



# Engine Diagnostics Tool 2.0 User Manual

Version 2.0

## About Manual

This manual describes the EDT 2.0 application and its ability to monitor ECU. It provides detailed information concerning the usage of EDT 2.0 application.

This manual contains the following chapters:

- Introduction
- Installation
- Starting EDT 2.0
- Main Window
- Application Menu
- Connect
- Measurement
- Faulty Manager
- Engine Information
- Diagnostics
- View
- Help

## Revision history

Revision No.	Revision Description	Revision Date
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**Warning:**

Failure to read and understand the information provided in this manual may result in product failure. Please read each chapter in its entirety and be sure you understand the information provided in the chapter and related chapters before attempting any of the procedures or operations given

# Table of Contents

<b>Table of Contents</b> .....	<b>2</b>
<b>Introduction</b> .....	<b>6</b>
<b>Installation</b> .....	<b>6</b>
<b>Starting EDT 2.0</b> .....	<b>9</b>
<b>Main Window</b> .....	<b>10</b>
Measurement Screen.....	11
Fault Manager Screen.....	11
Engine Information Screen.....	12
Diagnostics Screen .....	13
Status Information Screen.....	13
<b>Application Menu</b> .....	<b>14</b>
ECU Setup.....	15
ECU Setup HYBRID.....	17
ECU Setup Vehicle .....	18
Engine Power tune calibration.....	18
ECU Report .....	19
Virgin ECU Software Update.....	23
ECU Software Update.....	23
Import Engine Descriptor File.....	27
Import Engine Binary File (Engine Software).....	28
Exit.....	28
<b>Connect</b> .....	<b>29</b>
Auto Connect .....	31
Manual Connect.....	32
<b>Manual GPS config</b> .....	<b>34</b>
Export GPS.....	36
Open (multiple tabs).....	37
Select Engine Signals .....	38
Measurement signals .....	39
Config Signal Parameters .....	45
Start Measurement (Shortcut F9).....	46
BILMDIAG.....	47
Stop Measurement (Shortcut ESC) .....	48
<b>Stop Measurement (Shortcut ESC)</b> .....	<b>49</b>
Measurement Tools .....	49
Resume .....	49
Pause .....	49
Axes Scroll.....	49

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Zoom Out.....	49
Zoom In.....	50
Zoom Box .....	50
Data Cursor .....	50
<b>Fault Manager.....</b>	<b>51</b>
Delete Selected L2 (stored).....	51
Delete All L2 (stored) .....	51
Freeze Frame .....	51
Show DTC in Hex .....	52
<b>Engine Information.....</b>	<b>53</b>
Load Profile.....	53
<b>Diagnostics.....</b>	<b>55</b>
Connection.....	55
Diagnostics mode (Select Signals).....	59
Fuel pump diagnostics .....	59
FMS diagnostics .....	60
ITD diagnostics .....	60
VTG diagnostics (TCI & SCI) .....	60
SCI valves diagnostics .....	61
Bypass.....	61
<b>View.....</b>	<b>62</b>
Engine Information.....	62
Fault Manager.....	62
Status Information.....	62
<b>Help .....</b>	<b>63</b>
User Manual .....	63
Help About.....	63
Change Language EN / DE.....	64
<b>File update .....</b>	<b>64</b>
<b>Frequently Asked Questions (FAQ's) .....</b>	<b>66</b>

## Prerequisites

### Supported Operating Systems

- Windows 7, 32 and 64bit
- Windows 8.1, 32 and 64bit
- Windows 10, 32 and 64bit
- .NET Framework 4.0

### Supported Hardware

- Minimum: Intel or AMD Dual-Core-Processor with 2.0 GHz or faster
- Recommended: Intel i3, i5 or i7 processor
- 2 GB RAM memory
- Supported Resolution min.: 1280 x 720
- Free USB 2.0 Port for connecting the USB/CAN interface

# Introduction

This software is used for diagnosis on “Steyr-Motors” Diesel engines. It supplies data out of the engine control unit (ECU M1-CU3 und M1-CU4) and allows measurements and malfunction detection.

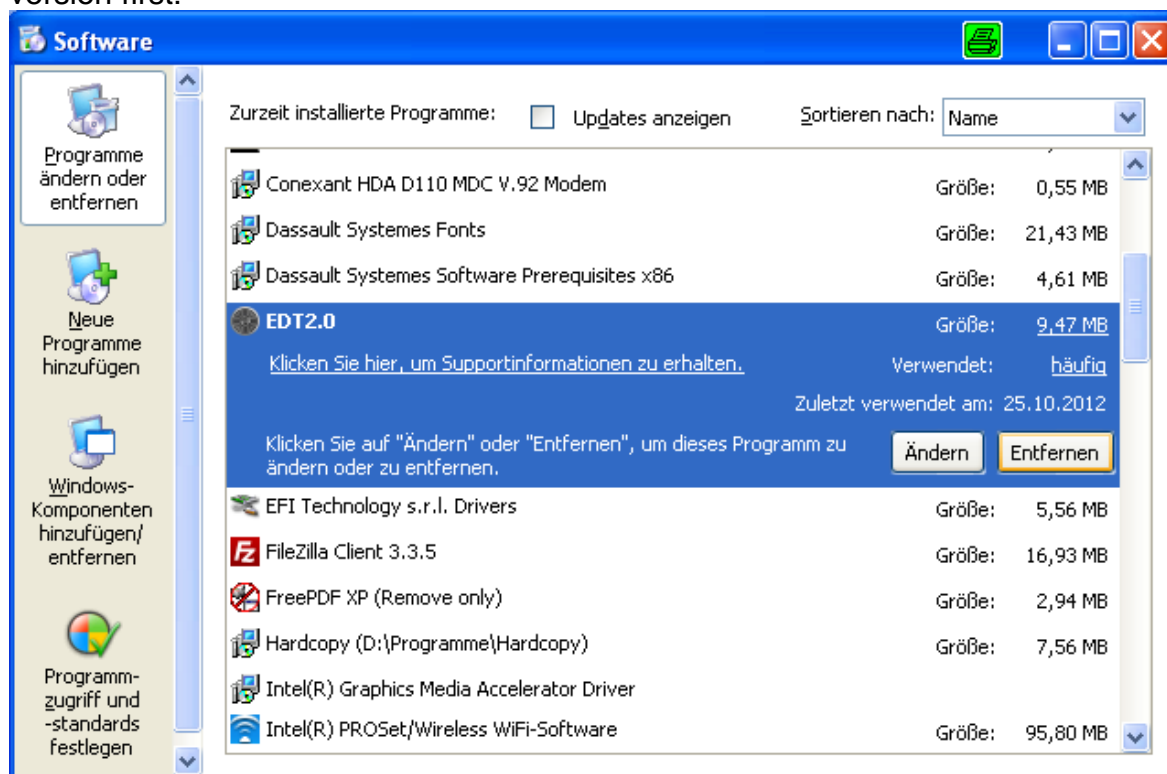
# Installation

This chapter describes the procedures involved in the installation of EDT 2.0 on a standard workstation running under Microsoft Windows 7.

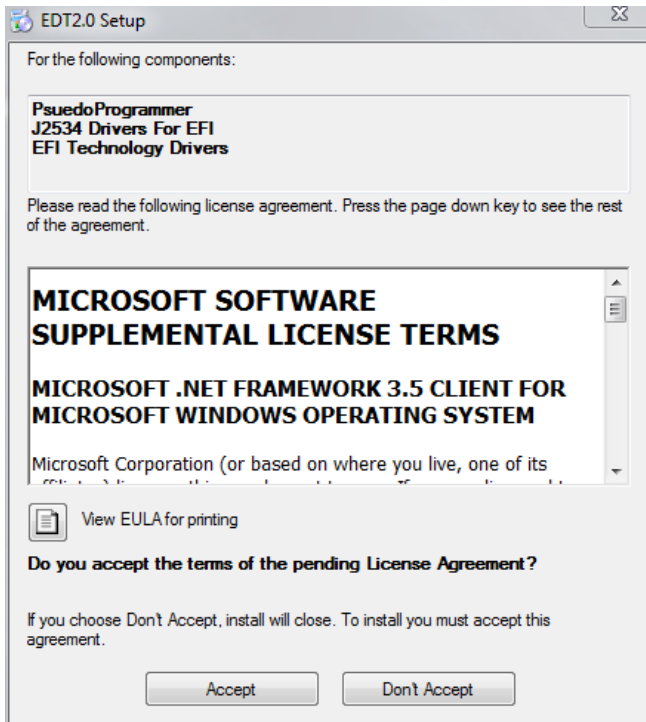
The software is supplied on <http://www.steyr-motors.com/download/tools/smo-edt-diagnostic-tool-list-files/se-series/> and is installed easily from within Microsoft Windows. The installation can be terminated at any point during the installation process.

For workstations running on Microsoft Windows 8, EDT-Version 1.1.62.2 or higher is necessary.

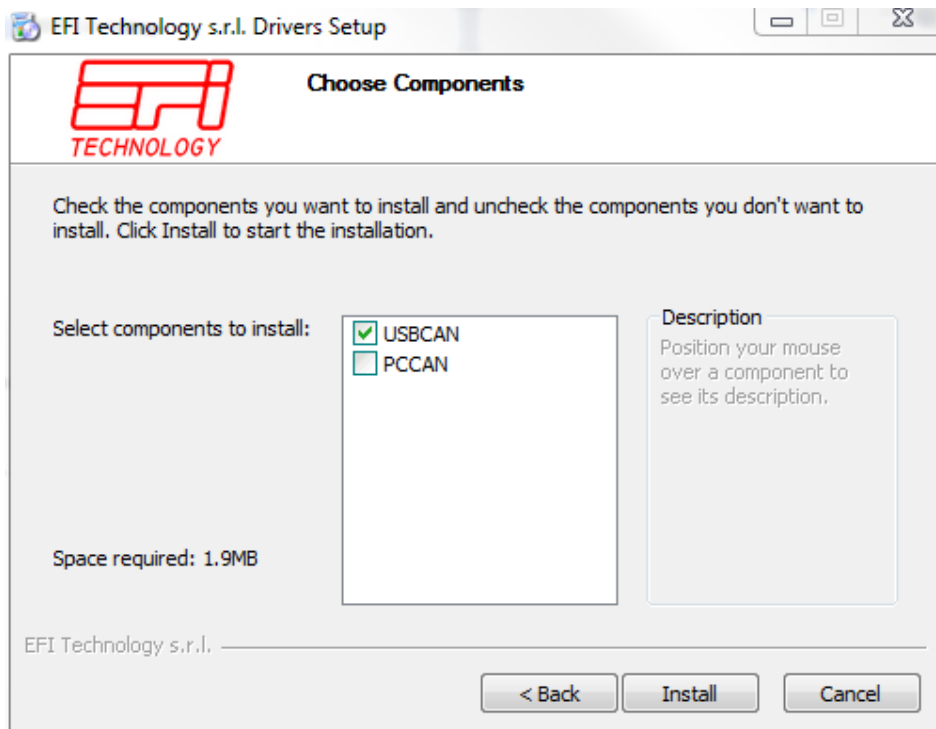
If there is an older version of EDT 2.0 already installed, please uninstall/remove this version first:



Open downloaded zip-file and start installation by using “setup.exe”.

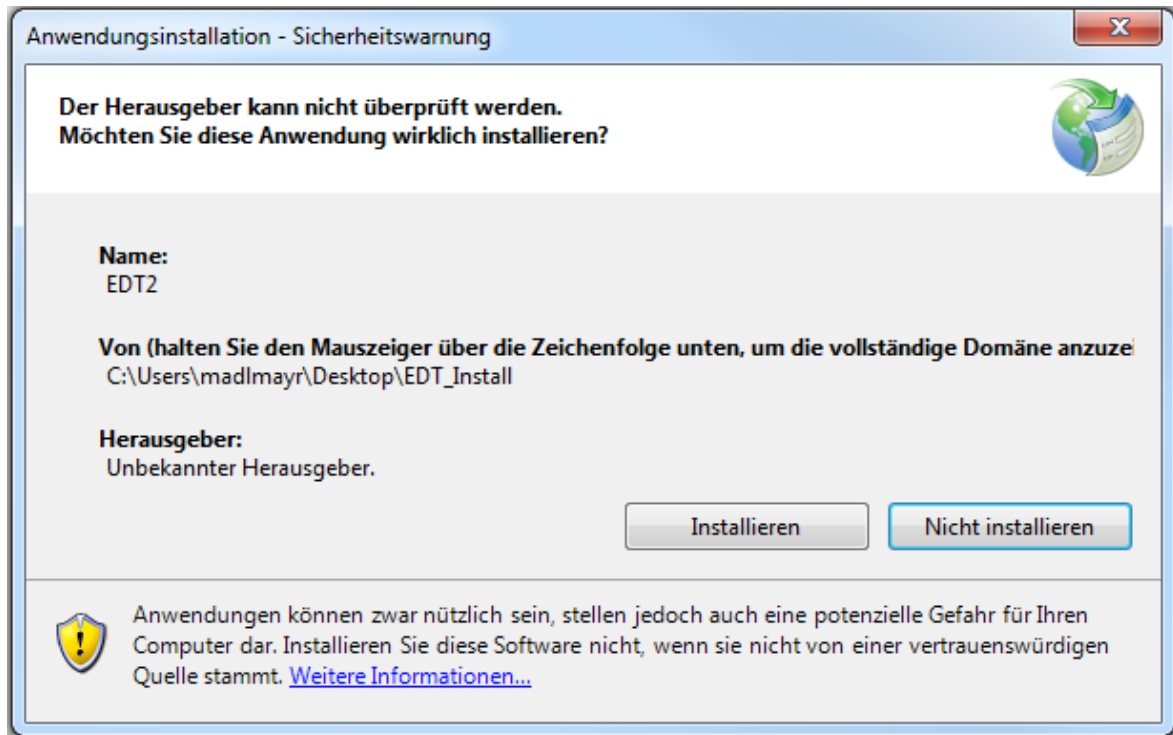


Press “Accept” and follow the on-screen instructions.



Select “USBCAN” and follow the instructions.

Press “Install” and follow the on-screen instructions.





# Starting EDT 2.0

To open the EDT go to:

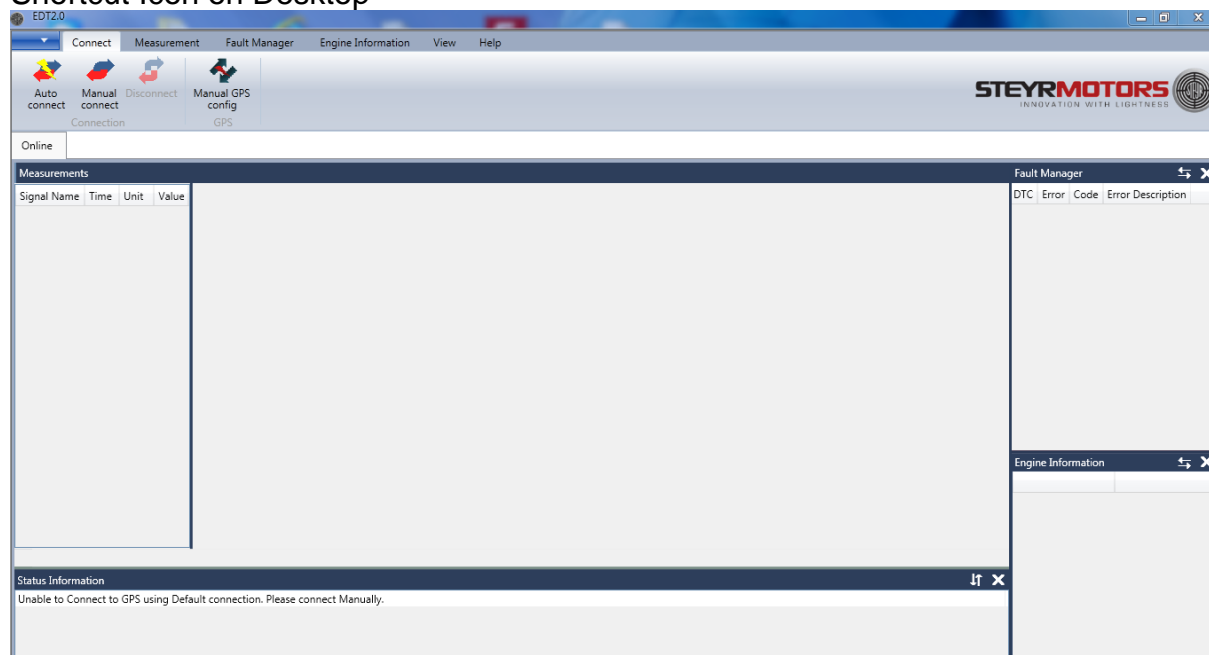
Windows Start → Programs → SMO → EDT2



Or  
Desktop → EDT2



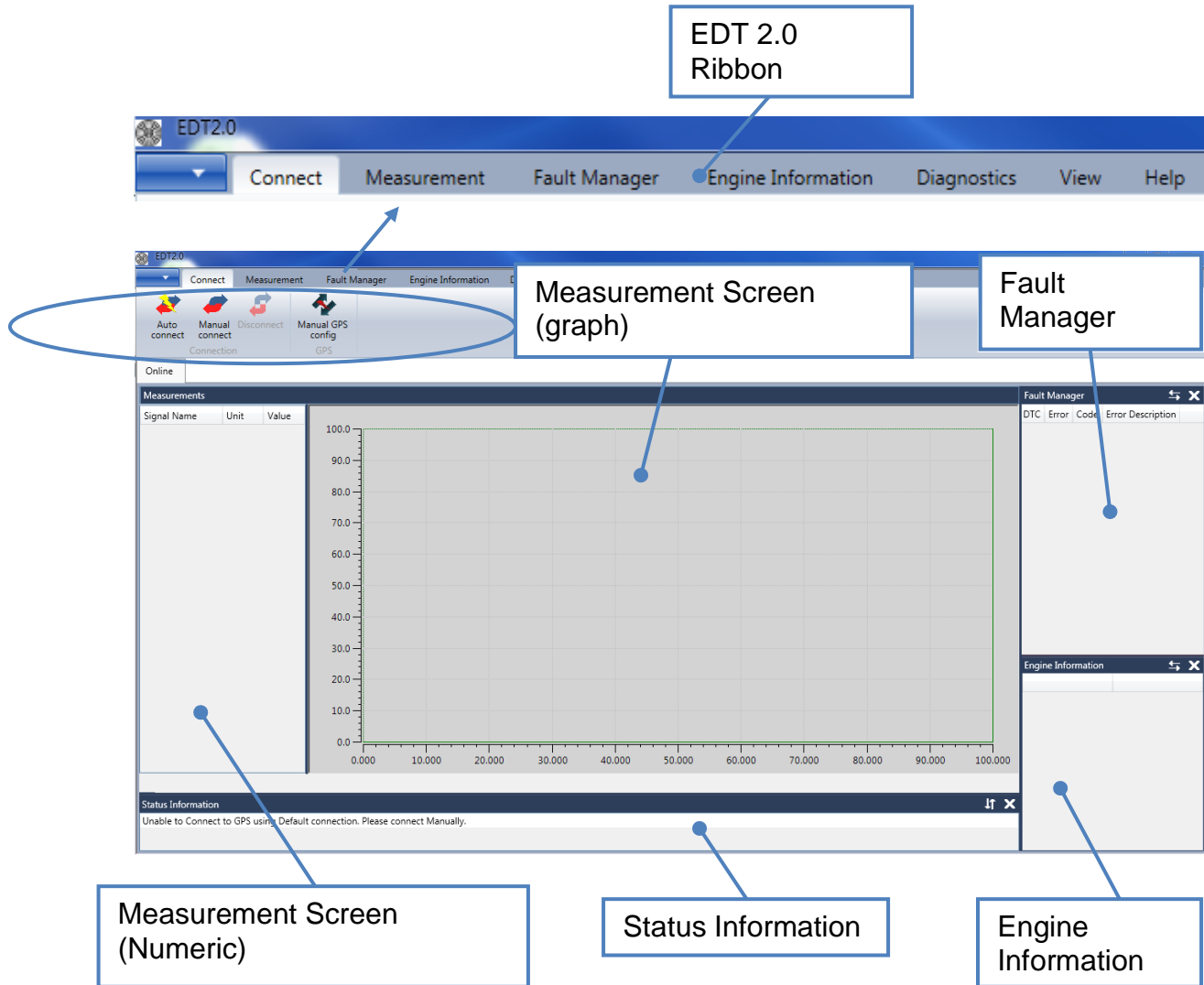
## Shortcut Icon on Desktop



EDT 2.0 application window

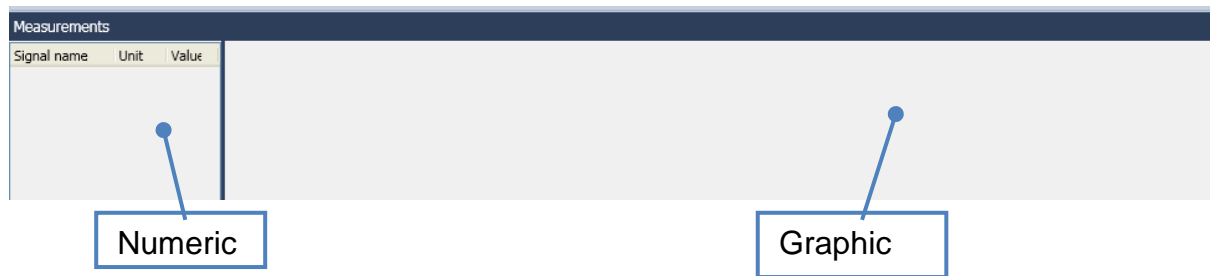
# Main Window

The EDT main window contains the following parts:



## Measurement Screen

Measurement screen shows Graphical and Numerical values of the selected Signals from ECU



## Fault Manager Screen

The Fault Manager Screen displays the current and stored Fault codes (error codes) from the ECU

DTC	Error	Code	Error Description
395	Stored	PF20_RANGE_E-FER	PF20 - Fuel Pressure Sensor, fuel pressure is below the limit
275	Stored	ACT_E-MAX	Ambient Air Temperature Sensor, signal voltage to high, possible short circuit to battery
8745	Current	MAP_E-MAX	Manifold Air Pressure Sensor (Boost pressure Sensor, signal voltage to high, possible short circuit to battery)
395	Current	PF20_RANGE_E-FER	PF20 - Fuel Pressure Sensor, fuel pressure is below the limit

Fault Manager			
DTC	Error	Code	Error Description
395	Stored	PF20_RANGE_E-FER	PF20 - Fuel Pressu
275	Stored	ACT_E-MAX	Ambient Air Temp
8745	Current	MAP_E-MAX	Manifold Air Press
395	Current	PF20_RANGE_E-FER	PF20 - Fuel Pressu

L2 (stored)

L1 (current)

### Level L1 (current)

The Error code is active. For service code table refer to Service Manual.  
If an error Level 1 (L1) occurs after ignition OFF and ON again, the fault will be shown as Level 2 (L2).

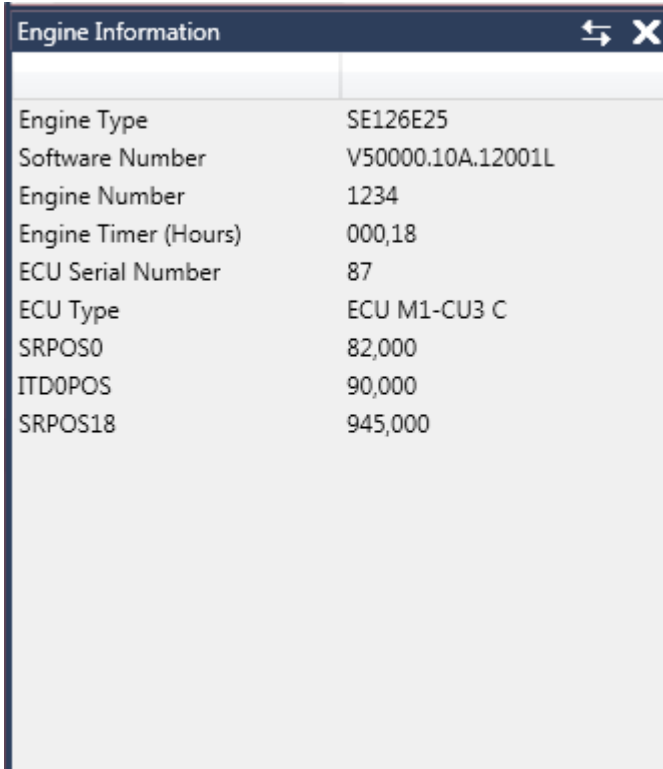
### Level L2 (stored)

The Error code is not active.  
After a certain number of cycles, the fault won't appear anymore.

## Engine Information Screen

The Engine Information Section displays the following Engine Information:

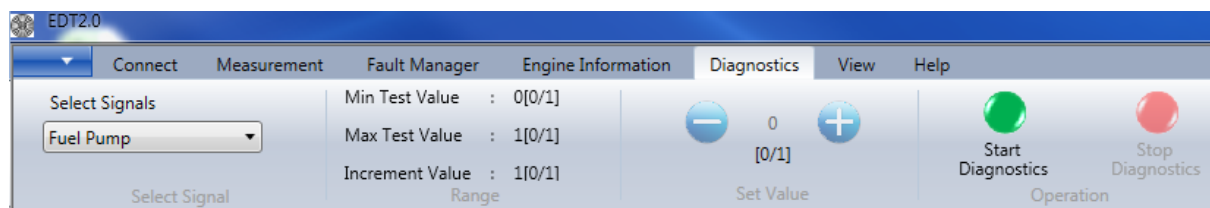
- Software Number
- Engine Number
- Engine Type
- ECU Serial Number
- ECU Type (M1-CU3, M1-CU4)
- Engine Timer
- SRPOS0 (Rack Zero Position)
- SRPOS18 (Rack 18mm Position)
- ITD0POS (ITD Zero Position)



Engine Information	
Engine Type	SE126E25
Software Number	V50000.10A.12001L
Engine Number	1234
Engine Timer (Hours)	000,18
ECU Serial Number	87
ECU Type	ECU M1-CU3 C
SRPOS0	82,000
ITD0POS	90,000
SRPOS18	945,000

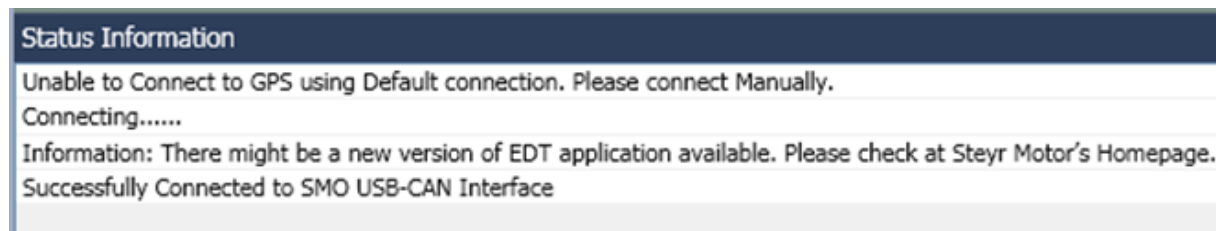
## Diagnostics Screen

The diagnostics screen allows to set actuators. The user can select which actuator should be diagnosed. After selecting an actuator, the user can set a value for the actuator. So the user can see the current values of the actuator in a measurement screen (e.g. fuel pump is on, fuel pressure can be measured). The values can be saved to disk. For some diagnostic functions, it is necessary to start the engine, for others not. If the engine got started while a diagnostic function is activated whereby an engine start is not allowed, the diagnostic function will be turned off immediately to avoid harm of the user or damage of the engine.



## Status Information Screen

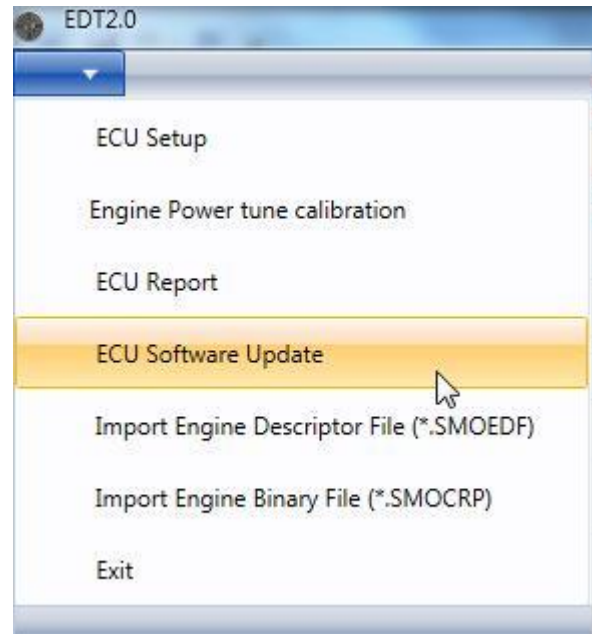
Status Information Screen shows the information of activates done on EDT 2.0 application



## Application Menu

ECU Application menu consists of:

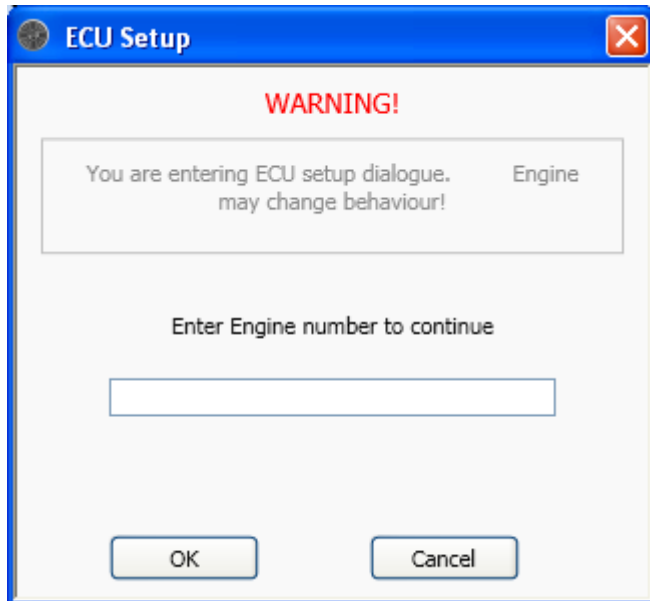
- ECU Setup
- Engine Power tune calibration
- ECU Report
- ECU Software Update
- Import Engine Descriptor File
- Import Engine Binary File
- Exit



## ECU Setup

ECU Setup helps to modify the ECU parameters

To open ECU Setup window click Application Menu → ECU Setup → Enter Engine number → Press Ok



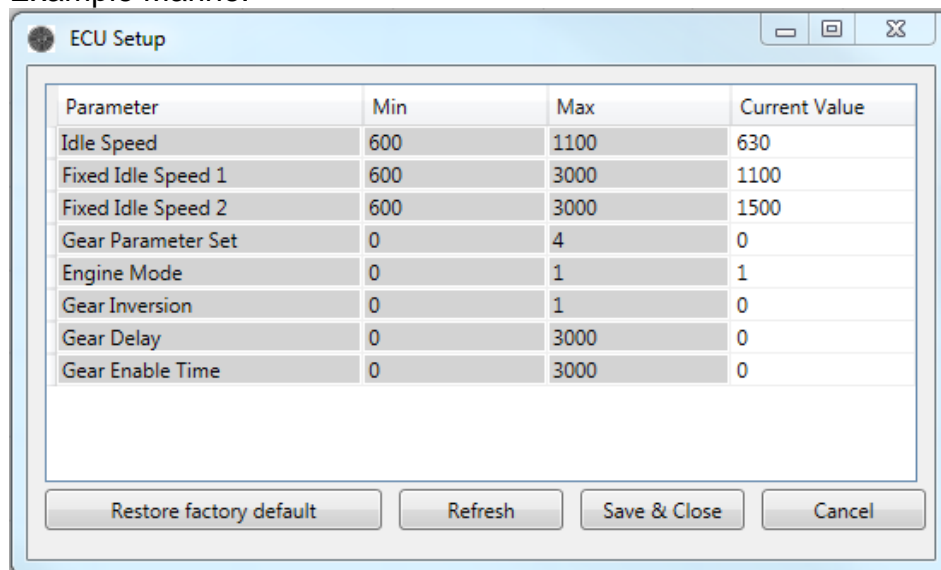
The following window contains at least 2 parameters, according to the ECU software there are more or less parameters:

- **IdleSpeed:** contains the current used engine idle speed
- **FixedIdleSpeed1:** contains the idle speed which is used, if the idle switch is switched to position 1
- **FixedIdleSpeed2:** contains the idle speed which is used, if the idle switch is switched to position 2

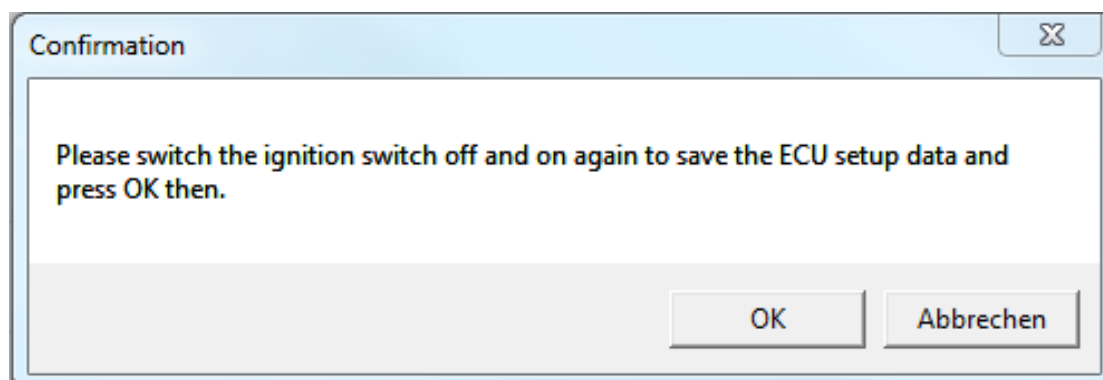
Parameters only for Marine engines:

- **GearParameterSet:** every increase of this value will increase the idle speed while shifting
- **EngineMode:** choose between torque governor (select "0") and speed governor (select "1")
- **Gear Inversion:** inverts the Gear activation
- **Gear Delay:** Gear activation delay time in milliseconds
- **Gear Enable Time:** activation time for gear strategy in milliseconds

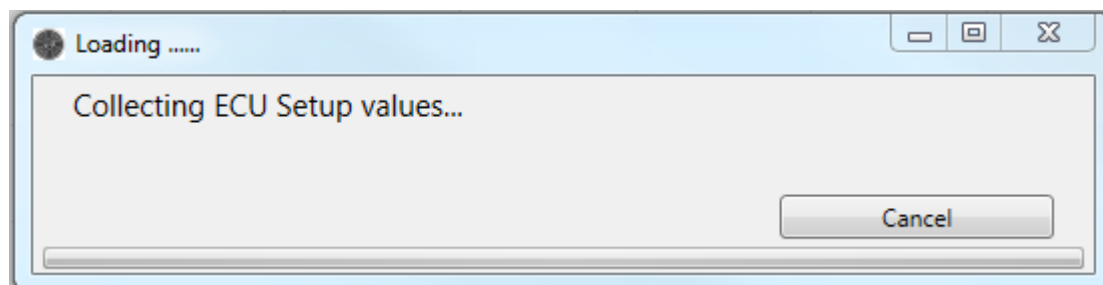
Example Marine:



To store the given values, press the "Save & Close"- Button, a pop up window will advise you to switch the ignition off and on again to store the values.

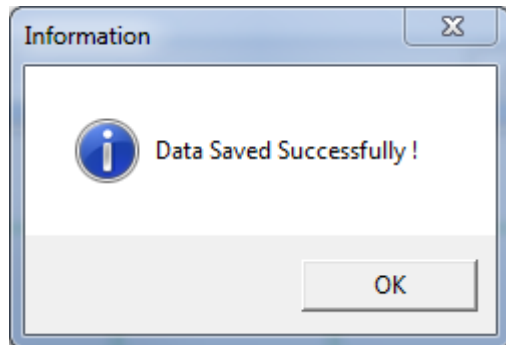


After pressing the "OK" button the EDT collects the ECU Setup values.



If the collected ECU setup data is equal with the previous written one, a pop up will show that the data was saved successfully.





To restore the default configuration, press “Restore factory default”.

## ECU Setup HYBRID

ECU Setup is used for the hybrid clutch and cooling vent mode:

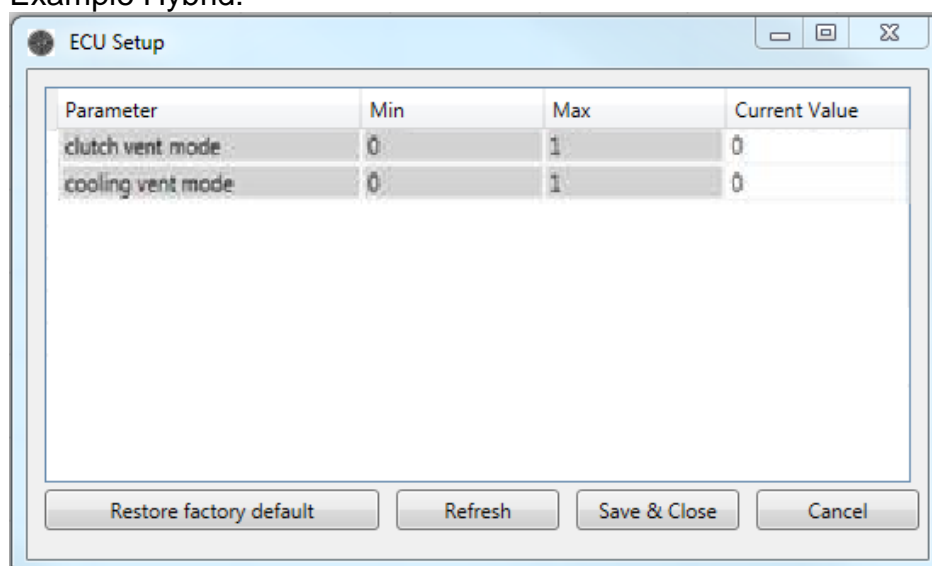
### Clutch vent mode

- current value = 0 → Hybrid hydraulic pump deactivated
- current value= 1 → Hybrid hydraulic pump activated  
(necessary to prime Hybrid Stage II hydraulic system; refer to Hybrid Stage II Modification Manual 701778/ chapter 5.Start Up &Adjustments)

### Cooling vent mode

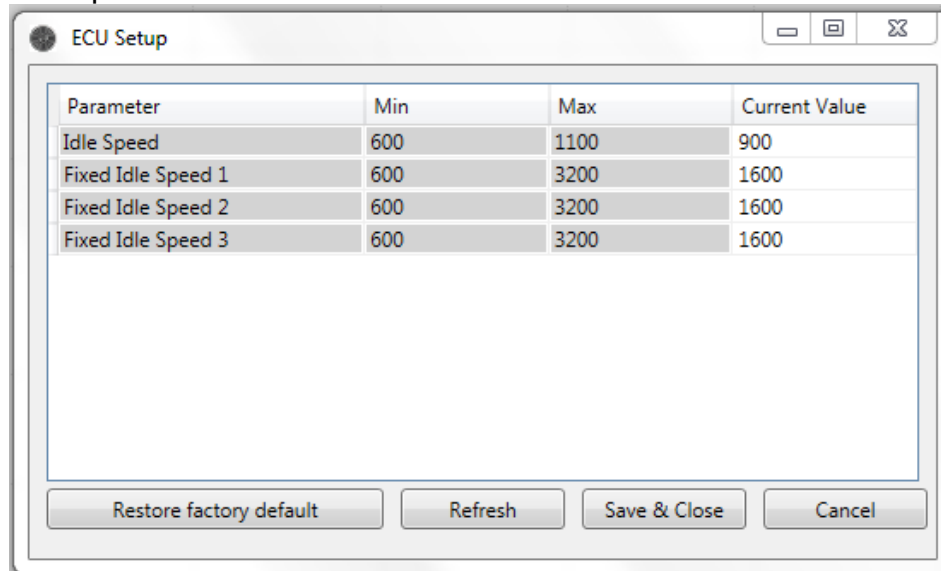
- current value = 0 → Hybrid cooling pump(s) deactivated
- current value = 1 → Hybrid cooling pump(s) activated  
(necessary to prime Hybrid stage II Cooling System; refer to Hybrid Stage II Modification Manual 701778/ chapter 5.Start Up &Adjustments)

Example Hybrid:



## ECU Setup Vehicle

Example Vehicle:



## Engine Power tune calibration

This feature is not activated yet (for future use).

## ECU Report

The ECU Report reads out stored values such as Common Data, Misuse Data, Marine Duty Rating and Load Profile.

The transfer of the ECU report data takes several seconds.

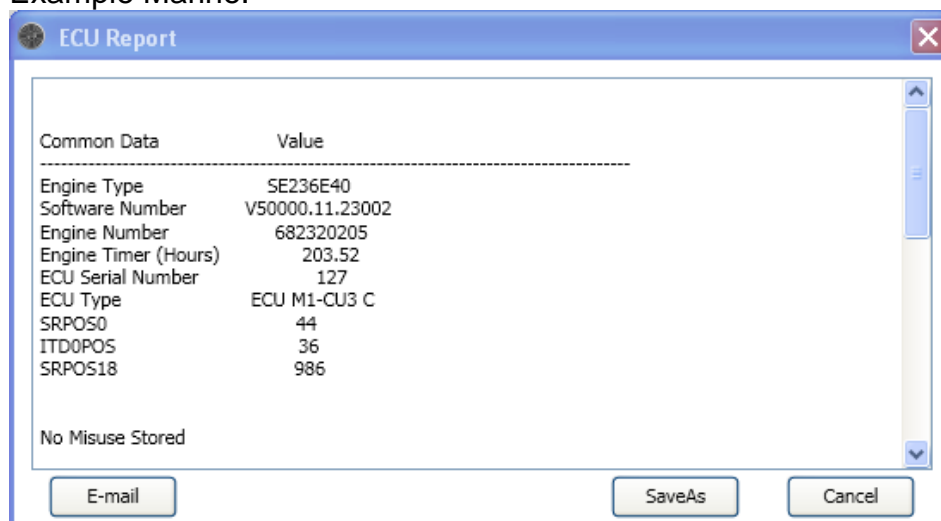
**Note:**

To generate the ECU Report for Marine engines min. Software Version V50000.11 is required.

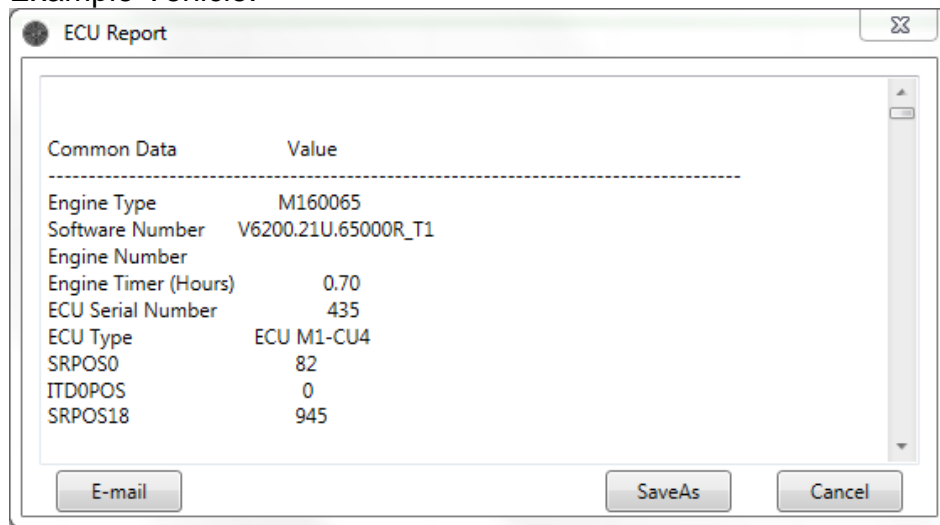
To open the ECU Report Window click Application Menu → ECU Report

- The first section of the ECU Report shows the Common Data of the engine, which contains the same information as the Engine Information Screen, see Engine Information Screen.

Example Marine:



Example Vehicle:



The second section of the ECU Report shows the stored Error Codes (only L2) and/or Misuse Code

LPS Misuse:

-----	
Version	1
Misuse Code	202
Engine Timer	0.13 hrs
Software Version	V50000.11.26002
Engine Speed	2296 rpm
Desired Manifold Air Pressure	0 mBar
Manifold Air Pressure	980 mBar
Bit field for beta limitation	76
Manifold Exhaust Gas Temperature	334 °C
Fuel Density	825.00 kg/m3
Desired Rack Position	2.10 mm
Rack Position	2.10 mm
Lubricant Pressure	1.44 bar
Engine Coolant Temperature	-17 °C
Air Charge Temperature	-20 °C
Exhaust Temperature	-17 °C
Accelerator pedal	0 CMD
Corrected fuel quantity after density compensation	0 mm3
Maximum amount of fuel to be injected	0 mm3
Fuel pressure	4.75 bar
Switched Battery Voltage	11.88 V
Commanded ITD Position	0.75 deg
ITD Position	1.19 deg
Desired VTG Turbocharger Position	0 %
VTG Turbocharger Position	0 %
Misuse Counter	1

The following misuse codes can be recorded:

Note!

Not every Misuse Code is relevant for the different engines. Only the relevant codes are reported.

Number	Misuse Code	Description
201	ECT (Engine Coolant Temperature)	The Misuse Code gets stored if the temperature is too high or too low
202	LPS (Lubricant Pressure)	The Misuse Code gets stored if the pressure is too low
203	OverSpeed	The Misuse Code gets stored if the speed crosses a certain value
204	WAR (Option)	Only if kit Override (WAR) is in use
205	ACT (Air Charge Temperature)	The Misuse Code gets stored if the temperature is too high
206	EXT (Exhaust Gas Temperature)	The Misuse Code gets stored if the temperature is too high
207	FSP (Fuel Supply Pressure)	The Misuse Code gets stored if the pressure is too low

- Only Errors Level 2 are shown at the end of the ecu-report-document.
- Errors Level 2 are also shown on the Freeze Frame screen (refer to chapter Freeze Frame).

Freeze Fame for DCT "8744" (0x2228)

Description	Value
Calculated Engine Load	0 %
Engine Coolant Temperature	-17 °C
Manifold Air Pressure	0 mBar
Engine Speed	2202 rpm
Vehicle Speed	0 km/h
Air Charge Temperature	-21 °C
Engine Timer	0 hrs
Lubricant Pressure	0.56 bar
Bit field for beta limitation	76
Switched Battery Voltage	11.99 V

- The third section of the ECU Report is only for Marine engines. The report shows the stored Marine Duty Rating Information

Marine Duty Rating

HighOutput Timer	0.00 hrs
Intermittent Timer	0.00 hrs
Pleasure Timer	0.00 hrs
Medium Continuous Timer	0.00 hrs
Time of Duty Rating Measurement	0.33 hrs

For analysing the Marine Duty Rating, take the corresponding Rating Timer (HO, INT, MCD or P) and compare it to the complete “Time of Duty Rating Measurement”.

For detailed Marine Duty Rating specifications, please refer to the STEYR MOTORS Limited Engine Warranty Conditions

- The fourth section of the ECU Report shows the stored Load Profile.

Engine Load Profile						
[%]/[rpm],	0.0-830.0,	830.0-1660.0,	1660.0-2490.0,	2490.0-3320.0,	>3320.0	
0.0- 25.0,	37.38,	0.36,	0.74,	1.26,	1.26	
25.0- 50.0,	3.41,	2.40,	4.17,	7.90,	2.53	
50.0- 75.0,	2.43,	11.44,	23.34,	39.68,	5.60	
75.0-100.0,	16.22,	213.60,	155.62,	264.55,	33.74	
> 100.0,	9.73,	46.71,	190.55,	10.12,	5.60	

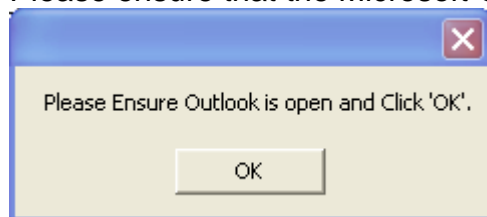
To store the complete ECU Report, press the “SaveAs”- Button, a pop up window will show, where the Report will be stored



The stored File (.txt) can be opened with any Text Editor, but to have a clearly represented Report, the program Microsoft WordPad is preferred.

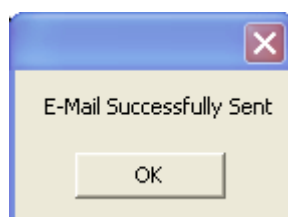
If you click on the Button “E-mail”, the ECU Report will be sent automatically to STEYR MOTORS

Please ensure that the Microsoft Outlook is open and confirm the following message:



Further, ensure connection to the Internet.

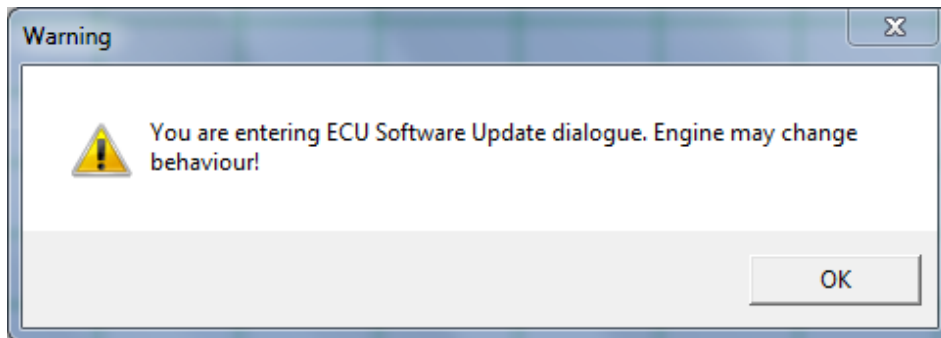
If the ECU Report was sent successfully, the following message appears:



## Virgin ECU Software Update

To flash a virgin / brand new ECU start EDT and click “ECU Software Update”.

A warning message appears and gives you a warning.



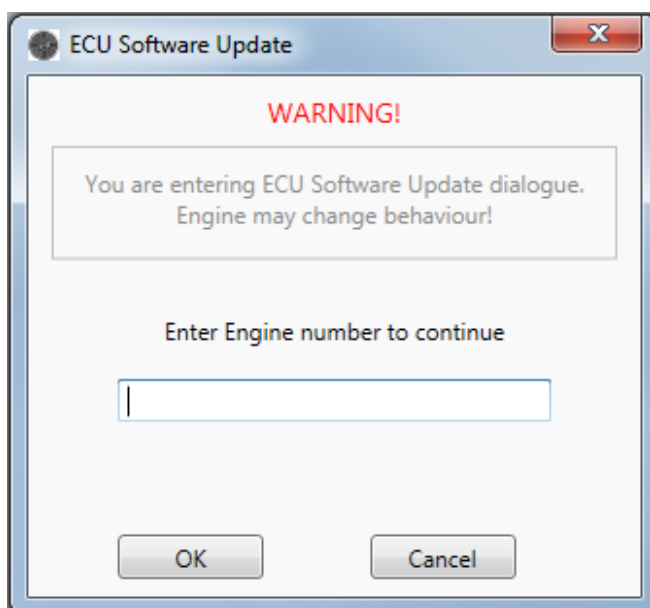
Then follow the instructions of the ECU Software Update

## ECU Software Update

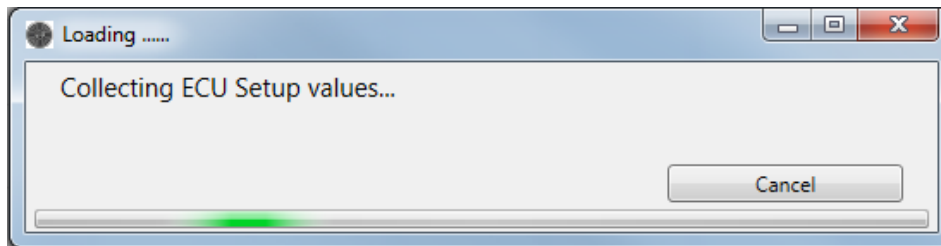
ECU Software Update helps to update the software on the ECU.

To open Software Update window click Application Menu → ECU Software Update.

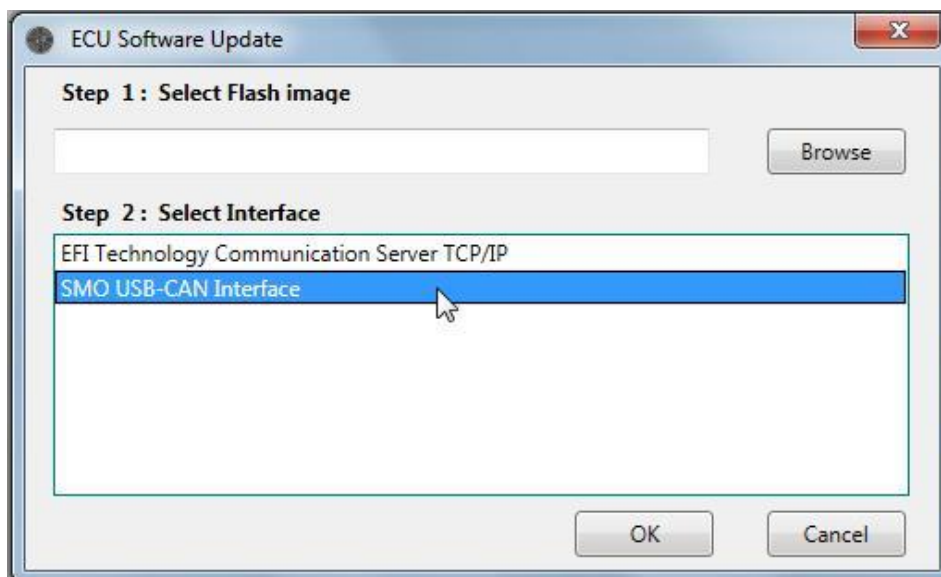
The Engine number is entered for validation. Press “OK” button after entering the current engine number.



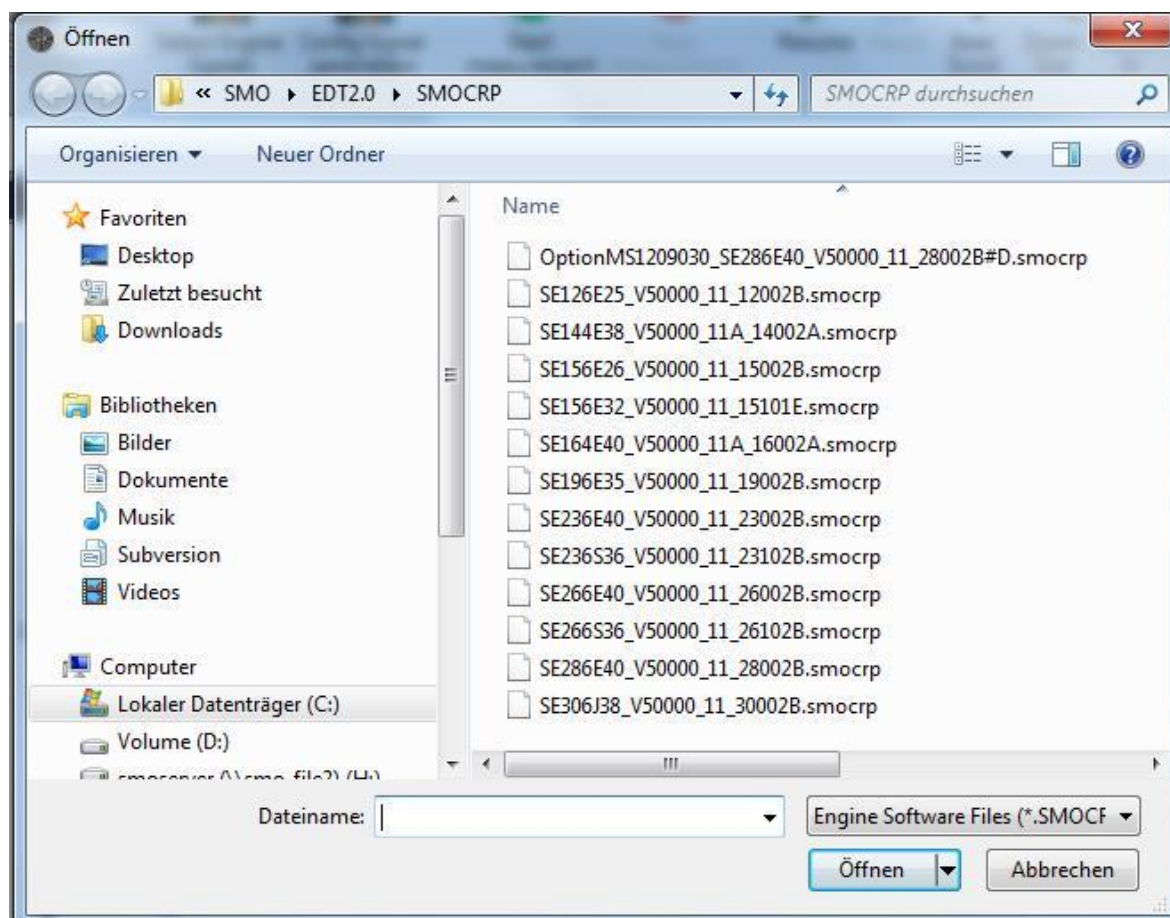
The ECU is collection the ECU setup values then.



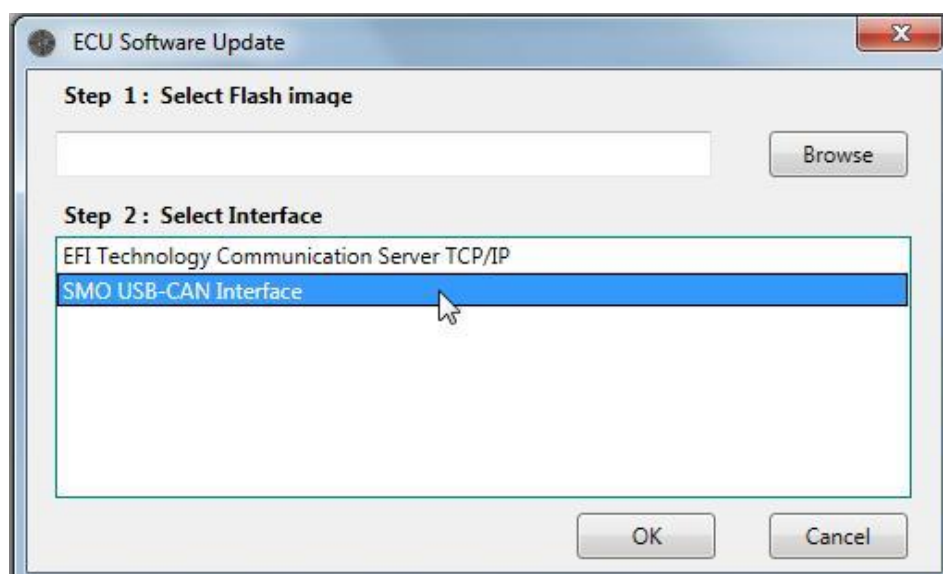
After collection is done, select the ECU software file using the Browse button.



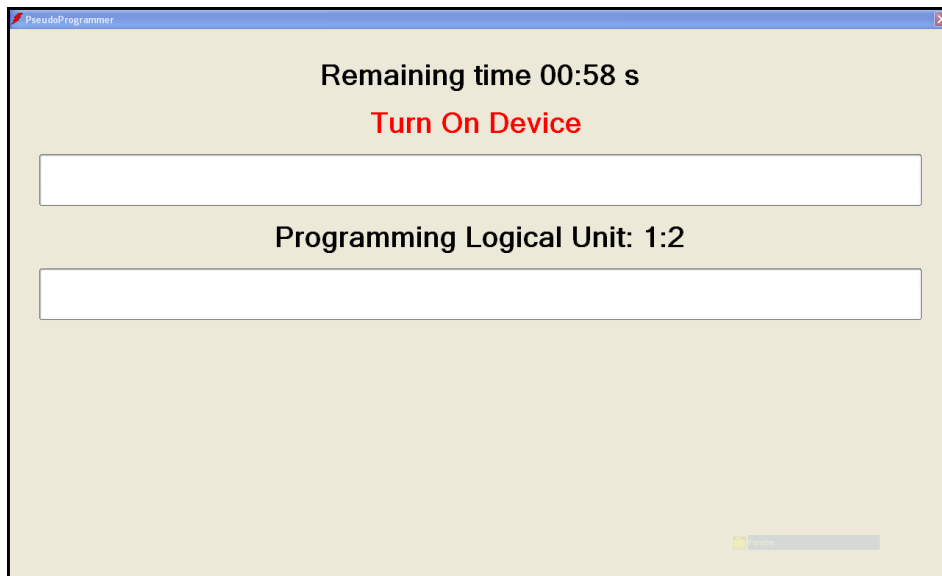
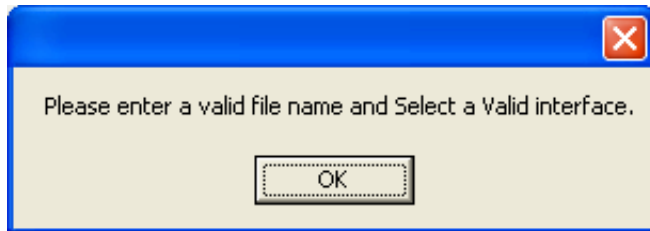




Select the interface to be used to program the ECU from the list displayed.

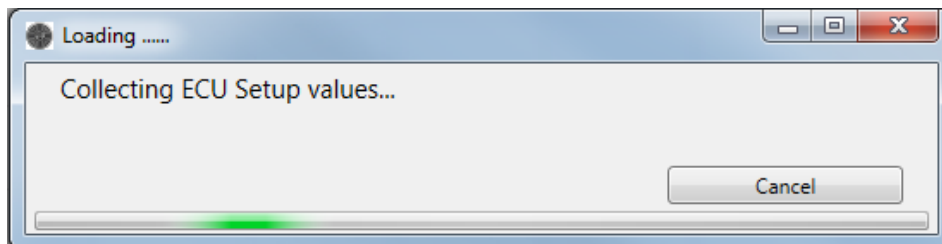


Press Ok. After selection of a valid Flash image file and an interface.  
If a valid file or interface is not selected the below message is shown. Press Ok and try again.

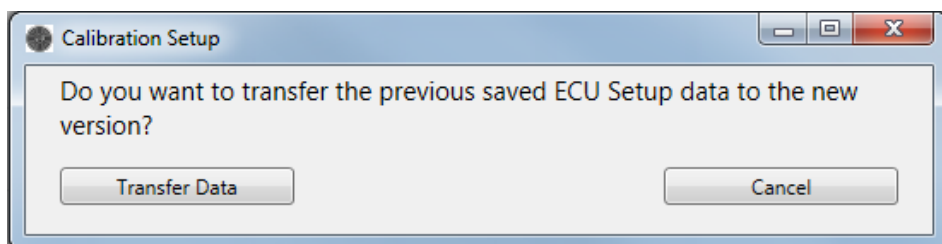


Turn Ignition Off and On again for starting the update.

When the flash setup was done the EDT loads all ECU Setup data.

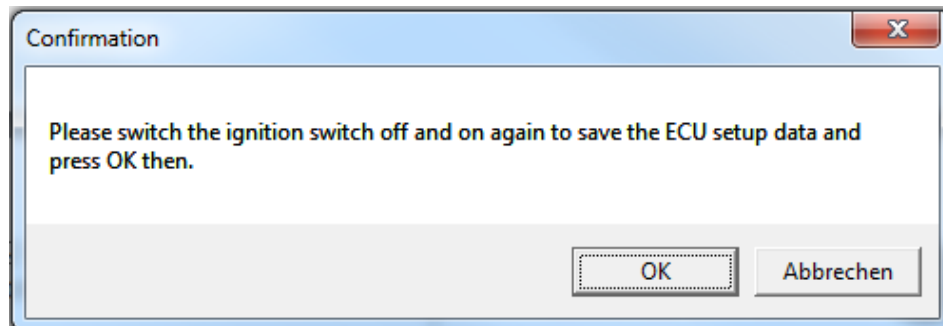


When the collection is finished the EDT asks whether to transfer the ECU setup data from previous version to current ECU software version. Press "Transfer Data" then.

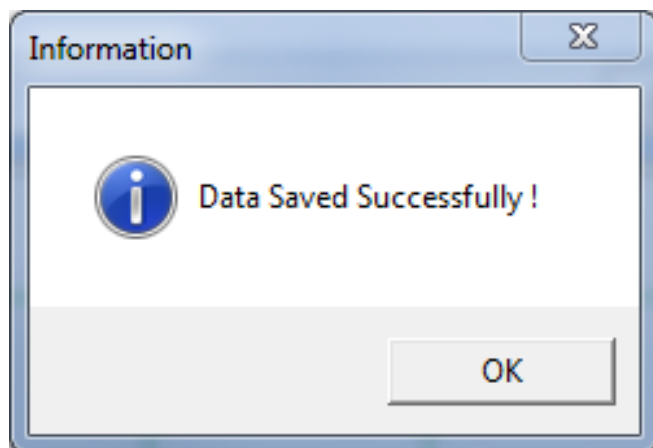


The EDT transfers the data then.

When transferring is done the EDT advises you to turn the ignition off and on again to save the data.



If the collected ECU setup data is equal with the previous written one, a pop up will show that the data was saved successfully.



## Import Engine Descriptor File

To use other available files on your Computer (sent by mail), you can use the import function to import a file to the SMO program folder. Press the "Import Engine Descriptor File" menu item and choose a valid SMOEDF file.

After the successful import, you will find this file in the SMO program folder.

If the import was not successful, this file is already in the folder.

## **Import Engine Binary File (Engine Software)**

To use other available files on your Computer (sent by mail), you can use the import function to import a file to the SMO program folder. Press the “Import Engine Binary File” menu item and choose a valid SMOCRPF file (for M1 - CU3) or SMOHDP (for M1 - CU4) file.

After the successful import, you will find this file in the SMO program folder.

If the import was not successful, this file is already in the folder.

## **Exit**

Exits the EDT 2.0 application

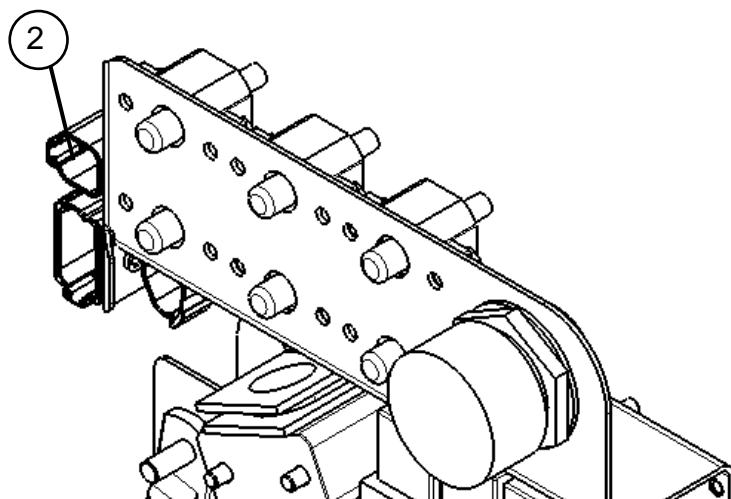
To Exit click Application Menu → Exit.

## Connect

1. Connect the plug (1) from the Diagnostic Tool Set (2201878-0) to the diagnostic plug X2.



For Marine engines connect to plug X2 (2) on the front side of the E-box (see example):



2. USB connection to the PC (yellow)

- Wait, until there is a connection
- USB illuminated yellow
- Driver installed correctly



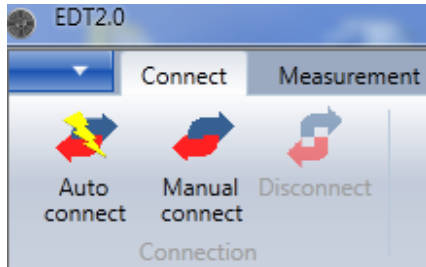
3. No USB-Driver installed (green and red)

- Wait, until there is a connection
- TX and RX illuminated green and red
- Driver installed not correctly
- Reinstall the driver manually (on the current USB-Port)



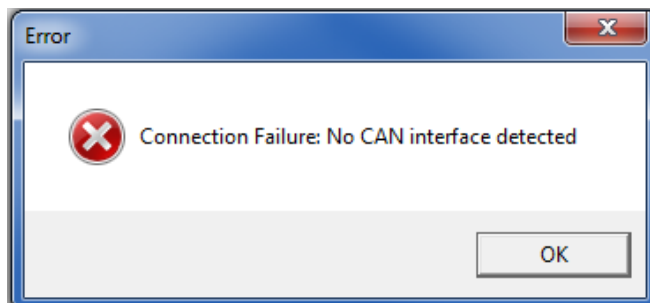
4. Turn ignition on
5. Connect (see Page 31)

## Auto Connect

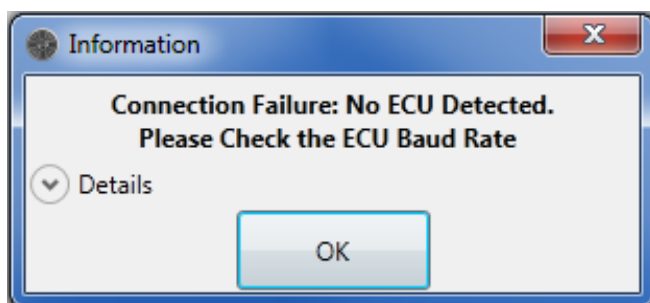


Connects to ECU automatically. Go to Connection Menu → Auto Connect.

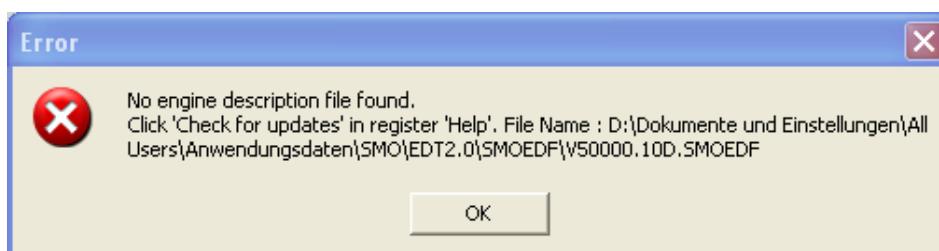
If no CAN connection displays an error message – Connection Failure: No CAN interface detected



CAN is connected, but ECU is not connected or no Power supply to ECU displays an error message – “Connected Failure: No ECU Detected”



CAN is connected, but Engine Descriptor File (SMOEDF) is missing.  
Refer to “Check for Engine Descriptor Updates” (see [Check for Engine Descriptor Updates](#))



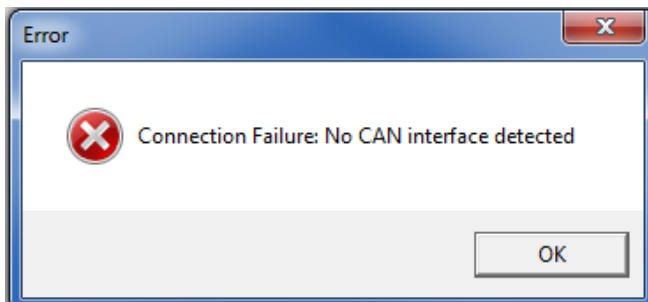
## Manual Connect

Go to Connection Menu → Manual Connect.

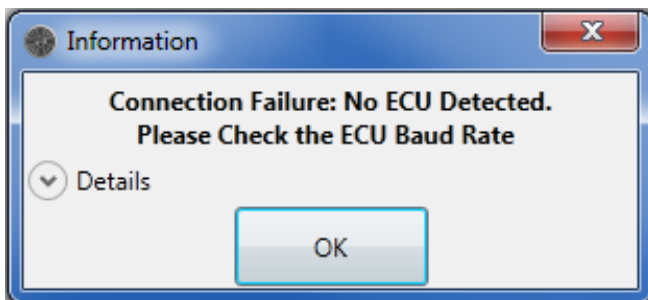
Display Open window and Prompt to select file .SMOEDF.

Connects to ECU automatically after selection of the right .SMOEDF-file

If no CAN connection, displays an error message – “Connection Failure: No CAN interface detected”

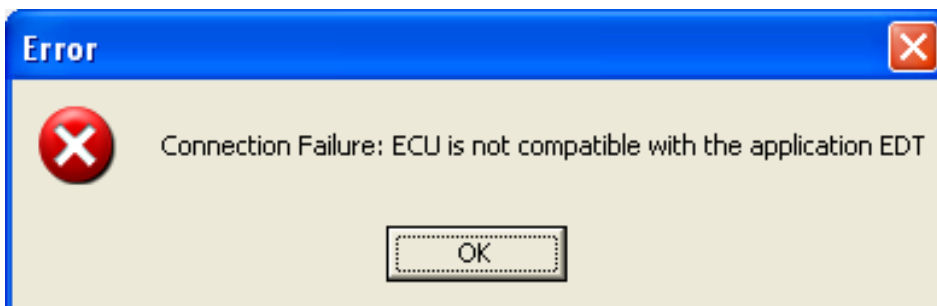


CAN is connected, but ECU is not connected or no Power supply to ECU displays an error message – “Connected Failure: No ECU Detected”



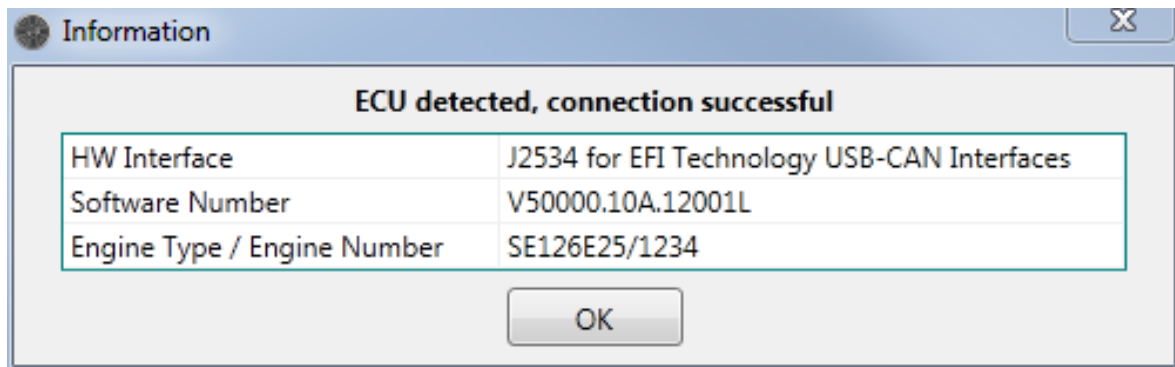
CAN device and ECU connected but ECU is invalid or not responding as expected, displays an error message – “Connection Failure: ECU is not compatible with the application EDT”

Please check that you have loaded the correct SMOEDF-file. Loading an incorrect SMOEDF-file will result false measurement values.



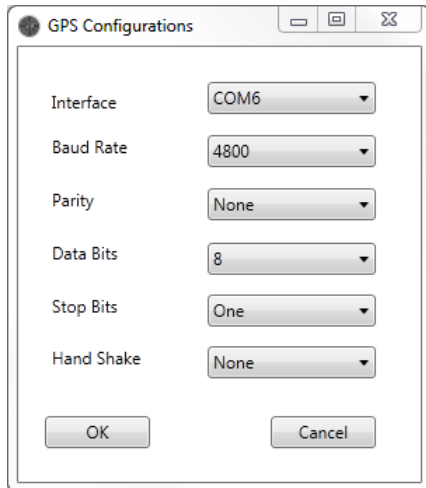
Display message on successful connection to EDT– ECU detected, connection successful



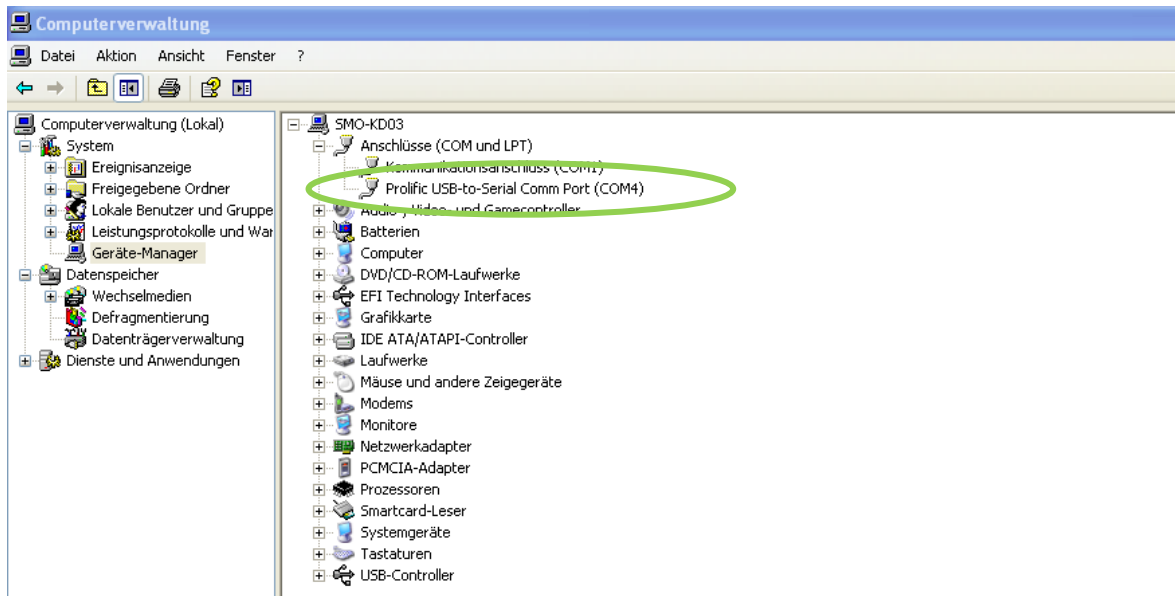


## Manual GPS config

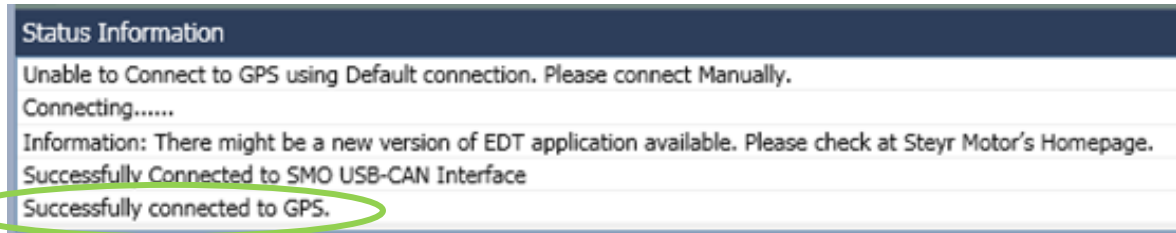
The setting of the GPS-System depends on which GPS-System is in use.  
Use the following configuration for the “SMO velocity transceiver for EDT2.0”  
PNo.: 2181338-0



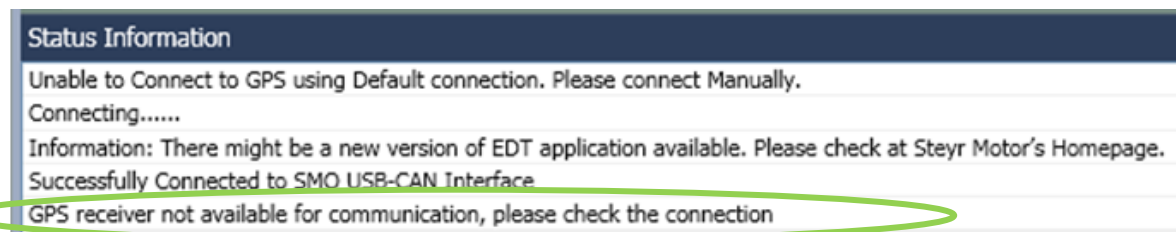
Find the used COM Port in the Device Manager:  
Control Panel → Device Manager



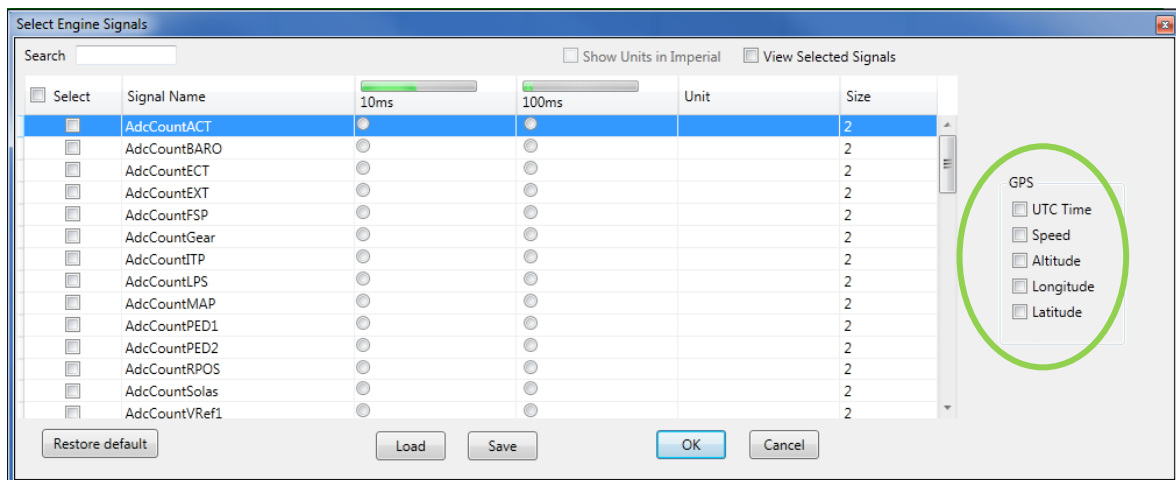
Look if the connection was successful:



If the following message appears, check if any other program is using the GPS Device

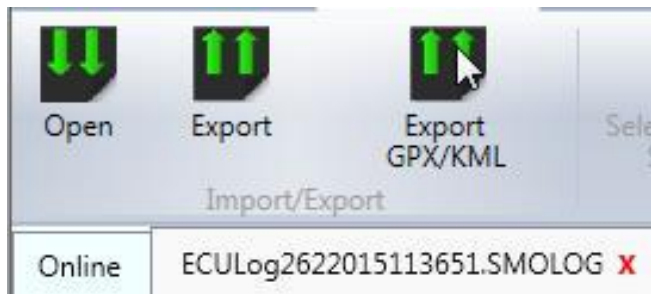


To see the current GPS information you can choose the desired signals in the Select Engine Signals dialog in GPS Section.

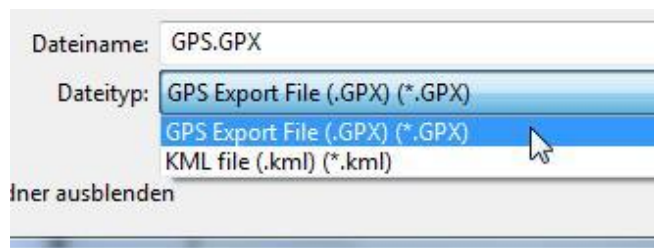


## Export GPS

GPS-Data can be exported by using the “Export GPX/KML” button.



Select either “GPS Export File” or “KML file” to store the GPS data in “.gpx” or “.kml” format.



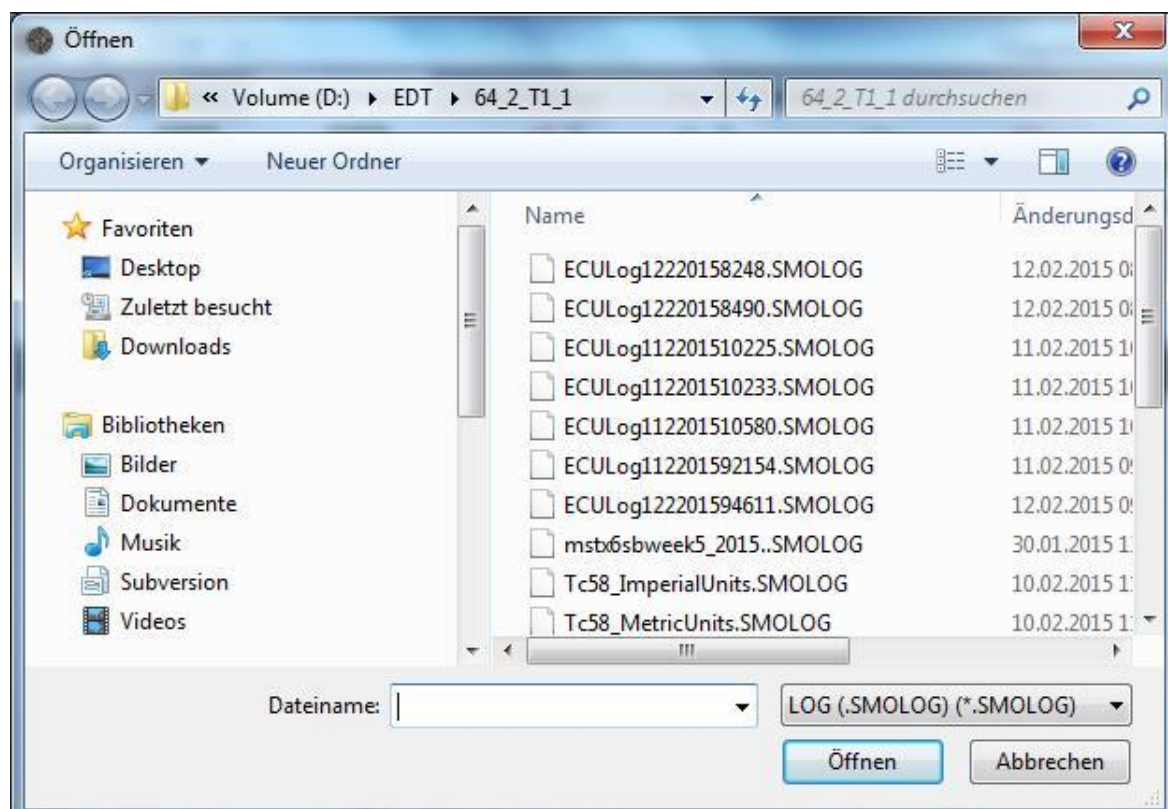
The stored GPX-File can be opened with Microsoft Excel.  
The stored KML-File can be uploaded to e.g. Google Maps for route tracking.

## Open (multiple tabs)

To open and load a stored log file for analysis, follow the steps:

Click Open button - Displays Open window and prompt to select file .SMOLOG

On selection of .SMOLOG file, displays the stored Measurements. Go to Measurement Menu → Open.



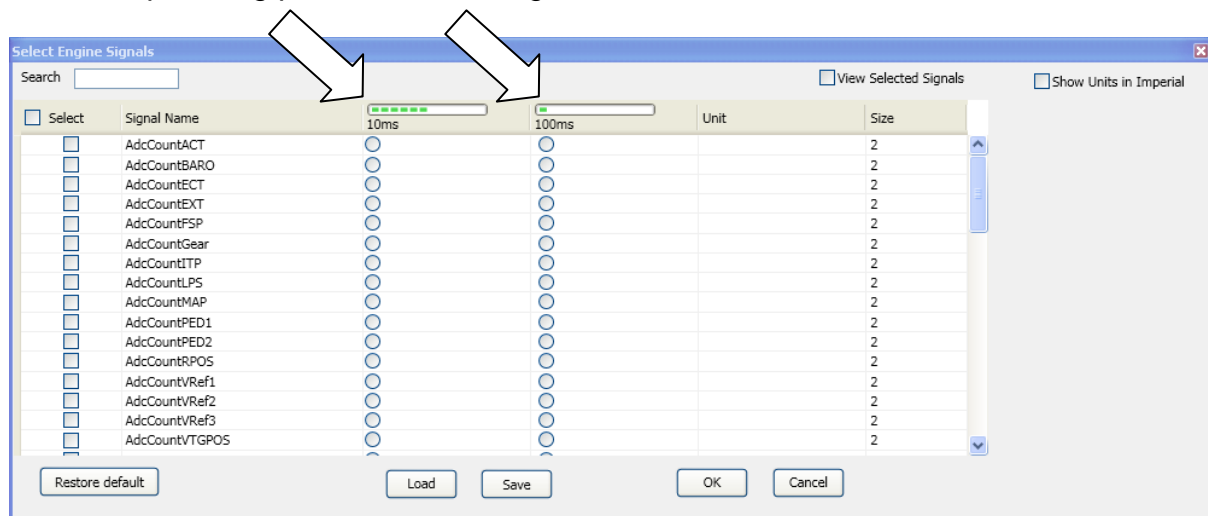
## Select Engine Signals

To open Display Select Engine Signal window click on the “Select Engine Signals” button. Required signals can be selected for measurement. Also the frequency for each signal measurement can also be selected.

Go to Measurement Menu → Select Engine Signals.

You can add additional parameters, which are shown in the Measurement screen.

**Note:** stop adding parameters if the green scale is full.



Restore to the default parameter selection with the “Restore default” button.

Save / Load your own configuration of the selected parameters.

## Measurement signals

Following Measurement Signals are available for diagnostic of **Marine engines**:

Signal Name	Description
ACT	Air Charge Temperature
AdcCountACT	Analog to digital converted counts
AdcCountBARO	Analog to digital converted counts
AdcCountECT	Analog to digital converted counts
AdcCountEXT	Analog to digital converted counts
AdcCountFSP	Analog to digital converted counts
AdcCountGear	Analog to digital converted counts
AdcCountITP	Analog to digital converted counts
AdcCountLPS	Analog to digital converted counts
AdcCountMAP	Analog to digital converted counts
AdcCountPED1	Analog to digital converted counts
AdcCountPED2	Analog to digital converted counts
AdcCountRPOS	Analog to digital converted counts
AdcCountSolas	Analog to digital converted counts
AdcCountVREF	Analog to digital converted counts
AdcCountVRef1	Analog to digital converted counts
AdcCountVRef2	Analog to digital converted counts
AdcCountVRef3	Analog to digital converted counts
AdcCountVTGPOS	Analog to digital converted counts
BARO	Ambient pressure (Barometric)
BETA	Fuel Quantity to be injected
BETA_MCRK	Maximum Fuel Quantity (Beta) during cranking
BETA_MIN	Minimum beta for cold start
BETACAL	Fuel quantity calculated from pedal position (via TBGOVT)
BETACOM	Commanded beta from idle speed governor
BETACORR	Corrected fuel quantity after density compensation
BETAMAX	Maximum quantity of fuel to be injected
BETAQM	Current fuel quantity calculated from engine actual behavior
BLIMDIAG	Bitfield for BETA limitation (details see chapter BLIMIDIAG)
CMD	Accelerator pedal (Command)
CRI	Crank indicator input
CRKT	Crank temperature calculated from ECT and ACT
ECT	Engine Coolant Temperature
ENGMODE	Engine operation mode 1 "Power On" 2 "Crank" 4 "Idle" 16 "Torque Mode Run" 64 "SOLAS"
EXT	Exhaust Temperature (in elbow pipe)
FSP	Fuel Supply Pressure

FUEL_DENS	Fuel Density
FUEL_RATE	Calculated fuel consumption from actual engine behavior
GEAR_INPUT	Gear switch input
GIR	Ground isolation relay output
GLOW_PLUGS	Glow Plug Relay output
HYB_AltCurr	Alternator current when hybrid boost mode is active
ITDCOM	Commanded Injection timing device position
ITDPOS	Injection timing device position
LPS	Lubricant Pressure
LPS_WARN	Low lubricant pressure warning
MAP_u16	Manifold Absolut pressure
N_IDLE	Actual desired speed in idle mode
NFIX_RPM	actual desired fixed idle speed
NIDLETUNE	Idle speed tuning value, set by EDT2.0
RPCOM	Commanded Rack position
RPM_N	Filtered Engine Speed (standard)
RPM_X	Slightly Filtered Engine Speed
RPOS	Current rack position
START_ENABLE	Starter enable control
TRIP_FUEL	Calculated fuel consumption from Ignition ON to OFF
TS_time_ms	Global millisecond counter for time measurement
VPWR	Input Voltage ECU
VREF1	Sensor reference voltage 1
VREF2	Sensor reference voltage 2
VREF3	Sensor reference voltage 3
VTG_POS	Position VTG

Following Measurement Signals are available for diagnostic of **Hybrid Clutch Control Unit (HCCU)**:

Signal	Device	Description
CC_OUT_b	Clutch Close Relays	Shows the output of the clutch close relays
CO_OUT_b	Clutch Open Relays	Shows the output of the clutch open relays
CPR_b	Cooling Pump Relays	Shows the output of the cooling pump relays
CPS_u16	Clutch Pressure Sensor	Pressure of the hydraulic of the clutch
EC_b	Mode Change Button	button to switch to the electrical mode
HCU_PWR_b	HCU Power Relays	Shows the output of the HCU power relays
HPV_b	Hydraulic Valve	Shows the output of the hydraulic valve relays
HYD_PUMP_b	Hydraulic Pump Output	Shows if the hydraulic pump should be running or not
OVP_b	Over-Voltage-Protection	If the batteries are fully charged the input



		is set (only used in the Mastervolt System)
SLR_b	Startlock Relays	Shows the output of the startlock relays
UVP_b	Under-Voltage-Protection	If the batteries have a to low charging state the input is set (only used in the Mastervolt System)
VREF1	Reference Voltage 1	Sensor reference voltage 1
VREF2	Reference Voltage 2	Sensor reference voltage 2
VREF3	Reference Voltage 3	Sensor reference voltage 3

Following Measurement Signals are available for diagnostic of **vehicles**:

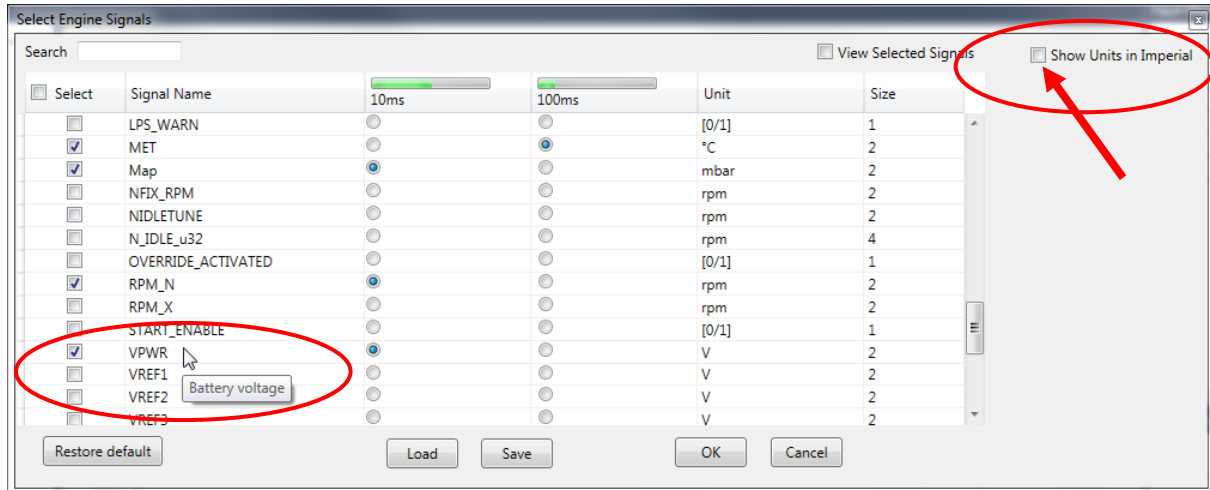
Signal	Description
ACT	Air charge temperature
AdcCount_12VOUT	Analog to digital converted counts 12VOUT
AdcCount_24VOUT	Analog to digital converted counts of input 24VOUT
AdcCount_24VRACK	Analog to digital converted counts of input 24VRACK
AdcCount_CUR12VDCDC	Analog to digital converted counts of input CUR12VDCDC
AdcCount_CUR12VOUT	Analog to digital converted counts of input CUR12VOUT
AdcCount_CUR24VOUT	Analog to digital converted counts of input CUR24VOUT
AdcCount_CUR24VRACK	Analog to digital converted counts of input CUR24VRACK
AdcCount_CUROUTH1	Analog to digital converted counts of input current of OUT_H1
AdcCount_CUROUTH2	Analog to digital converted counts of input current of OUT_H2
AdcCount_CUROUTH3	Analog to digital converted counts of input current of OUT_H3
AdcCount_CURPT1000	Analog to digital converted counts of input CURPT1000
AdcCount_CURPT200	Analog to digital converted counts of input CURPT200
AdcCount_CURRACK	Analog to digital converted counts of input current of RACK
AdcCount_I24V	Analog to digital converted counts of input I24V
AdcCount_IGNSW	Analog to digital converted counts of input IGNSW
AdcCount_IOOUT12	Analog to digital converted counts of input IOOUT12
AdcCount_IOOUT34	Analog to digital converted counts of input IOOUT34
AdcCount_IOOUT56	Analog to digital converted counts of input IOOUT56
AdcCount_IOOUT78	Analog to digital converted counts of input IOOUT78
AdcCount_LNR10	Analog to digital converted counts of input LNR10
AdcCount_LNR11	Analog to digital converted counts of input LNR11
AdcCount_LNR12	Analog to digital converted counts of input LNR12
AdcCount_LNR13	Analog to digital converted counts of input LNR13

AdcCount_LNR14	Analog to digital converted counts of input LNR14
AdcCount_LNR15	Analog to digital converted counts of input LNR15
AdcCount_LNR16	Analog to digital converted counts of input LNR16
AdcCount_LNR2	Analog to digital converted counts of input LNR2
AdcCount_LNR3	Analog to digital converted counts of input LNR3
AdcCount_LNR4	Analog to digital converted counts of input LNR4
AdcCount_LNR5	Analog to digital converted counts of input LNR5
AdcCount_LNR6	Analog to digital converted counts of input LNR6
AdcCount_LNR7	Analog to digital converted counts of input LNR7
AdcCount_LNR8	Analog to digital converted counts of input LNR8
AdcCount_LNR9	Analog to digital converted counts of input LNR9
AdcCount_MAP	Analog to digital converted counts of input MAP
AdcCount_PPS1	Analog to digital converted counts of input PPS1
AdcCount_PPS2	Analog to digital converted counts of input PPS2
AdcCount_RPOS	Analog to digital converted counts of input Rack Pos
AdcCount_RPOS	Analog to digital converted counts of input RPOS
AdcCount_TMP1	Analog to digital converted counts of input TMP1
AdcCount_TMP2	Analog to digital converted counts of input TMP2
AdcCount_TMP3	Analog to digital converted counts of input TMP3
AdcCount_TMP4	Analog to digital converted counts of input TMP4
AdcCount_TMP5	Analog to digital converted counts of input TMP5
AdcCount_TMP6	Analog to digital converted counts of input TMP6
AdcCount_TMP7	Analog to digital converted counts of input TMP7
AdcCount_TMP8	Analog to digital converted counts of input TMP8
AdcCount_TMP9	Analog to digital converted counts of input TMP9
AdcCount_TPCB1	Analog to digital converted counts of input TPCB1
AdcCount_TPCB2	Analog to digital converted counts of input TPCB2
AdcCount_VBATT	Analog to digital converted counts of input VBATT
AdcCount_VBINT	Analog to digital converted counts of input VBINT
AdcCount_VGATEINVPOL	Analog to digital converted counts of VGATEINVPOL
AdcCount_VREF1	Analog to digital converted counts of input VREF1
AdcCount_VREF2	Analog to digital converted counts of input VREF2
AdcCount_VREF3	Analog to digital converted counts of input VREF3
AdcCount_VREFCRANK	Analog to digital converted counts of input VREFCRANK
AdcCount_VREFPPS1	Analog to digital converted counts of input VREFPPS1
AdcCount_VREFPPS2	Analog to digital converted counts of input VREFPPS2
BETA	Fuel Quantity to be injected
BETA_MCRK	Maximum Fuel Quantity (Beta) during cranking
BETA_RED	Reduced fuel injection amount after torque calculation
BETACAL	Fuel injection amount calculated from pedal position (via TBGOVT)
BETACOM	Commanded fuel injection amount from idle speed governor

BETACORR	Corrected fuel quantity after fuel density compensation
BETAMAX	Maximum allowed amount of fuel to be injected
BETAMIN	Minimum fuel injection amount for cold start
BETAQM	Current fuel quantity calculated from engine actual behavior
BLIMDIAG	Bitfield for for Beta limitation (details see chapter BLIMIDIAG)
BLIMDIAG2	Bit field 2 for beta limitation
BPC_CtrlMode	Actual Boost Pressure Control mode
BPC_MODE2_DC	Dutycycle for BP control mode 2
BPSetValBase	Desired boost Pressure out of TBBPCSET/TBBPCSET_HALT interpolation
CMD Accelerator pedal position	Accelerator pedal (Command)
CRI	Crank indicator input
CRKT	Crank temperature calculated from ECT and ACT
CurrGear	Current gear position, received from transmission control unit
ECT	Engine coolant temperature
ENGMODE	Engine operation mode
FMS_DC	FMS duty cycle
FMSActualCurrent	avg measured RACK current
FMSDesiredCurrent	output of FMS controller [A]
FSP	Fuel supply pressure
FUEL_RATE	Calculated fuel consumption from actual engine behavior
FUELPUMP	State of fuel pump
FUELTEMP	Fuel Temperature
FUELTEMP_CAN	Fuel Temperature received via CAN (ET1) from FSP2800 Sensor
GLOW_PLUGS	Glow plug relay output
GOT	Gearbox Oil Temperature
GPL	bit for the glow plug LAMP
GRIDHEAT	State of Gridheater
ISC_feed	Feed forward value for engine speed governor
ISC_pid_dPart	d part of engine speed governor
ISC_pid_iPart	i part of engine speed governor
ISC_pid_pPart	p part of engine speed governor
ITD_DC	ITD duty cycle
ITDActualCurrent	avg measured ITD current
ITDCOM	Commanded Injection timing device position
ITDDesiredCurrent	Commanded current (=sum PID-control + offset ITD_ipre)
ITDPOS	Injection timing device position
LOP	LOP (Low Oil Pressure) output

LPS	Lubricant Pressure
LPS_WARN	Low lubricant pressure warning
MAP_u16	Manifold absolute pressure
MAPCOM	Boost Pressure Control set value
MD_CS	Crankshaft torque: MD_IND - MD_FRIC
MD_CSGEARBOX	Crankshaft torque gearbox: MD_IND - MD_PAR_TOT
MD_DEFAULT_LIMIT	Default transmission torque limitation received from message TCFG2
MD_DRVDEM	Drivers demand torque
MD_ENGDEM	Engine demand torque (minimum from idle speed governor or driver demand after vehicle speed limiter)
MD_FRIC	Internal friction losses depending on ECT and RPM
MD_IND	Current desired torque
MD_LIM_ACTIVE_GEARBOX	Activation bit for gearbox limitations which are not because of TSC1 (default torque lim., NAG1 gearbox lim...)
MD_MAX	Current maximum torque
MD_PAR	Parasitic losses from FEAD
MD_PAR_TOT	Sum of friction torque and parasitic losses (MD_FRIC + MD_PAR)
MD_REF	Engine reference torque
MD_STA	Current torque output
N_IDLE	Actual desired speed in idle mode
NFIX_RPM	Actual desired fixed idle speed
NIDLETUNE	Idle speed tuning value, set by EDT2.0
P20St1	Absolute air pressure after first turbocharger
PBARO	Ambient air pressure
RPCOM	Commanded rack position
RPM_N	Filtered engine speed
RPM_X	Slightly filtered engine speed
RPOS	Current rack position
STARTER_ENABLE	serial out for starter enable control
STARTLOCK	The Start Lock bit avoid the start of the Engine, start is locked via software and start lock relais
T2	Temperature before the intercooler (T2)
T30	Exhaust gas temperature before the turbine of turbocharger (T30)
TISI_ECUSTART	Time since ECU start
TISI_ENGSTART	Time since ENGINE start
TLIMDIAG	Bit field for torque limitation indication
TS_time_ms	Global millisecond counter for time measurement
VPWR Battery voltage	Input Voltage ECU
VREF1	Sensor reference voltage 1
VREF2	Sensor reference voltage 2
VREF3	Sensor reference voltage 3
WAR	Override active flag

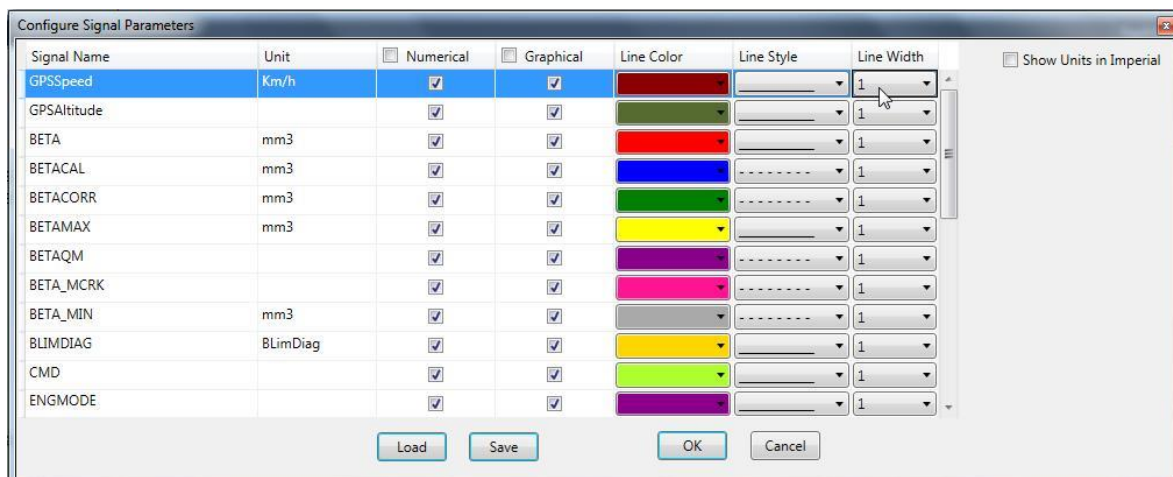
A tooltip appears when you drop the mouse to a signal. It will show you a description of the selected signal.



Select the check box “Show Units in Imperial” (see arrow) to switch from Metric to Imperial Units.

## Config Signal Parameters

To open Display Select Engine Signal window click on the “Configure Signal parameters” button. The display properties of each of the signal selected can be set. Go to Measurement Menu → Configure Signal Parameters.



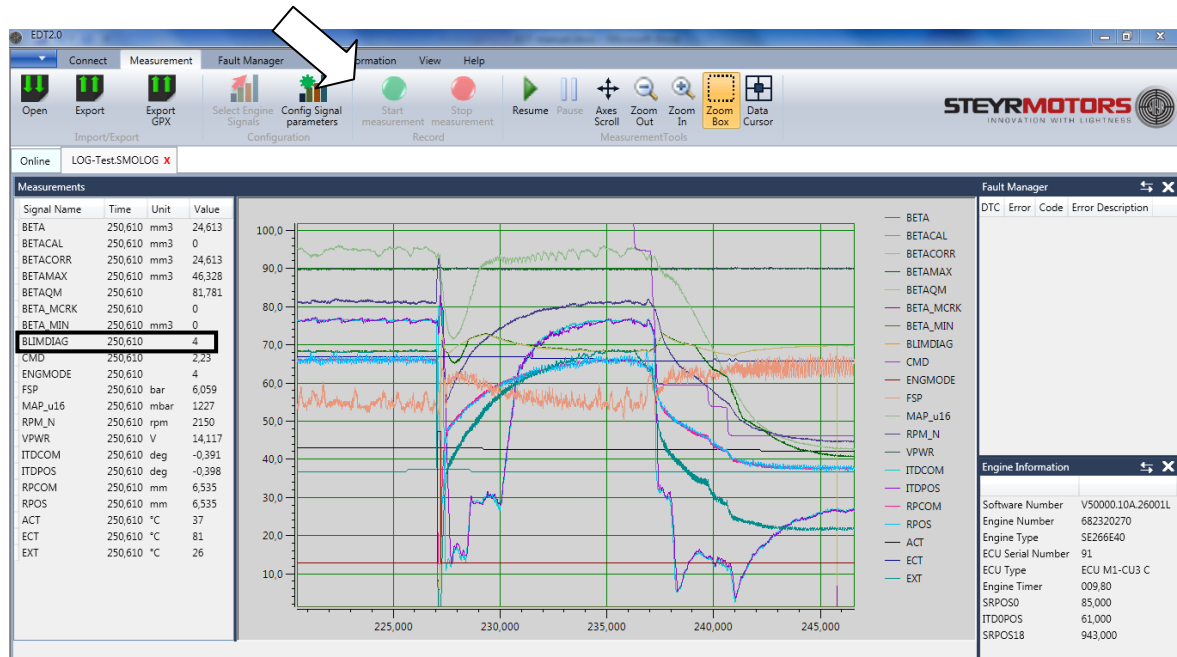
Numerical: is shown in “Measurement Screen (Numeric)” → only numbers  
Graphical: is shown in “Measurement Screen (Graph)”

Select the check box “Show Units in Imperial” to switch from Metric to Imperial Units.

## Start Measurement (Shortcut F9)

Measurement can be started by clicking on the “Start Measurement” button. The Measurement is started and the selected signals are shown in the Measurement window as per configuration.

Go to Measurement Menu → Start Measurement.



The screenshot shows the EDT 2.0 software interface. The 'Measurement' menu is highlighted, and the 'Start measurement' button is indicated by a white arrow. The main window displays a graph of various engine signals over time. The 'Measurements' table on the left lists the following data:

Signal Name	Time	Unit	Value
BETA	250,610	mm3	24,613
BETACAL	250,610	mm3	0
BETACORR	250,610	mm3	24,613
BETAMAX	250,610	mm3	46,328
BETAQM	250,610		81,781
BETA_MCRK	250,610		0
BETA_MIN	250,610	mm3	0
BLIMDIAG	250,610		4
CMD	250,610		2,23
ENGMODE	250,610		4
FSP	250,610	bar	6,059
MAP_u16	250,610	mbar	1227
RPM_N	250,610	rpm	2150
VPWR	250,610	V	14,117
ITDCOM	250,610	deg	-0,391
ITDPOS	250,610	deg	-0,398
RPCOM	250,610	mm	6,535
RPOS	250,610	mm	6,535
ACT	250,610	°C	37
ECT	250,610	°C	81
EXT	250,610	°C	26

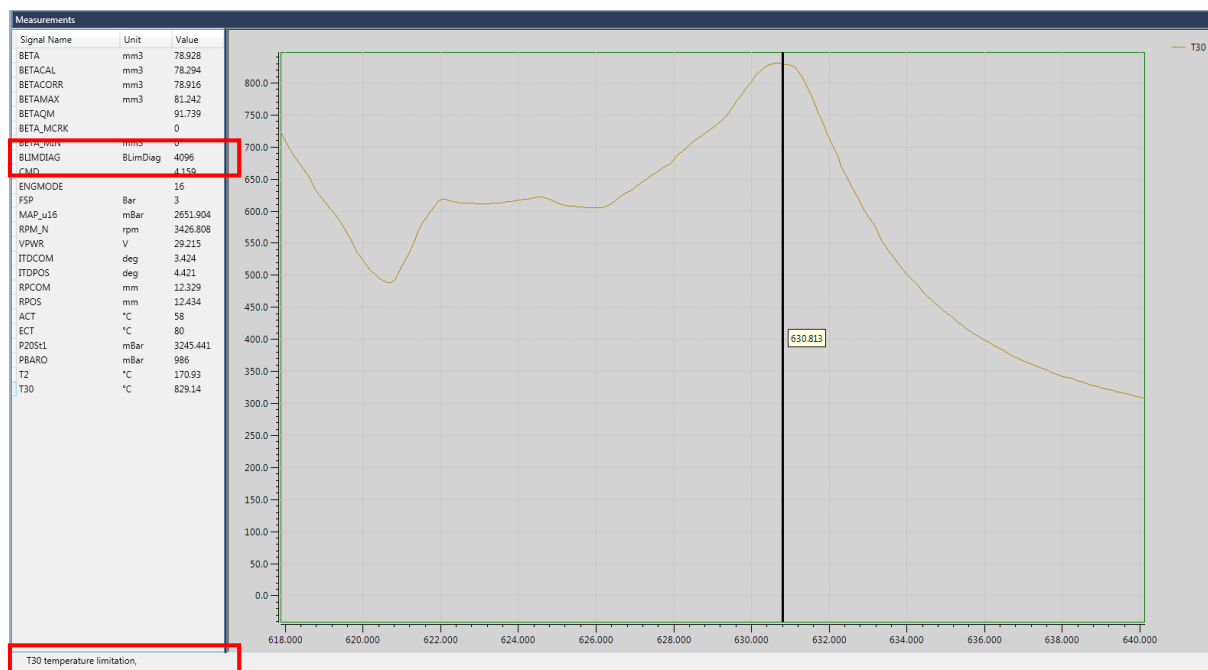
The graph shows multiple signals plotted against time (from 225,000 to 245,000). The signals include BETA, BETACAL, BETACORR, BETAMAX, BETAQM, BETA\_MCRK, BETA\_MIN, BLIMDIAG, CMD, ENGMODE, FSP, MAP\_u16, RPM\_N, VPWR, ITDCOM, ITDPOS, RPCOM, RPOS, ACT, ECT, and EXT. The 'Fault Manager' window on the right shows no DTCs, and the 'Engine Information' window displays details such as Software Number (V50000.10A.26001L), Engine Number (682320270), and ECU Type (ECU M1-CU3 C).

## BILMDIAG

The BLIMDIAG object is built by bits called “BLD\*”, an information, to catch the error causing circumstances (tables, function) to fix it.

### Example:

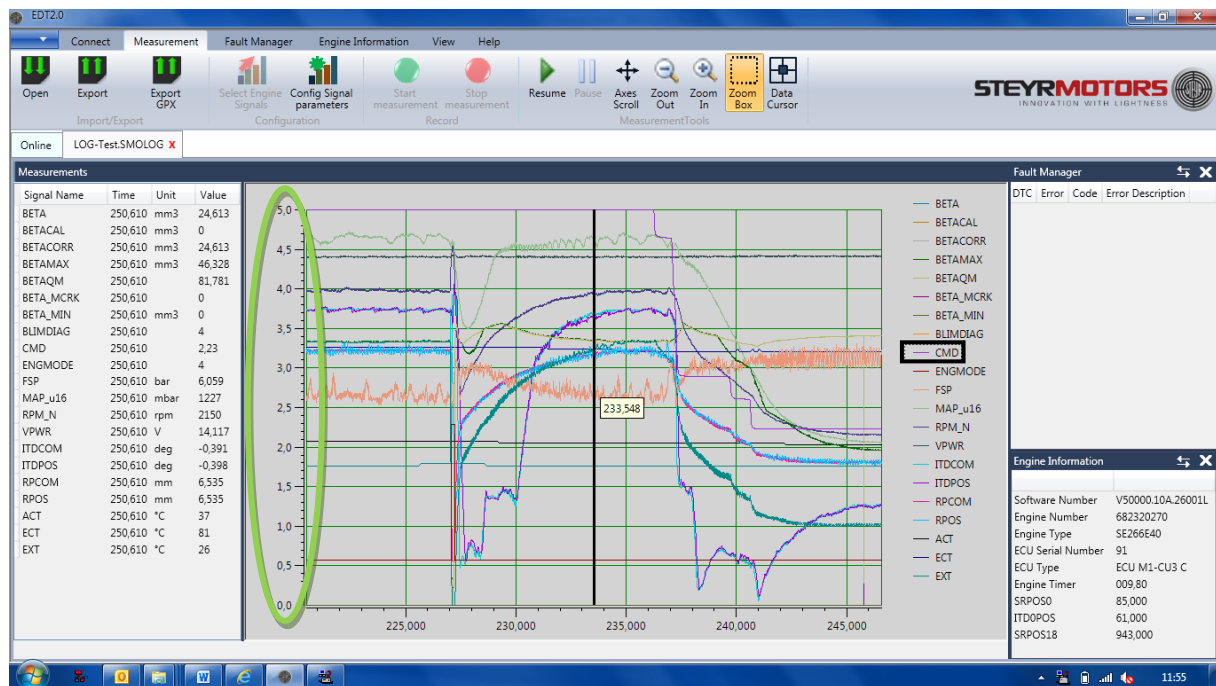
- BLIMDIAG is 4096  
4096 = T30 temperature limitation = BLDt30 (see picture)
- BLIMDIAG is 4168  
4168 = 4096 + 64 + 8 (4168 - 4096 = 72; 72 - 64 = 8; 8 - 8 = 0)  
Results must always be zero!  
4096 = T30 temperature limitation = BLDt30  
64 = engine coolant temperature too high = BLDect  
8 = insufficient lubricant pressure at present engine speed = BLDlps



## Stop Measurement (Shortcut ESC)

Measurement can be stopped by clicking on the “Stop Measurement” button. Upon measurement stoppage, the log file with the data of the measurement can be saved (.smolog –format). This log file is loaded on the measurement window for further analysis. The name of the log file is shown on the application title.

Go to Measurement Menu → Stop Measurement.



Axis Scale:

The Scale of Y-Axis (Ordinate) is depending on the selected parameter (CMD).

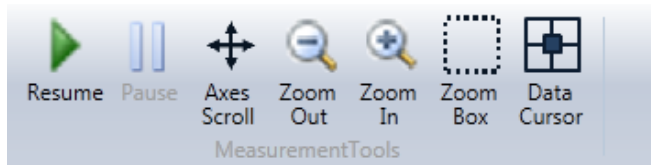


## Stop Measurement (Shortcut ESC)

Measurement-Data can be exported by using the “Export” button.  
The Files are stored in “.smorec” format.  
“.smorec” can be opened with MS Excel or any Text Editor.



## Measurement Tools



A number of options are provided control the display of measurements on the screen.  
These are

### Resume

Resumes the default settings and focuses on the latest signals being added.

### Pause

Pauses the scrolling of the Measurement screen.

### Axes Scroll

Provides the option to scroll the axis.

### Zoom Out

Zooms out of the Measurement screen

## **Zoom In**

Zooms into the Measurement screen

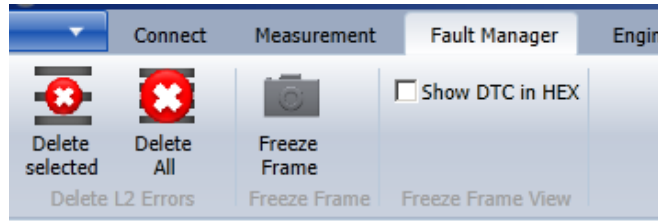
## **Zoom Box**

Zoom into an area marked on the Measurement screen

## **Data Cursor**

Show a cursor on the Measurement screen, for details of the exact values at the cursor point. Move the cursor with the arrow keys (right and left) when the cursor is selected.

# Fault Manager



## Delete Selected L2 (stored)

Deletes the selected Fault (in the fault manager window). Go to Fault Manager Menu → Delete Selected

**NOTE:** Only L2 faults can be deleted.

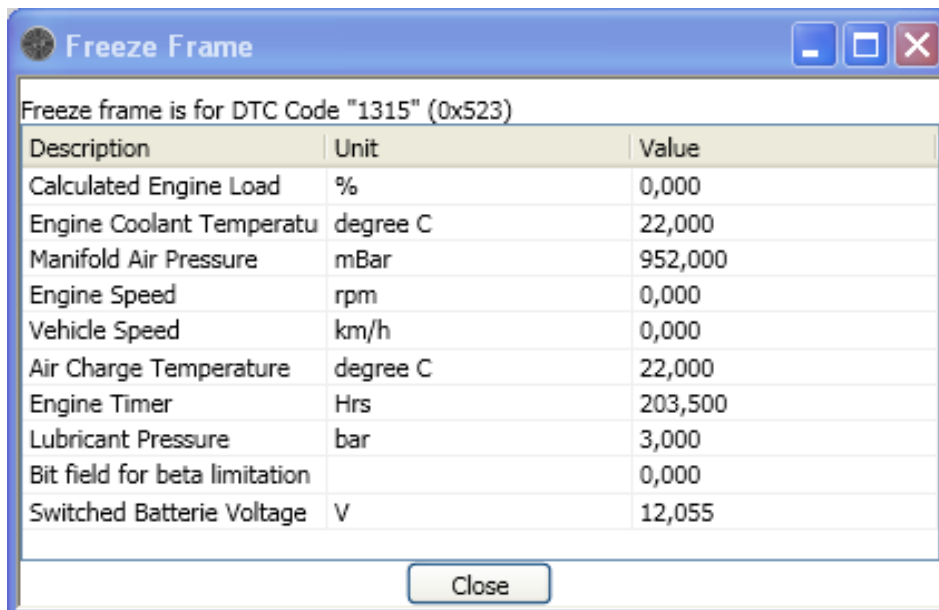
## Delete All L2 (stored)

Deletes all available stored faults. Go to Fault Manager Menu → Delete All

## Freeze Frame

Displays the Freeze Frame information for the selected Service Codes. Go to Fault Manager Menu, select one Service Code → Freeze Frame

Freeze Frame registers Engine Data of the moment when a failure occurs.



The screenshot shows a 'Freeze Frame' window with a table of engine data. The title bar reads 'Freeze Frame'. The text above the table says 'Freeze frame is for DTC Code "1315" (0x523)'. The table has three columns: 'Description', 'Unit', and 'Value'. A 'Close' button is at the bottom.

Description	Unit	Value
Calculated Engine Load	%	0,000
Engine Coolant Temperature	degree C	22,000
Manifold Air Pressure	mBar	952,000
Engine Speed	rpm	0,000
Vehicle Speed	km/h	0,000
Air Charge Temperature	degree C	22,000
Engine Timer	Hrs	203,500
Lubricant Pressure	bar	3,000
Bit field for beta limitation		0,000
Switched Batterie Voltage	V	12,055

## Show DTC in Hex

When selected, the DTC is shown as hexadecimal values in the fault manager window. Go to Fault Manager Menu → Show DTC in Hex

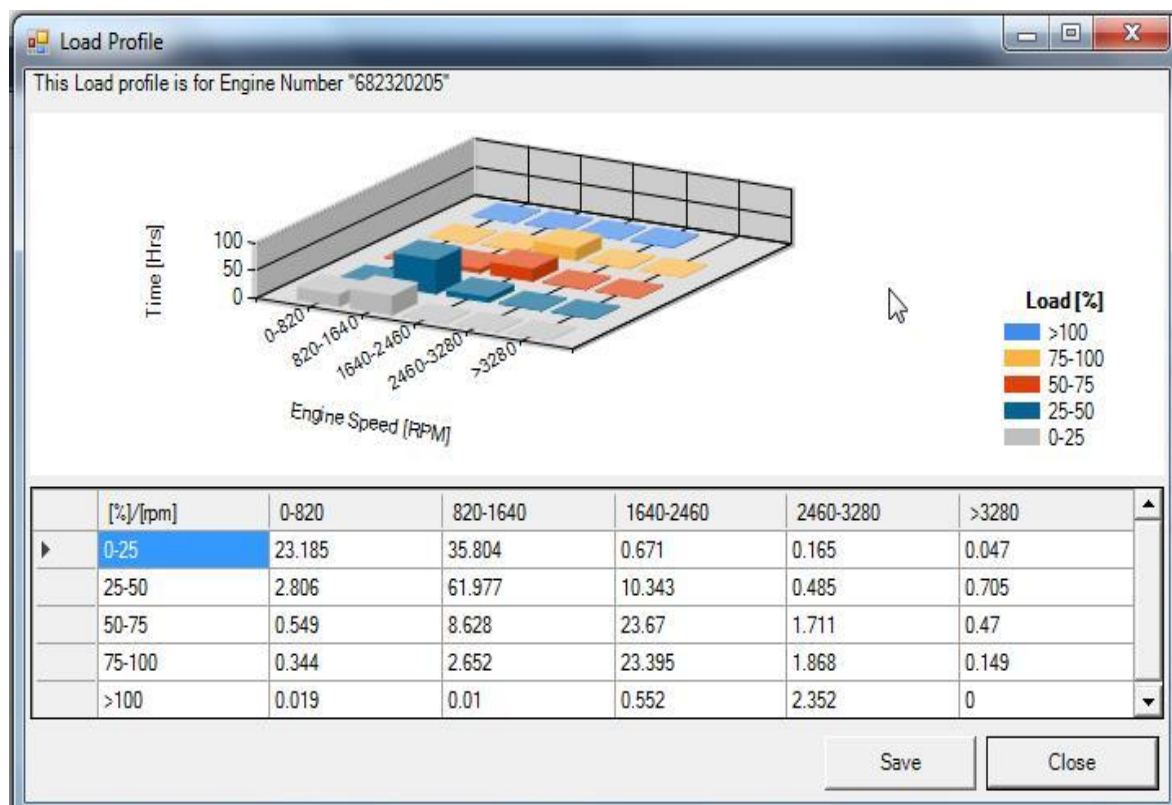
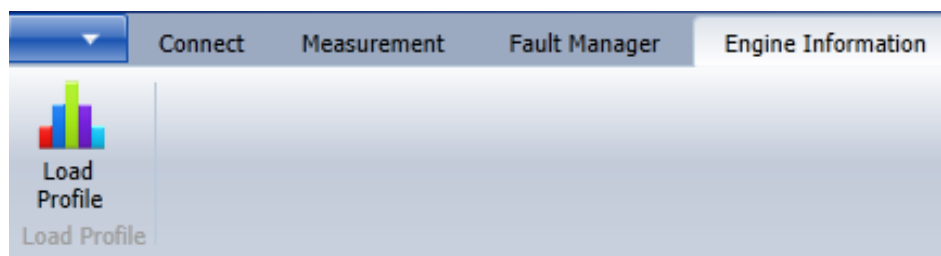
For detailed fault information see:  
Service Manual Chapter 06-Electric → Principle service code table

# Engine Information

## Load Profile

Shows the engines load profile. The x-Axis shows the engine speed [rpm\_n] and the y-Axis shows the driven load and percent of the maximum fuel quantity. The z-Axis shows the engine hours [hrs].

Go to Engine Information Menu → Load Profile



Press the "Save" button to store the Load Profile table section in .csv format, see below shown picture:

[%]/[rpm]	0-820	820-1640	1640-2460	2460-3280	>3280
0-25	23.185	35.804	0.671	0.165	0.047
25-50	2.806	61.977	10.343	0.485	0.705
50-75	0.549	8.628	23.67	1.711	0.47
75-100	0.344	2.652	23.395	1.868	0.149
>100	0.019	0.01	0.552	2.352	0

# Diagnostics

The actuator diagnostics can be used to check all the relevant actuators on the engine.

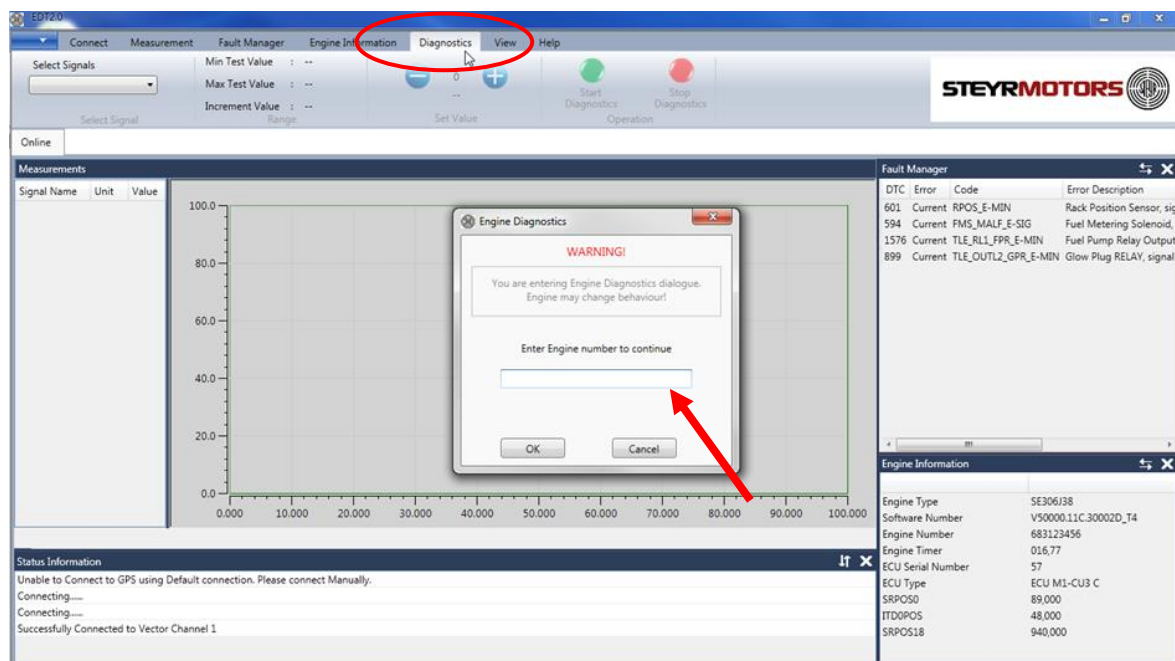
Following actuators can be checked:

- Fuel pump relay (FPR)
- Engine fuel rack actuator (FMS)
- Injection timing device (ITD)
- Turbine geometry of a VTG turbocharger <sup>1</sup>
- SCI valves: wastegate, bypass, exhaust flap <sup>2</sup>

It depends on the ECU software whether the diagnostics functions are available or not. When diagnostic function is enabled it is listed in SMOEDF. The dialog window is always present but the user cannot select any output in the drop-down menu.

## Connection

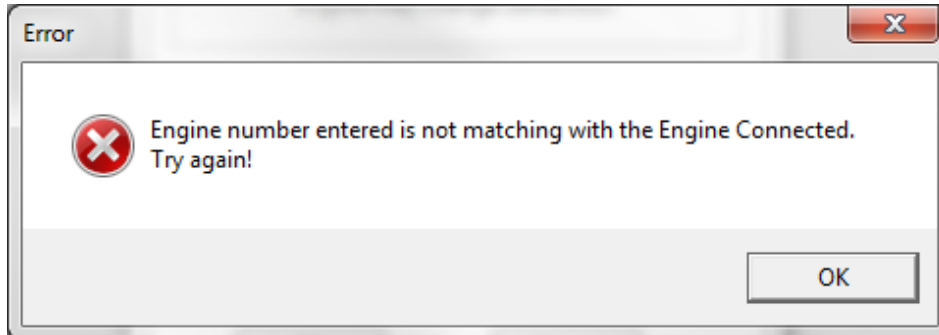
In order to start the diagnostic function the EDT application has to be connected to the ECU using the correct SMOEDF file. After pressing the “Diagnostics” tab the user is supposed to enter the correct engine serial number once. The engine serial number can be taken from the “Engine Information” window.



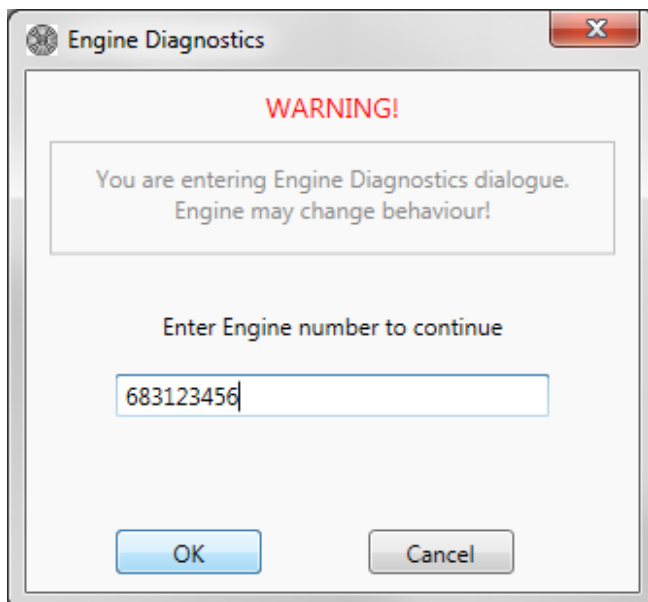
<sup>1</sup> Only available for engines using a VTG turbocharger

<sup>2</sup> Only available for SCI engines

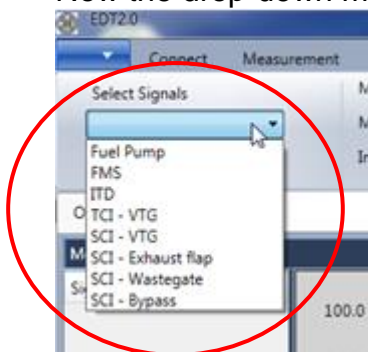
If the engine serial number is wrong an error dialogue will pop up. The user is supposed to try to enter the right engine number again.



If the correct engine serial number was entered the „Warning“ dialogue will disappear.



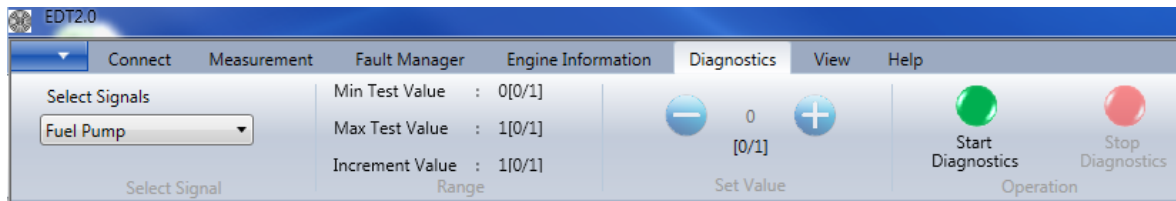
Now the drop-down menu „Select Signals“ will be enabled.



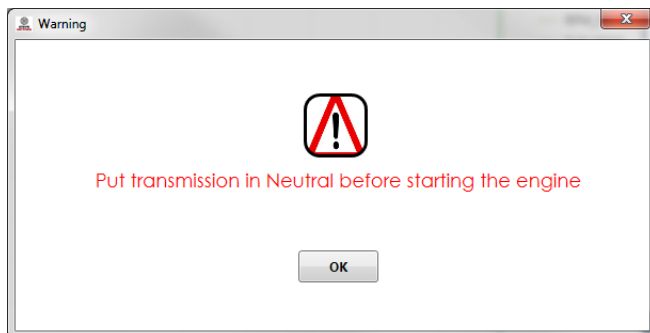


The diagnostics section contains following parts:

- Select Signals: Drop-down menu for selecting the desired diagnostics function
- Range: This sections shows the set value range of the selected actuator
- Set Value: Two buttons for incrementing and decrementing the desired actuator set value
- Operation: Green button for starting the diagnostics function and a red button for stopping the diagnostics function

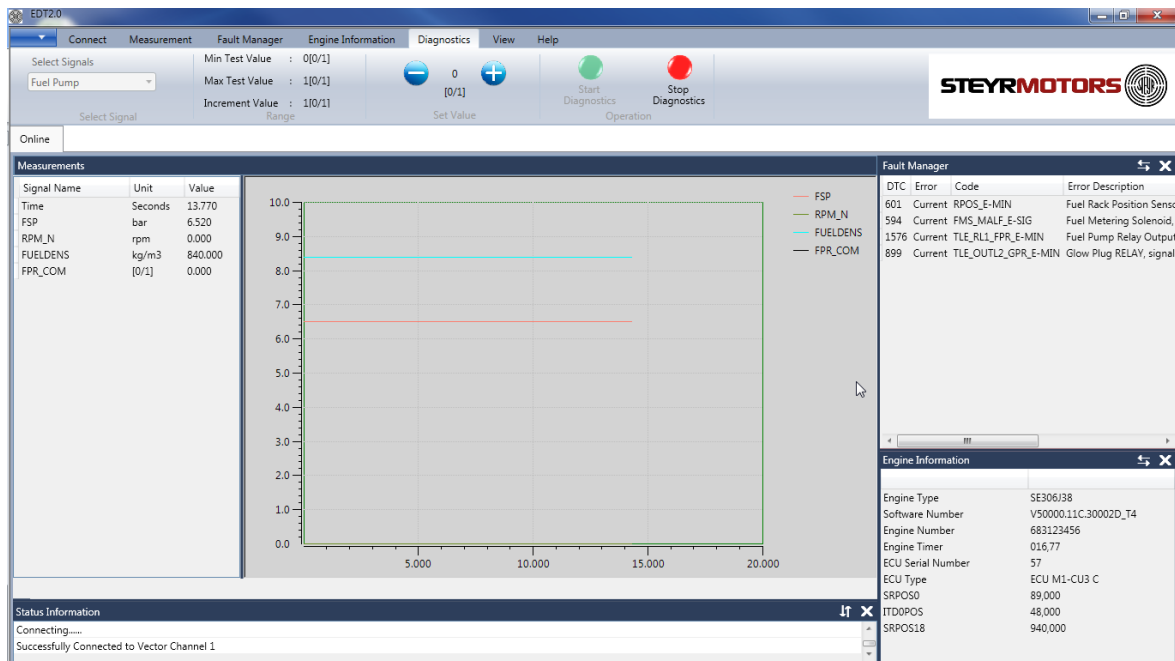


The green button “Start Diagnostics” is used to start the diagnostics function. After pressing the green button a warning dialogue will pop up:



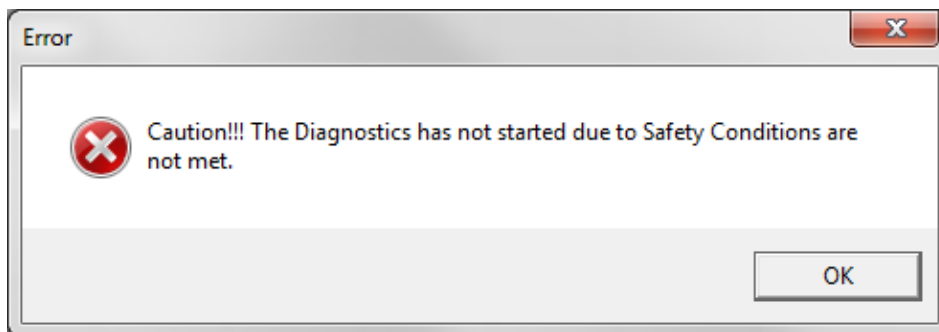
**Note:** Due to safety reasons the user must put the transmission in “Park” or “Neutral” position before starting the actuator diagnostics. The accelerator pedal must not be pressed while the actuator diagnostics is running

The user must press the “OK” button in order to start the diagnostics function. It is not possible to close the warning window by pressing the “Close” button. After pressing the “OK” button the diagnostics will be started.



After starting the diagnostics the set value of the selected actuator can be changed by using the blue buttons “+” and “-“.

Due to safety reasons some diagnostics functions can be only started if the engine is not running. If the user tries to start the FMS diagnostics although the engine is running then the following error dialogue will pop up:



The selected diagnostic function will stop automatically.

The red button “Stop Diagnostics” is used to stop the diagnostic function. A “file-save-dialogue” will appear automatically after pressing the “Stop Diagnostics” button.

### Naming convention for the measurement file:

Default filename:

DIAG\_<Actuator>\_<Engine serial number>\_<ECU serial number>\_<Date>\_<Time>.SMOLOG

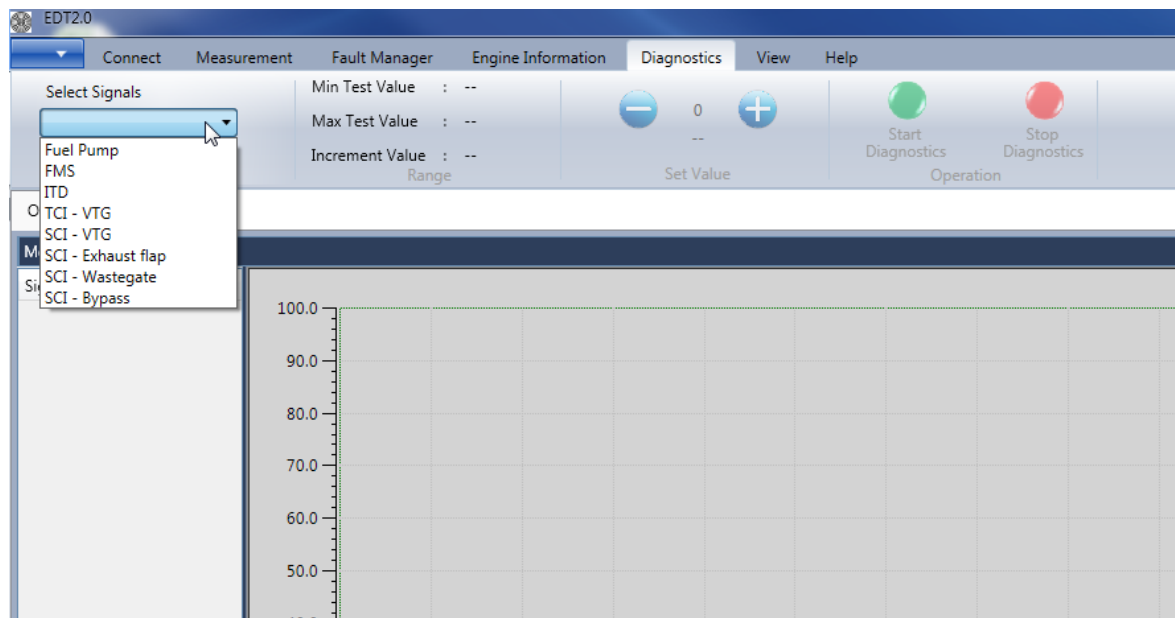
Example: DIAG\_FuelPump\_683123456\_57\_20170126\_0906.SMOLOG

The default filename should not be modified by the user. The user can add additional information at the end of the default filename.

Example:

DIAG\_FuelPump\_683123456\_57\_20170126\_0906\_fuelpumpNotWorking.SMOLOG

## Diagnostics mode (Select Signals)



### Fuel pump diagnostics

The fuel pump diagnostics is available for every engine. The diagnostics of the fuel pump can be used to check the actuation of the fuel pump relay and the fuel pump. The fuel pump diagnostics can be only activated if the engine is not running. The fuel pump relay can be either turned ON or OFF. Using this diagnostics function the user can check the activation of the fuel pump and the circulation of the engine fuel.

Available measurement signals:

- FSP: Fuel supply pressure
- RPM\_N: Engine speed
- FUELDENS: Fuel density
- FPR\_COM: Commanded state of the fuel pump relay (0 = fuel pump relay ON; 1 = fuel pump relay OFF)

## FMS diagnostics

The FMS diagnostics is available for every engine. The FMS diagnostics can be used to check the movement of the fuel rack actuator. Due to safety reasons the diagnostics of the FMS can only be activated if the engine is not running. The set value range is from 0mm to 16mm. The movement of the fuel rack actuator can be checked with the feedback value from the fuel rack sensor (RPOS).

Available measurement signals:

- FSP: Fuel supply pressure
- RPM\_N: Engine speed
- AdcCountRPOS: ADC value of the rack position sensor (RPOS)
- RCOM: Commanded position of the fuel rack actuator (0mm to 16mm)
- RPOS: Actual position of the fuel rack actuator

## ITD diagnostics

The ITD diagnostics is available for every engine. The diagnostics of the ITD can be used to check the functionality of the injection timing device (ITD). The ITD diagnostics is only useful if the engine is running because the injection timing device is moved by engine oil pressure.

Only start the ITD diagnostics if the engine is already running at idle speed – transmission in “Neutral” and accelerator pedal is not pressed. After starting the ITD diagnostics the engine will ramp up to 1500 rpm. Now the user can set the commanded value between -3,5 deg and +8,5 deg. The movement of the ITD actuator can be checked with the feedback value from the ITD sensor (ITDPOS). Also the engine combustion sound should be changed by changing the injection timing.

Available measurement signals:

- CMD: Accelerator pedal position
- RPM\_N: Engine speed
- LPS: Engine oil pressure
- AdcCountITP: ADC value of the injection timing position sensor (ITP)
- ITDCOM: Commanded position of the injection timing device (-3,5 deg to +8,5 deg)
- ITDPOS: Actual position of the injection timing device

## VTG diagnostics (TCI & SCI)

The VTG diagnostics is only available for engines using a VTG turbocharger. The diagnostics of the VTG can be used to check the actuation of the VTG by changing the geometry of the turbine housing. Due to safety reasons the VTG diagnostics can be only activated if the engine is not running.

The user can set the commanded value between 10% and 90%. The changing of the turbine geometry of the VTG actuator can be checked with VTG\_POS: This signal is not available on all turbo chargers.

Available measurement signals:

- RPM\_N: Engine speed
- VTG\_COM: Commanded geometry of the turbine housing (10% to 90%)
- VTG\_POS: Actual geometry of the turbine housing

## **SCI valves diagnostics**

This diagnostics function is only available for SCI engines. The diagnostics of the SCI valves can be used to check the actuation of the SCI valves (exhaust flap, wastegate and bypass).

The SCI diagnostics is only useful if the engine is running because only then the change of the engine boost pressure is measured. Only start the SCI diagnostics if the engine is already running at idle speed – transmission in “Neutral” and accelerator pedal is not pressed. After starting the SCI diagnostics the engine will ramp up to 1500 rpm.

### **Exhaust flap**

Available measurement signals:

- RPM\_N: Engine speed
- MAP\_u16: Manifold absolute pressure
- SCI\_EF\_COM: Commanded value for the exhaust flap (0 to 100%)

### **Wastegate**

Available measurement signals:

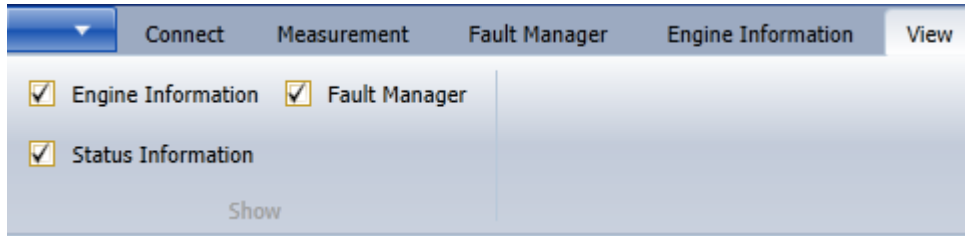
- RPM\_N: Engine speed
- MAP\_u16: Manifold absolute pressure
- SCI\_WG\_COM: Commanded value for the wastegate (0 to 100%)

### **Bypass**

Available measurement signals:

- RPM\_N: Engine speed
- MAP\_u16: Manifold absolute pressure
- SCI\_BP\_COM: Commanded value for the bypass (0 to 100%)

## View



### Engine Information

Controls the display of the Engine information window. Go to Help Menu → User Manual

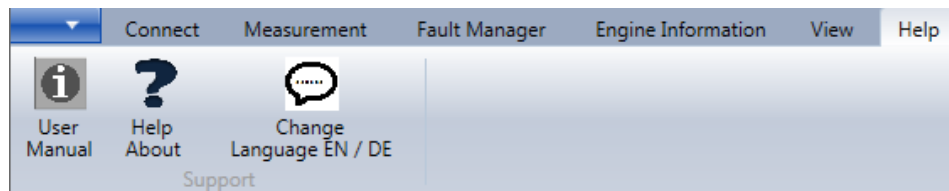
### Fault Manager

Controls the display of the Fault Manager window.

### Status Information

Controls the display of the Status information window.

# Help



## User Manual

Displays the User manual for the application. Go to Help Menu → User Manual

## Help About

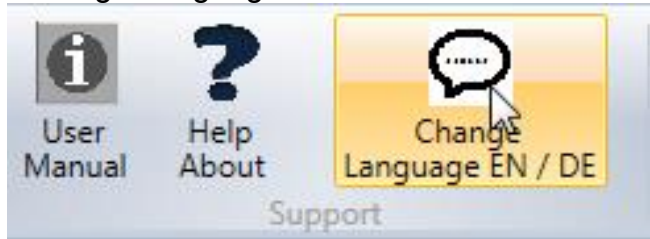
To display information about EDT 2.0 Application, will also show the installed Software version of the EDT.

Go to Help Menu → Help About

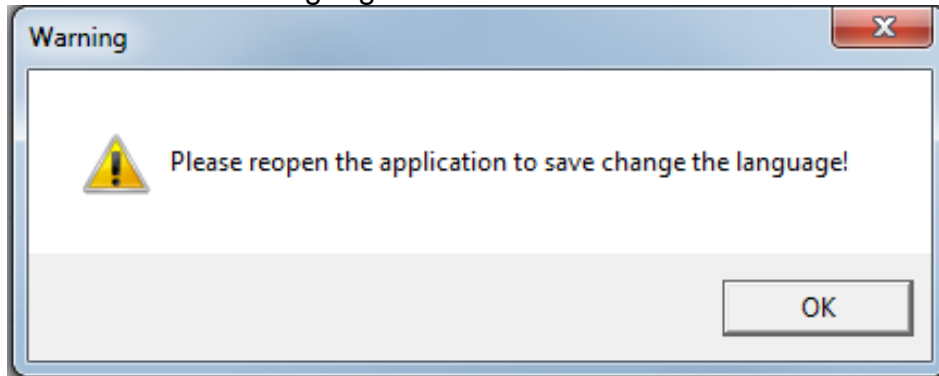


## Change Language EN / DE

To change the program language from English to German, click on the button “Change Language EN / DE” as shown below:



After accepting below shown warning, close the EDT 2 program and open it again to activate the other language.



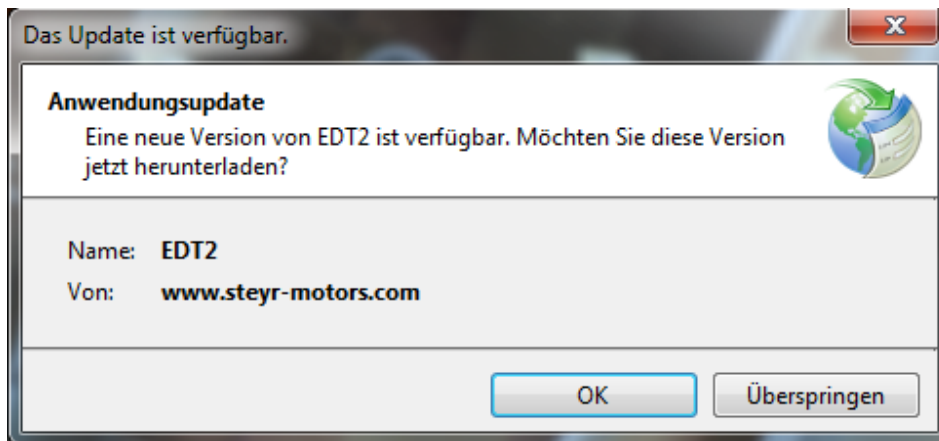
## File update

The update of the .SMOEDF & .SMOCRPF-files and the EDT2 application itself will happen automatically during the start-up of EDT2.0.

Every time the EDT2 application gets opened, the program checks the file version automatically.

If there is a newer version available, it will ask to install the new files.  
Click “OK” if you want to download the latest files:





**Note:** Please ensure that there is an internet connection available during opening of EDT2, if a file-version check is required.

## Frequently Asked Questions (FAQ's)

1. During the Installation of EDT 2.0, Windows is asking for ".NET Framework". Where can I find this program?
  - Find the link on the SMO – Homepage:  
<http://www.steyr-motors.com/download/tools/smo-edt-diagnostic-tool-list-files/se-series/>
2. I can't find the GPS - Device in the Device Manager (Prolific USB-to-Serial Comm Port)
  - Wait until the automatic installation of the driver has finished
  - Is the problem still existing, try another USB – Port or install the driver (from the CD-ROM) manually
3. The GPS – connection was successful (acc. Information window), but no GPS – data are measured (Lat = 0, Lon = 0, Alt = 0)
  - Ensure GPS reception quality
  - Check selected Baud Rate, see "Manual GPS config" (see Page 34)
  - Check selected ComPort, see "Manual GPS config" (see Page 34)
4. After interrupting the measurement, there are more parameters shown as selected before.
  - The EDT 2.0 always measures some parameters in the background, which are shown in the log-mode only (offline)
5. After the Software Update the shown SW-Number, in the Engine Information Window, is still the same as before.
  - Disconnect via the disconnect-button, close EDT 2.0 application and try it again
  - SW Update was not successful, try again (see SW Update, Page 23)
6. After the Software Update the engine doesn't start and/or the RPM indicator is moving up and down on the instrument panel.
  - The wrong SW was flashed. Compare the SW-number and the engine type.
  - Take the right SW-file and Update again (see SW Update, Page 23)
7. It is not possible to delete the DTC (error code).
  - Check if you are in the online mode. In the log-mode (offline) DTC's can't be deleted
  - Check if you have selected a L1 (current) or L2 (stored) fault. L1 faults can't be deleted

8. It is not possible to open the Freeze Frame for the selected DTC (error code)
  - Check if you are in the online mode. In the log-mode (offline) Freeze Frame is not available
  
9. I can't Import the files via the Import Button.
  - The file is already in this folder
  - Copy the downloaded files manually in the SMOCRCP or SMOEDF folder



Easy access to established Service Partner network can be found on the STEYR  
MOTORS homepage:  
<http://www.steyr-motors.com/network>

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[www.steyr-motors.com](http://www.steyr-motors.com)

