

1 - Clarification

This software can be used to access the controllers of vehicles via custom queries. A connection to the ECU is established via various adapters that are freely available in stores. The basis of communication is the sending and receiving of bits and bytes via integrated protocols for different systems. Depending on the system, the software establishes a connection and keeps it active, even if there is currently no communication. Other systems create and keep a connection alive through the adapter's internal logic.

Apart from these activities, further communication takes place exclusively via the independently created queries and files. This allows data to be read, changed and irrevocably deleted. The type or model of vehicles is not known to the software, only the internal extensible protocols for the appropriate system. It can be useful to use these queries and files from other sources or to work out further knowledge with an emulation.

This application is a tool for users with the required knowledge.

2 - Overview

This Windows desktop application can only be installed via the Microsoft Store. It is programmed with Microsoft Visual Studio in C++. The user interface is designed with MS Net Framework, the internal processes runs via Windows API and C++ runtime. The languages of the user interface will be expanded later as required.

This documentation is not extensive, but extensive knowledge of ECU communication is required. There is a lot of public documentation available and therefore it makes no sense to go into it again at this point or to update it continuously. Since the various vehicles are not known, no information can be given about them.

The types and systems are grouped in the options under the adapter setting. The internal protocols are ISO 9141, KWP 1281, KWP 2000 and their variants such as 2025, 2026, 2027, etc. The types of error codes (DTC) with a length of 2 or 3 bytes are analyzed based on their values. The third byte for determining the internal attributes is also read into ECU data view.

3 - Script editor

The editor creates the query settings on the one hand and the import options of the incoming data on the other. Most editors are prepared for multi selecting to modify a selected set of items.

1. List editor

The first list is the base list for creating and editing the entries.

Usage

The usage enables or disables the query element. If this option is disabled, the query will not be able to run.

Tx Data

Each query is based on transmitted data (Tx) identified by a label. These query bytes will be transmitted to the ECU as service byte [SID], parameter byte [PID] and option bytes [OPT].

Label

The name or short information of this query.

Remarks

The comments should describe the process in detail so that no malfunctions or confusion arise.

2. Type editor

This list is used to specify the type and options of incoming data.

Data type

The selection defines the type of import data. Basic types are text conversions, DTC trouble codes or value types, which can be calculated.

Byte range

The option is used to select one or more bytes of the value byte list received from ECU. The selected bytes are processed in the same way as all other value bytes. The selection begins with the index of the start byte and has the number of bytes as length value.

Service bytes

This value is the number of data bytes to use as leading confirm bytes. The following bytes after this number of data bytes are used as value bytes. This option splits the data bytes in confirm bytes and value bytes.

Protocol bytes:

All received bytes from one query including header and checksum bytes. The program automatically splits the protocol bytes into data bytes, header and checksum bytes.

Data bytes:

These bytes include the leading confirm bytes like [SID +40] [PID] [OPT] and the following value bytes. The confirm bytes are checked by the program and can create an error message.

Value bytes:

These are the data bytes without the leading confirm bytes. There can be no or a lot of value bytes.

Multi response

The option activates the possibility of a multiple response, like OBD queries, which return fixed vehicle information. If this option is disabled and a multiple response occurs, the query finishes after the first response received and the next responses will be lost. If the option is enabled the query finishes always by timeout and needs more total response time.

Numbering:

This option activates the using of the numbering of multiple response. If enabled, the program searches for response numbers to split these bytes from the value bytes. When enabled and no numbering is received, the program uses the first value byte as numbering or sends an error message if this byte is incorrect as numbering. When disabled and a numbering is received, the program uses them as value bytes.

Static data

The option controls the using of the received data as dynamic or static values. When enabled, this query runs only once to get fixed values. If the query response is invalid, the system runs further queries depending on auto lock.

Auto-Lock

If an error occurs during the query of this element, the program sets the data as invalid and increases the invalid query counter. If the option is enabled and the threshold setting is reached, the system locks further queries.

Limit:

The threshold setting for the query auto locking if the response data is invalid. Locked query items can again be unlocked in the data window.

3. Value editor

The value list is only used to specify value types and options for importing the incoming data.

Byte type

The byte type selection defines the number and type of bytes using for a single value import. If more bytes available as needed for the selected byte type results also more than only one value import. Too few bytes or an incompatible number of bytes create an error message. Using an 8-bit integer type and receiving three bytes results in three separate values. Using a 16-bit integer type and receiving three bytes will result in an error message. After the import the value can be further calculated.

Bit range

The option is used to select a single range of bits from one or more received value bytes. The selected bits are converted to an integer, which is processed in the same way as other value bytes. The correct import type for the bit range option is therefore an integer number. The selection begins with the index of the start bit and has the number of bits as length value.

Calculation

This field is used for further calculations of the imported value. Each line in the text box is a single calculation. Only English signs + - * / are possible with round brackets and a dot as a decimal point. Using defined byte types the value import sign is #, using custom byte import the signs are A B C D... for the specified bytes. In more than one calculation line the value must always imported with # from the previous line.

Decimals

This value defines the number of decimal places of the display value.

Value range

Enables the use of the coloured value range. The value display shows valid values in green and invalid values in red.

Unit

This field defines the unit for the display value.

4. Filter editor

The filter editor allows you to create your own query selection for scanning.

Preview

This is the preview query list of the selected filter and is displayed in the ECU data view.

Query usage of filter entries

The selected queries are part of one or more filters and are displayed informally in this usage list.

Filter list

The list for creating and editing the filters based on the individual name.

Query selection

The checklist for data queries to associate them with filters. Use multiple selection to change more than one filter or query.

4 - DTC editor

The editor create, import or export entries based on DTC and system or symptom codes in multiple selection mode. When listing the DTC fault in the ECU data view, these remarks will also be listed if the codes match.

Usage

Enables or disables the item. If this option is disabled, the item will not be displayed for the corresponding error code.

Code

Defines the trouble code which is conform to the ECU trouble data, normally DTC.

System

The label or system of this trouble code. If no match is found in the code column, the program uses the system column for searching.

Remarks

The description of this error code appears in other listings.

5 - ECU data view

This window is the ECU scanner with the data query list created in the script editor. Basically you can use two types of files, the script files and the data files. The script files are used for scanning and import the data into an internal database. If you save the scanned script file as a data file, you have saved the script including the database. You can save a scanned script file or any data file as a script file, but you only save the script and the scanned data will be lost because the script editor only reads the script options with no data.

1. Script data

This view shows the read-only scan options of a single script entry.

2. Query data

The view shows the transmitted and received bytes.

Query

These are the data bytes and the automatically generated protocol bytes based on the protocol type.

Response

Shows the access success and the number of protocol bytes received followed by the automatically generated data and value bytes based on the protocol type.

Value type

The value bytes can be of text or numeric value type. The following lines show different types and display values that can result from it independent of each protocol type.

3. Value display

This is a multiple view that automatically switches view and icon by data type.

Value, unit, timestamp

The view shows text or numeric values with a unit and the elapsed time since the last update. The context menu in the time range changes the time delay after which the display switches from the text "current" to the elapsed time to avoid flickering.

Error codes

A special data view for error codes with 2 or 3 bytes per encoding. You can load your own error file to display additional data. If there is a match, this also displays data for the third byte.

Command

The view logs the responses to commands, most of which are confirmed without further data.

4. Value list

The list shows every single scan that is currently in the database. Only in this view can you delete individual data items.

5. Diagram

There are two basic diagram views because the script elements can be selected multiple times. They can be displayed one after the other or together in a single chart. Use the context menu to change options or save the chart to a file. It is possible to scan more data at a later time, but if the time gap is large, the chart will be displayed with long time lines and you will have to select a shorter time range with mouse selection.

6 - Console

The console is a terminal window for simple communication. On the right side is the command list, which can be edited via the dialog view. On the left side you can switch between dialog and console view.

1. Console view

There are two basic modes, ECU mode and text mode. Both have their own serial port with options.

ECU mode

This mode allows you to connect to a controller using the internal protocol type. Note that the terminal performs the same queries with the same consequences as the ECU data view. It is only for testing the communication and the data is only displayed as hex data.

Text mode

Text mode is used to communicate with an adapter when a setup interface is present.

2. Dialog view

This is the dialog for editing the list on the right.

7 - Messenger

The window is used for all internal messages of the application. The list can be filtered by type and cleared at any time. During scanning, communications are listed in hex code, including warnings and errors.

8 - Options

The dialog shows the program settings for different categories. Please use the hint window for further information.