

ENABLE TOOL

Software for FRIWO's e-mobility hardware

MANUAL

Version 2.0



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4 Introduction

FRIWO Gerätebau GmbH (further abbreviated as "FRIWO") is a manufacturer of electronic devices such as power supply units, motor control units, and battery packs. This document is a reference manual for the Enable-Tool, a piece of software that allows monitoring, calibration, and configuration of motor control units and battery management systems (integral part of the battery pack). The following pages are aimed at explaining how to use the Enable-Tool safely and responsibly, to achieve your goals.

5 Copyright

The content of this document is protected and owned by FRIWO and may not be used, not even in part, for own publications and implementations. Exception shall only be permitted after the prior written approval from FRIWO.

6 Liability Waiver and terms of use

Using the motor control unit referenced in this document can be dangerous in case of incorrect use. Therefore, it is mandatory to follow instructions in this manual carefully. Stop your application work if you encounter unexpected behavior.

6.1 Terms of use

The use of this program, further called "Enable-Tool" or „Software“, can be very dangerous, that means it can cause damage to persons and property in case of incorrect use. Use the Enable-Tool with extreme care and make sure that you follow the instructions in this manual and that it is used by qualified personnel only. With this Software, you are able to influence or control a connected electronic control system such as motor-controllers, battery-management-units or other general electronic control devices. Your actions may result in serious personal injury or property damage. Therefore, you should only use this software (i) if you understand the possible consequences which might occur by working with this Software and (ii) if you have been specifically trained/qualified to work with this software! The Enable-Tool is currently under development and the functionality might be subject to change without prior notice or arrangement.

6.2 Liability Waiver

This Liability Waiver (further called "waiver") is made between the parties FRIWO Gerätebau GmbH ("Manufacturer") Von-Liebig-Strasse 11, 48326 Ostbevern and the user of Enable-Tool ("User"). For purposes of this waiver, the definitions of the parties shall be deemed to include any parent, subsidiary, affiliate of, or entity under common control.

6.2.1 Purpose

User desires to get access to the online-network infrastructure of the Manufacturer to obtain a license for the use of the Enable-Tool. User desires to use Enable-Tool to work with one or more electronic-control-units of the Manufacturer. The parties acknowledge that advanced electronic-control-units are complex and proprietary devices that require special knowledge, skills and equipment to program and commission. User declares that he complies with the instructions in the manual and that he has all necessary knowledge, skills and equipment to work with it.

6.2.2 Non-Exclusivity

The waiver does not prevent either party from continuing its independent, continuous development of technologies, products and other business-related research and development.

6.2.3 General

If any provision of the waiver is held invalid or unenforceable by a court of competent jurisdiction, such invalidity or unenforceability will not affect any other provision of the waiver, which shall remain in effect.

6.2.4 Governing Law

This waiver is subject to the law of the Federal Republic of Germany with the exclusion of the conflict-of-laws rules and with the exclusion of the United Nations Convention on Contracts for International Sale of Goods (CISG). The place of jurisdiction for all disputes arising out of this waiver is Münster, Westfalen.

6.2.5 Entire waiver

This waiver constitutes the entire agreement between the parties with respect to the subject matter herein, and supersedes all prior oral or written waivers, arrangements, and understandings related thereto. This waiver may not be modified or amended except in writing signed by an authorized representative of each Party. WHEREOF, in consideration for the mutual promises contained herein, the parties have caused this waiver to be executed by their authorized representatives. FRIWO Gerätebau GmbH assumes no liability for loss of data, personal injury or damage of property caused by misuse of the program or by use of improper settings. In particular, we expressly point out that FRIWO Gerätebau GmbH under no circumstances warrant / is liable for, including but not limited to, data loss, personal injury or property damage resulting from the direct use of this software takes over. This does not apply if liability is based on: (i) the German Product Liability Act („Produkthaftungsgesetz“) or comparable foreign laws; (ii) intent; (iii) gross negligence on the part of the owners, legal representatives or executives; (iv) fraud; (v) failure to comply with a guarantee granted; (vi) negligent injury to life, limb or death; or (vii) negligent breach of a fundamental condition of contract. However, claims for damages arising from a breach of a fundamental condition of contract shall be limited to the foreseeable damage which is intrinsic to the contract, provided that no other of the above cases applies.

7 Installation

Before installing the Enable-Tool, it should be checked that the system meets the following requirements.

- Operating System: Windows 10
- CPU: Intel i3 4. GEN or comparable / better
- RAM: 4 GB
- Storage: 10 GB free space
- Interface: USB 2.0 hi-speed or better
- A working internet connection

The latest installer for the Enable-Tool can be downloaded from the FRIWO web shop. The download is a ZIP file which contains the Enable-Tool and a setup.exe file. After downloading the ZIP file, its contents have to be extracted before executing setup.exe. The installation requires administrative privileges.

Online license request

FRIWO

Firstname:
 Lastname:
 Company name:
 Company address:
 Zipcode:
 City:
 Country:

E-Mail address:
 Phone number:
 Project code:

12. EXISTENCE OF AUTOMATED DECISION-MAKING
 As a responsible company, we do not use automatic decision-making or profiling.

I accept the terms of conditions

1. Confirm your email address:

2. Enter confirmation code:

3. Submit your tool registration:

Figure 1: example license request

After the installation is complete the Enable Tool can be launched from the desktop or the start menu. Depending on the system, the tool might initiate an additional driver installation. If this is the first time the Enable-Tool is started on this computer you will be prompted for a license. Fill out the license request as shown in the example. Processing this request requires a few minutes, please wait for the confirmation E-mail, before restarting the Enable-Tool. The computer will then be permanently linked to the license, which prohibits it from being used on any other device.

The project code in the form is an identifier used in our web shop. It resembles a pool of licenses that is representative of a project (i.e. a certain product line). The project code comes with the license that was purchased. Developers that want to use the Enable-Tool should contact their project managers or lead developers. Licenses can be bought and registered to the pool as needed. First time customers will receive a project code upon their first purchase. For more information on obtaining a license see chapter 15 Licensing, or visit [our web shop](https://www.friwo-shop.de/).



<https://www.friwo-shop.de/>

8 General Information

FRIWO Enable-Tool is a measurement and calibration software for parameterization of motor controls and battery management systems. The software establishes an encrypted connection to an ECU via the USB interface, and allows read and write access to parameters and measured values. The Enable-Tool is typically used for the following purposes.

8.1 Customer Service / Production

- Firmware and dataset update
- Troubleshooting (error memory evaluation, diagnostic functions)
- Service routines (e.g. training of a throttle grip and brake contact switch)
- Preparation of a vehicle for handover to the end customer
- Maintenance of a vehicle

8.2 Development

- Parameterization (setting of ECU functions)
- Dataset handling: read, write, sign, compare, mix
- Sharing of dataset in development teams
- Log function

8.3 Production

- Write production dataset
- Preparation of a vehicle for delivery

8.4 Important notes on setting parameters



Setting parameters can have negative effects on the behavior of the controller. Please review the following notes on setting or adjusting parameters.

- Only start working with the Enable-Tool after reading this document and understanding its content.
- Apply changes to the parameters gradually step by step.
- Great care was attached to safety during the development of the software Invalid changes *should* be intercepted and parameters *should* be limited to safe values.
- However, a residual risk cannot be ruled out with certain changes. It is therefore recommended that you only change parameters when the system to be controlled is idle. In addition, you should always use a USB isolator to protect your PC from possible over voltages and to prevent ground loops in your laboratory or test bench.
- Some parameters are monitored by superimposed protective functions, so that only limited changes are possible during operation.

8.5 Nomenclature (Parameters and snapshots)

The naming convention for Variables is as follows:

TRQ_DES_C_N_Limit_Rotor_Speed_Max

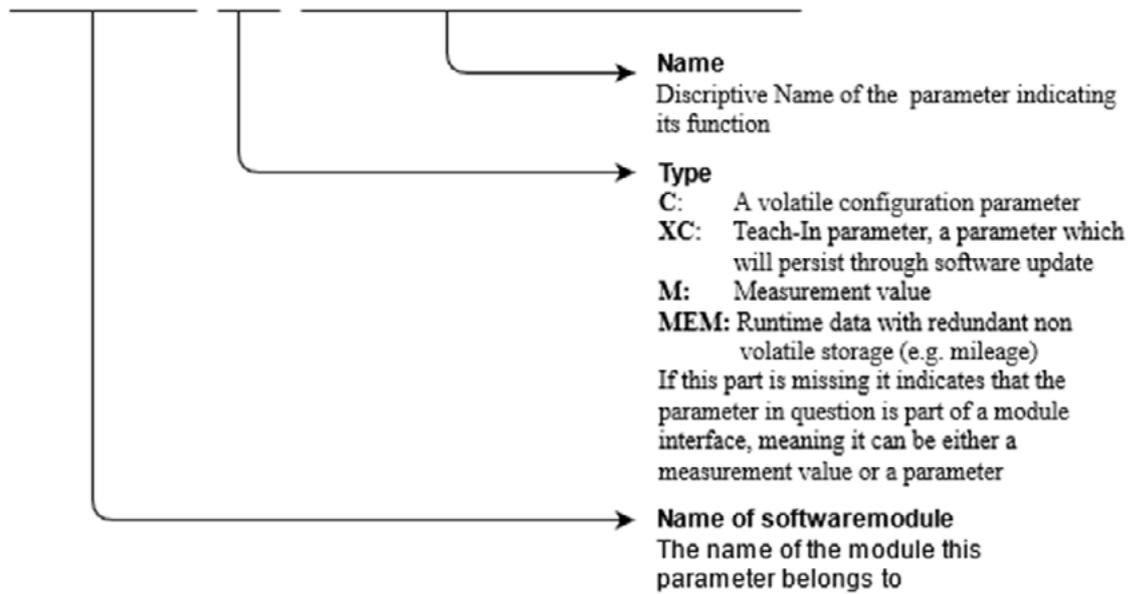


Figure 2: naming convention for parameters

Parameters and measured values can be adjusted or measured with the Enable-Tool. Read the appropriate instructions before using the Enable-Tool. The graphical user interface is very customer-specific and can vary depending on the customer, application and user authorization. It is therefore possible that not all parameters, measured values and functions described in this document are available to you.

A snapshot contains the current values of all parameters of the ECU, during firmware updates a snapshot is temporarily created in order to restore the ECU to the last known state. There are fail-safes in place to restore the snapshot even if the update fails. However, we strongly recommend creating snapshots for backups, so that data can be restored in case of data loss. Snapshots can also be used to configure new ECUs in production. More on snapshots and how to create them can be found in the chapter 11.5 Snapshots.

9 Quick start

After connecting the motor controller or electronic control unit to your computer via USB (for alternative methods see the chapter13 Connect via CAN), you can scan for it in the Enable-Tool. To do so press the start button in the upper left corner and select **Scan...**, or press **Ctrl + S**. The application will now spawn a new ECU overview window for each device that was found. The window consists of five major elements. The menu bar is on top. Just below the menu bar to the left is a general overview labeled **ECU**, which contains information about the Hardware and Software in use, as well as an indicator for the connectivity to the ECU. In the middle is the live view, which can show real-time data sent by the ECU. At the bottom left is a plot window, which supports the live view by visualizing its listed parameters (for more information see chapter 11.2 Live View). To the right hand side is the variable view. All available variables that can be set or read can be seen here. The User Interface is described in detail in chapter 10 GUI Overview. After establishing a connection, the Enable-Tool will download the necessary data containing further information about the connected device. From here on out you can work with your ECU and the Enable-Tool, tweak and monitor parameters to your liking.

10 GUI Overview

Figure 3 shows the Graphical User Interface (GUI) of the Enable-Tool. It consists of several elements, which are briefly described in Table 1 down below and extensively in the following chapters.

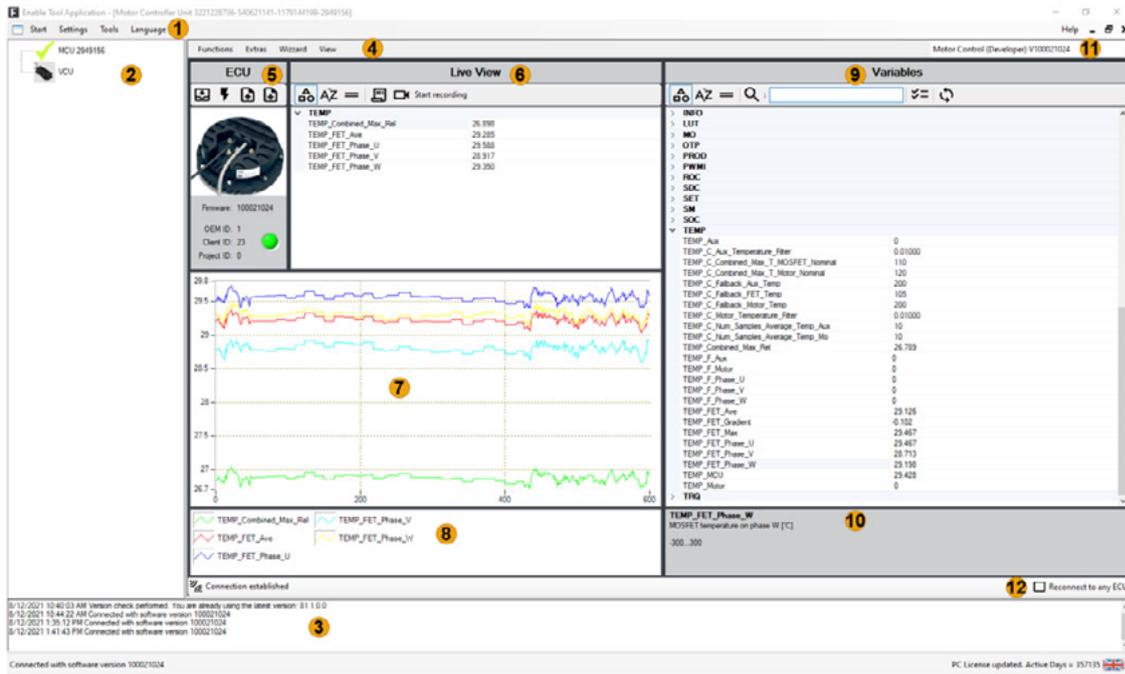


Figure 3: annotated screenshot of GUI

Table 1: GUI annotations and overview

Pos.	Name	Annotation
1	Menu bar	Contains dropdown menus for general use cases.
2	ECU selection	Provides an overview of open ECU windows and indicates which one is focused.
3	general info box	Logs and informs about general events.
4	ECU menu bar	Contains dropdown menus for ECU related use cases.
5	ECU overview	General info about the ECU (firmware version and IDs), activity indicator, and quick access buttons.

6	Live View		List of currently observed variables / parameters with updating values. Double clicking on the items to the right (pos. 9) will move them to the live view. Double clicking in here will remove them again. See chapter 11.2 Live View for more information.
7	Live View plot		Plotted Live View variables.
8	Live View legend		Color legend of the plot mentioned above. Clicking on the colored line icons toggles their presence in the plot.
9	Variable overview		Overview of all variables / parameters (subject to variable config). Double clicking on the listed items moves them to the live view (pos. 6). By left clicking into the value fields you can set the value.
10	Variable info box		Description of selected variables / parameters, range of valid values.
11	Variable config selector		Dropdown menu for selecting different variable configs.
12	Reconnect to any ECU		Checkbox that allows the window to be reused for an ECU with a different hardware ID, to quickly switch between different ECUs.

10.1 Main menu bar

In the following Chapter, we will showcase how to access the various key features of the Enable-Tool. Each feature will have a small screenshot and an accompanying explanation what is seen. The explanation on how to use these features is explained further down in the chapter Key features.

10.1.1 Start

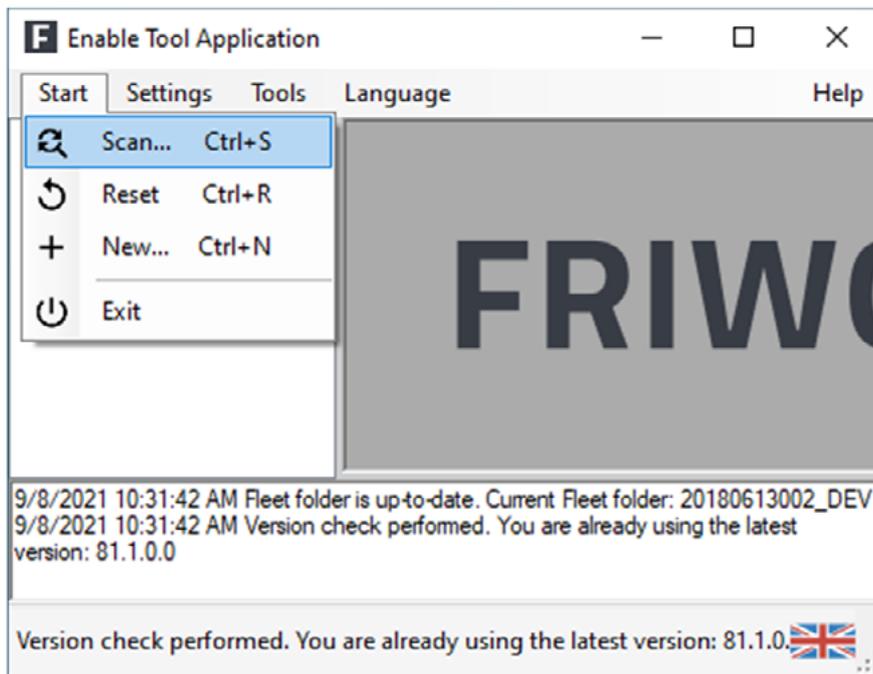


Figure 4: menu bar start

There are four options:

- Scan:
 - Starts to scan for connected ECUs
 - If it finds any, it will automatically open up a window and a corresponding entry in the ECU section (pos. 2).
- Reset:
 - Resets the currently opened windows to their initial settings (i.e. empty live view)

It also resets the link between the window and the concrete ECU connected, so that it can be connected to other ECUs.

- New:

Opens up a new empty window which automatically connects to any undiscovered ECUs that are connected via USB (devices connected via CAN bus can be discovered through the "Scan" option)

- Exit:

Closes the Enable-Tool

10.1.2 Settings

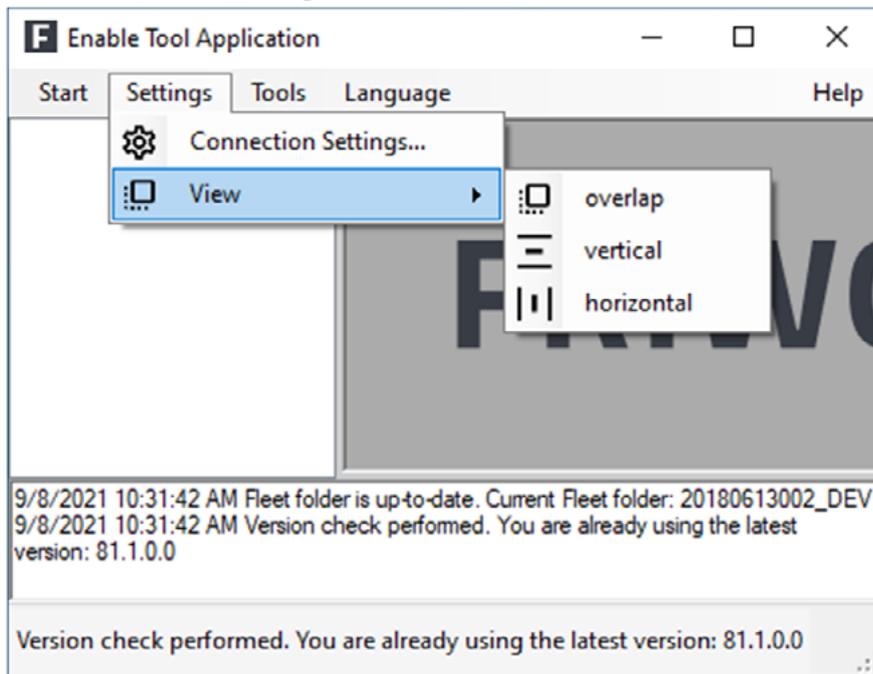


Figure 5: menu bar settings

There are two options:

- Connection Settings:

Specifies the connection (USB/CAN) used for the communication with the ECU

For more information see chapter 13 Connect via CAN.

- View:

Specifies the window layout if multiple ECUs are connected

The available options are stacked, vertically split or horizontal split.

10.1.3 Tools

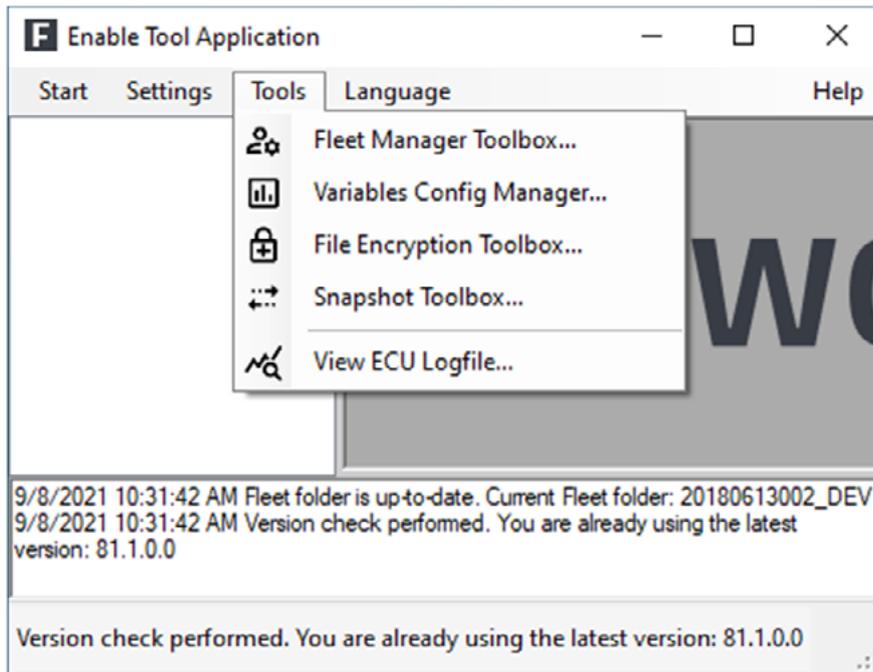


Figure 6: menu bar tools

- Fleet Manager Toolbox:

A toolbox that allows managing of licenses and files relating to the ECU

More information can be found in chapter 14.4 Fleet Management.

- Variables Config Manager:

Modification and creation of variable configs

More information can be found in chapter 14.2 Variable Config Toolbox.

- Snapshot Toolbox:

Comparison and creation of snapshots

More information can be found in chapter 14.1 Snapshot Toolbox.

- View ECU Logfile:

Viewing log files

More information can be found in chapter 11.3 Logging.

- File Encryption Toolbox:

En-/decrypting of files

This tool will only be available to specific partners and is hidden otherwise.

10.1.4 Language

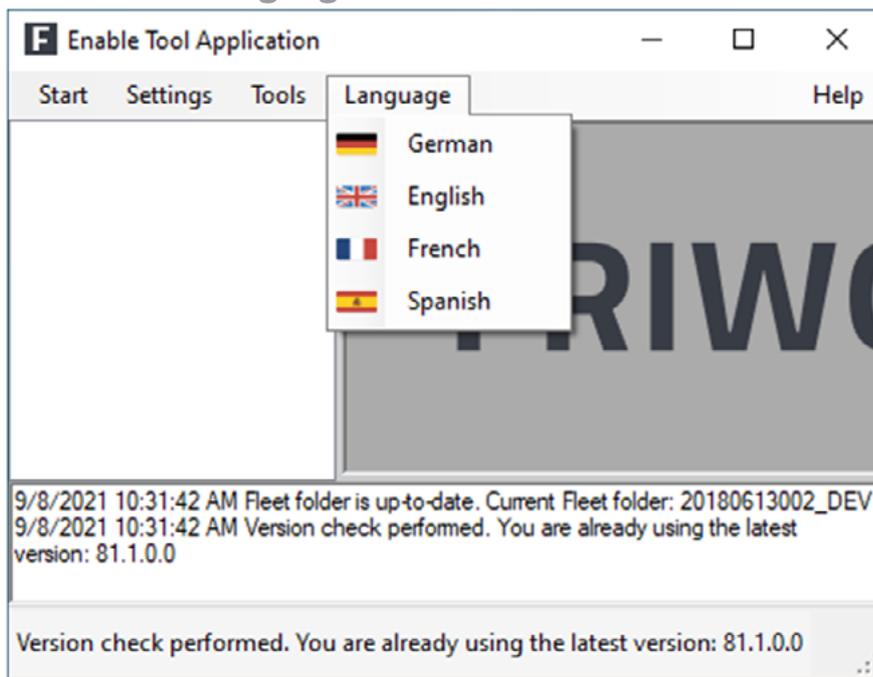


Figure 7: menu bar language

This menu allows selecting the language. (The available languages are currently limited to English, German, French, and Spanish)

10.1.5 Help Content

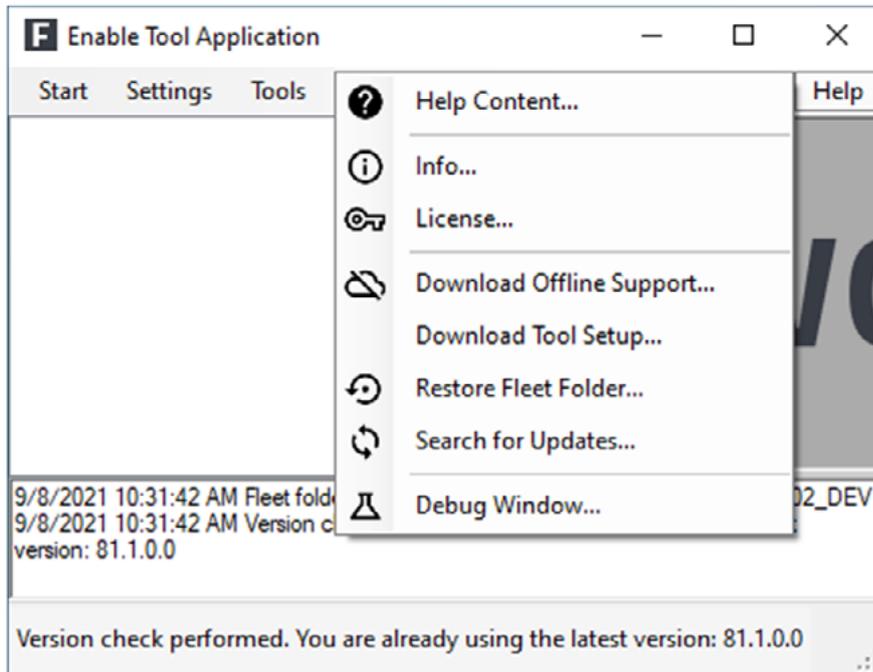


Figure 8: menu bar help

The help menu options are as follows

- Help Content:
 - Brings up this document
- Info:
 - Brings up a small box with general information about your Enable-Tool, as well as information about your license
- License:
 - Pulls up a context window which shows information about your license and an option to deactivate your license
 - See chapter 15.1 Deactivating a License for more information.
- Download Offline Support:
 - See the chapter 14.3 Offline support for more information.

- Download Tool Setup:

Downloads the latest version of the Enable-Tool installer, which will be automatically configured to match the current version, and can be used for further distribution via other means

Update files can be found at C:\FRIWO\Enable Tool Application\Update_Files.

- Restore Fleet Folder:

Restores the fleet folder files in accordance to your working directory, see chapter 14.4 Fleet Management for more information about working directories.

- Search for Updates:

Looks for new updates

If any are found, the Enable-Tool will prompt with a changelog and an option to update it.

- Debug Window:

Logs debug messages

10.2 ECU Menu bar

This menu bar offers ECU specific functions, tools and wizards. Some of them are also provided as dedicated buttons in the ECU overview for quick access using the same icons. Hovering over them with the cursor will also show their function.

10.2.1 Functions

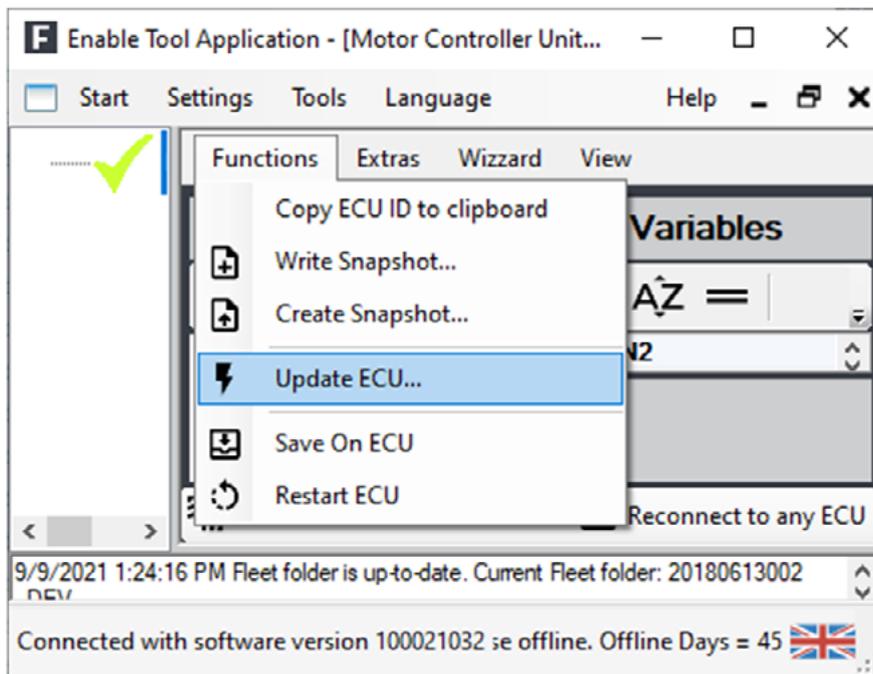


Figure 9: ECU menu bar functions

- Copy ECU ID to clipboard:
Copies the unique ID of the ECU into the system clipboard
- Write Snapshot:
Opens up a file explorer window to select the snapshot to be written onto the ECU
- Create Snapshot:
Opens up a file explorer window to enter location and name of the snapshot that is going to be created of the ECU, followed by signature window to sign the snapshot
More information can be found in chapter 11.5 Snapshots.

- Update ECU:
 - Opens up a prompt to enter the firmware and an optional snapshot for updating and parametrization of the ECU
 - For more information on snapshots, see the chapter 11.5 Snapshots.
- Save On ECU:
 - Save currently applied parameter changes to the ECU to start with them after power up
 - Otherwise changes are lost after a power cycle.
- Restart ECU:
 - Force a restart of the ECU

10.2.2 Extras

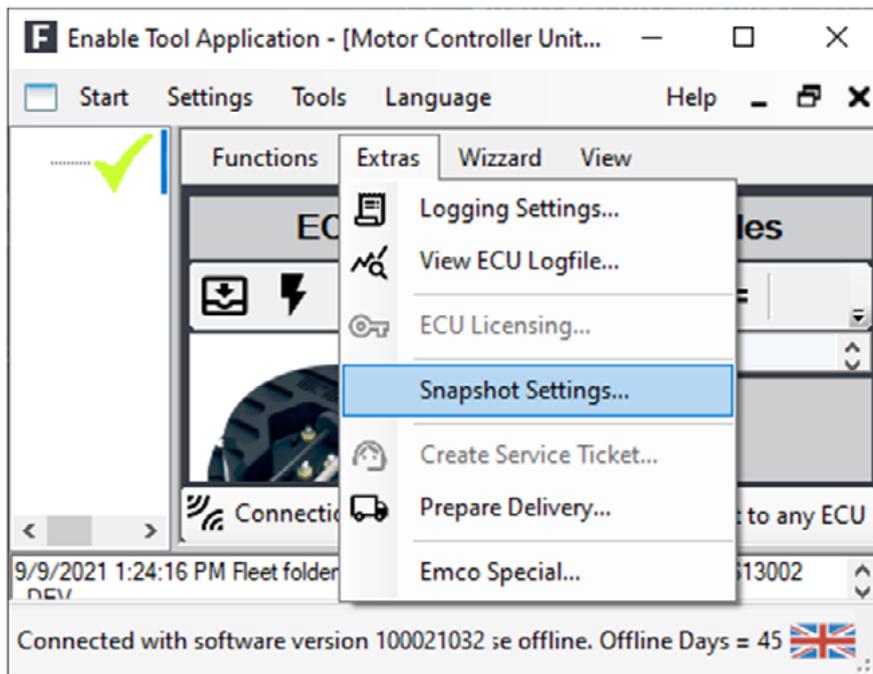


Figure 10: ECU menu bar extras

These are the extra options

- Logging Settings:
Set name, location and logging interval for the new log file
- View ECU log file:
Opens a file explorer window to select a recorded log file and view it in the live view plot
- Snapshot Settings:
Allows the selection of additional parameters that are transferred on top of the standard configuration parameters
Which parameters are selectable depends on the license. The view is adjusted accordingly.
- Create Service Ticket:
Opens up a small form to enter a text describing the issue at hand
There is also a history with previous reports and statistical data (if any were submitted).

- Prepare Delivery:
Resets the error logs in the ECU and for motor controllers the mileage as well

10.2.3 Wizzard

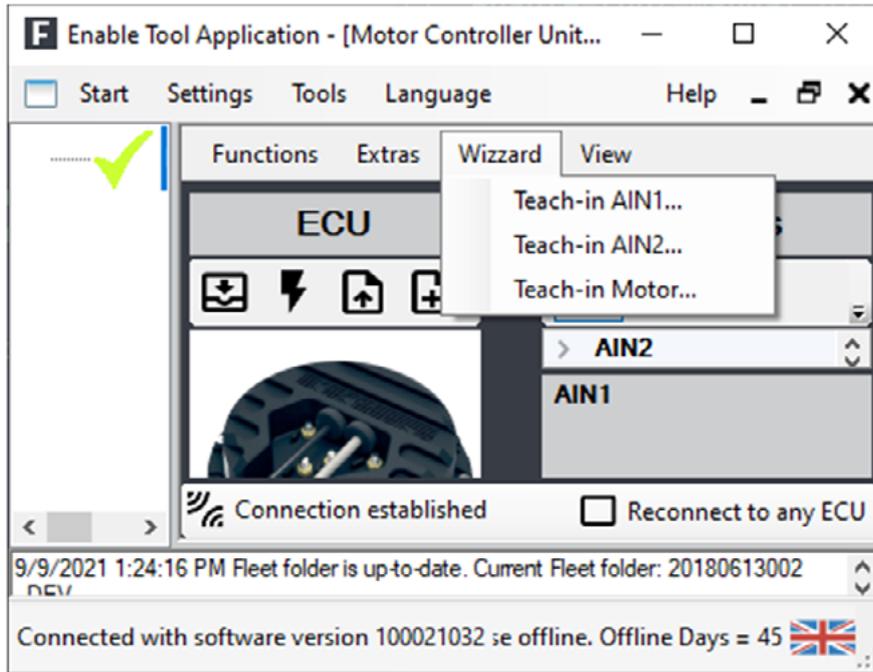


Figure 11: ECU menu bar wizzard

The Wizzard option is only available on motor controllers. For more information see the chapter 10.2.3 Wizzard.

10.2.4 View

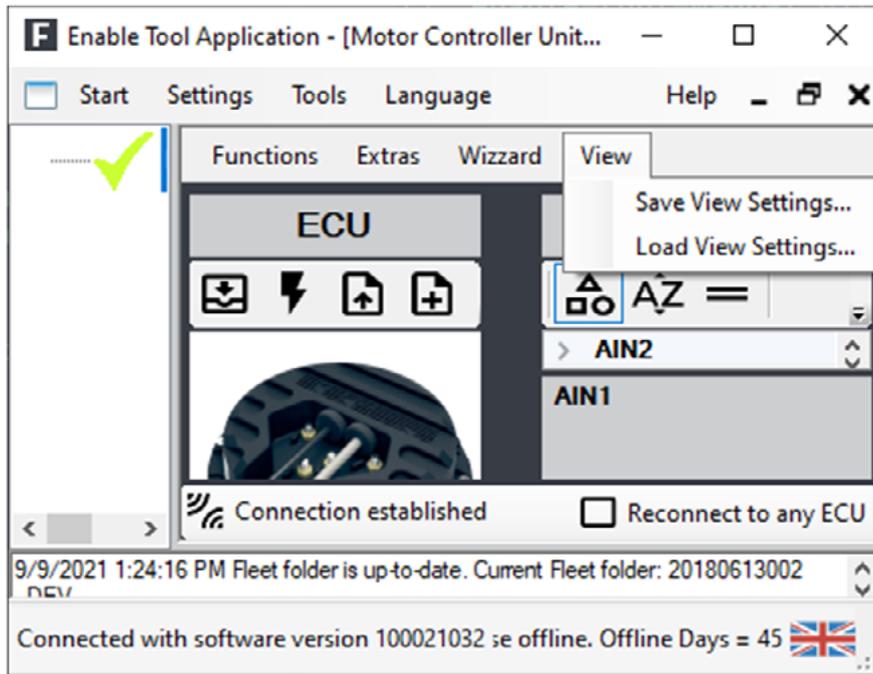


Figure 12: ECU menu bar views

The view tab allows you to save and restore a set of parameters in the live view window using .ovp files.

11 Key Features

11.1 Changing Parameters

After the connection to an ECU has been established, all accessible parameters can be seen on the right hand side in the variables overview (position 9 in the annotated screenshot of GUI). Specific variables can be found with the help of the search bar or the sorting options (associated software module; alphabetically). Each line consists of two parts, the variable name and its current value. The values are read periodically but since there are a lot of them, updating all the values might take a few seconds. The next sections explain how to view and log specific parameters effectively. By clicking on the variable name, a description of the variable and its range of nominal values are shown. By clicking into the value field and entering a value, a command is sent to the ECU to use the updated value (only works for writable parameters).

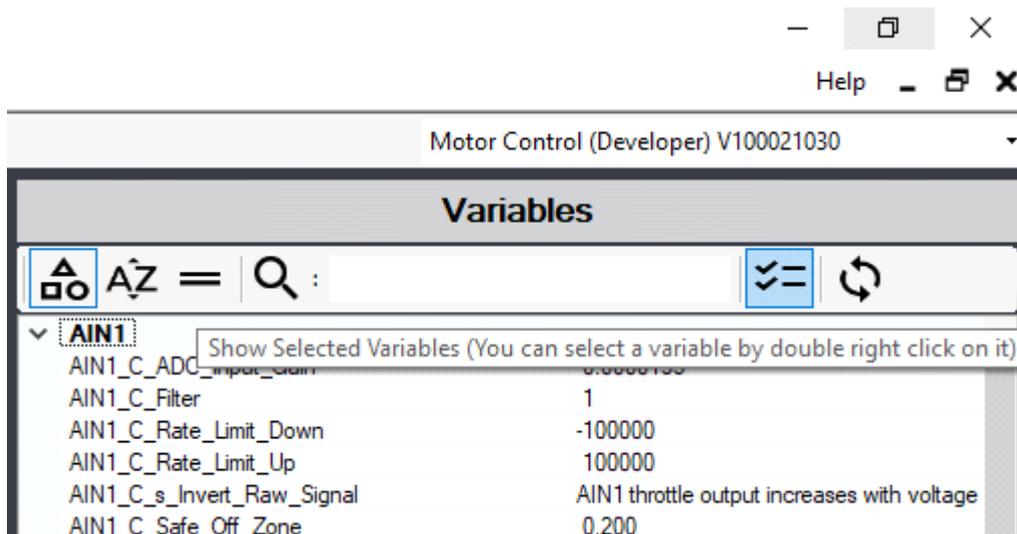


Figure 13: selecting variables

The quick-action button to the right of the search text form (see Figure 13: selecting variables) also allows toggling the view to only see variables that were selected by double right clicking on them. It is sometimes helpful to have a preselected set of variables so it is easier to quickly view and change them which this feature facilitates.

11.1.1 Permanently changing Parameters

In order to retain values written and configured during the runtime of the controller, the **Save on ECU** button in the Functions tab of the ECU menu bar (position 4 in the annotated screenshot of GUI) or on the corresponding quick-action button must be used. Otherwise the changes are lost after a power cycle.

11.2 Live View

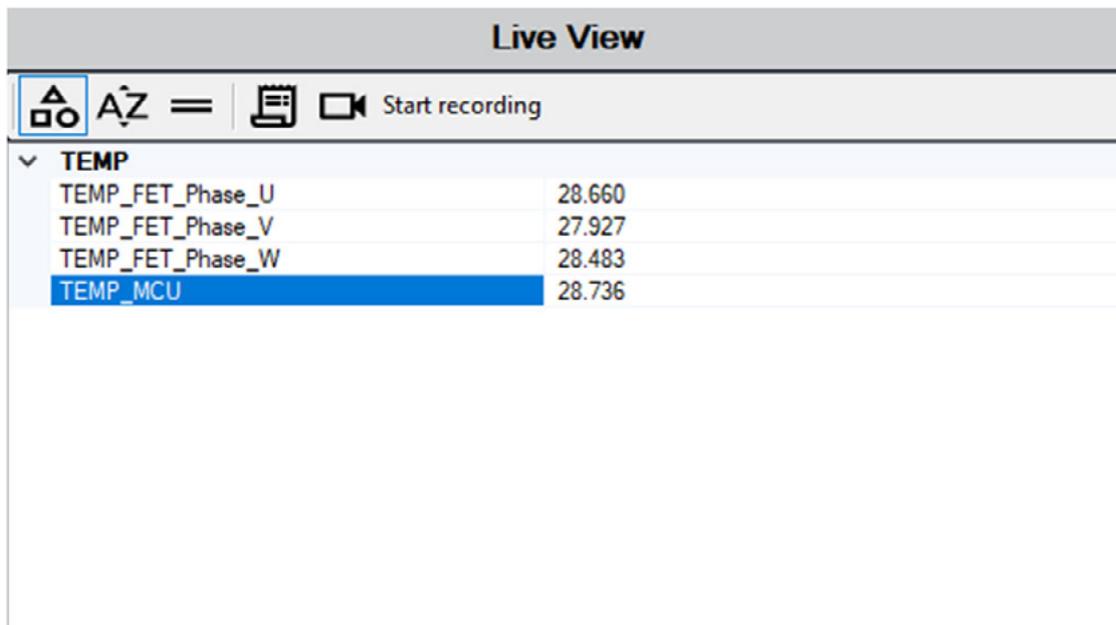


Figure 14: live view

In the previously mentioned variables overview a double left click on the variables will move them over to the live view in the middle of the screen (position 6 in the annotated screenshot of GUI). They can be sorted in a similar fashion to the variables overview. Double left clicking on variable names in the live view will remove them from the list. Variables displayed here are being updated more frequently, and are also visualized in the plot below. There is a colored legend below the plot, clicking on the colored line icon in the legend will toggle whether its parameter will be plotted or not. This option only affects the current view of the plot; it does not delete the parameter from the live view. The plot automatically scrolls down the time axis and only ever shows the last minute, the ordinate will automatically scale to include currently visible maximum and minimum.

The current list of variables in the live view window can be saved to restore it after restarting the application. This can be done via the **View** menu in the ECU menu bar (position 4 annotated screenshot of GUI) and the **Save view settings...** option. Now a descriptive name for the file can be entered. The saved view can be loaded again via the **Load view settings...** option in the same menu.

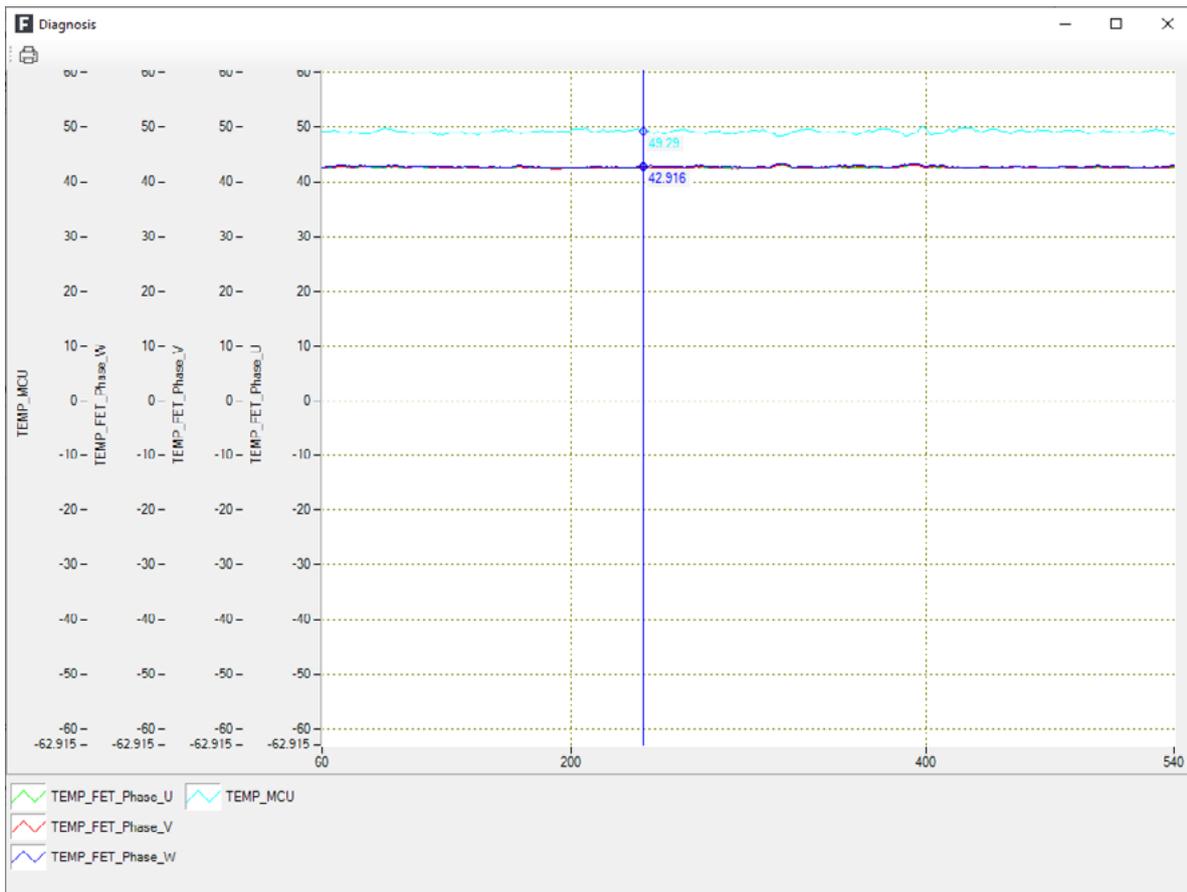


Figure 15: diagnosis view

Double left clicking on the plot will pop up the diagnosis window. This is a frozen version of the plot as it was when it was clicked. Inside the diagnosis window, a cursor (blue line) is available to drag to a certain point in time to inspect the exact values that have been recorded.

Several shortcuts are available to manage the plot:

- Hold CTRL & left mouse button to scroll through the window
- Hold CTRL & click right to undo the last action
- Double click left anywhere to reset the view (axes are scaled to fit full plot)
- Use the mouse wheel to zoom in or out around the current center of the plot
- Hold shift & click left/right to zoom in/out around the current cursor position.

11.3 Logging

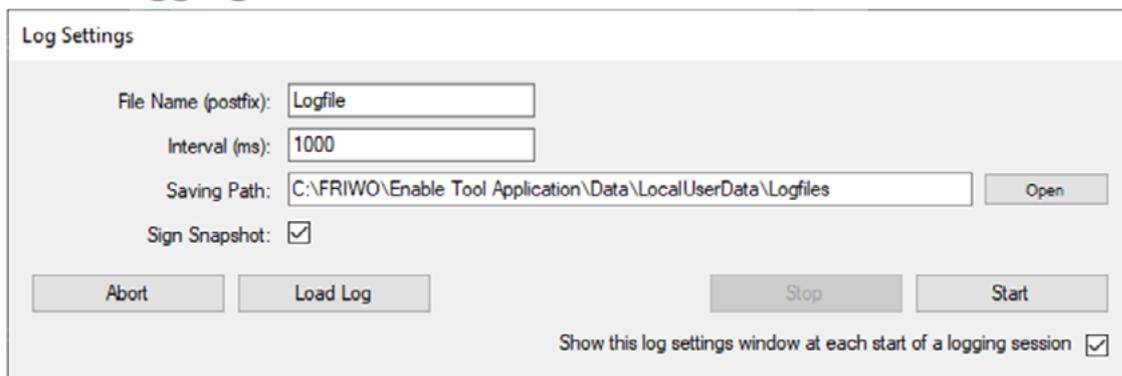


Figure 16: log settings

The Enable-Tool also has the option to log all live viewed parameters. This can be done via the **Logging Settings** found in the **Extras** tab of the ECU menu bar or by using the according quick-action button. In the now opened pop up window, settings like the name of the log file, the logging interval as well as the path can be set before starting the logging process with the **Start** button. The logging interval should be set in consideration of the number of logged variables. In general, the number of logged variables should be chosen rather conservative. The data will be written into the file in csv format, which can be opened by most modern spreadsheet applications. The quick-action button to Start and Stop logging is situated to the right in the live views menu bar, it will change its appearance, along with the text to the side, to indicate whether it's possible to *start recording* or it is *Preparing... or Logging*.

11.4 Variable Config

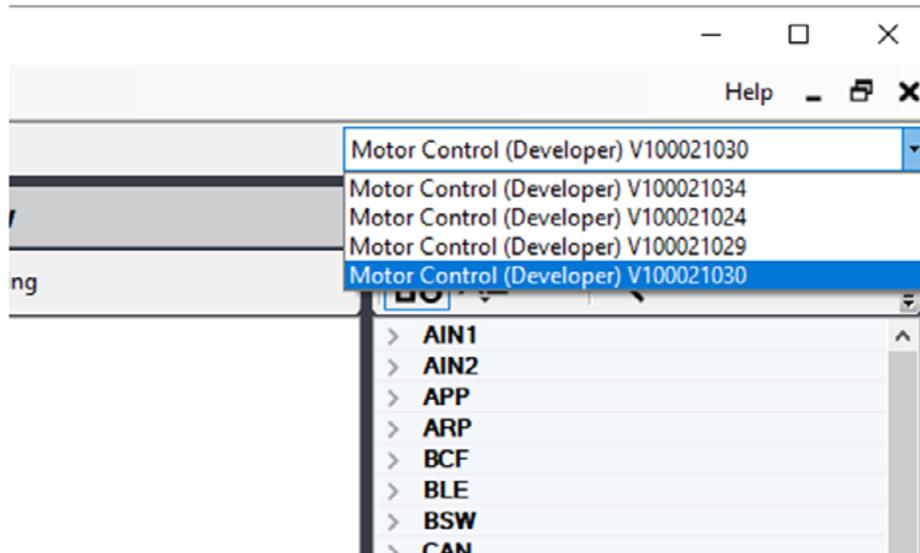


Figure 17: variable config

The variable config files determine which set of variables are initially seen in the variables overview. In the upper right corner on the ECU menu bar (position 4 in the annotated screenshot of GUI) the configuration to load must be chosen. Access to certain parameters can be limited depending on the role that the config is associated to, further information are given in chapter 15.2 Roles and permissions. It is also possible to further reduce the available parameters by creating a subset of the variable config, chapter 14.2 Variable Config Toolbox provides more details.

11.5 Snapshots

A snapshot freezes the configuration of an ECU at a certain time. It can be used to put an ECU into a known state. The common use case for this is to first configure or trim features of the ECU to achieve the desired behavior, then creating a snapshot of it to be able to bring other ECUs to the same state or to roll the ECU back after further testing. Another important aspect is that snapshots can be signed. Signed snapshots are used to brand the ECU, and contain information about access rights (see chapter 15 Licensing for more information). Therefore, only signed snapshots can be written back onto the ECU. This ensures that no one can tamper with it. This is possible because every snapshot has its own unique identifier, which the Enable-Tool will use to determine access rights.

11.5.1 Creating a snapshot

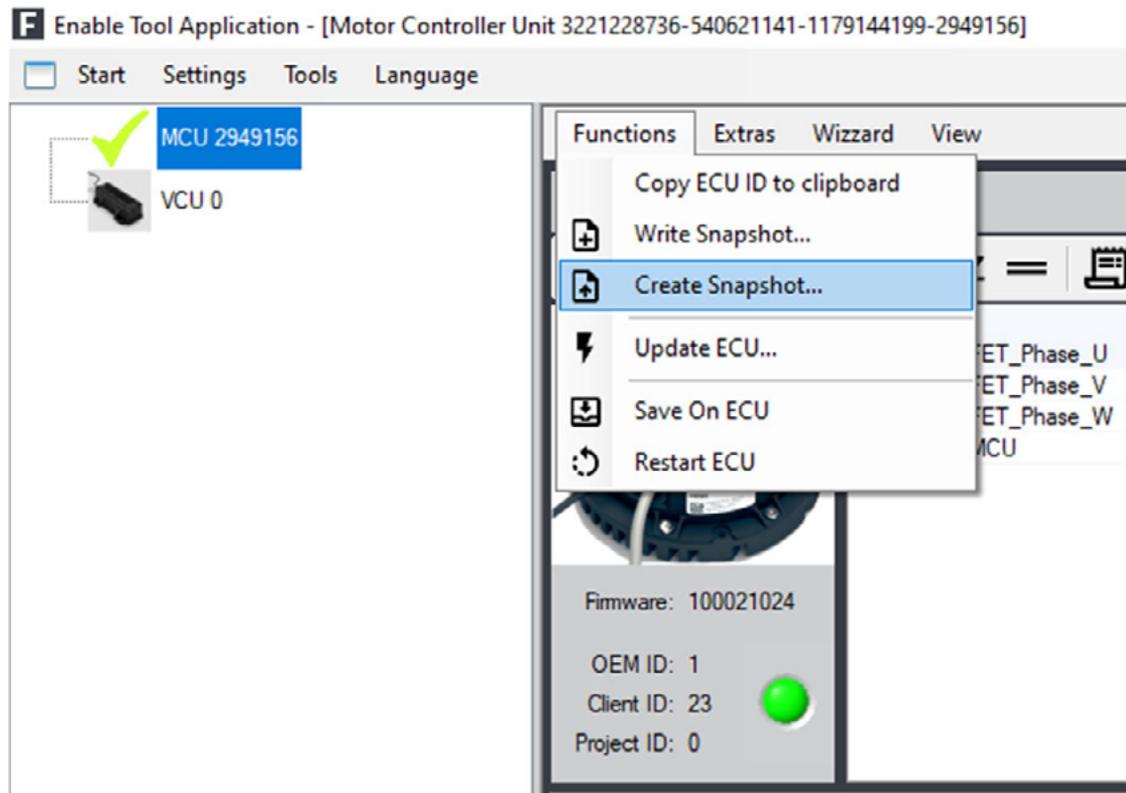
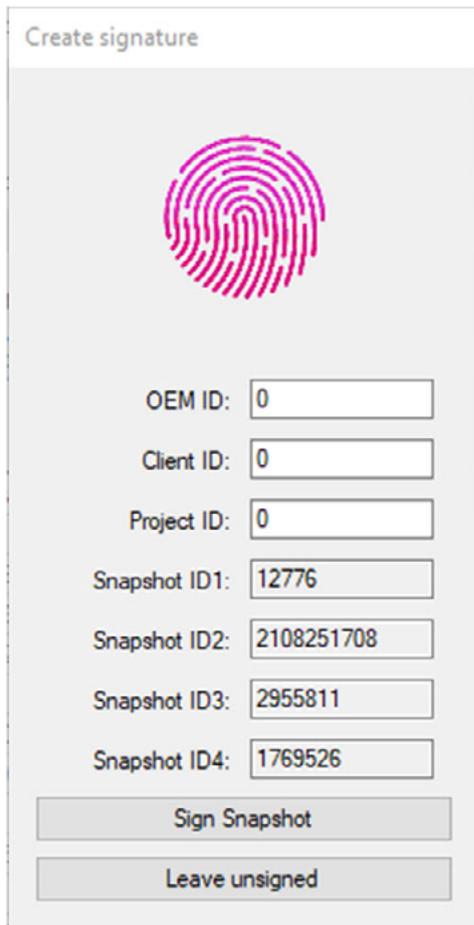


Figure 18: create snapshot

Snapshots can be generated by clicking on the Functions tab in the ECU menu bar (position 4 in the annotated screenshot of GUI) and selecting **Create Snapshot...**. Alternatively, there is a corresponding quick-action button in the ECU overview window (position 5 in the GUI overview figure) as well.

Using either option will bring up a prompt to enter name and location of the new snapshot. Entering the required information will result in a second pop up that allows signing the created snapshot.



Create signature



OEM ID:

Client ID:

Project ID:

Snapshot ID1:

Snapshot ID2:

Snapshot ID3:

Snapshot ID4:

Figure 19: signing snapshot

It is now possible to decide whether or not to sign the new snapshot. If the snapshot is to be signed, the three IDs, OEM ID, Client ID, Project ID need to be entered. These values decide which licenses have which access to the ECU. Chapter 15.2 Roles and permissions provides more information about that. If the snapshot is left unsigned it cannot be flashed onto an ECU. Snapshots can only be signed by partners and developers, more information on that can be found in chapter 15.3 Roles, identifiers, and descriptions.

11.5.2 Writing a snapshot

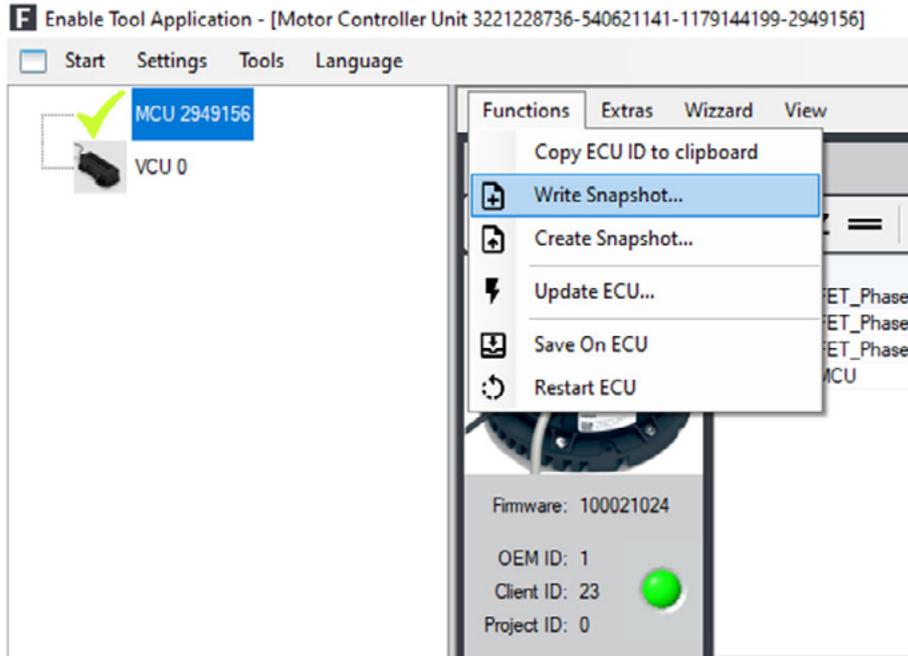


Figure 20: write snapshot

Existing snapshots can be written by clicking the Functions tab in the ECU menu bar (position 4 in the GUI overview figure) and selecting **Write Snapshot...**. A file explorer window opens up to select the snapshot file. This will in effect restore all configuration parameters (parameters with a *C* preamble) to the ECU. A warning is issued if there is a mismatch between the current firmware version and the one used to create the snapshot.

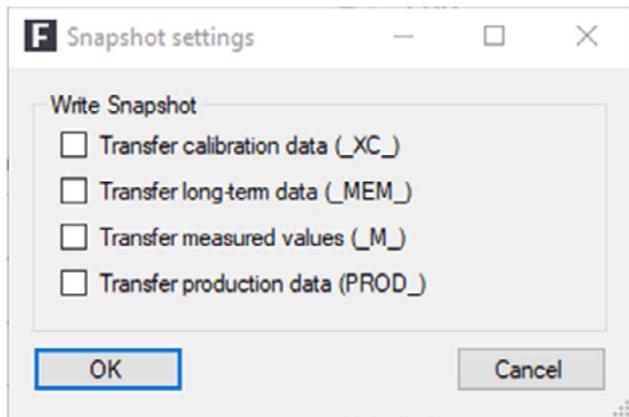


Figure 21: snapshot settings

Extras → **Snapshot settings** allows you to select additional parameters to be transferred during writing of the snapshot.

11.6 Updating the ECU

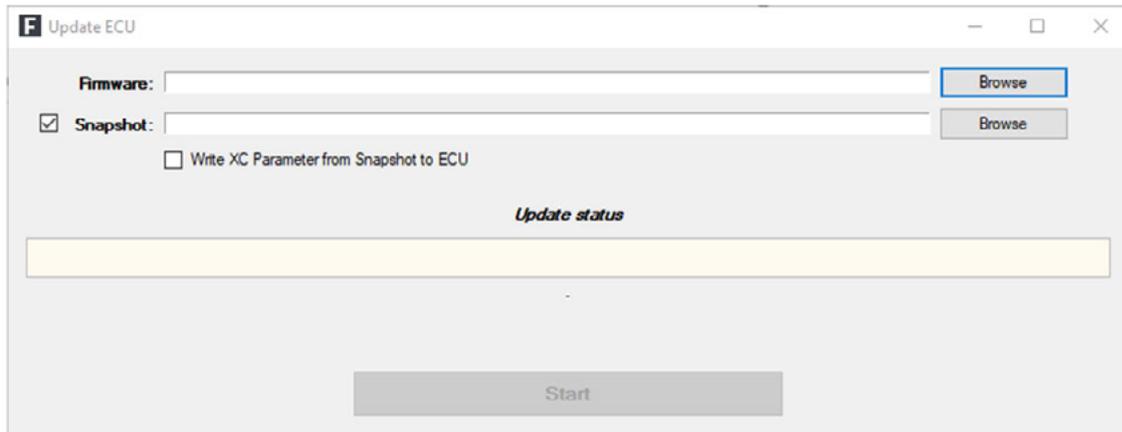


Figure 22: updating the ECU

Clicking the Functions tab in the ECU menu bar (position 4 in the GUI overview figure) and selecting **Update ECU...**, or the corresponding quick-action button will bring up a window to flash a new firmware onto the ECU. Via the **Browse** button the desired firmware file can be selected. Additionally, a Snapshot can also be included to preset parameters right after the flashing procedure, which is the recommended way of updating the ECU. If the box **Write XC Parameter from Snapshot to ECU** is checked, all current parameters that have been assigned via teach-in method (see chapter 10.2.3 Wizzard for more information) will be overwritten. This is, however, not recommended unless the ECU will operate on the same vehicle from which the XC parameters were taken from.

Careful! Do not to interrupt the USB connection during the update. This may cause irreversible damage to the ECU.

We highly recommend only flashing ECUs with a signed snapshot if it is to be used in the field. This ensures the ECU is in a known good state.

12 Wizzard

The Wizzard option is only available on MCUs and is an easy way to teach-in parameters with regard to external components such as the accelerator or the motor. By clicking on the Wizzard tab on the ECU menu bar (position 4 in the GUI overview figure) and then selecting the according external component to be calibrated, a configuration window with the following context and instructions will open.

12.1 Teach in AIN1 and AIN2

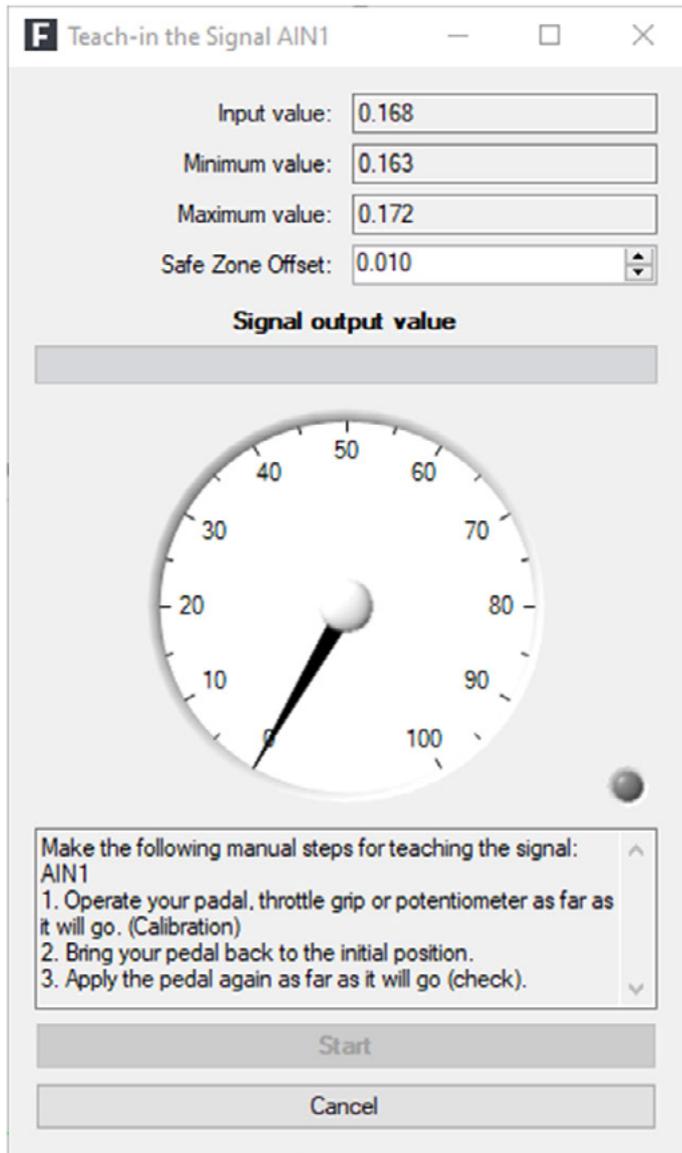


Figure 23: teach in AINx

1. Operate the pedal, throttle grip or potentiometer as far as it will go. (Calibration)
2. Bring the pedal back to the initial position.
3. Apply the pedal again as far as it will go (check).

12.2 Teach in motor

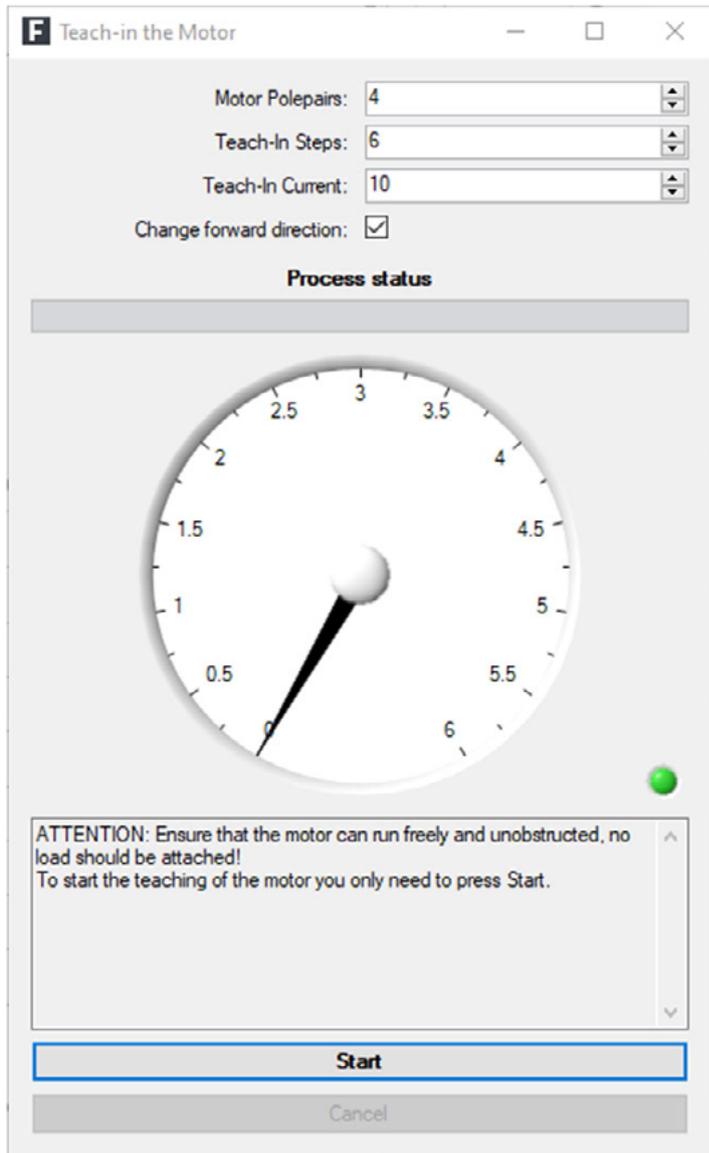


Figure 24: teach in motor

1. Ensure that the motor can run freely and unobstructed. No load should be applied!
2. Enter the correct Motor specification in the fields seen in **Fehler! Verweisquelle konnte nicht gefunden werden..**
3. Press the start button.

13 Connect via CAN

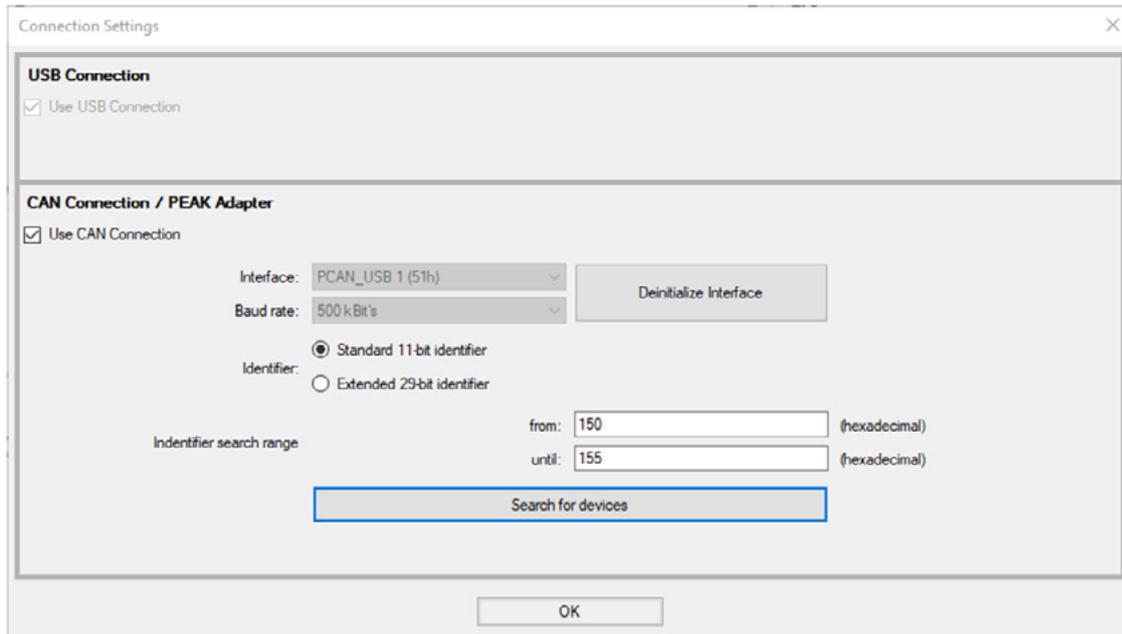


Figure 25: connect via CAN interface

Connecting to the ECU via CAN requires a CAN Adapter. The driver for the CAN Adapter has to be installed and up to date. After connecting the ECU with the CAN Adapter to the PC, the connection settings has to be changed as well. This can be done via **Connection Settings...** in the **Settings** tab. In the lower half of the prompt are several options relating the CAN interface, which have already been set to the ECUs default parameters. Once the interface has been initialized, available ECUs can be searched. If the desired device was found and the prompt was closed with the **OK** button, the usual ECU configuration window appears.

Different interfaces can be selected in case multiple CAN adapters are connected. The other settings only need changing if they were changed on the ECU beforehand.

Currently supported CAN Adapters: PEAK CAN

14 Toolboxes

14.1 Snapshot Toolbox

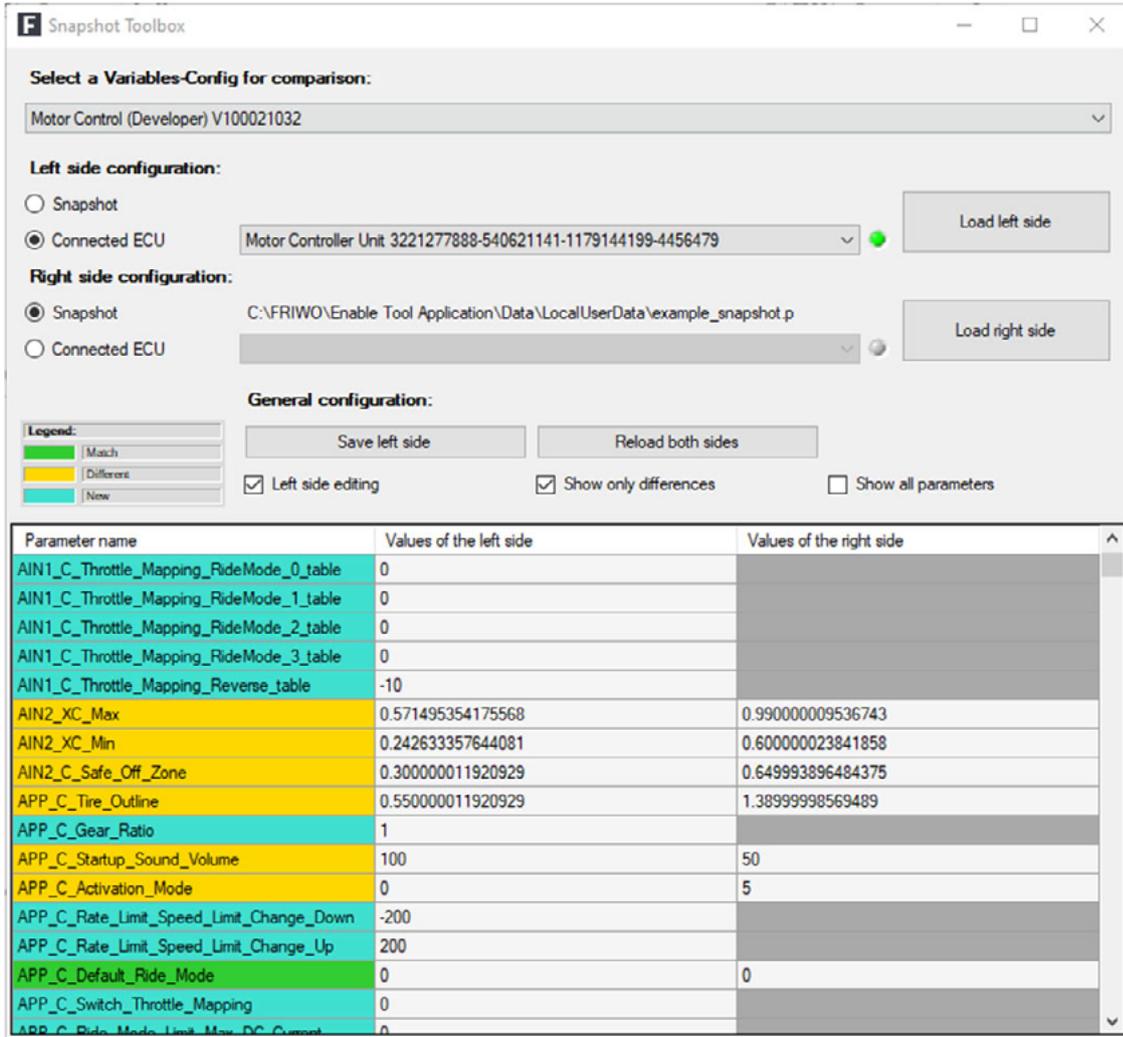


Figure 26: snapshot toolbox

As described before, a snapshot is a list of all the parameters in the ECU from the time the snapshot was taken. The Snapshot Toolbox can be found under the **Tool** tab in the main menu bar. It allows comparing and editing different snapshots. These snapshots could be old snapshots from files, or directly downloaded from the currently connected ECUs. At first the variable config, which was used to create the snapshot, needs to be selected in the top of the window. After that there are two choices. Either a snapshot is loaded from a file or from a connected ECU. Loading from the ECU will not immediately create a

snapshot of it, nor are changes made to a loaded ECU parameter set persistent. After loading both, visibility of either all variables, or the ones that differ between the snapshots, can be set by marking the appropriate check boxes. Values on the left side can be edited by left clicking into the text field and entering the new value. If the snapshot on the left is not loaded from an ECU, a new custom snapshot can be created with the changed values. If the left hand side snapshot is a currently connected ECU, changes will be written to the ECU immediately. The parameters will be colorized to indicate the status of the comparison. Right clicking onto the parameter name will transfer the value from the right hand side to the left hand side, if the **Left side editing** box is ticked. By using the **Save left side** button the snapshot can either be saved to ECU persistent (only if it was previously loaded from the ECU), or be saved to file. When saving to file the **create signature** prompt will open up. Only signed snapshots can later be written to an ECU. It also keeps track of the IDs. For more information about IDs see chapter 15 Licensing. After signing the snapshot, the location and name of the new snapshot needs to be entered in order to save the snapshot file.

14.2 Variable Config Toolbox

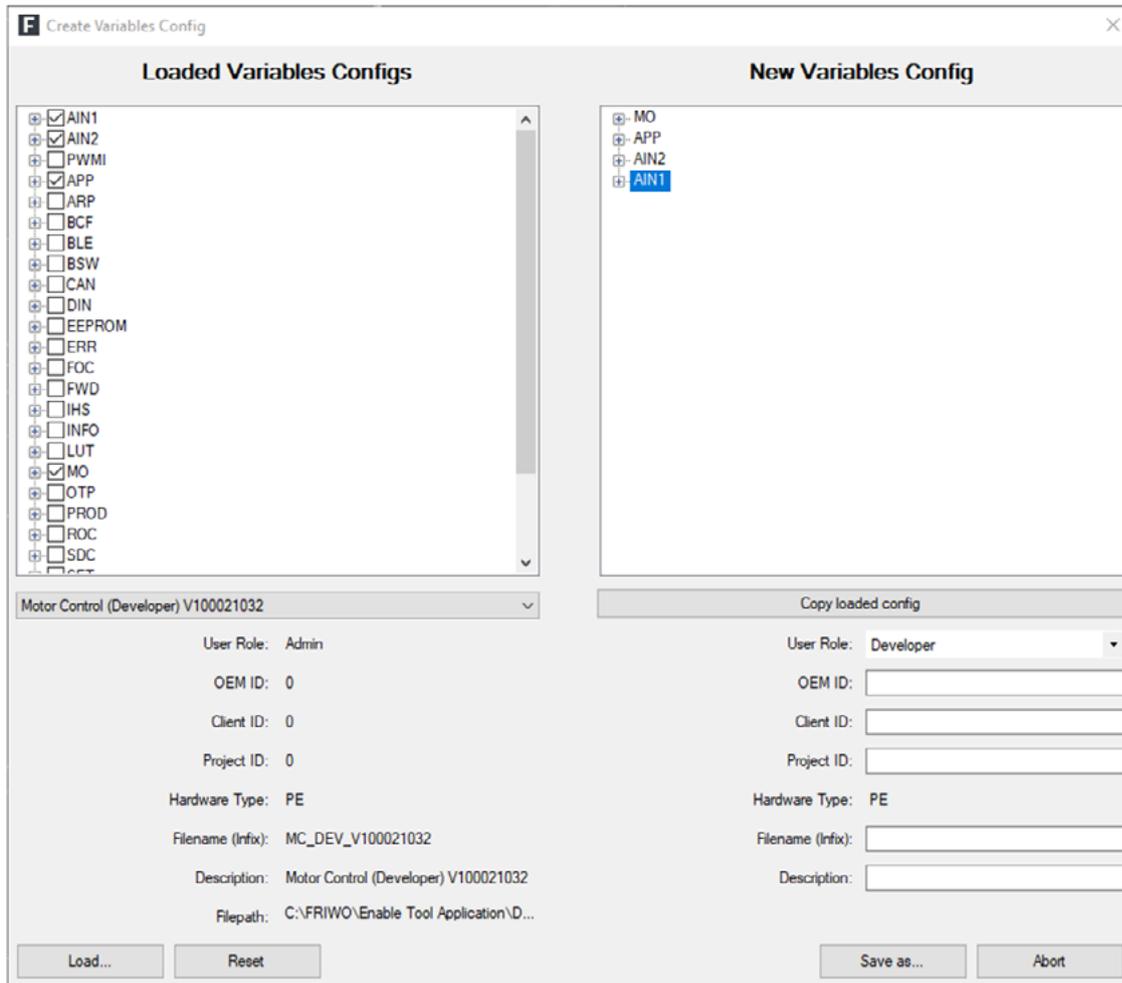


Figure 27: variable config toolbox window

With the variable config toolbox, new subsets of currently available variable configs can be created. The Variable config toolbox is available through the Tool tab on the main menu bar. Upon opening the toolbox window two variable views are visible. The one on the left hand side shows the variables in the currently selected variable config. The one on the right hand side shows the selected variables that will end up in the new config. The available configs will be listed in the dropdown menu below the left hand view. It is also possible to change roles to further limit access to these variables. However, only roles with the same permission, as the current config, or lower are available. It is not possible to inter mix config variables from battery management units and motor control units.

If a config is not located in the default path, it can be loaded using the **Load...** button to the bottom left hand side of the window. Configs located in the default location will be loaded automatically. Clicking the **Reset** button will clear the list of variables in the right hand side view of the variables. The newly created config can be saved after entering the OEMs ID, client ID and project ID via the **Save as...** button to the bottom right of the window. For more information about the various IDs, see the chapter 15 Licensing.

14.3 Offline support

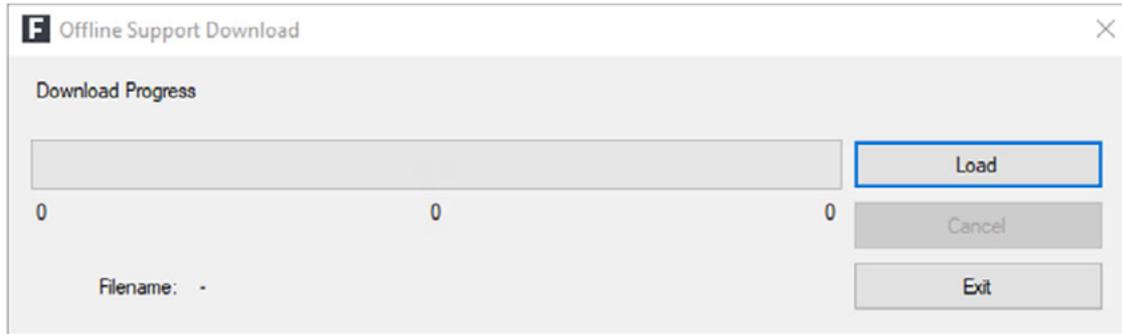


Figure 28: offline support download progress

To be able to communicate with the ECU a description file that corresponds to the firmware version on the ECU is needed. Usually, the Enable Tool will go ahead and automatically download this file once it sees a new ECU. However, all description files can be loaded ahead in case working in environments without a working internet connection is required. The **Download offline support...** in the **Help** tab of the main menu bar provides this feature. In the upcoming prompt, clicking **Load** will start the download of all description files. The download may take a while, and upon being exited, will continue where it left of the next time the download is resumed. As the tool is not meant to operate offline all the time, there is a timer on how long offline operation is permitted, which is currently 45 days. After this period the Enable-Tool needs to be connected to the internet again to verify licenses and check for updates.

14.4 Fleet Management

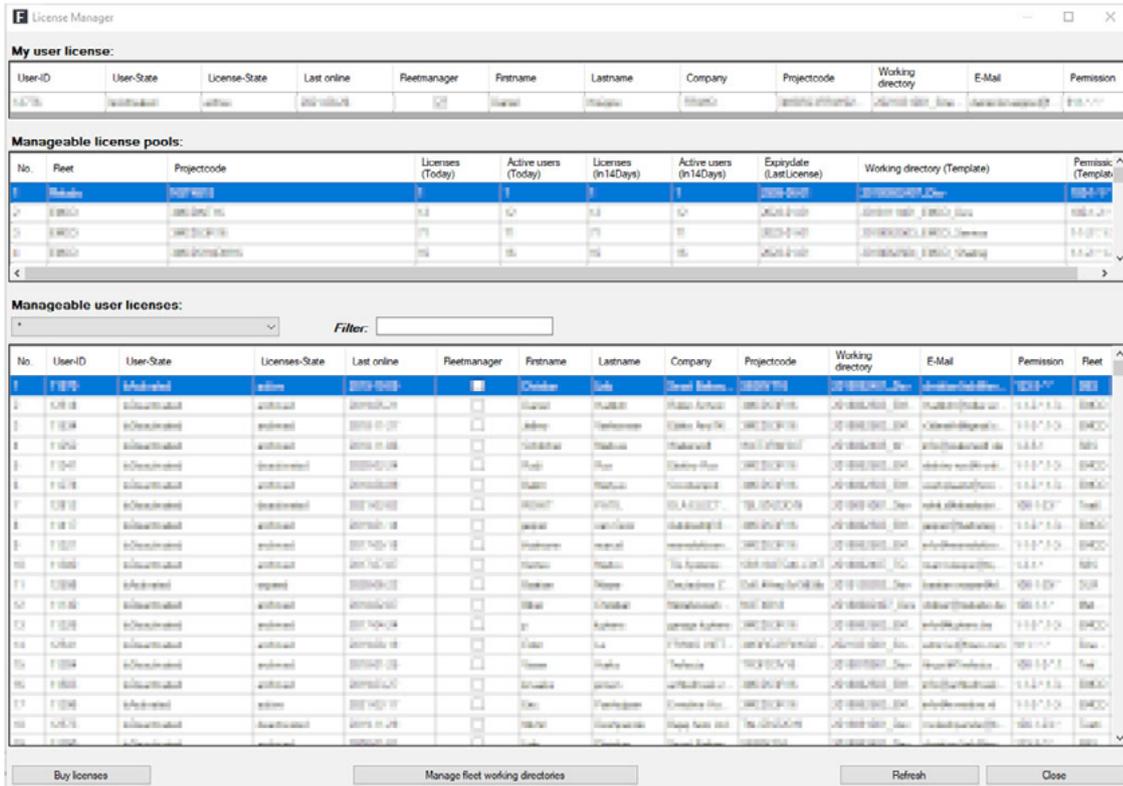


Figure 29: fleet manager toolbox window

This is the Fleet Manager Toolbox window, it is only accessible to people who are registered as fleet managers for the project code (license pool) of their license. The fleet manager can turn files, snapshots and firmware updates into packages and distribute them via working directories, as well as activate and deactivate individual licenses. Every user is assigned a working directory so this way the fleet data can be managed, so that every end user of the Enable-Tool has exactly what they need.

Fleet managers can also promote other Licenses to fleet manager. If there is no current fleet manager, which will be the case after the initial license purchase, a request needs to be issued to software.support@friwo.com containing the following information of the fleet manager:

- Name
- Unique ID of the license (**Help** → **Info...**)
- E-mail
- Phone number (optional)

If that person is not the person responsible for the purchase of the license, we kindly ask that the responsible person be put into cc when making the request, so that they are informed about it. We will then go ahead and confirm this request with them, and then promote the given license identified via the unique ID to fleet manager.

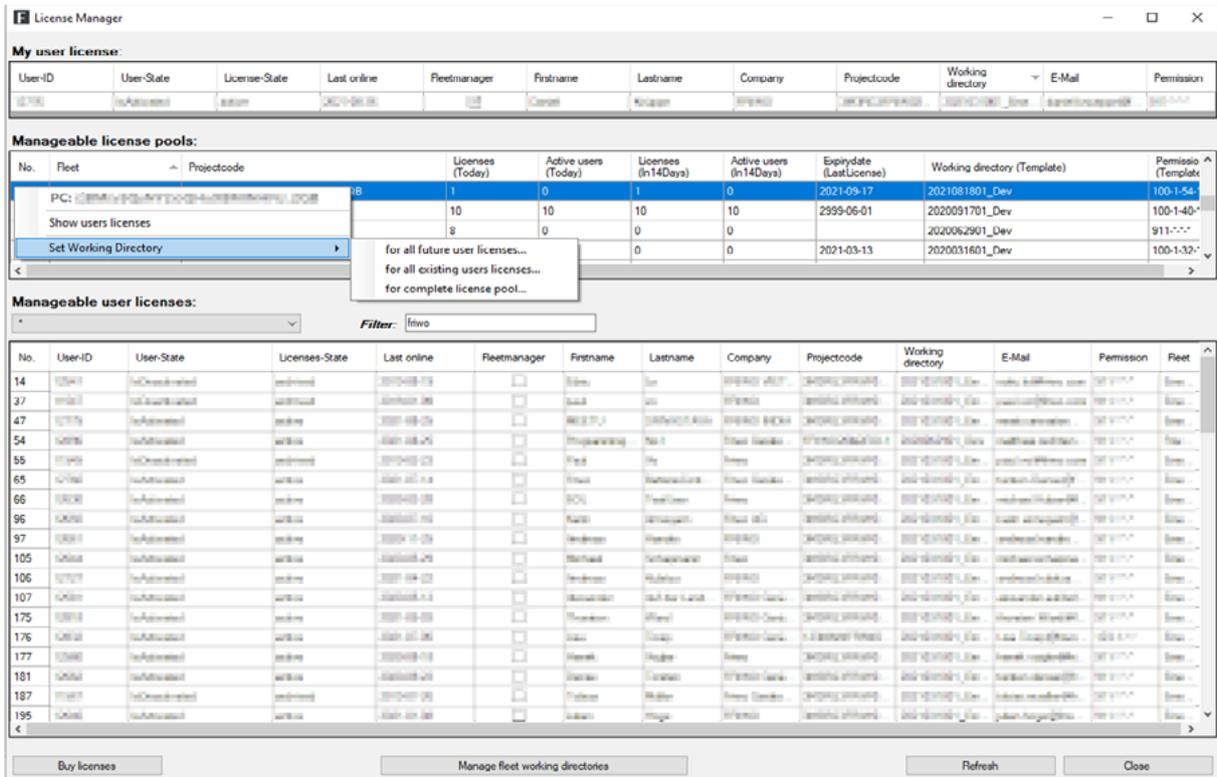


Figure 30: fleet manager set working directory

The fleet manager is available via the **Tools** tab on the main menu bar by selecting **Fleet Manager Toolbox**. The fleet manager keeps track of the files relating to their Vehicles (hardware description, firmware or documentation etc.) as well as manages access rights to them. The files are arranged in so called working directories, those working directories represent a set of files that can be used to distribute to specific users (identified via their licenses unique ID) or an entire license pool (identified via the project code). They can be used to manage access rights of e.g. different branches of operations (production and service technicians as two examples) see chapter 15.2 Roles and permissions for more information. Those working directories determine who in the license pool gets access to which files. After the working directory has been created, the license pool can be set up by right-clicking on the pool you want to set up in the **Manageable License Pools** view of the Fleet Manager and selecting the desired option on the **Set Working Directory** tab.

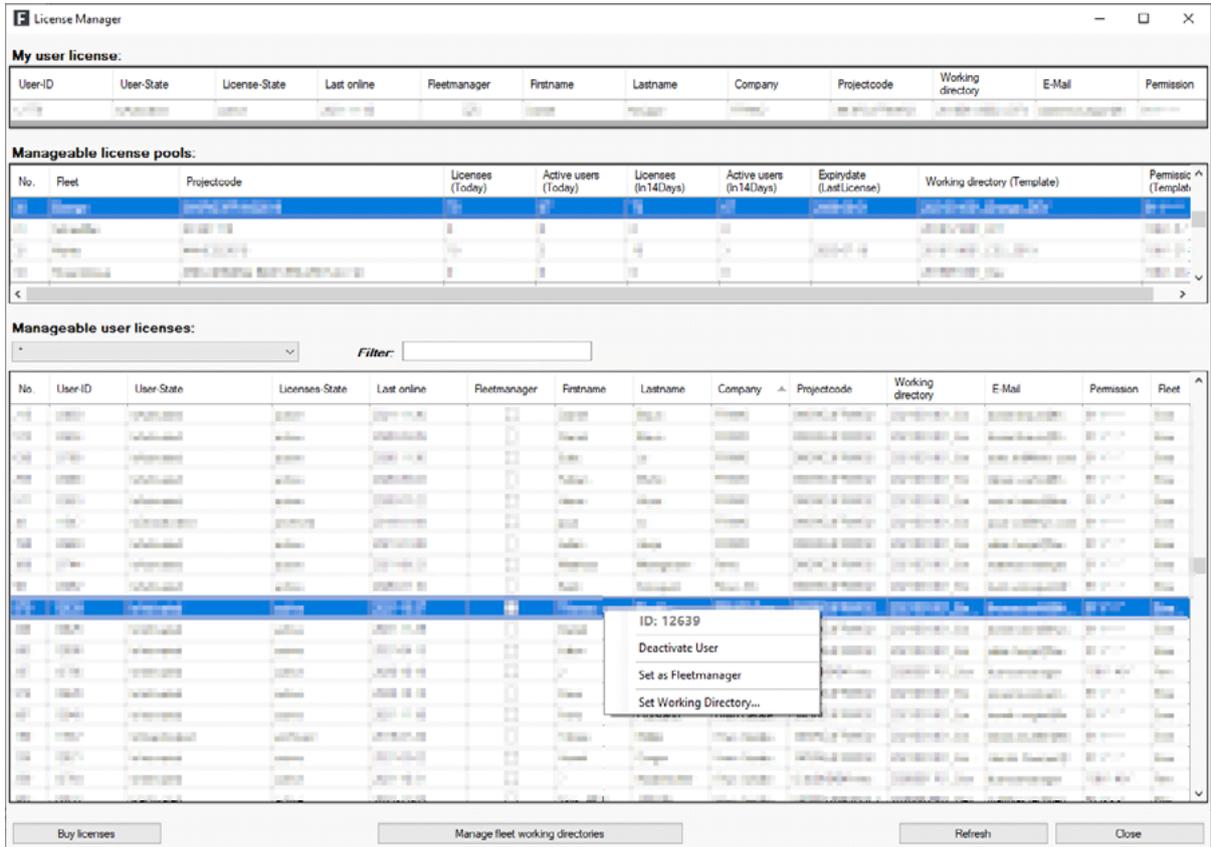


Figure 31: fleet manager context menu licenses

Fleet managers are also able to manage individual user licenses. They can promote other licenses to fleet manager, as well as activate and deactivate licenses that are registered to the project code. Fleet managers will also be informed via E-Mail about any changing license status, such as a user activating their license, or if purchased licenses are about to expire.

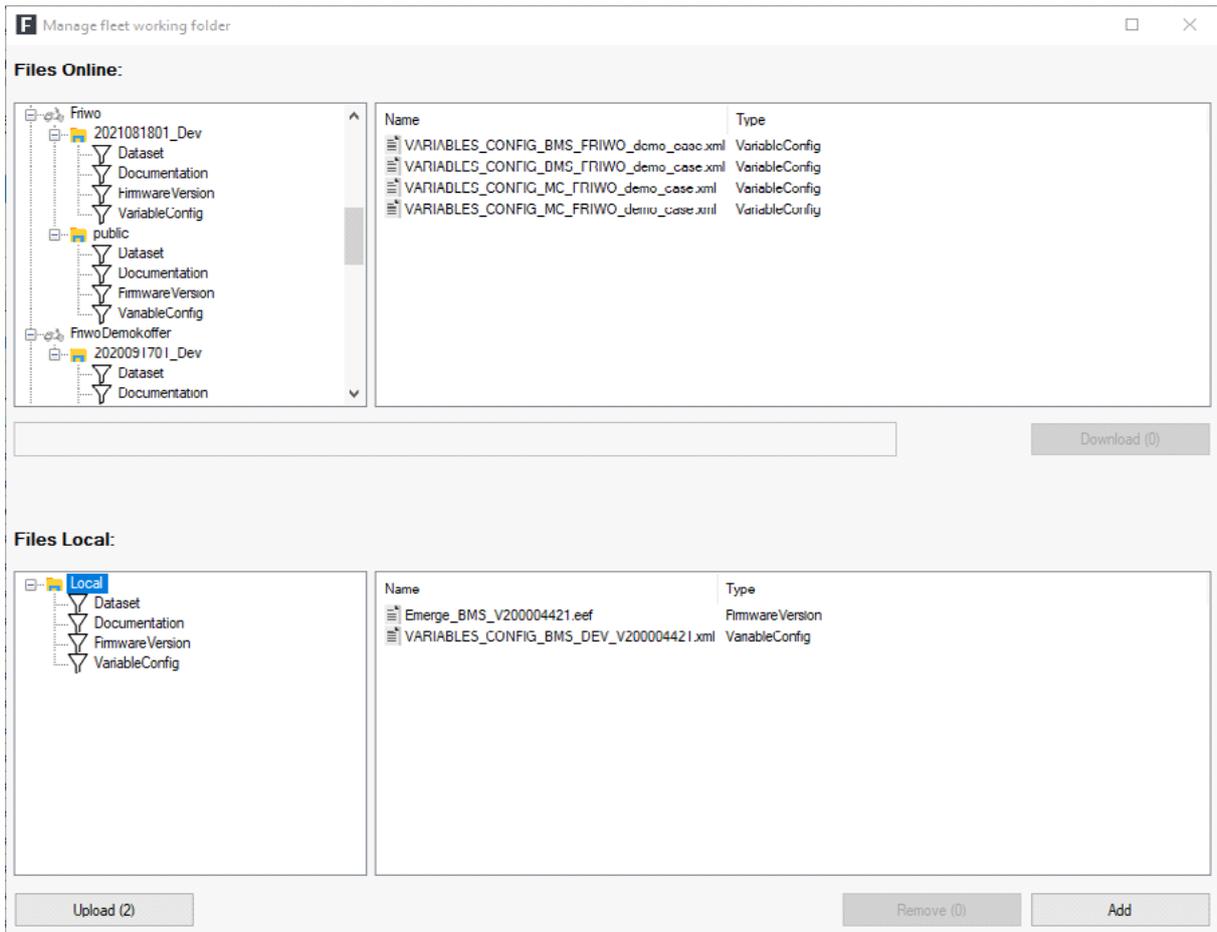


Figure 32: fleet manager working directory overview

Clicking on **Manage Working Directory** will open a prompt that allows you to add new working directories. There are two options to fill the working directory to be created with files. **Download** will pull the selected files from existing working directories to the preliminary working directory (bottom right context window). **Add** pushes selected local files into the preliminary working directory. **Upload** will then push the local preliminary working directory to the server where it will be stored under the given name. Since it is not possible to change the working directory once it's pushed to the server we recommend to double check the files before uploading.

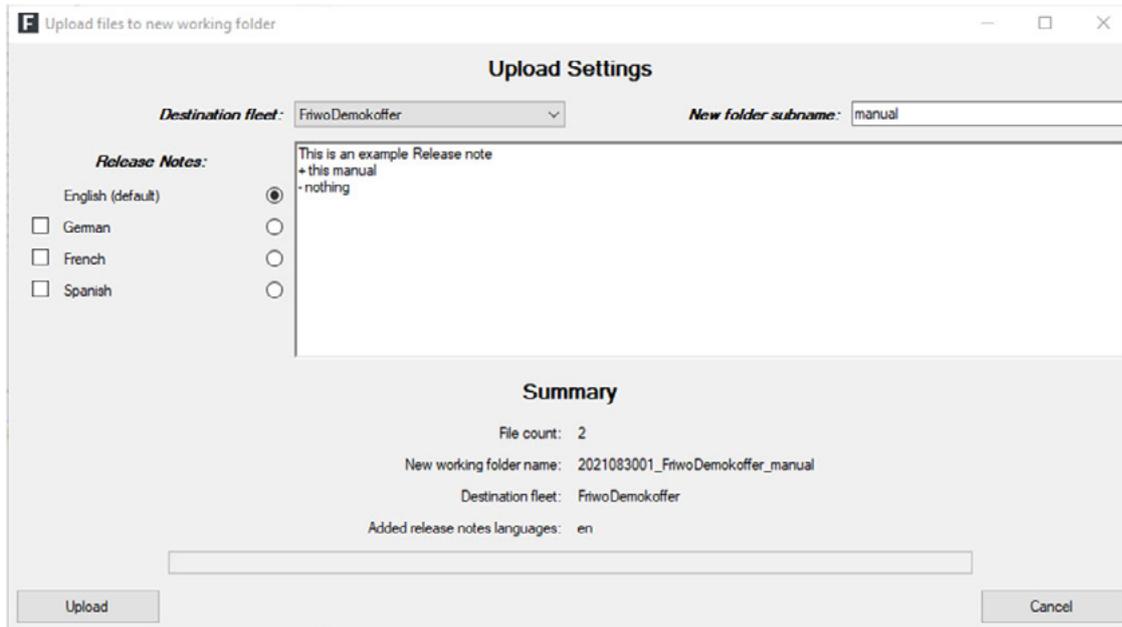


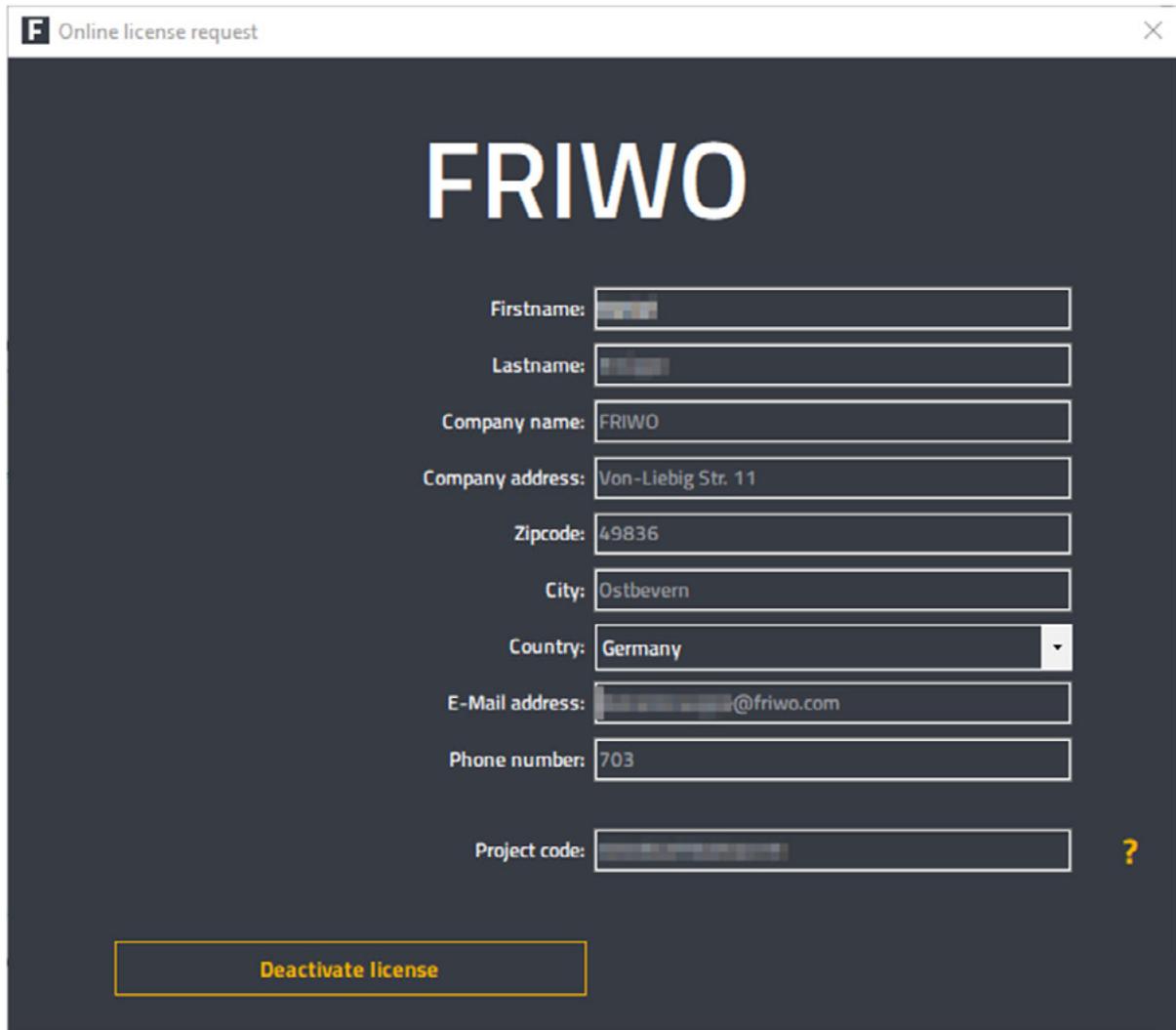
Figure 33: updating files in working directories

New working directories can be created using the update function. To do that, simply choose the fleet that requires a new working directory, and give it a name. Now there will be a new working directory with the contents previously chosen in the **Upload** context. After the fleet manager created the new working directory and assigned it to a certain license, the end users of the Enable-Tool application can now pull in changes by selecting the **Search for Updates** in the **Help** tab on the main menu bar. Alternatively restarting the Enable-Tool application will update the files, if the internet is accessible. A prompt will pop up with the release notes and ask to confirm the update. This will synchronize the contents of the RemoteFleetData directory with the data in the working directory which is assigned to that user.

15 Licensing

 Licenses are arranged in license pools, which are identified by the project code. When ordering new licenses through our [online shop](#), the project code to which the licenses will be added has to be specified. For new customers that don't have a project code, please enter "**new**". If the project code is lost or forgotten, please send an inquiry to feedback@friwo.com Please state your name, E-Mail, and if possible, your unique license ID. A valid project code has to be entered to request a license through the Enable-Tool.  The license to be received is not directly issued by FRIWO but is part of the license pool which the project code refers to, and which a client has previously bought. To receive a project code, please contact the OEM of the ECU. The license is then registered to your name, and bound to your workstation.

15.1 Deactivating a License



The screenshot shows a dialog box titled "Online license request" with a close button (X) in the top right corner. The dialog has a dark background and the FRIWO logo in large white letters at the top center. Below the logo are several input fields:

- Firstname: [Redacted]
- Lastname: [Redacted]
- Company name: FRIWO
- Company address: Von-Liebig Str. 11
- Zipcode: 49836
- City: Ostbevern
- Country: Germany (dropdown menu)
- E-Mail address: [Redacted]@friwo.com
- Phone number: 703
- Project code: [Redacted] ?

At the bottom left of the dialog, there is a button labeled "Deactivate license" with a yellow border.

There are two ways in which to deactivate a license. The fleet manager can deactivate each license in the license pool that they govern. A user might also deactivate their license by clicking on **Help** → **License**, and then clicking the button on the bottom left corner of the prompt.

15.2 Roles and permissions

The ECUs can be identified via three identifiers which are explained in the following sections and are relevant for access rights and permissions with regards to the firmware running on the ECUs

OEM ID:

This identifies the manufacturer of the ECU. OEM IDs uniquely identify partners of FRIWO that are utilizing our firmware.

CLIENT ID:

This identifies the client of the OEM. Clients are system integrators who wish to integrate our ECUs into their products. Client IDs are only unique in the context of an OEM. A client can have different IDs at different OEMs. For example a company could be a client of FRIWO, purchasing Motor control units, and obtain battery management systems from another OEM. In this case the company is a client of both parties and thus has an ID at both, which may or may not be the same.

PROJECT ID:

This is an ID which a client can set themselves to identify their products. They can use different IDs to distinguish different products, and thus have a fine grained control over who gets permissions to access which of their products.

The Enable-Tool is able to reproduce these IDs from the ECU and uses the following roles decide which parameters and to what extend the user might have access to. Access will also be allowed or restricted based on the variable config that is selected.

15.3 Roles, identifiers, and descriptions

Table 2: user role description

Number	Role	Description
123	Partner	Partners of FRIWO who build their own hardware but pair it with FRIWO's licensed software
100	Developer	Customers who buy hardware and software from FRIWO and only do configuration
1	Service	Service and maintenance technicians who don't configure something themselves and only read out data, or load preconfigured configs

Now whether or not access is granted to a specific ECU or not will depend on the following settings. A user can have multiple Roles for multiple products. The final access permissions look like this:

User: ROLE – OEM ID – CLIENT ID – PROJECT ID

Example:

John Doe: 1 – 1 – 99998 – 3
 100 – 1 – 99999 - *

The user John Doe now has two roles for two different clients. He would be a service technician for the client whose ID is 99998 and a developer at client 99999. For his role as service technician he only has permissions for the project whose ID is 3. The asterisk indicates that the role is applicable over the entire range of valid IDs in that category. The exact read and write permissions, as well as which functions are available for which role is shown in Table 3: permissions.

So to recap, the check for access rights looks like this.

First the Enable-Tool identifies the connected ECU via the OEM ID, the CLIENT ID and the PROJECT ID, which have been branded into the ECU during the creation of the snapshot and subsequent flashing of said snapshot onto the ECU. Then the Enable-Tool checks the selected variable config to ascertain which parameters can be accessed. It is possible to alter the access rights, by switching the variable config. However, the Enable-Tool won't allow anyone to select a variable config that exceeds the permissions of their license. The Enable-Tool will disregard any variable config that exceeds the user's permissions. So they won't be visible in the Enable-Tool.

The default permissions with a license obtained through our web shop grants the role of developer for all FRIWO ECUs, a client can flash their own snapshot with their CLIENT ID to brand it as their own ECU and thus prevent others with default permissions from accessing their ECU.

It should be noted that the only effective difference between a service and a developer role lie within the fact that the service role cannot alter or create signed snapshots, so they cannot alter the ECU parameters in a persistent manner. They can, however, alter the live parameters that are configured (by the developer) in the variable configs that they got access to.

15.4 Permissions

Table 3: permissions

Permission	Service	Developer	Partner
Establish connection with the control unit (e.g. read out error memory)	✓ ¹	✓ ³	✓ ⁵
Perform firmware update	✓	✓	✓
Transfer signed snapshots to ECU	✓	✓	✓
Create signed snapshots from ECU		✓	✓
Transfer snapshot to different vehicle model (change project ID)		✓	✓
Sign snapshot for all vehicle models of a manufacturer		✓	✓
Sign snapshots for all their clients			✓ ⁶
Snapshot without signature (for collaboration with development)	✓	✓	✓
Manual data change	✓ ²	✓ ⁴	✓ ⁷
Manual storage of data changes	✓	✓	✓
Record log data	✓	✓	✓
Licensing of produced ECU hardware			✓

1. individual vehicles only
2. only visible parameters
3. all vehicle types
4. application-specific parameters
5. all models, all manufacturers
6. A partner can sign snapshots for all their customers, not those of other partners
7. all parameters

16 Bug reporting

If you encounter any unexpected behavior, we appreciate it if you could take a moment of your time to answer the following questions, if possible, and send them, as well as any session log file or relevant screenshot as contact form or via mail to feedback@friwo.com.

<https://friwo.link/et/feedback>

You can find the session log files at "C:\FRIWO\Enable Tool Application\EtLogs"

Questions:

1. Summary of the bug.
2. Steps to reproduce.
3. What is the *current* bug behavior?
4. What is the *expected* correct behavior?

Final Words

You've reached the end of the Manual, thank you for your time and attention. This Manual should have given you the insight required to smoothly and efficiently use the Enable-Tool.

Feedback

We are working very hard to improve our products and therefore **feedback** is indispensable! Please send us your valuable feedback as contact form or via Mail to feedback@friwo.com



<https://friwo.link/et/feedback>