HOW-TO

How-to Use APS Tuner in EMU PRO

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Client: 102.0
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ECU MASTER

1. Introduction

The main aim of the APS Tuner in EMU PRO is to calibrate the accelerator position sensor when used in the Drive-By-Wire (DBW) System. This tuner ensures voltage calibration for 0% and 100% accelerator positions, assuming a linear voltage progression in between.

2. Requirements

Before starting the APS tuner, the following parameters should be configured:

1. Set *Throttles type* to **DBW Throttles**

   In *Sensors / Accelerator position / Throttle type*

2. Choose the analog input and voltage reference to which the *Main signal* from the accelerator sensor is connected:

   In *Sensors / Accelerator position / Main signal / Input*

   Sensors / Accelerator position / Main signal / Voltage reference

3. Choose the analog input and voltage reference to which the *Check signal* from the accelerator sensor is connected:

   In *Sensors / Accelerator position / Check signal / Input*

   Sensors / Accelerator position / Check signal / Voltage reference

   If *Check signal* is not required, select the same input as for *Main signal*.
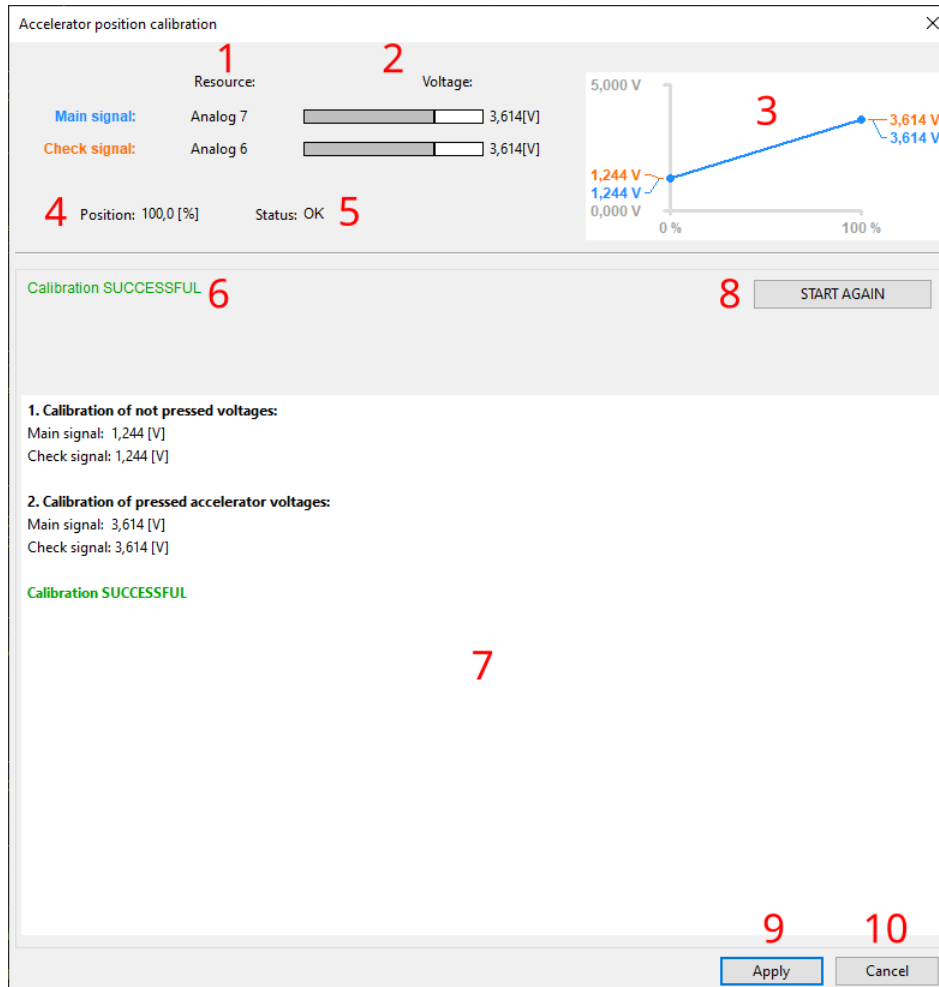
> ⚠️ **Warning:**
>
> It is highly recommended to use two independent position sensors for the accelerator pedal. Using only one sensor increases the risk of not detecting possible failure.

3. Using the APS Tuner

To access APS Tuner, navigate to the main menu, and select *Tools / APS Tuner.*

The APS Tuner window description:

1. Assigned resources - Analog Input for *Main* and *Check signal*

2. Voltage of each used resource

3. Plot with voltage progression for each APS position for *Main signal* (blue) and *Check signal* (orange).

4. APS position channel value. Not visible during calibration or if calibration fails.

5. APS Diagnostics. Not visible during calibration or if calibration fails.

6. Calibration result.

7. Calibration report window.

8. Button to start or abort the auto-calibration.

9. *Apply* button: Saves parameters calculated by auto-calibration and closes the window.

10. *Cancel* button: Discards parameters calculated by auto-calibration and closes the window.

Calibration Procedure for APS Tuner:

- Ensure the ignition is switched on while the engine is turned off.
- If there are no 'Missing configurations' messages, start the calibration process.
- Click the *Start* button when the pedal is in the limp position (not pressed, 0% position).
- Quickly press the pedal to reach the 100% position.
- Calibration will only proceed if both the *Main signal* and *Check signal* change by a minimum of 0.1V.
- If the *Main signal* and *Check signal* do not change, calibration will wait indefinitely.
- After pushing the pedal, the voltage read after 3 seconds is stored as the voltage for the 100% position.
- To save the calibration in the project, click *Apply*.
- To discard the calibration, click *Cancel*.

Parameters not set by the APS Tuner:

Sensors / Accelerator position / Rate calculation interval,

Sensors / Accelerator position / Check signal / Error tolerance.

4. Possible errors

"Calibration FAILED. STOP the engine during the calibration!"
Calibration will be aborted if the engine is running or started during the calibration.

"Lost connection with the device. Tuner will be closed."
If the connection with EMU PRO is lost during calibration, it will be aborted, and changes will not be saved.

"Calibration FAILED. Max voltage of main sensor is greater than 4.900V - signal range too close to 5.000V."
The working range of the main sensor signal must be between 0.1V and 4.9V.

"Calibration FAILED. Min voltage of main sensor is less than 0.100V - signal range too close to GND."
The working range of the check signal must be between 0.1V and 4.9V.

"Select 'DBW throttles' in 'Sensors / Accelerator position / Throttles type' to use APS tuner."
APS Tuner calibrates the accelerator position sensor only within a Drive-By-Wire (DBW) system.

"Please setup: 'Sensors / Accelerator position / Check signal / Input'. If check signal is not required, select same input as for main signal."

Both the *Main signal Input* and *Check signal Input* must be configured before starting the calibration process. If only one analog input for the accelerator pedal is used, assigning the same analog input for *Main signal* and *Check signal* is possible. WARNING: It is highly recommended to use two independent position sensors for the accelerator pedal. Using only one sensor increases the risk of not detecting possible failure.

"Please setup: 'Sensors / Accelerator position / Main signal / Input'."

Main signal Input must be configured before starting the calibration process.

"Upgrade firmware to version 81.0 or higher to use APS tuner with Client in this version."

Calibration is possible from version 81 onwards. Note: Version 81 was before the official product release.

5. Document history

Version	Date	Changes
1.0	2024.02.29	Initial release