
SCI PDI Builder

Release 6.8

Embention

2023-08-04

CONTENTS

1 Quick Start	3
1.1 Installation	3
2 Configuration	5
2.1 Operating Modes	6
2.2 Establishing connection	7
2.3 CAN baudrate	8
2.4 Port routing	8
2.5 I/O Manager	9
2.6 CAN Config	10
2.7 CAN configuration for normal mode	13
2.8 VCP	16
2.9 CAN I/O	17
2.9.1 Producers	18
2.9.2 Consumers	19
2.9.3 CAN Telemetry	19
2.10 CAN Setup	20
3 Integration examples	23
3.1 Transparent Tunnel	23
3.2 CAN filter	25
3.3 Control the GPIO Outputs	29
3.4 Send Internal Telemetry	33
4 Troubleshooting	37
4.1 Maintenance mode	37
4.1.1 Forcing Maintenance mode for troubleshooting	37

SCI | PDI BUILDER

SCI PDI Builder is the **SCI** configuration tool to adapt it to a specific vehicle.

QUICK START

SCI PDI Builder is used to set all the configurable parameters of **SCI** (Smart CAN Isolator).
SCI can be adjusted according to different inputs, outputs, CAN communications and telemetries.

1.1 Installation

To configure a **SCI**, first of all download and install **SCI PDI Builder**.

To install **SCI PDI Builder** on Windows just execute the exe file and follow the installer indications. Administrator rights are needed.

Warning: If users have any problems with the installation, please disable the antivirus and the Windows firewall. Disabling the antivirus depends on the antivirus software.

To disable the firewall, go to “Control Panel” → “System and Security” → “Windows Defender Firewall” and then, click on “Turn windows Defender Firewall on or off”.

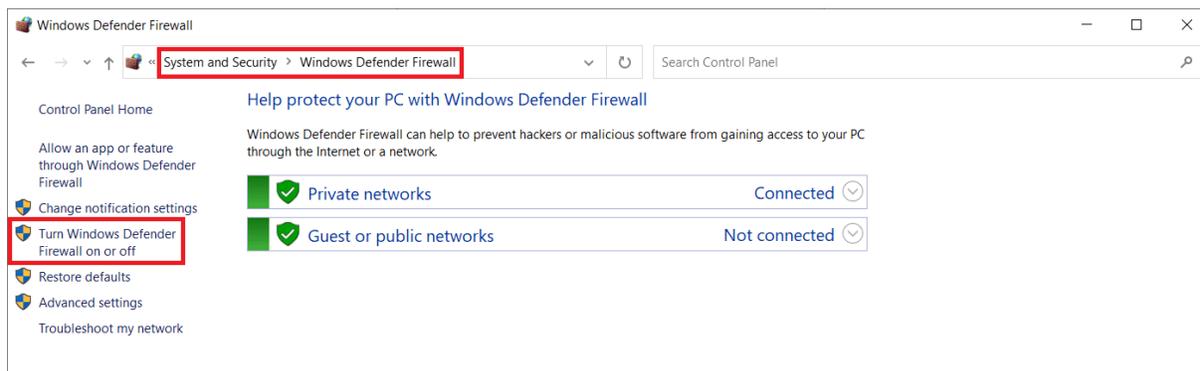


Fig. 1: Windows Defender Firewall

CONFIGURATION

When **SCI PDI Builder** is executed, the following window and options will appear:

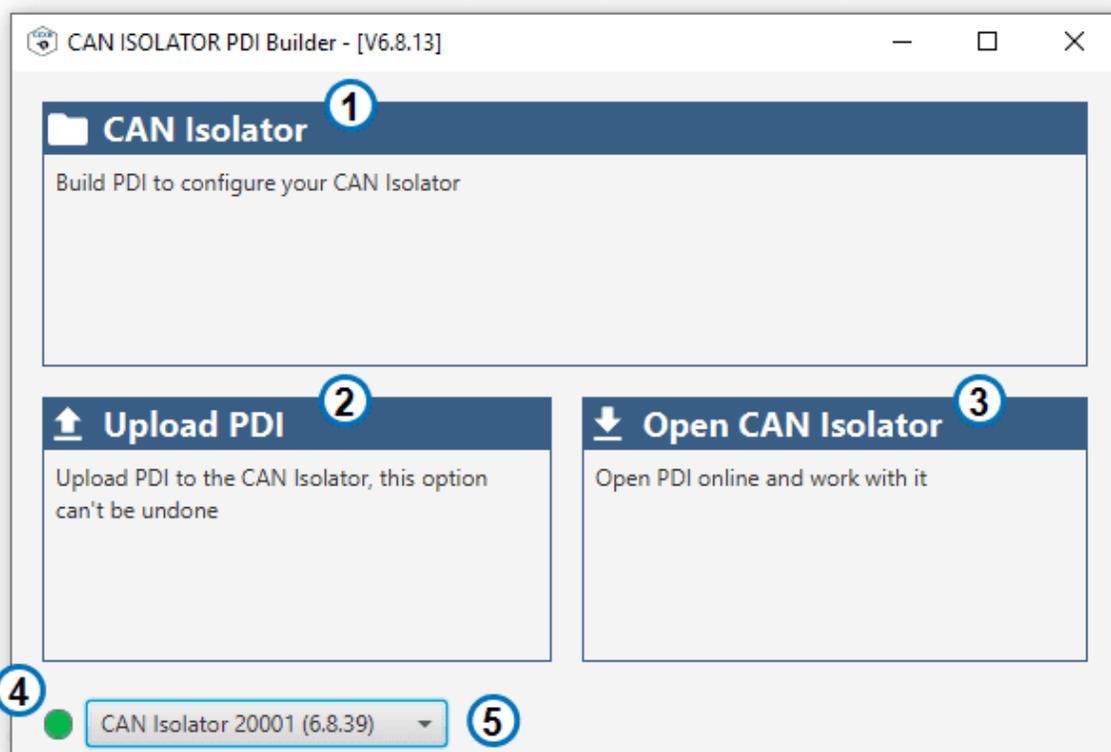


Fig. 1: CAN ISO PDI Builder

1. **Offline configuration:** Click here to work with configurations offline, without the need of a connected device.
2. **Upload PDI:** Upload an existing configuration to the selected device. .. note:: PDI files are configuration files. This files are used by modular control with improved version management.
3. **Open CAN Isolator:** Open the configuration of the selected device.
4. **Current mode:** Current mode of the selected device. Click to alternate between **Normal (Green)** and **Maintenance (Orange)** modes.
5. **Selected device:** Selected device upon the connected devices.

Important: Builder and Firmware major and minor versions must match (For example, Firmware version **6.8.40** is compatible with Builder version **6.8.13**, but not with version **6.10.13**).

Clicking on **1.** or **3.** will open the configuration menu, where the following options are available:

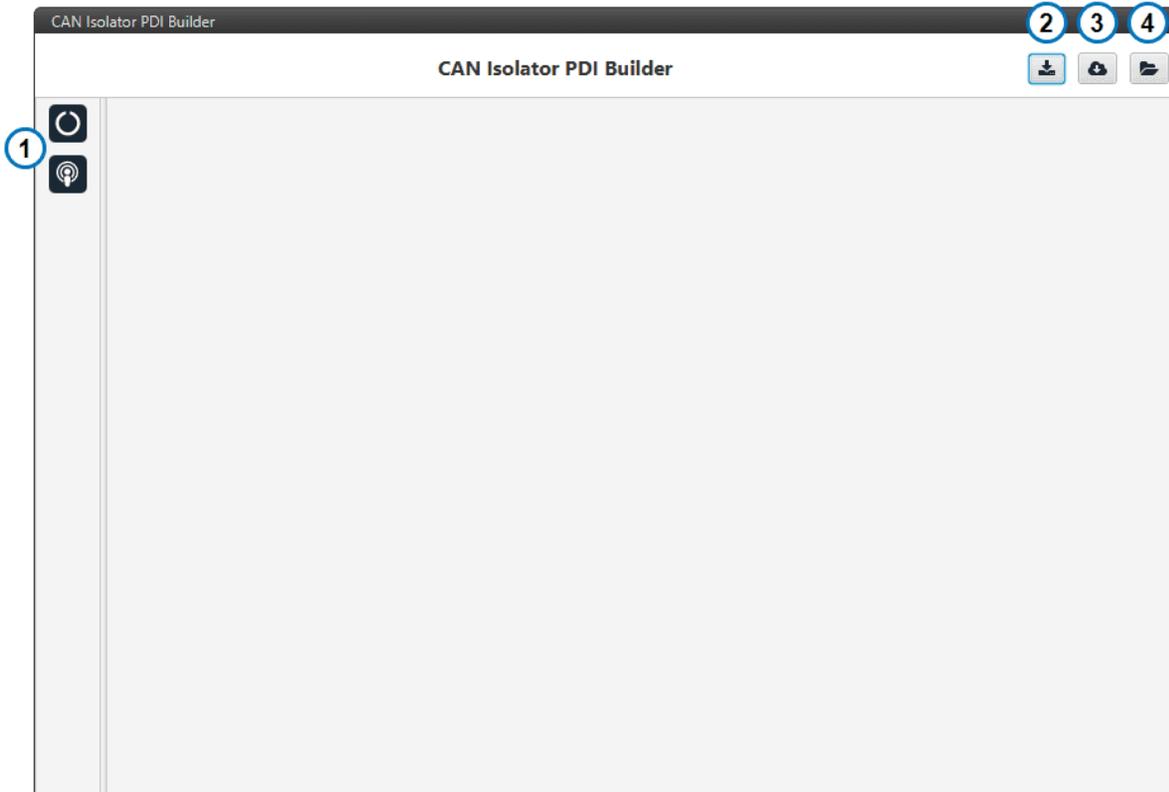


Fig. 2: CAN ISO PDI Builder configuration

1. **Configuration tabs:** Access to the configuration of the different available features.
2. **Export PDI:** Save the current configuration files into your local storage.
3. **Import Online PDI (NOT AVAILABLE YET):** Import configuration from the available online configurations.
4. **Import PDI from Local Storage:** Import configuration from your local files.

2.1 Operating Modes

Smart CAN Isolator has two different operating modes. The current **mode** can be seen on the bottom left corner when connected to **CAN ISO PDI Builder**.

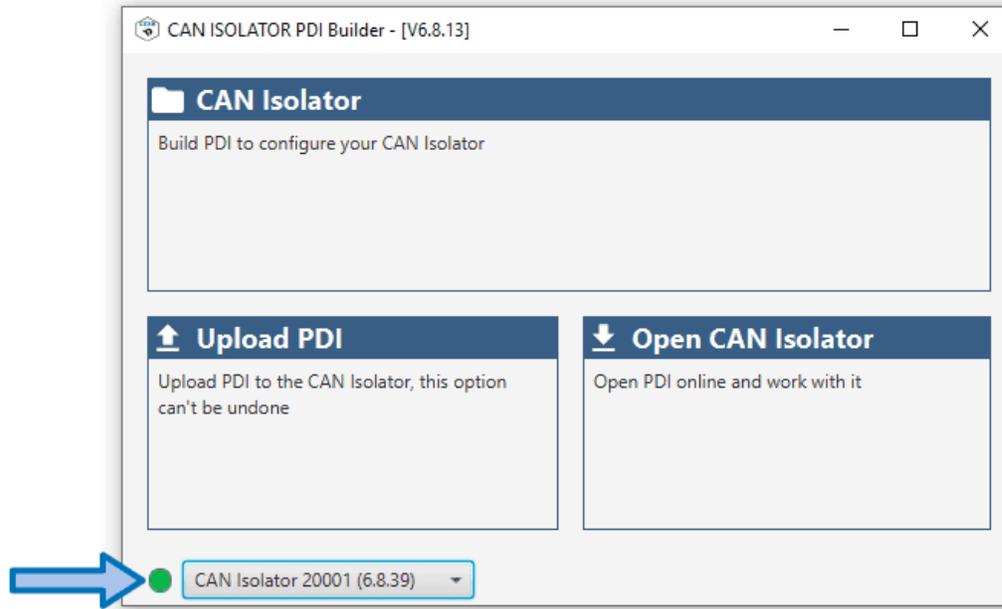


Fig. 3: Smart CAN Isolator mode

Clicking on the indicator allows to switch the current mode.

Tip: **Smart CAN Isolator** will modify the baudrate of its interfaces when in **maintenance mode**. If these baudrates do not match your setup, an external configuration setup will be needed to modify the configuration.

With normal operating mode. The loaded configuration will be executed. **Smart CAN Isolator** will always try to boot in **Normal mode**.

Read *Maintenance mode section* to know more.

2.2 Establishing connection

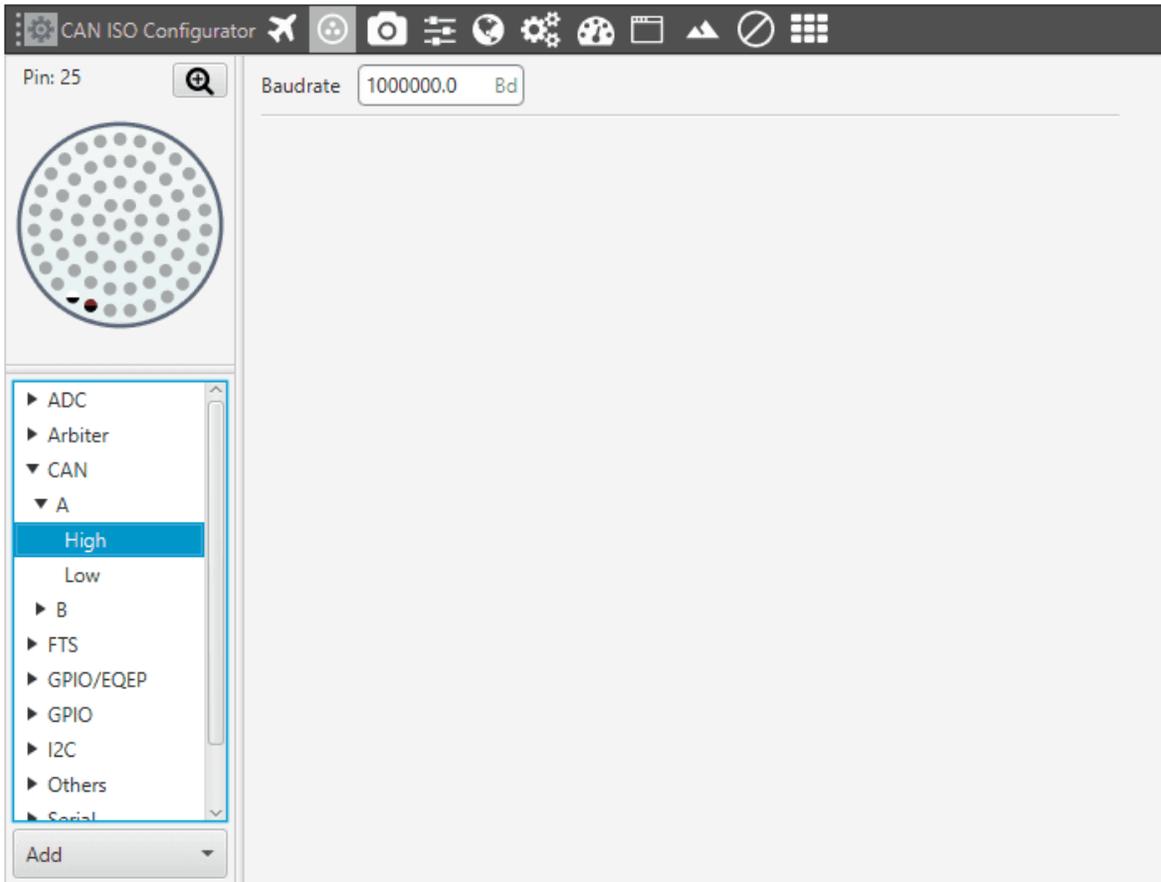
The configuration of the **Smart CAN Isolator** can only be performed through one of its **CAN interfaces**.

In order to do this, a support device is needed to act as a **configurator** (for example a **Veronte Autopilot** or a **Veronte CAN Expander**).

Important: 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 *Operating modes* for more information.

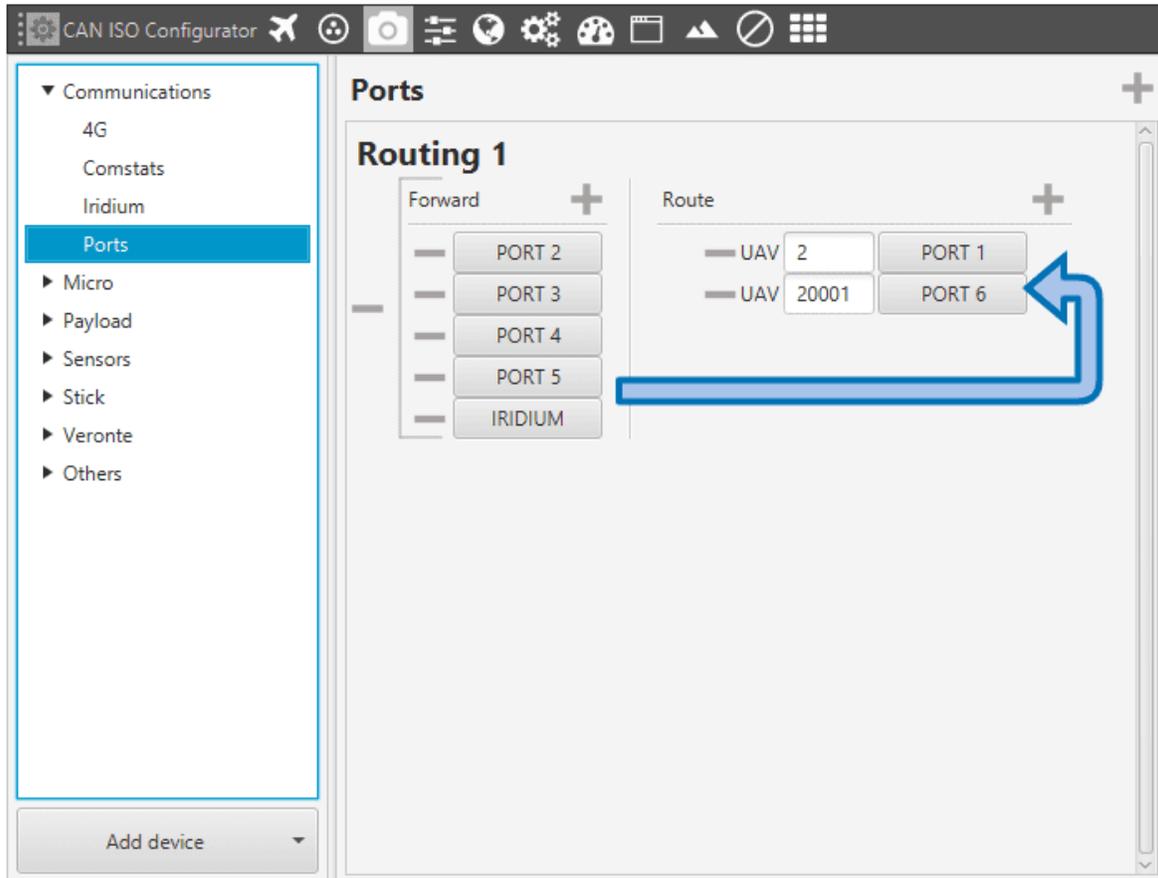
2.3 CAN baudrate

1M for interface A, 500k for interface B:



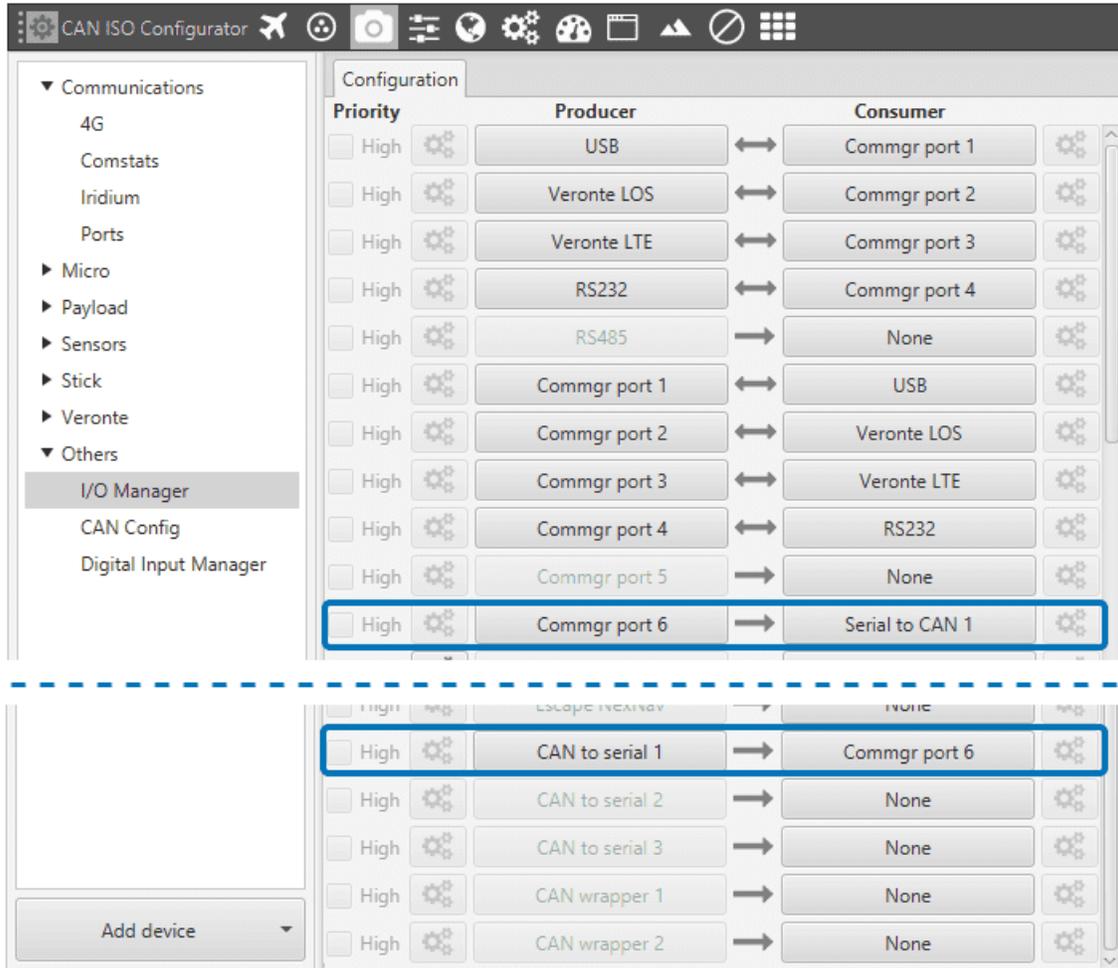
2.4 Port routing

Redirect the messages addressed to the **Smart CAN Isolator** through a Comm Manager port. For this example CAN Isolator S/N:20001 and **Comm Port 6** are used:



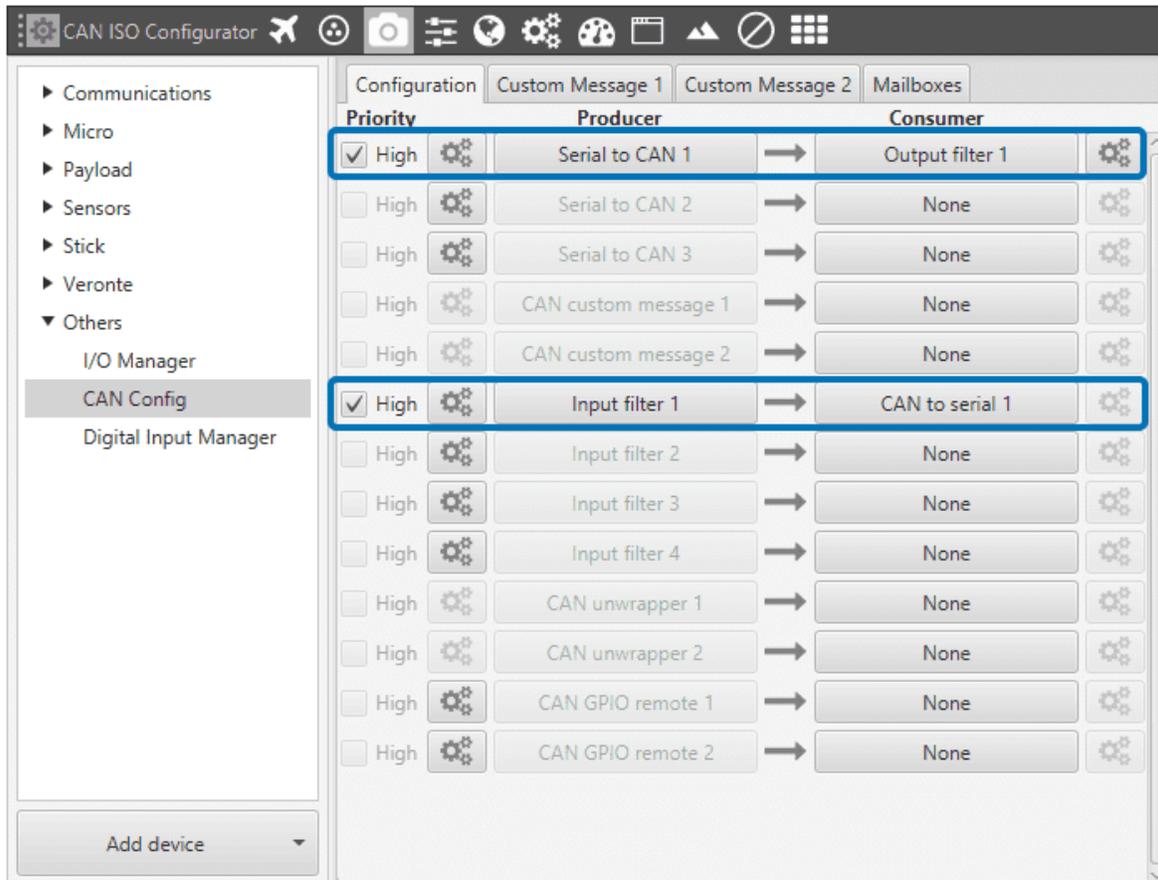
2.5 I/O Manager

In the I/O Manager, connect a **Serial to CAN** interface bidirectionally with the selected **Comm Manager Port**:

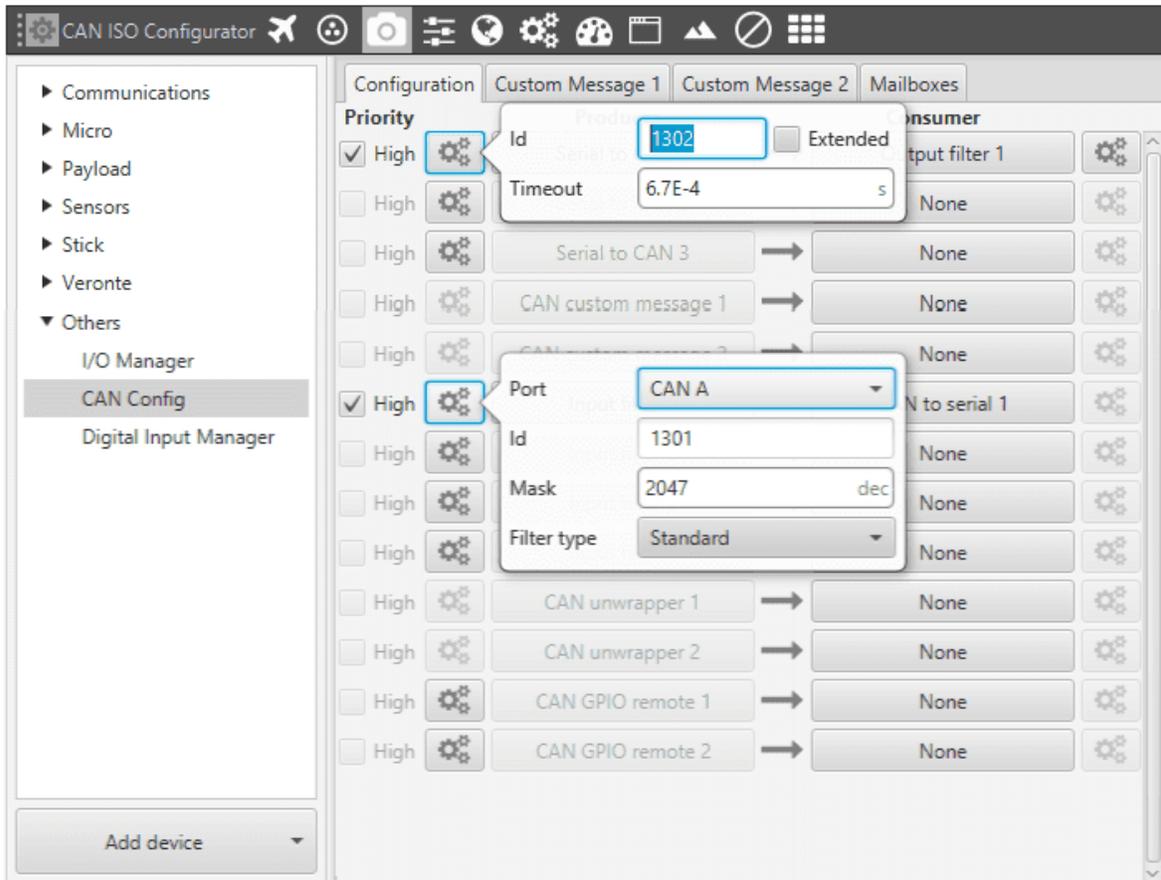


2.6 CAN Config

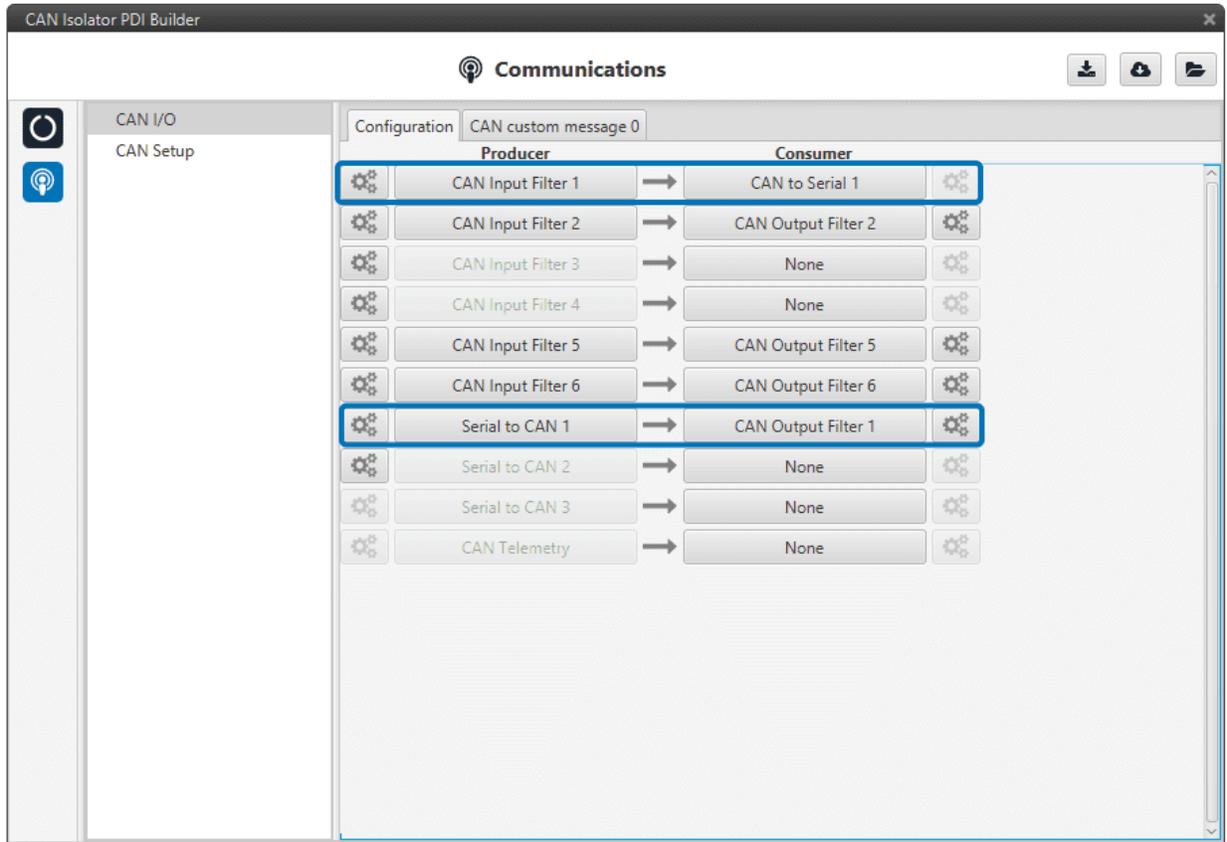
Connect the **Serial to CAN** and **CAN to Serial** producer and consumer to the respective input and output filters. Set both to **High** priority:

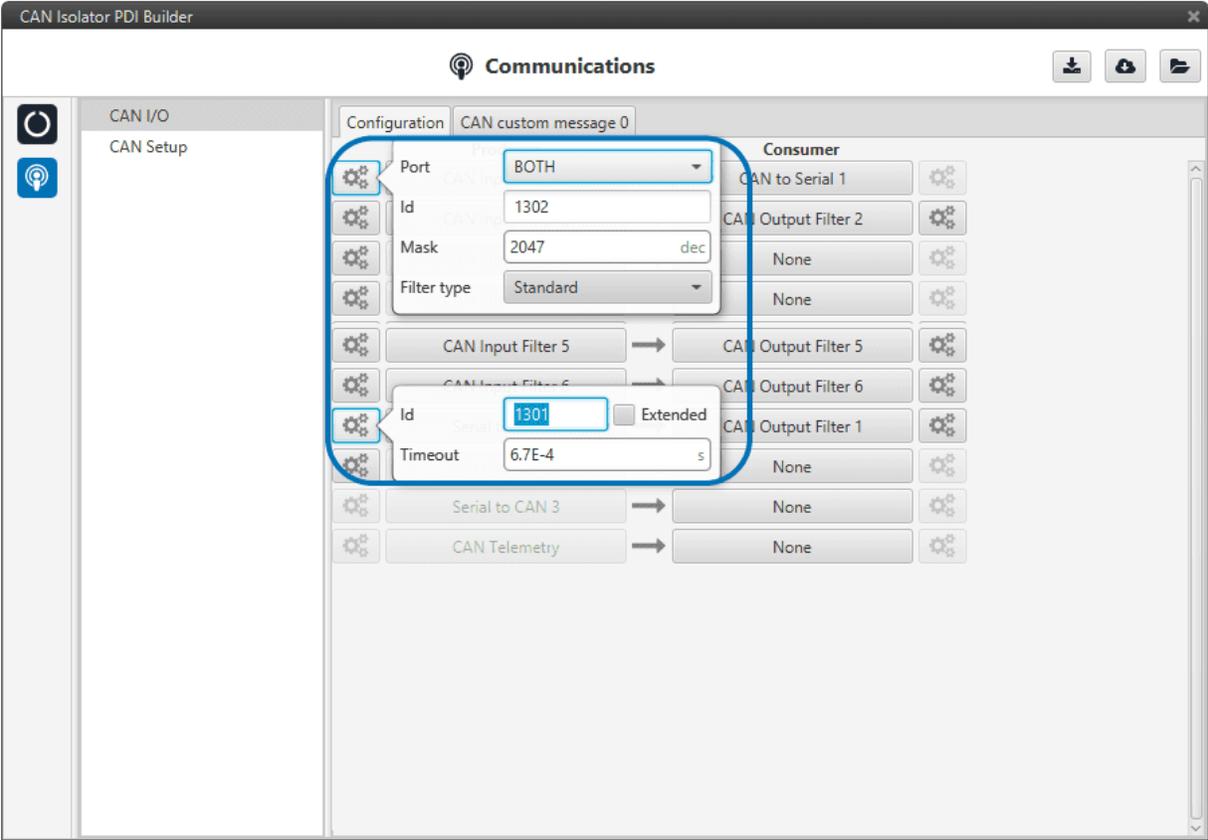


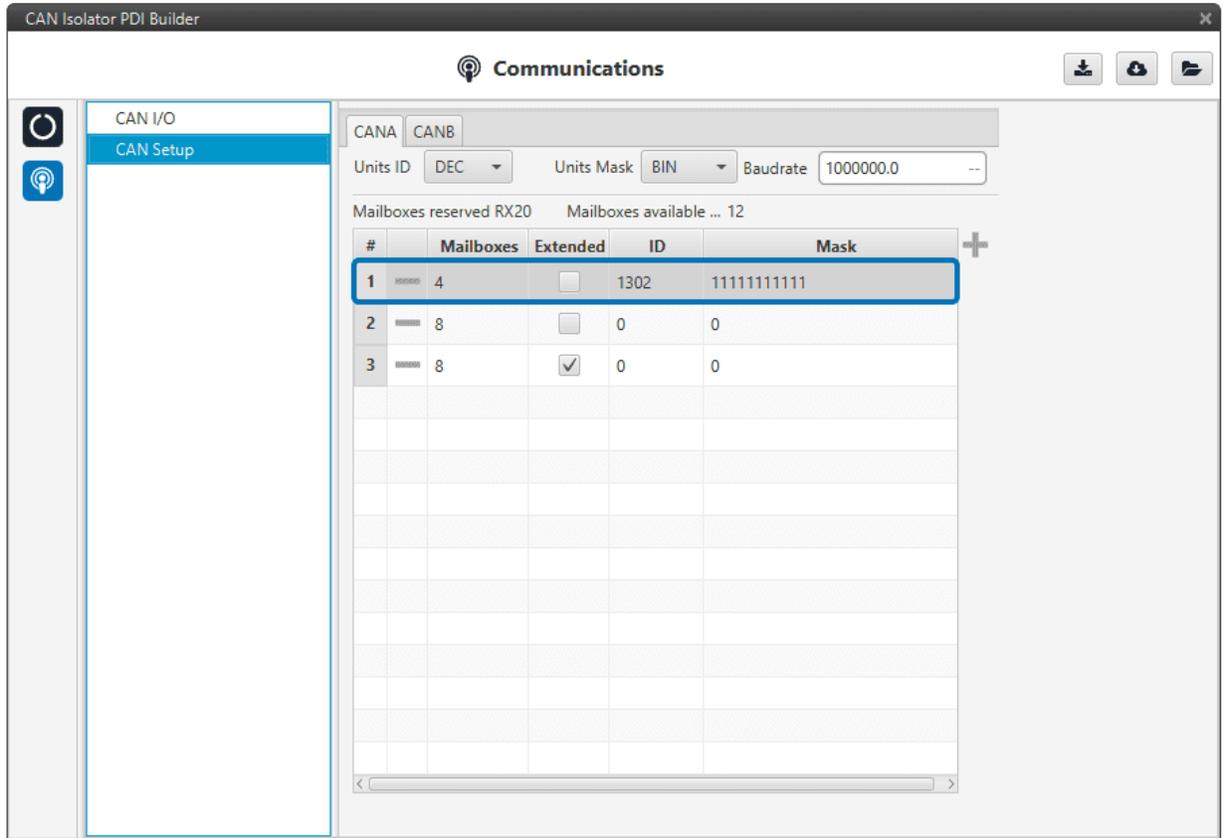
Use **ID 1302** for **Serial to CAN** producer and **ID 1301** for the **Input Filter**:



Finally, add **CAN ID 1301** to the **CAN Mailboxes**







2.8 VCP

1. **Enable VCP Status Message:** (Veronte Communication Protocol) **Smart CAN Isolator** will send a periodic message so that other applications and devices in the **Embention** environment can know its status. The period of this message can be chosen, or it can be disabled if required.

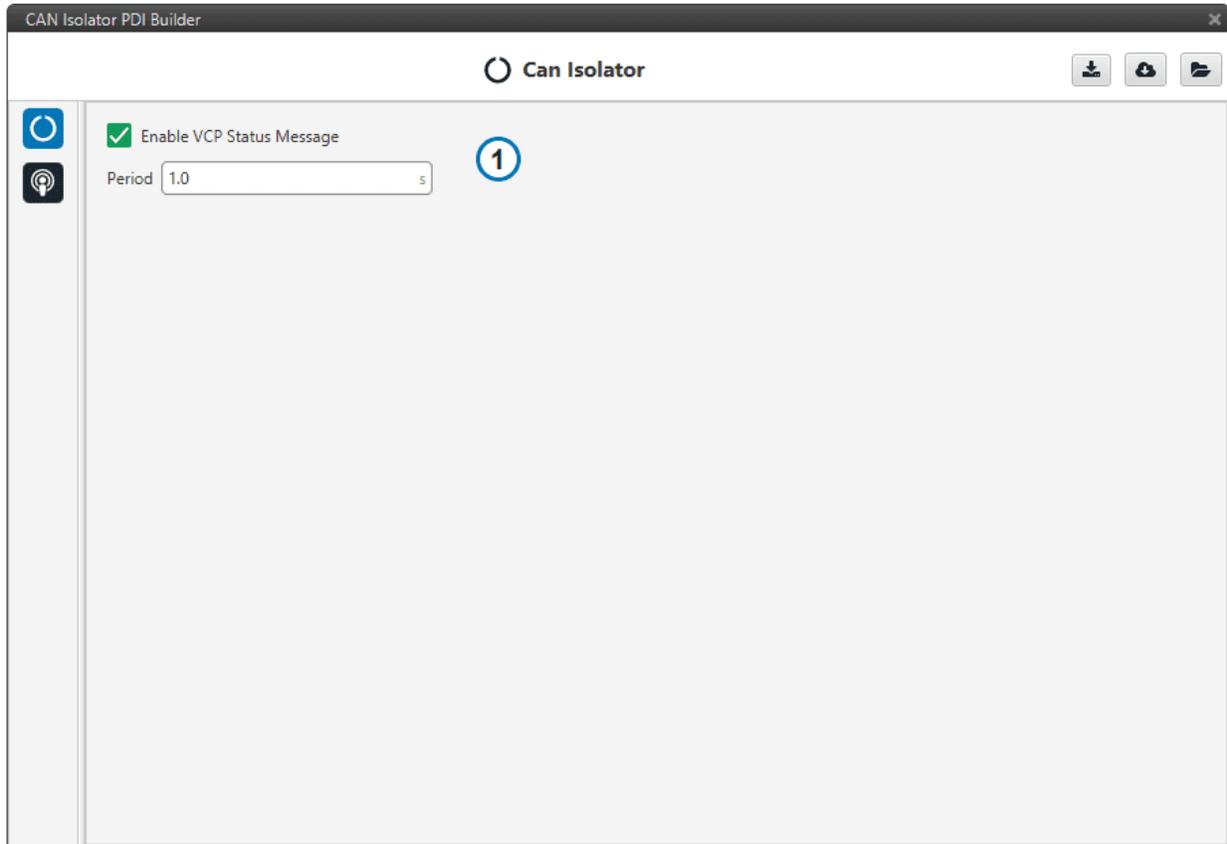


Fig. 4: VCP Status configuration

Warning: Disabling the Status Message will disable other apps and devices from detecting **Smart CAN Isolator** automatically.

2.9 CAN I/O

Configuration of the CAN Producers and Consumers

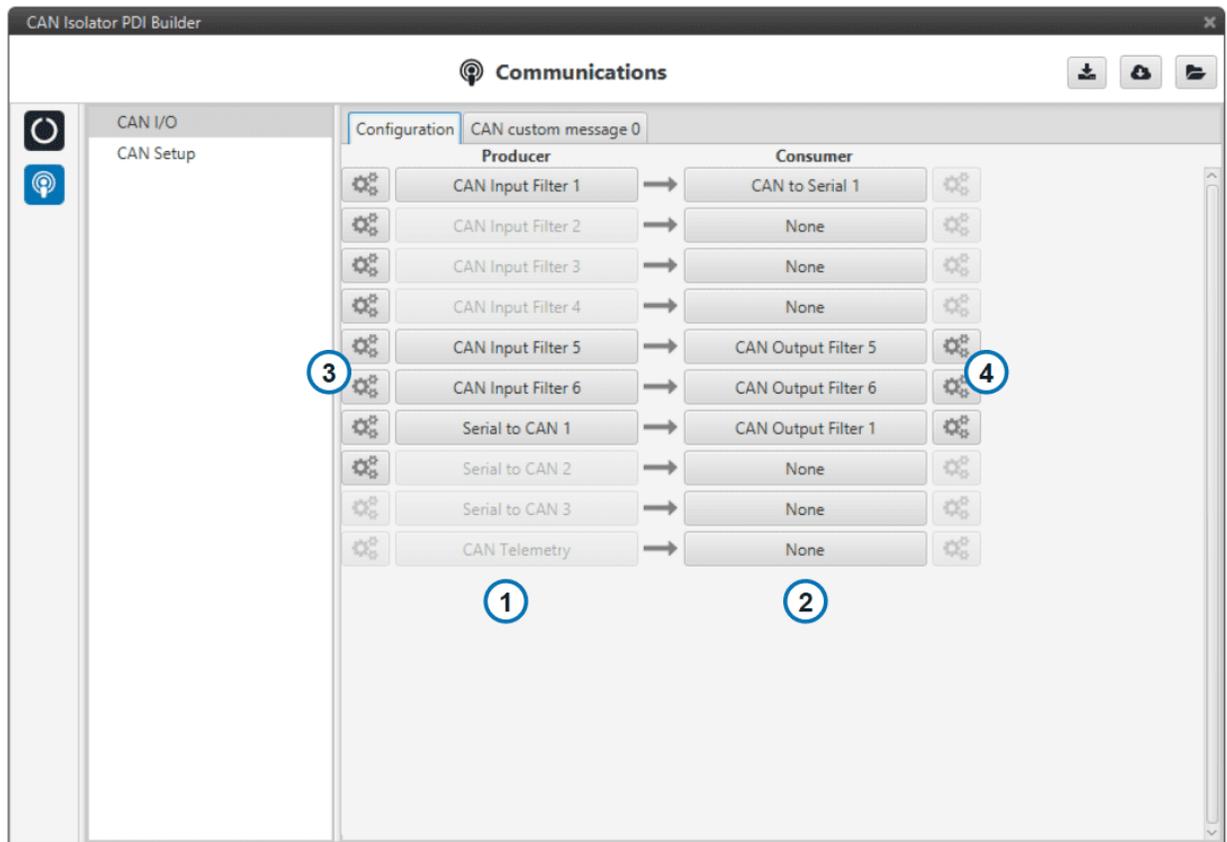


Fig. 5: CAN I/O configuration

1. **Producers:** Producers allow to read CAN messages from the CAN buses or to create new ones.
2. **Consumers:** Consumers allow to process CAN messages or send them into one of the CAN buses.
3. **Producer settings**
4. **Consumer settings**

2.9.1 Producers

- **CAN Input Filter:** Read CAN Messages from the CAN bus.

Important: For a message to be read by an **Input filter**, it must have an assigned mailbox in *CAN Setup*.

- **Serial to CAN:** Producer for internal and configuration messages. Only **Serial to CAN 1** is currently enabled.
- **CAN Telemetry:** Custom CAN messages producers. See *CAN Telemetry section*.

2.9.2 Consumers

- **CAN Output Filter:** Send CAN Messages into the CAN bus.
- **CAN to Serial:** Consumer for internal and configuration messages. Only **CAN to Serial 1** is currently enabled.
- **CAN GPIO consumer:** Consumer for GPIO command messages. For controlling **Smart CAN Isolator** GPIO outputs, it is necessary to send activation for **Virtual GPIO 02 (Interface A)** and **Virtual GPIO 04 (Interface B)**.

2.9.3 CAN Telemetry

With **CAN Telemetry** the user can create CAN custom messages using its internal variables. Examples of internal variables are:

- Voltage Input
- GPIO Status
- Configuration CRC
- Device ID

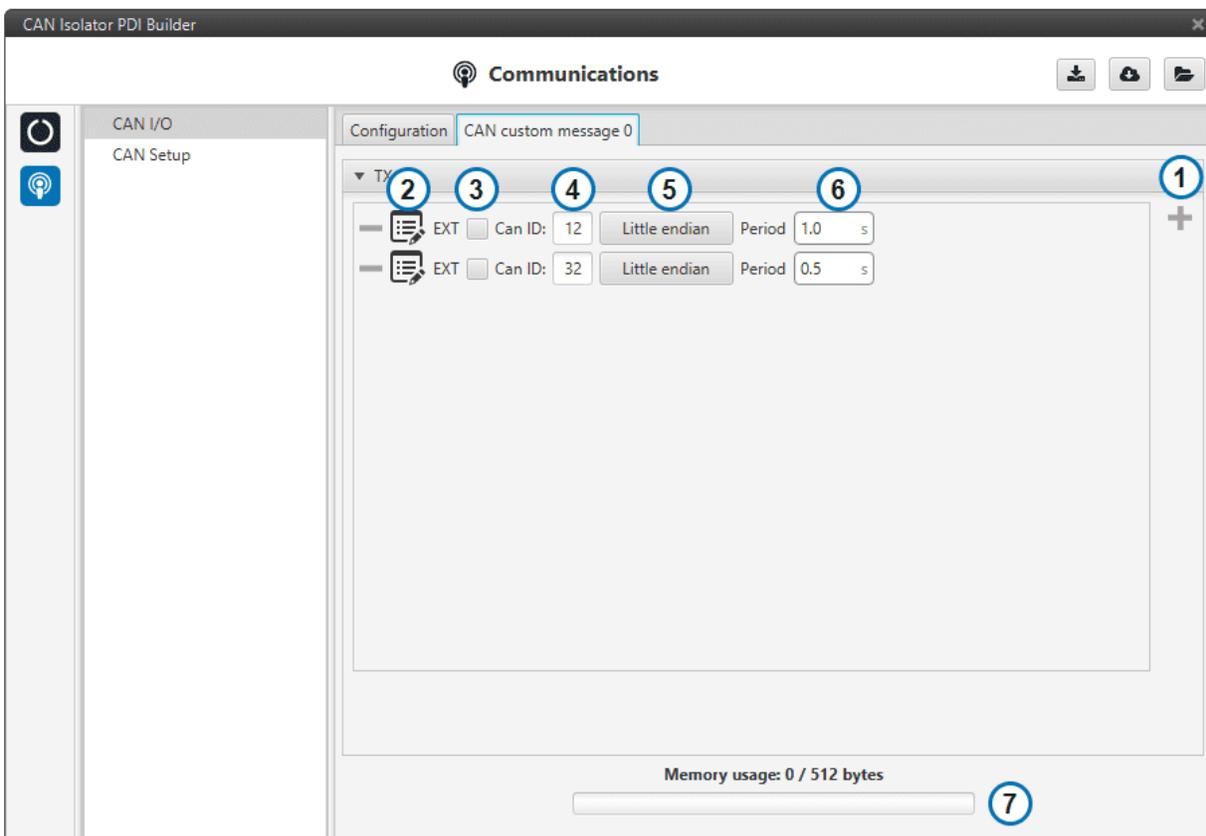


Fig. 6: CAN Telemetry configuration

1. **Add new CAN message:** Add a new custom message to the **CAN Telemetry**
2. **CAN Message Data:** Edit the message Data field.

3. **CAN ID Type:** Select between **Standard** CAN ID (11-bit) or **Extended** CAN ID (29-bit).
4. **CAN Message ID:** CAN ID for the message.
5. **Endianness:** Big Endian, Little Endian or Hybrid.
6. **Period:** Frequency at which the message is sent.
7. **Memory usage:** Memory left for building CAN Telemetry messages.

2.10 CAN Setup

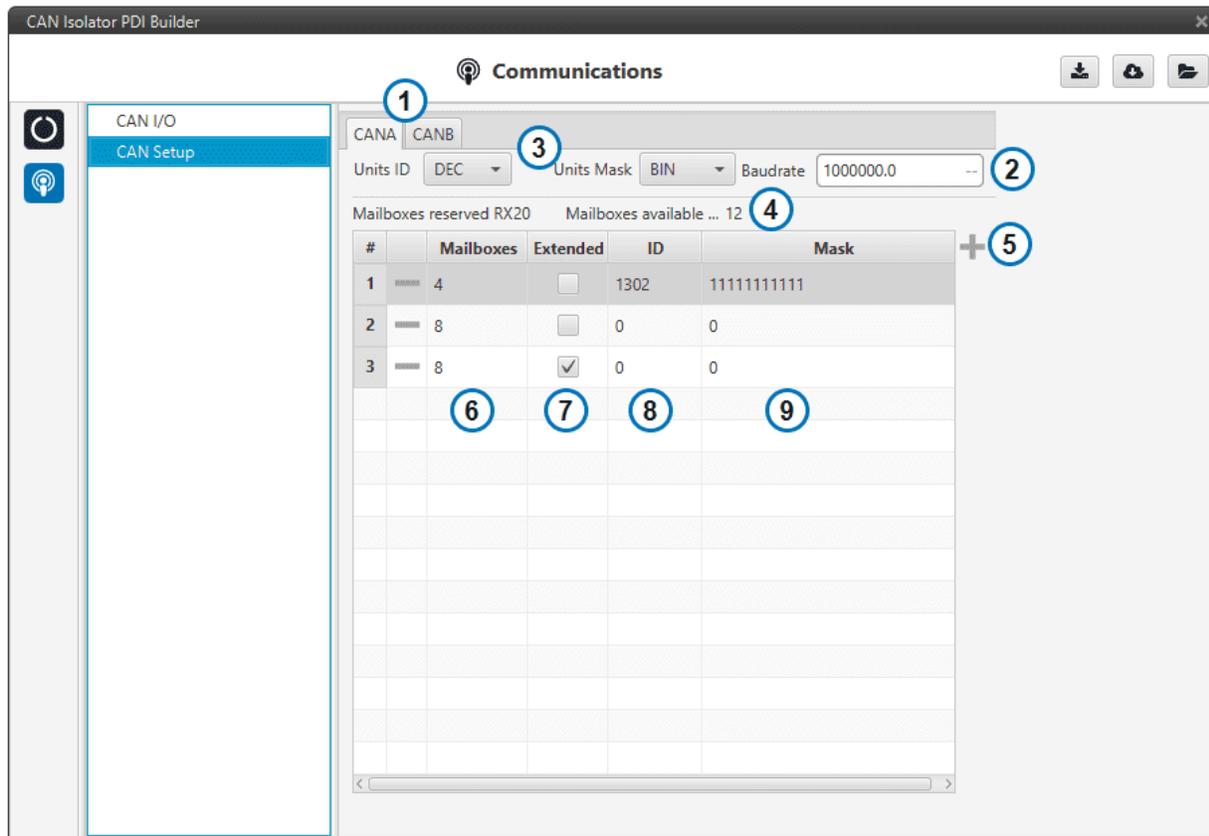
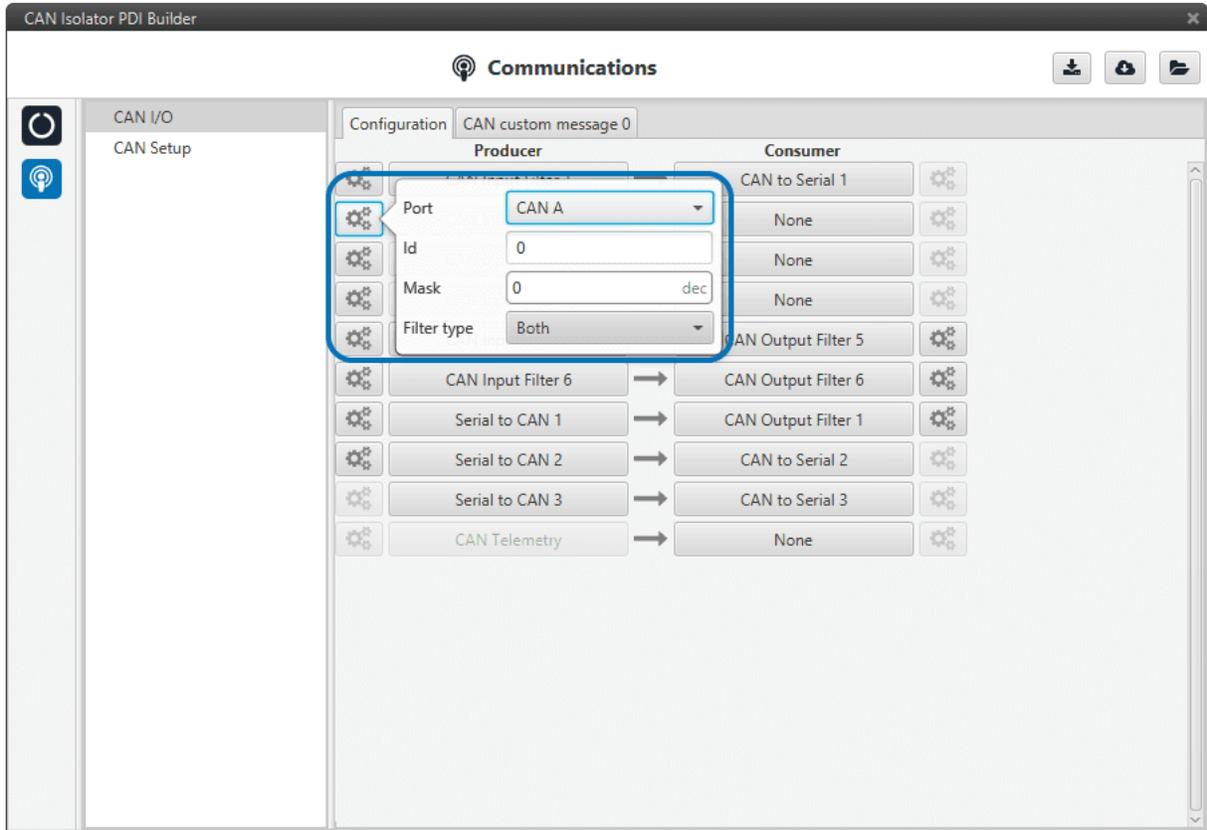


Fig. 7: CAN Setup configuration

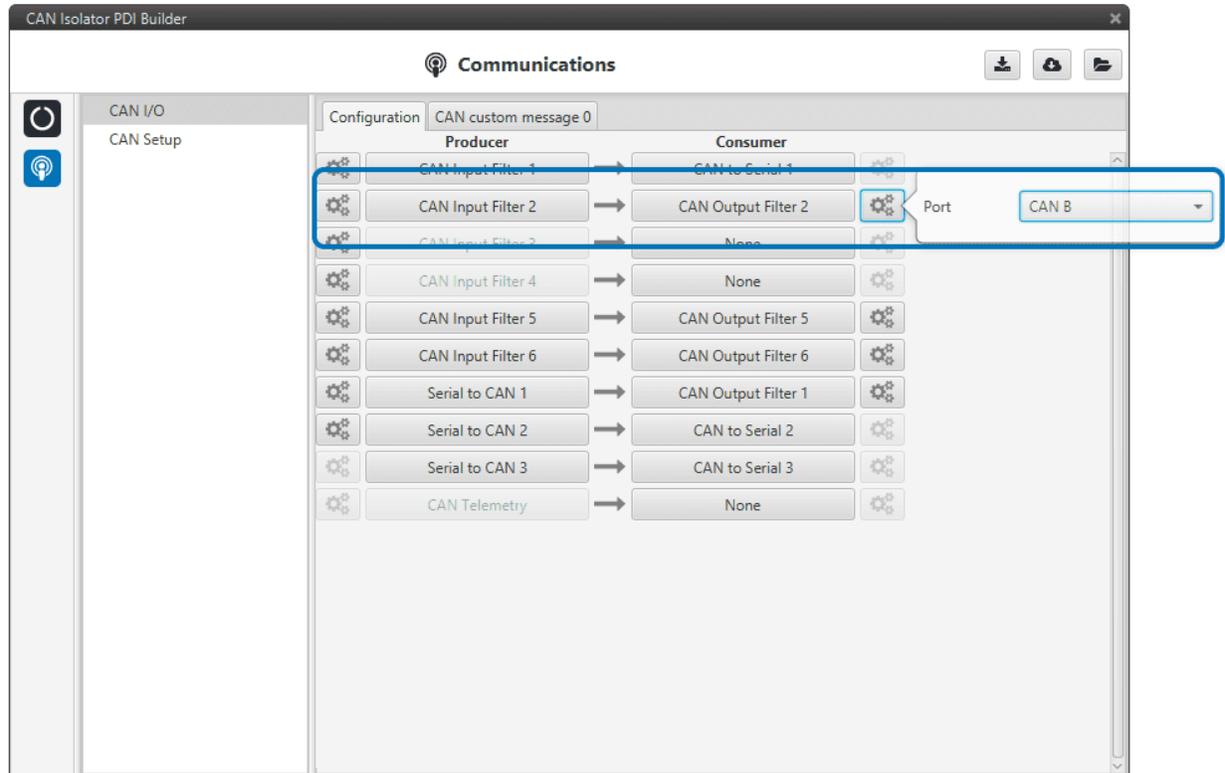
1. **Interface selection:** Apply settings to interface **A** or interface **B**.
2. **Baudrate:** CAN Baudrate for the selected interface.
3. **Mask display settings:** Select in which format the mask is displayed.
4. **Available mailboxes:** Current mailbox distribution.
5. **Create new mailbox entry:** Add a new line to the mailbox list.
6. **Number of mailboxes:** Number of mailboxes assigned to a given ID.
7. **ID type:** Select between **Standard** CAN ID (11-bit) or **Extended** CAN ID (29-bit).

8. **ID:** Input CAN ID.
9. **Mask:** Input mask. Use it for accepting more than one CAN ID within the same mailbox group.

Warning: At least one available mailbox must be left for **Smart CAN Isolator** to be able to send messages through that given interface.



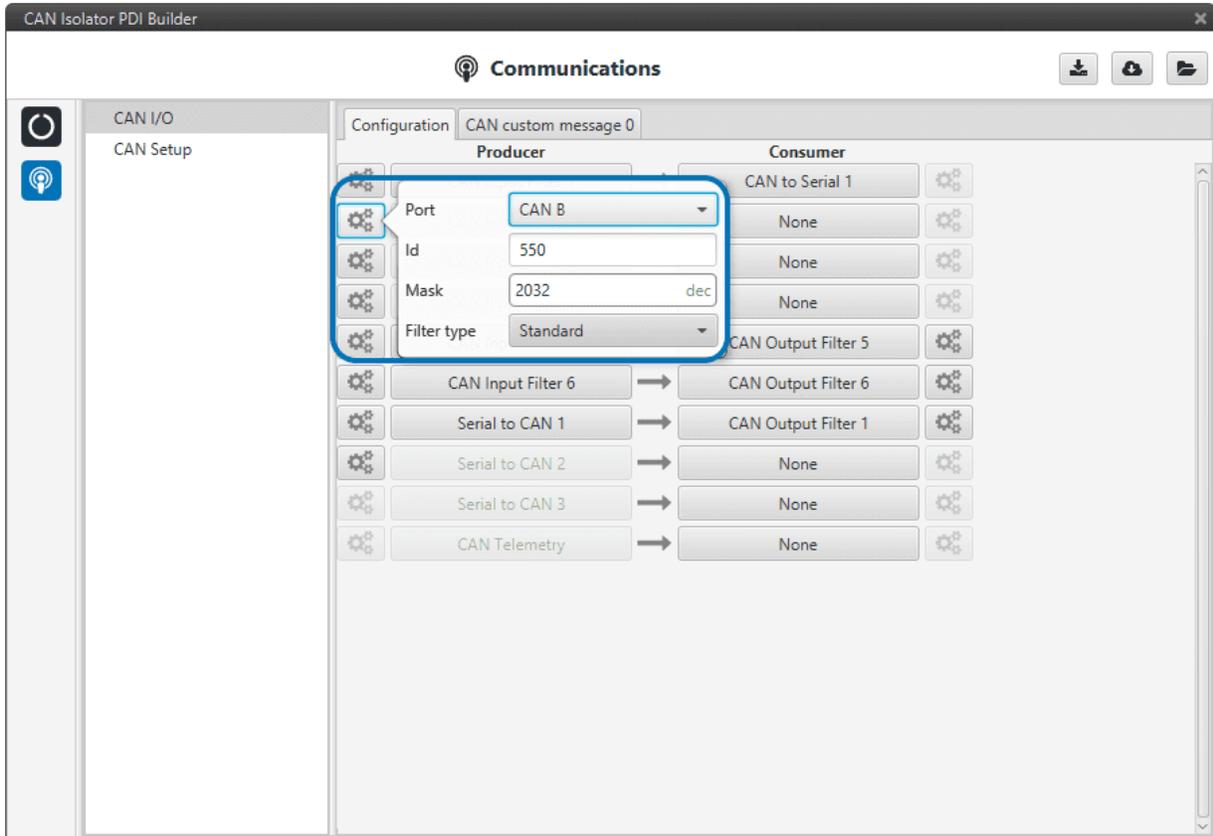
3. Bind **CAN Output Filter 2** to **CAN Input Filter 2**, configured to **CAN B**.



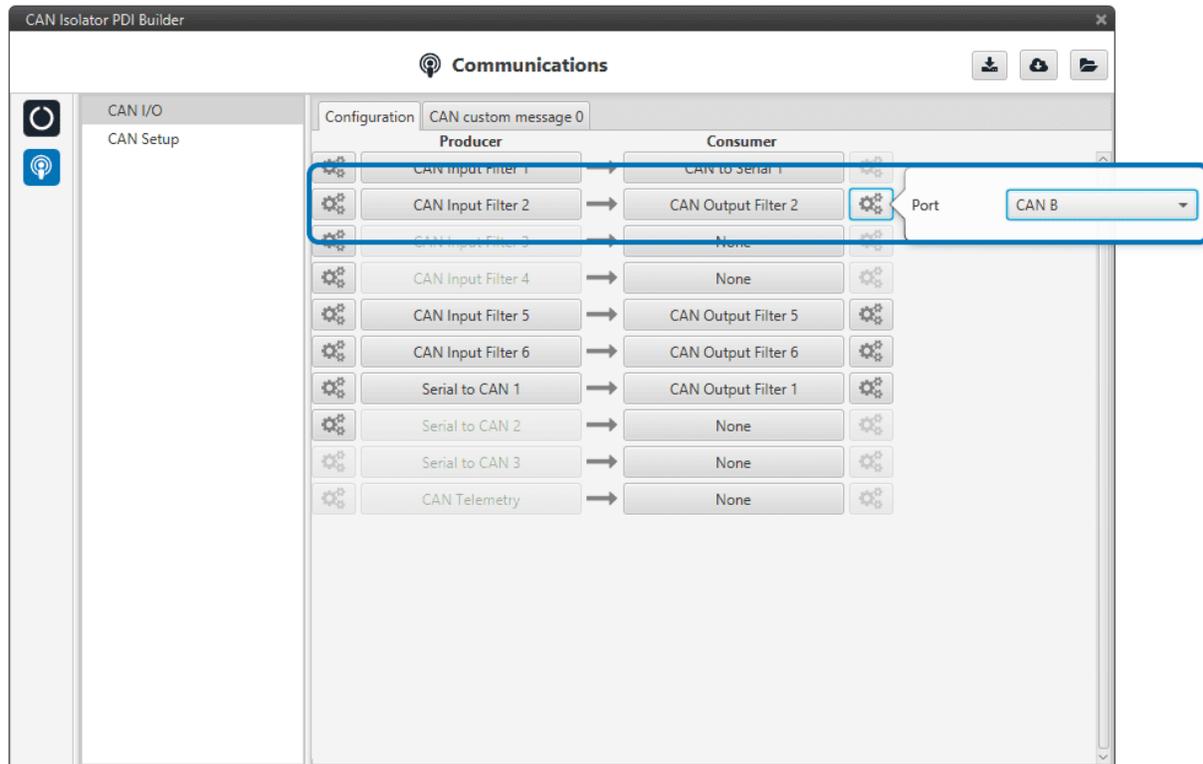
3.2 CAN filter

In this example, only a certain range of CAN IDs will be allowed to cross from **Interface B** to **Interface A**. The allowed range will be from **0x550** to **0x55F**.

1. Create a new mailbox entry for **Interface B**. Assign some of the mailboxes to it and set the ID to **0x550**.



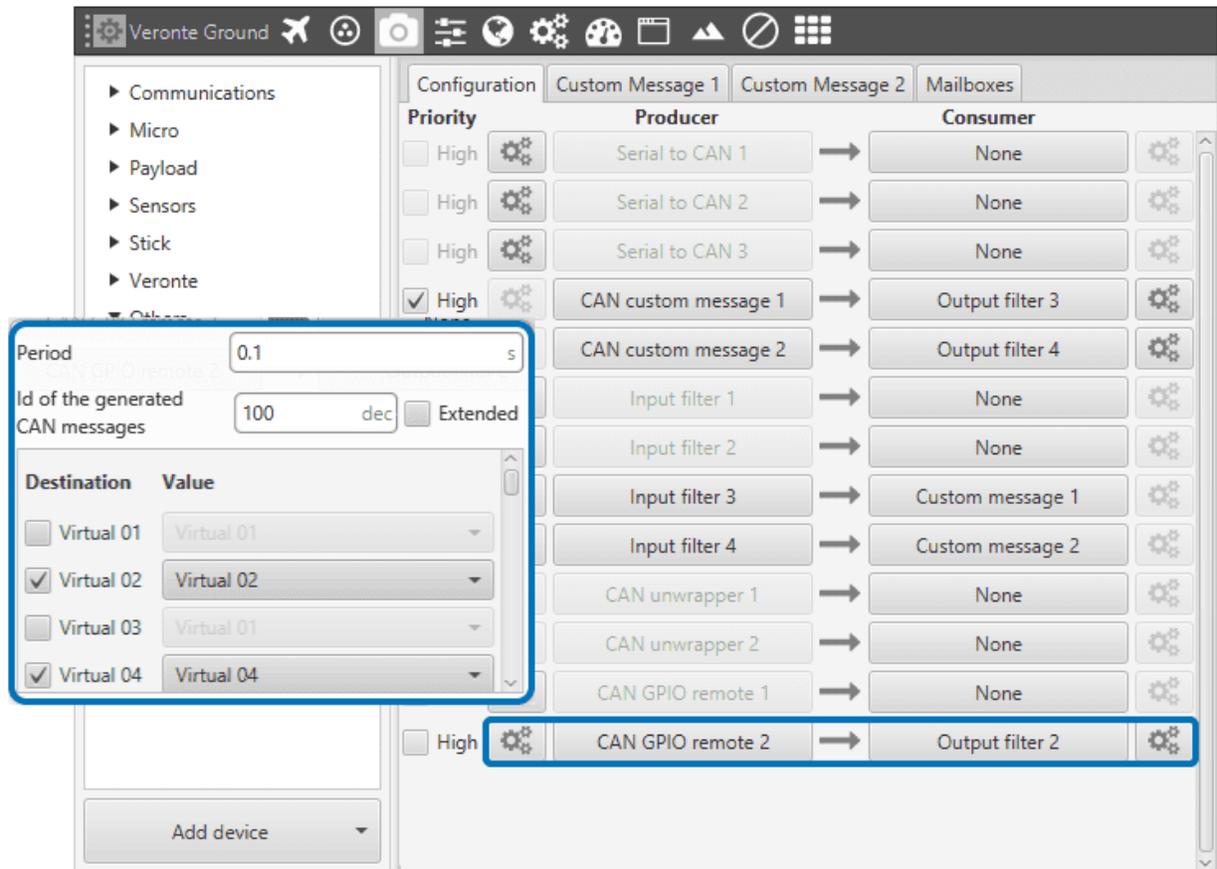
4. Bind **CAN Output Filter 2** to **CAN Input Filter 2**, configured to **CAN A**.



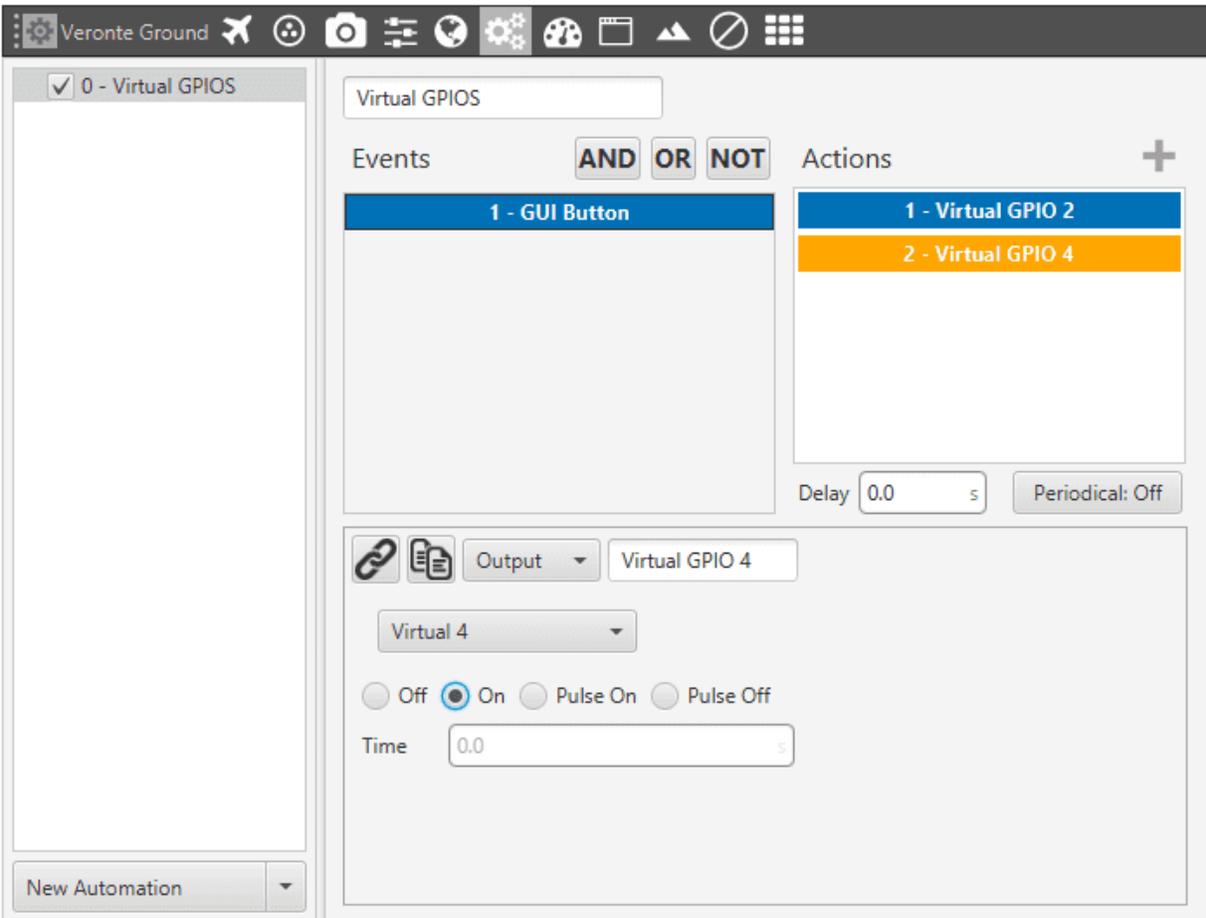
3.3 Control the GPIO Outputs

In this example we will see how to control the GPIO Output pins on **Smart CAN Isolator**.

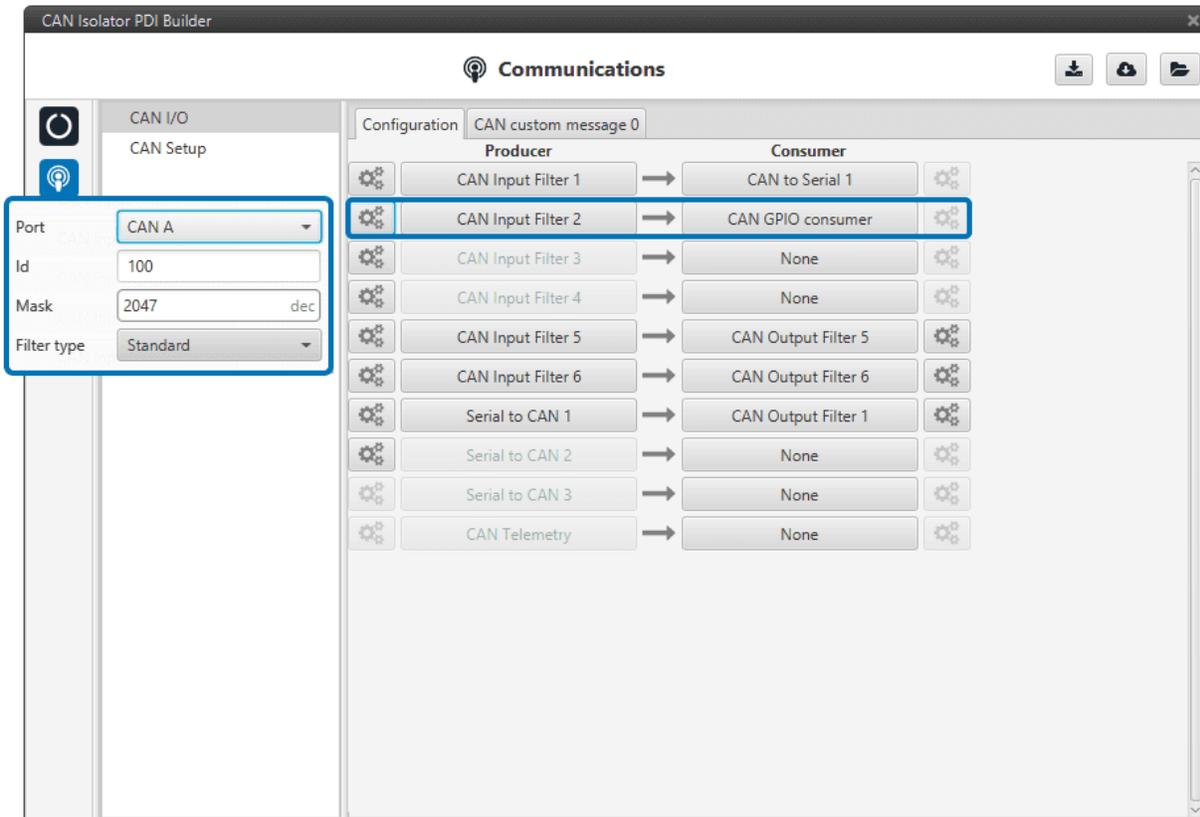
1. On **Veronte**, Configure **CAN GPIO Remote** and connect it to an Output Filter. We will need to command Virtual GPIOs 2 and 4. The CAN ID can be arbitrarily chosen. For this example, **ID 100** will be used.



2. Use the action **Output** in Veronte, to control the Virtual GPIOs.



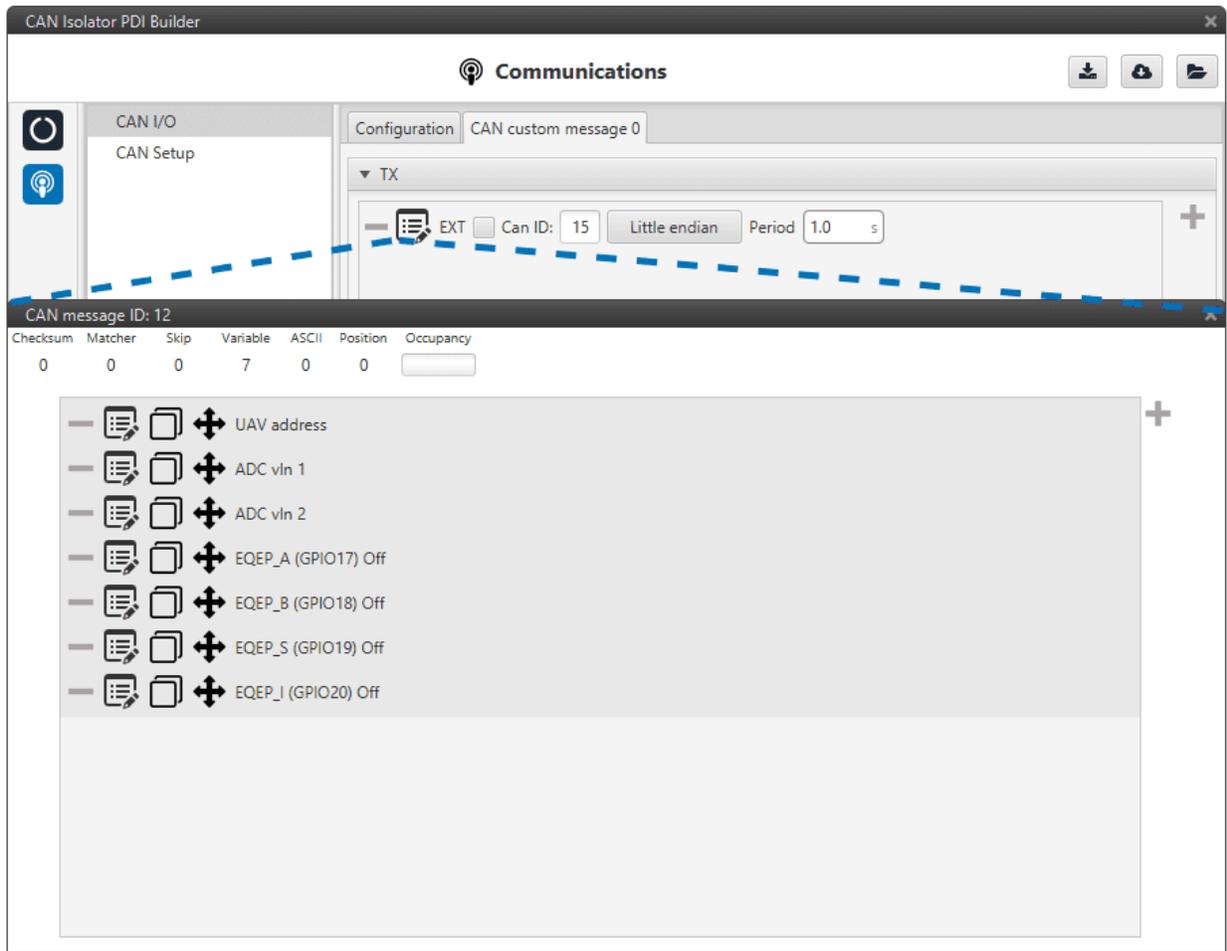
3. In **Smart CAN Isolator**, create a mailbox with **ID 100** to receive the CAN message.



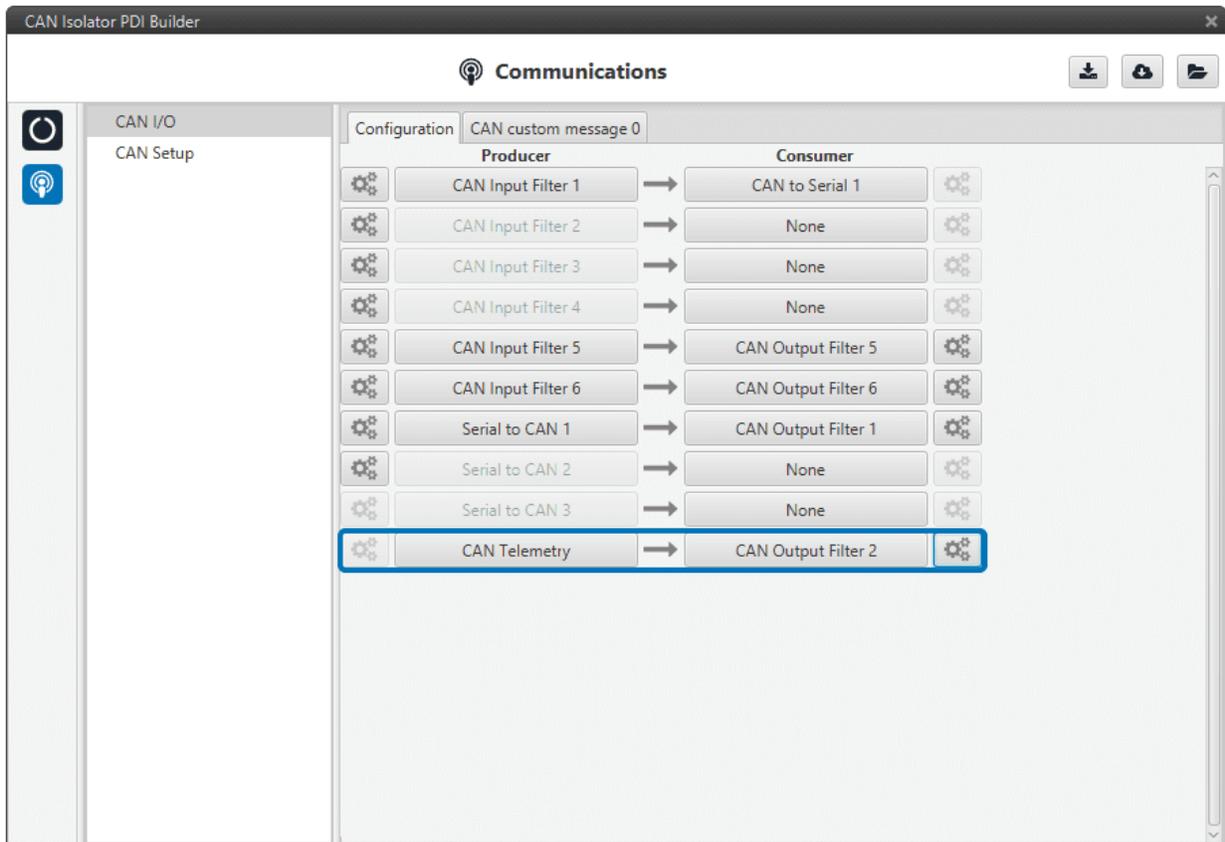
3.4 Send Internal Telemetry

In this example we will see how to create a custom CAN message to send internal information to other devices.

1. In **CAN telemetry**, create the CAN message, including any relevant variables. For this example, internal ID, power inputs and status of GPIOs will be sent. Only Data and ID need to be configured. **Smart CAN Isolator** will automatically build the rest of the message.



1. Connect the **CAN Telemetry** producer to an output filter, on the **CAN Interface** you want the information to be sent.



3. Now any device on the bus can read the information.

TROUBLESHOOTING

4.1 Maintenance mode

Debugging and configuration mode. **Smart CAN Isolator** must be in **maintenance mode** in order to modify its configuration.

While in **maintenance mode**, a default configuration will be executed.

<p>Warning: In maintenance mode, CAN interface A will switch to a baudrate of 1M, while CAN interface B will switch to a baudrate of 500k.</p>
--

4.1.1 Forcing Maintenance mode for troubleshooting

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.