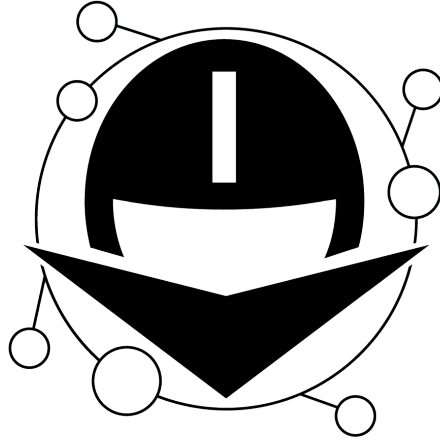
Release 1.0

Embention

2023-08-04

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A V I O N I C S

INTRODUCTION

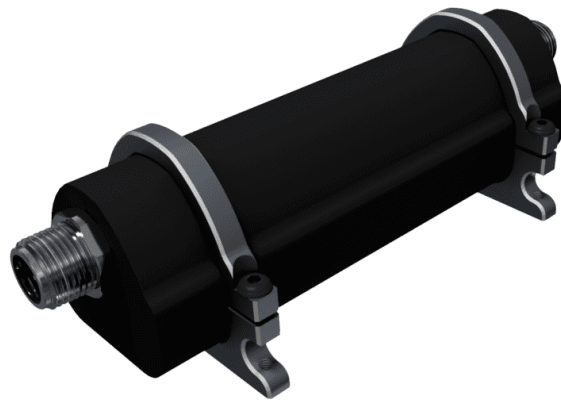


Fig. 1: Smart CAN Isolator

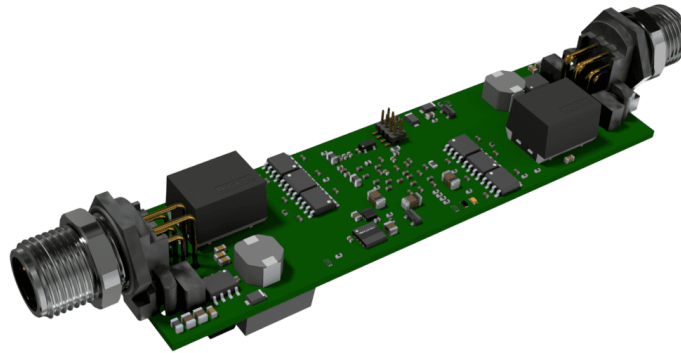


Fig. 2: **Smart CAN Isolator OEM**

Smart CAN Isolator is a high reliability CAN bus isolator designed for its use in critical applications where isolation, repetition or fail-safe is required. It offers a high voltage galvanic isolation up to 3000-Vrms. Due to the isolation, ground loops are eliminated, providing higher reliability in the communication, avoiding current recirculation in the ground paths.

The system has a built-in microcontroller which runs real-time supervision of the CAN bus and, in case of an anomaly or malfunction, disconnects the system, releasing the bus. This feature is very useful in critical applications where the malfunction of a device may hang the CAN bus with the consequence that all devices connected to it will stop working. In those cases, the microcontroller will detect the anomaly and prevent the failure of the whole bus. Redundancy and isolation in the system power supply make the system robust against single point of failure.

Smart CAN Isolator can handle speeds up to **1Mbps**. Due to the built-in real-time microcontroller, this product can also be configured as a filter, allowing only specific messages to reach the other side of the bus.

QUICK START

2.1 Warnings

- In **maintenance mode**, **CAN interface A** will switch to a baudrate of **1M**, while **CAN interface B** will switch to a baudrate of **500k**.
- For configuration purposes, only specific baudrates can be used. Once in **maintenance mode**, **1M** baudrate must be used to configure **Smart CAN Isolator** through the **A** interface, and **500k** for the **B** interface. See *maintenance mode* for more information.
- At least one available mailbox must be left for **Smart CAN Isolator** to be able to send messages through that given interface.
- Disabling the Status Message will disable other apps and devices (i.e. **Veronte Link**) from detecting **Smart CAN Isolator** automatically.

3.1 Variants

Smart CAN Isolator is offered with two versions: **Smart CAN Isolator** and **Smart CAN Isolator OEM**. **Smart CAN Isolator** is protected by an enclosure made of ABS polymer. The OEM version is smaller, lighter and has better heat dissipation; but requires mechanical protection when installed.



Fig. 1: Smart CAN Isolator

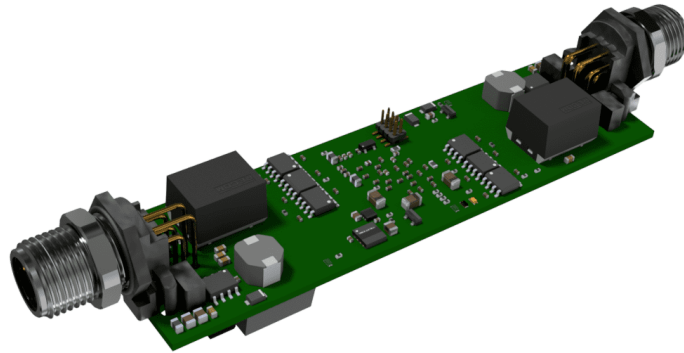


Fig. 2: Smart CAN Isolator OEM

3.2 Block Diagram

The following block diagram summarizes the functionality of the system and gives an overview of the redundant power supply scheme.

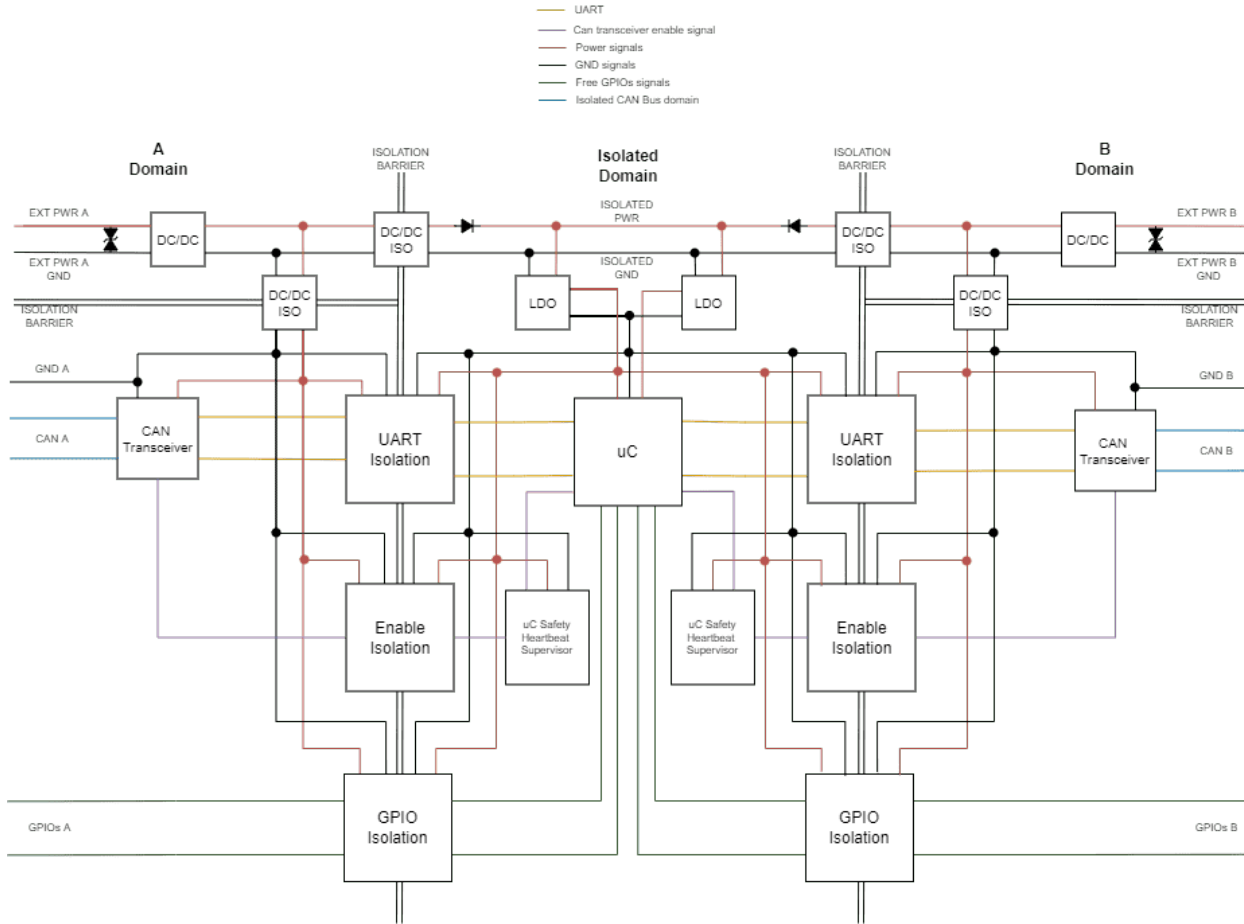


Fig. 3: Smart CAN Isolator Block Diagram

3.3 Mechanical Specifications

Smart CAN Isolator is provided using an ABS polymer enclosure with **IP 67** protection. The approximate total weight without cable harness is around **50g** without clamps and **66g** with 2 clamps.

Inside the **Smart CAN Isolator** there are not included any navigation sensors, this implies that there are no constraints regarding vibration isolation, location or orientation of the **Smart CAN Isolator**.

The following figures show the dimensions of the device.

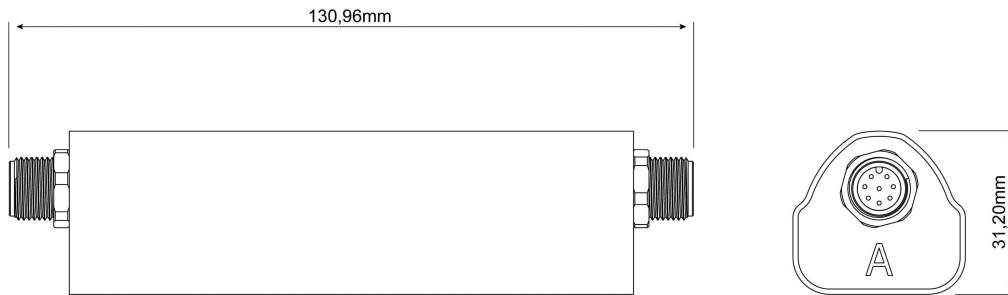


Fig. 4: Smart CAN Isolator Dimensions

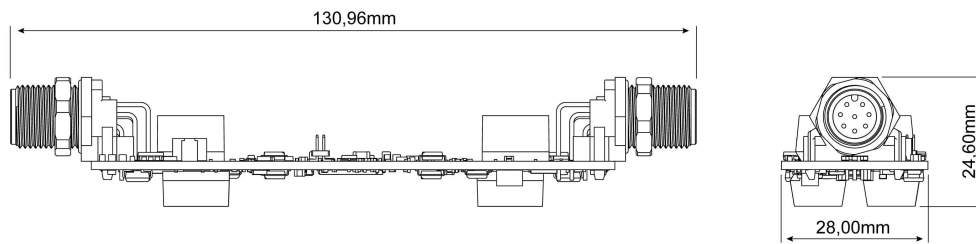


Fig. 5: Smart CAN Isolator Dimensions Without Enclosure

3.4 Electrical Specifications

- Double, redundant, power supply inputs.
- Input voltage range Domain A: **6V** to **28V** - Maximum power consumption Domain A: 2.5 W
- Input voltage range Domain B: **6V** to **28V** - Maximum power consumption Domain B: 2.5 W
- Temperature range: **-40°C** to **85°C**
- Isolation barrier: **3000Vrms**
- All inputs are **ESD protected**
- CAN bus speed up to: **1Mbps**
 - Compatible with **ISO 11898**
- Digital isolated Input/Output (GPIO)

- Voltage is **3.3V**
- Current I (oh) = **1.6mA** and I (ol) = **-1.6mA**

3.5 Interfaces

Smart CAN Isolator has two electric male connectors, which require two female connectors. These required connectors are provided by Embention, but sold separately. They have **P001636** as Embention reference and **Harting 21033192801** as commercial reference.



HARDWARE INSTALLATION

4.1 Mechanical Installation

To fix the **Smart CAN Isolator** to the airframe, clamps are provided and may be used depending on final position. M3 screws are recommended for mounting when clamps are used.

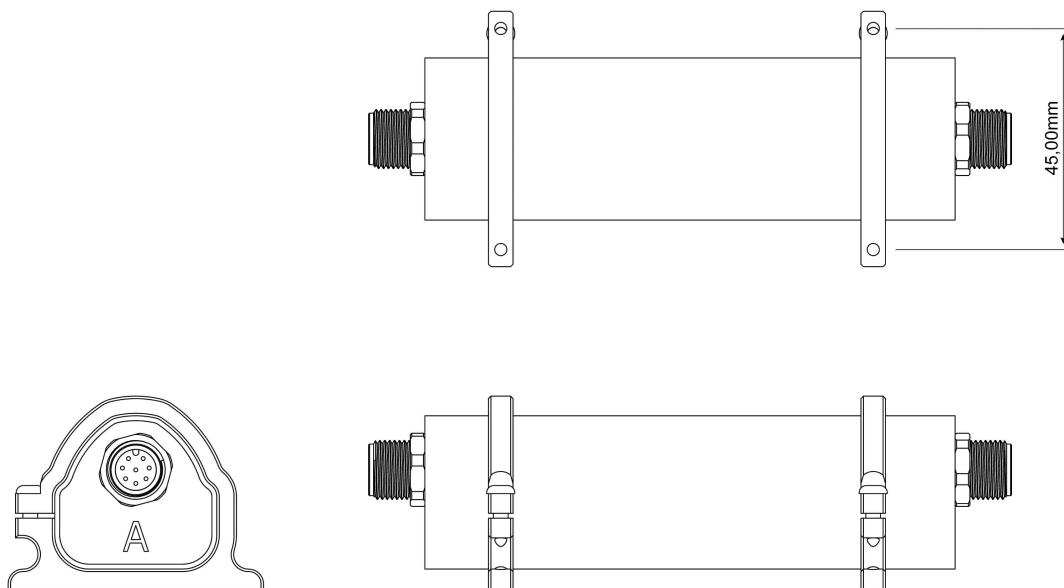


Fig. 1: Smart CAN Isolator Clamps Dimensions

4.2 Electrical Installation

4.2.1 Power Supply

Smart CAN Isolator requires power supply on both connectors from 6 to 28V. Both connectors must receive power supply simultaneously; however, they have 30 seconds as grace period to connect the second one. If this period is not accomplished, **Smart CAN Isolator** will require to reboot before to try again.

4.2.2 CAN circuit

Smart CAN Isolator does not integrate a termination resistance in order to allow for multiple devices to be connected to the same line. Considering **Veronte Autopilot** includes one entrance resistance of $120\ \Omega$, a second resistance needs to be placed at the end of the line (again $120\ \Omega$). This resistance may be placed on the cable or on another PCB.

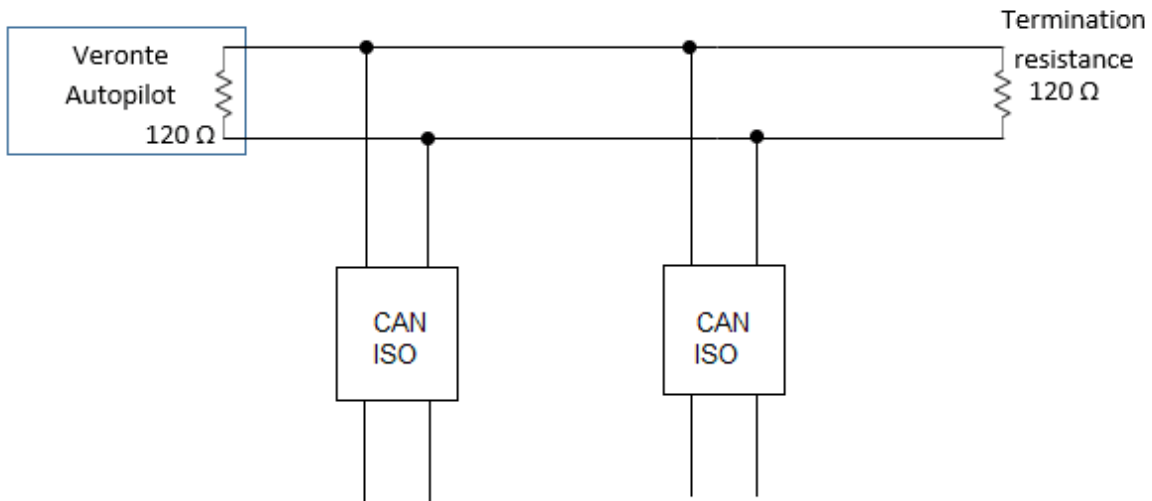


Fig. 2: Smart CAN Isolator Assembly Diagram Example

4.2.3 Pinout

OEM version does not have explicit indicators to distinguish connectors A and B. However, the JTAG connector can be used as a reference according to the following image:

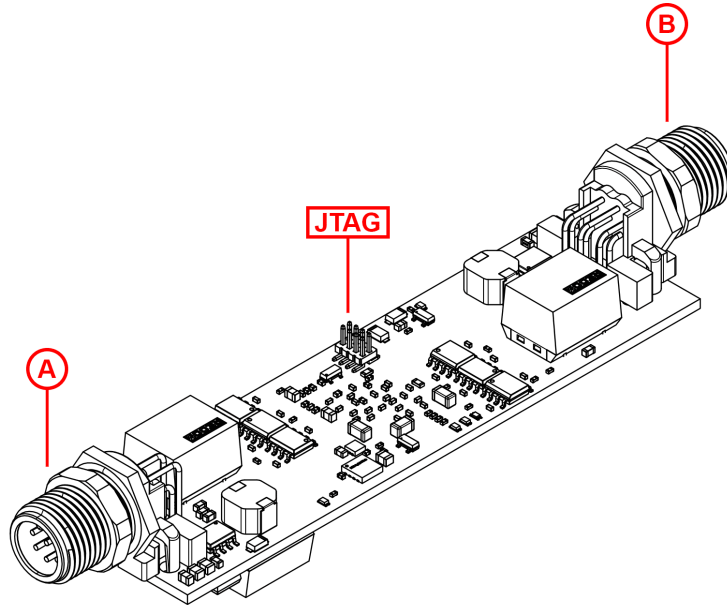
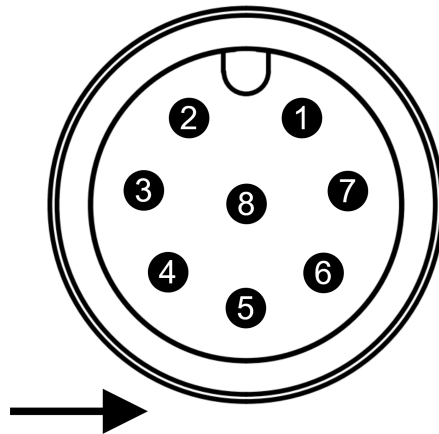


Fig. 3: Connectors location of OEM version

Pin distribution for both connectors is as follows.



A side connector - T4144015081-000		
PIN N°	I/O	Comments
1	VIN_A -	Negative reference for power supply A
2	CAN A (N)	CANbus interface. It supports data rates up to 1 Mbps Twisted pair with a 120 Z_o recommended
3	CAN A (P)	
4	GPIO Output A	DIGITAL output signal (0-3.3V)
5	GPIO Input A	DIGITAL input signal (0-3.3V). Has pull-up resistor.
6	GND A	Ground reference for domain A CAN and GPIOs
7	VIN_A +	Positive reference for power supply A
8	N.C.	No connect

B side connector - T4144015081-000		
PIN N°	I/O	Comments
1	VIN_B -	Negative reference for power supply B
2	CAN B (N)	CANbus interface. It supports data rates up to 1 Mbps Twisted pair with a 120 Z_o recommended
3	CAN B (P)	
4	GPIO Output B	DIGITAL output signal (0-3.3V).
5	GPIO Input B	DIGITAL input signal (0-3.3V). Has pull-up resistor.
6	GND B	Ground reference for domain B CAN and GPIOs
7	VIN_B +	Positive reference for power supply B
8	N.C.	No connect

As mating connectors for both inputs, there are several recommended options:

- **21033192801:** Straight option, with screw termination
- **1522875:** Straight option, 24 AWG 3 meters cables already assembled
- **21033194801:** Right angle option, with screw termination
- **1522639:** Right angle option, 24 AWG 3 meters cables already assembled

SOFTWARE INSTALLATION

Smart CAN Isolator is configured with a computer via CAN. Normally, there is not a direct connection with a PC with CAN, so an **Autopilot 1x** is employed as a tunnel to connect CAN to USB, RS-232 or RS-485.

The physical connections can be summarized with the following diagrams (including power supplies):

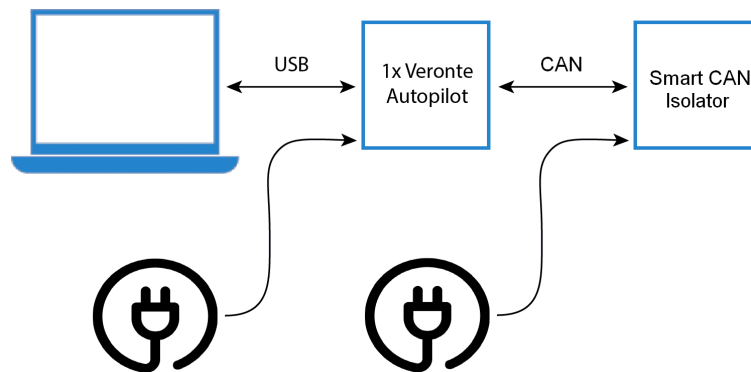


Fig. 1: USB connection

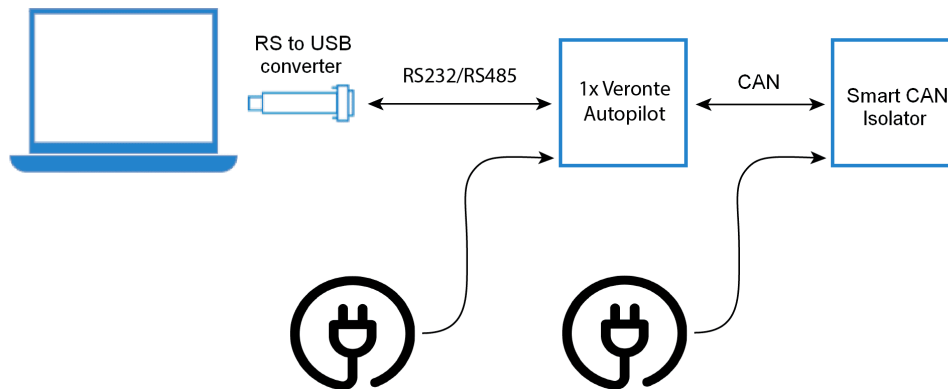


Fig. 2: Serial connection

To use the required software and configure **Smart CAN Isolator**, read the [SCI Software Manual](#).

MAINTENANCE

Apart from cleaning, no extra maintenance is required to guarantee the correct operation of the Smart CAN Isolator.

In order to clean the Smart CAN Isolator, properly follow the next recommendations:

- Disconnect the device before cleaning.
- Use a clean, soft, damp cloth to clean the unit (not for OEM version).
- Do not immerse the unit in water to clean it.

TROUBLESHOOTING

7.1 Maintenance mode

Maintenance mode is the main troubleshooting tool that Veronte puts at the user disposal. While in maintenance mode, all communication channels are enabled by default, so it is possible to connect to **SCI**, no matter its current configuration.

The main use of maintenance mode is to solve issues related to the current configuration, mainly related with communication or memory writing issues.

While in maintenance mode, it is possible to perform actions such as force the load of a new configuration file .

If a mistake was made when building the configuration and the communication with the device has been lost, it is possible to force the device to boot into **maintenance mode** in order to modify its configuration.

Tip: It is heavily recommended to always use **maintenance mode** to load a new configuration that is very different from the current one.

7.1.1 How to enter in maintenance mode

There are two ways to enter in **maintenance mode**: using software or forcing it.

7.1.1.1 Using software to enter in maintenance mode

To enter in maintenance mode using software, read [SCI PDI Builder user manual -> Maintenance Mode](#).

7.1.1.2 Forcing maintenance mode

To force **Maintenance mode**, create a loopback on both **GPIO** interfaces (connect *pins 4 & 5* on both sides). When powered, **Smart CAN Isolator** will boot in **maintenance mode**.

7.2 FAQ

The baudrate I am using is different from the ones used in Maintenance mode. How do I program my Smart CAN Isolator?

In this case, a separate setup will be needed. Create a setup that allows to *force maintenance mode* and uses the right baudrate. Then, load into **Smart CAN Isolator** the required configuration. Finally, once the configuration is loaded, install it in the original setup.

I am not able to communicate with SMART CAN Isolator

This can be due to several reasons:

- A wrong configuration was loaded, which disabled the configuration settings.
- An incorrect CAN baudrate is being used.

The first step should be *forcing maintenance mode*.

Once that is done, the baudrates will be known and the communication will be enabled.

Now in maintenance mode, the current configuration can be checked, or a new one can be loaded.

My Smart CAN Isolator starts in maintenance mode

This usually indicates that a problem was detected during the booting.

First of all, verify that you are not *in maintenance mode*.

Once that is done, verify that the wiring is correct and load a default configuration.

If the problem persists, please contact support@embention.com.

ACRONYMS AND DEFINITIONS

CAN	Controller Area Network
COM	COMMunications
FAQ	Frequently Asked Questions
GND	Electrical ground
GPIO	General Purpose Input Output
ID	IDentification
Mbps	MegaBits per Second
OEM	Original Equipment Manufacturer
PCB	Printed Circuit Board
RS-232	Recommended Standard 232
SCI	Smart CAN Isolator
Vrms	Voltage Root Mean Squared

CONTACT DATA

You can contact Embention in any moment if you need further help and support.

Embention contact data is as follows:

Email: support@embention.com

Web page: <https://www.embention.com/contact/>

Telephone: (+34) 965 421 115

Address: Polígono Industrial Las Atalayas, C/ Chelín, Nº 16, CP 03114, Alicante (España).