



SmartyUDCsw - Remote Tuning Guide

1 Customer

1.1 Customer requirements



A Smarty device with the latest software revision installed.



SmartyUDCsw installed on a PC.



A main license dongle for the SmartyUDCsw with a VIN# license free or associated to the truck to be tuned.



In case of more vehicles, the VIN# license dongle, free or associated to the truck to be tuned, is needed.

2 Tuner

2.1 Tuner requirements



SmartyUDCsw installed on a PC.



A main license dongle for the SmartyUDCsw with a VIN# license free or associated to the truck to be tuned.



In case of more vehicles, the VIN# license dongle, free or associated to the truck to be tuned, is needed.



SmartyUDCsw - Remote Tuning Guide

1.2 Customer stock file send instructions

- Associate or VIN# lock the Smarty to the vehicle.
See: "5 Associate or VIN# lock the Smarty to the vehicle" in the "SmartyUDC - Quick Guide".
- Connect the Smarty to the PC.
- Insert the main license dongle. If the main dongle contains a VIN# license for another vehicle, insert also a free VIN# license dongle for that vehicle.
- Run the SmartyUDCsw.
- Create a new .smarty document with the stock for your vehicle from the Smarty. Use the "File > Read from stock Smarty" command, by default the application will automatically save the file in the appropriate folder
...\\My Documents\\SmartyUDCsw\\...,
the format of the file name is <the last 9 digits of the VIN#>_
<progressive number>.smarty. See: "8.2.1.1 Read stock from Smarty (CTRL+N)" in the "SmartyUDCsw - Application Guide".
- Send the .smarty file to your Tuner via email or USB device.
- The Tuner can now start writing your custom tune. Just wait to receive the .smarty document prepared by the Tuner.

2.2 Tuner stock file receive instructions

- Copy the .smarty file you received from the customer to the appropriate folder in
...\\Documents\\SmartyUDCsw\\...
- Insert the main license dongle, if the VIN# license has already been used, insert a free VIN# license dongle.
- Run the SmartyUDCsw.
- If you did not already, now compile the user data from the menu Tools > User data..., these are the only information's that will be displayed from a .smarty protected document.
- Open the .smarty document (stock file) you received from the customer. The first time you open the file you will be asked to use a free VIN# license.
- Perform the tuning with the SmartyUDCsw.
- Enter a comment for the customer in the "User File Notes", this information will be displayed by the .smarty protected document.
- Save the changes to the .smarty document.



SmartyUDCsw - Remote Tuning Guide

1.3 Customer tuned file receive instructions

- Copy the .smarty file received from the Tuner to the appropriate folder in ...\\Documents\\SmartyUDCsw\\....
- Connect the Smarty to the PC.
- Insert the main license dongle, if that contains a VIN# license for another vehicle, insert the VIN# license dongle for the vehicle which had been used to read the stock file from the vehicle.
- Start the SmartyUDCsw.
- In the SmartyUDCsw open the .smarty document (tuned file) you received from the Tuner.
- With SmartyUDCsw write the tuned file into the Smarty.
- Disconnect the Smarty from the PC and connect it to the vehicle.
- With the Smarty now write the tuned file into the ECM.

See also:
"SmartyUDCsw – Quick Guide",
"SmartyUDCsw – Application Guide".

2.3 Tuner, tuned file send instructions

- Export the tuned file as a .smarty **protected** document. A protected file can not be opened / viewed / copied but only written into a Smarty with the matching VIN#.
- Send the .smarty protected document to the Customer.

See also:
"SmartyUDCsw – Quick Guide",
"SmartyUDCsw – Application Guide".



Injection Duration

Injection Duration is the pulse width applied to the injector(s) solenoid(s) for the main injection event. It commands how long (how much time) the injector is held open and flows fuel. The unit of measure for the Duration is in Microseconds (μs). One μs is one millionth of a second (or $1 / 1,000,000$).

In a common rail injection system the injectors are opened by voltage applied to a solenoid rather than by the fuel pressure, like in older injection systems. This allows for very precise fuel metering.

As a rule of thumb, with a "matched engine build", anytime the engine produces heavy black smoke the Duration is too long. Heavy black smoke means, wasted fuel and power. Definition of "matched engine build": the injectors at their maximum flow keep the turbo(s) within their efficiency map and of course all other components involved are matched for this purpose.

It is very common that engines are built with either not enough or too much turbo(s) for the injectors used for that build.

"Not enough turbo" means that the injectors flow more fuel than what the turbo(s) can provide adequate air, to properly burn said fuel. Normally this translates into very high EGT's, heavy black smoke and very high back pressure. This is the only situation where over fueling (thus heavy smoke) makes more power than reducing the fuel flow. Yet, this comes with a price tag, VERY HIGH EGT's and very high backpressure! At least with injectors flowing too much fuel it is possible to reduce the duration table and adapt it to the injectors. Although, it can be very difficult to control very big injectors, it is a viable option.

"Too much turbo" means that the injectors can't flow enough fuel to light the turbo(s). This can also result in high EGT's and normally makes for sluggish engine responsiveness.

The right combination consists of injector fuel flow, matching the efficient air flow of the turbo (s).

A few hints about tuning the Duration tables.

It is probably easier to think about the "Load" as if it was the "throttle position". While they're not really the same, the results are rather close.

IMPORTANT!

The values of all the first points in the different load maps are zero. NEVER change those cells!

If these values are increased you will get an un-predictable engine run away when the throttle is released! Leave these cells alone!!!

Increasing the duration in the load tables before 50 - 56% load may or will result in heavy smoke under light throttle. Smoke hinders the performance and the turbo spool up. It is easier to light a large turbo with little fuel, rather than with too much of it.

Increasing the last 2-3 load ranges too much (81,4 to 100%), can result in a "hanging



SmartyUDCsw - Tuning Tips

throttle". Yet at the same time, not enough duration at the highest load and RPM will feel like the engine is defueling and a huge power loss in the high RPM range will result. Also with not enough duration on the top end, the engine will be limited in the RPM's it can rev up to. Please, look at the comparison files that come with this tuning software. They work very well with an average injector size.

There is no way to predict exactly how much the duration needs to be changed for the best performance possible. Everything depends upon the injector size or in other words how much fuel they can flow during the time the duration commands the injector to be open. With very large injectors it is possible that you will need to decrease the Duration, rather than increasing it. The comparison files we've provided make for a very good starting point.



Injection Timing

The Injection Timing defines the moment in which voltage is applied to the injector(s) solenoid(s) in regards to the piston position related to Top Dead Center (TDC). The unit of measure for the injection timing is in degrees. Positive numbers mean: the injection event starts Before TDC. Zero degrees means: the injection event starts at the TDC. Negative numbers mean: injection starts After TDC.

In a common rail injection system the injectors are opened by a voltage applied to a solenoid rather than by the fuel pressure like in older injection systems. This allows for very precise injection timing.

There is no good tuning without good timing!

If you were to spend a hundred hours tuning an engine, spend at least ninety of them on the timing!

One very important concept that needs to be taken into account while tuning the timing is the Ignition Delay (ID) of the diesel fuel. The ID is the time it takes for the fuel to start to burn from the moment it is injected. Diesel fuel does not burn immediately when it is injected, but it takes quite some time for it to ignite. Diesel burns significantly slower than gas. ID depends upon parameters like, fuel atomization, compression, boost and fuel quality. The fuel quality is most important. The higher the cetane rating, the faster the fuel burns.

What this means in the real world:

At 3000 RPM an engine turns 1.080.000 degrees in a minute ($360^\circ \times 3000$). Or 18.000 degrees in a second ($108.000 / 60$). Or 0,018 degrees in a μs ($18.000 / 1.000.000$). If the ID is, let's say 500 μs then the crank has turned nine degrees from the moment the fuel was injected to the moment the fuel ignites! At 4000 RPM the ID will then be twelve degrees! At 5000 RPM... 15 degrees!

This clearly tells that the timing needs to be increased (injecting earlier before TDC) as the RPM's raise. Yet, there is a limit for the timing. If the fuel is injected too soon, the fuel will ignite before the piston has reached the TDC. NOT GOOD! Be CAREFUL here, severe engine damage will result in a short time.

In a completely stock engine, very good timing alone (means, everything else remains the same) can gain up to 70 HP over the stock timing! In a highly modified engine, the difference can be several hundred HP!!! Also, the higher timing can lower the EGT's of a stock engine by several hundred degrees F.

What effect does the timing have on performance?

(All other parameters remain unchanged. The only change is a higher or a lower timing.)

A higher timing does: More power, lower EGT's, more smoke, better MPG and *less* boost.

A lower timing does: Less power, higher EGT's, less smoke, worse MPG and *more* boost.

Why does less timing make higher boost, but less power?

Everybody always says that more boost = more power!

Think about the timing as if you were to decide where the thermal energy of the engine will be directed to. Into the combustion chamber with the higher timing or part into the exhaust / turbo with a lower timing. More energy into the combustion chamber of course increases the power, but at the same time reduces the available energy to spool the turbo.



SmartyUDCsw - Tuning Tips

This means in the real world, that you want a lower timing in the low load part of the timing tables to help the turbo spool up. Once the turbo is spooled up, you then (may) want to rapidly increase the timing for max power.

Unfortunately in regards to timing, there is no way to predict how much is too much. The only way to set the timing correctly for max power, is by test and trial. On the dyno, increase the timing, verify your results. Continuously increase the timing run after run. The timing becomes too high, when the power becomes less than the previous run. When the power becomes less than in the previous run, then the fuel is injected too soon, thus it ignites before TDC, thus the power loss.

Attention!

Always look at the whole dyno graph! Anytime less power is achieved ANYWHERE in the dyno graph, then too much timing has been added. It is easier to set the timing too high in the lower RPM's, than the high ones.

If you have increased the timing as a whole and you loose power around the start of the run, but gain power at the top end, then the timing at low RPM's is set too high. Likely the high RPM's still have some room left for a further timing increase.

The comparison files provided with the UDC are from real world tuning and can give a rather good idea about what works.

The only real indication we can provide, is that we have never seen any further gain above +32. Use this as a safe maximum limit, but like said before, everything depends upon the individual engine build.

De-compressed engines come to mind. Those may (or may not) need an even higher timing value.



SmartyUDCsw - Tuning Tips

Rail Pressure

Rail Pressure defines at what pressure the fuel in the common rail is stored. The unit of measure for the Rail Pressure is PSI. In a common rail injection system the Rail Pressure does not depend upon engine speed (within limits) like in older injection systems. This combined with the average higher fuel pressure (compared to older injection systems) provides very fine fuel atomization.

Attention!

The 5.9L Cummins injectors are rated by Bosch to 1.600 Bar which is equal to 23.207 PSI. The 6.7L Cummins injectors are rated by Bosch to 1.800 Bar which is equal to 26.107 PSI. Exceeding these pressures can lead to injector damage!

A distinction between daily drivers and race trucks needs to be made.

A daily driver should not exceed the stock rail pressure. Period. In fact, the highest rail pressure in the stock tables is already set to the maximum Bosch rating. Giving the rail pressure tables a closer look, you will notice that the stock rail pressure is always reduced in the highest RPM points. Of course, this should be addressed if the goal is performance. Raise those points to the highest value you find in the stock tables. Now the rail pressure does not exceed the maximum rating, but the performance will increase.

The goal for a race truck, is of course a whole different story.

Our advice, use as much rail pressure for the race as you need (or can get) but reduce it when driving home...



SmartyUDCsw - Tuning Tips



Waste Gate

The Waste Gate table defines at what boost pressure the waste gate will be opened and route part of the exhaust gases around the turbine to prevent turbo over speed or excessive boost pressure.

The unit of measure for the boost pressure / waste gate opening point, is in PSI.

Only the 2004.5 to 2007 trucks actually have the electronically actuated waste gate.

Higher boost means more power and lower EGT's. It is essential to increase the boost pressure in order to be able to effectively burn any added fuel. The stock boost pressure sensor can only read 36 to 38 PSI (Depending upon the individual sensor tolerance). If the boost pressure is set higher than what the boost pressure sensor can actually read, the result will be that the waste gate does not open.

The best thing for mileage is to set the boost pressure as low as possible at cruising speed. You want the engine to work against the least possible back pressure (waste gate open) which yields very good fuel mileage gains. The nice thing about tuning the electronics, is that it is possible to keep the waste gate open at low loads and RPM's. As soon as more throttle is applied (more load) close the waste gate, and keep it closed for best power and performance.



SmartyUDCsw - Tuning Tips



Torque Management

The torque management defines how much torque the engine is allowed to produce for a given throttle position. In other words, how much fuel is allowed for a given throttle position.

Never change the first value of the table. The throttle will become too sensitive almost like an on / off switch. Also don't increase the second and third values too much because the engine response to the throttle will become violent, almost out of control. Please, look up the different comparison file, to get an idea how this table is modified.



SmartyUDCsw - Application Guide

1 Disclaimer of Liability

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This product is intended for OFF ROAD USE ONLY.

This product is not intended to be used to break the law.

Do not use this product until you have read the following agreement.

This agreement sets forth the terms and conditions for the use of this product.

The installation of this product indicates that the buyer has read and understands this agreement and accepts the terms and conditions.

1.1 DISCLAIMER OF LIABILITY

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The Seller assumes no liability regarding the improper installation or misapplication of its products.

It is the installers responsibility to check for proper installation and in doubt contact the manufacturer.

The buyer is solely responsible for all warranty issues from the manufacturer.



SmartyUDCsw - Application Guide

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Under no circumstances will the Seller be liable for any damage or expenses incurred by reason of the use or sale of any such equipment.

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THE INSTALLATION OF THIS PRODUCT INDICATES THAT THE BUYER HAS READ AND UNDERSTANDS THIS AGREEMENT AND ACCEPTS THE TERMS AND CONDITIONS.



SmartyUDCsw - Application Guide

2 What is the Smarty UDC tuning software?

UDC stands for **U**ser **D**efined **CaT**CHER. The Smarty UDC tuning software (PC based) is an ADDITION to the already existing Smarty tuners. This means that the tuning software can be used with any Smarty product, both already sold or new.

The Smarty tuner retains all of its actual features. I.E. all power levels, options and possible settings remain "as is". In addition to the previous features there is now the possibility for the customer to program the Smarty with his own modified parameters to fine tune his truck. One more power level is added to Smarty's menu. The **U**ser **D**efined **CaT**CHER.

2.1 How it works

First thing, the Smarty tuner needs to be upgraded with the UDC feature. This is simply done by updating the tuner with a new software release which is available for free download from our website. This needs to be done only with a pre owned product. Once the UDC software is released the tuners will leave our facility with the UDC feature already installed.

Then the Smarty UDC software will be able to identify the software for THAT truck and provide certain STOCK parameters to the customer which can be tuned at will.

Once the customer has modified the stock parameters on the PC to his needs, he will then download that SW to the Smarty. Now, the Smarty can program his truck with the **U**ser **D**efined **CaT**CHER level.

2.2 Easy tuning!

Our highest priority for the UDC: **"it has to be as simple as possible!"**. Any professional tuner will tell you that the most time consuming part in custom tuning is working out the right "base tune". I.E. a tune where all the parameters needed for the increased performance (like: torque limiters, fuel limiters, boost limiters, just to mention very few) are finely matched. There are hundreds of parameters that need to come together for a smooth, powerful and trouble free base tune! That requires broad knowledge and hundreds if not thousands dyno runs! Weeks if not months or years!

With the UDC, as the base software, the highest CaTCHER in the Smarty is used and the customer then needs to fine tune only the most performance relevant parameters.

For example, for the Cummins CR 5.9L these engine operation parameters are:

- 1) Duration (how long the fuel is injected->The fuel quantity).
- 2) Timing (when the fuel is injected in relation to the TDC).
- 3) Rail Pressure.
- 4) Wastegate opening pressure (where applicable).
- 5) Torque management (more or less sensitive throttle).



SmartyUDCsw - Application Guide

It is now possible in very short time to finely match the above mentioned parameters to the truck's needs. **In addition**, we will provide "sample" tunes from the **real** tuning world. It is then possible to copy all (or part !) of these into a customer's software. A very good starting point for everybody's needs! Combine this with the "tuning tips" that we provide in the UDC software and fine tuning becomes **E A S Y !**

The previously mentioned tuning **sample document** files can be copied and pasted into the customer's software. The resulting tuning file can be eventually shared exporting it in "sample" format.

It is possible to write a modified file into Smarty but it can **NOT** be read from the Smarty later on! This is most important for example the tuning shop that needs to protect the hard work.

The software we write into the ECM is protected against read out. Thus, it is not possible to simply read the ECM to get the tuning file. The reason for this is the same reason as above, protect the hard work.

We don't need to read out the ECM! The Smarty already has the software's for all trucks on board. Smarty only needs to identify the truck (Year / Tranny / Emissions / VIN#) this takes two seconds (Needed only if Smarty is not already VIN# locked).

The features like the ability to alter certain parameters like for example the speed limiter; rev limiter; shift defuel; depend upon the Smarty NOT upon the UDC SW!

Example: the JR does not provide the option to raise the rev limiter; that's not going to change even with the UDC. Those parameters remain in Smarty's options.

There is no limit to the number of VIN# licenses that can be used with the same software (Main Dongle) but the Smarty will remain as is; one truck at a time. In other words, multiple vehicles require multiple Smarty's and license dongles but only one tuning software main dongle.

The UDC SW can be downloaded from our website but fully works only when combined with a main dongle.

For evaluation purposes, the UDC software downloaded from our website works as a Demo version until it is used in combination with a Main Dongle. The Demo version can not save any changes made to a file and can not communicate with the Smarty.



3 Setup

3.1 Requirements

3.1.1 Minimum Hardware Requirements

CPU:

Pentium 1 GHz or higher.

RAM:

512 MB or more.

Video card:

3D accelerated;
OpenGL 1.1 compatible;
800x600 65,535 colors.

Disk space:

you may need up to 650 MB of available
(if MS Framework is not yet installed).

you may need up to 48 MB of available
(if MS Framework is already installed).

USB:

two free USB(2 or 3) ports.
One for the license dongle and one for the Smarty.

3.1.2 Supported Operating Systems

| | |
|---------------|------------------------|
| Windows XP | 32 bit Service Pack 3. |
| Windows Vista | 32 bit Service Pack 2. |
| Windows Vista | 64 bit Service Pack 2. |
| Windows 7 | 32 bit Service Pack 1. |
| Windows 7 | 64 bit Service Pack 1. |
| Windows 8 | 32 bit. |
| Windows 8 | 64 bit. |



SmartyUDCsw - Application Guide

3.2 Software installation

Setup installs the following software:

| | |
|--------------------------|---------------------------------|
| SmartyUDCsw | Smarty Tuning Software |
| SmartyUSB | Smarty USB Update Program |
| FTDI Driver Setup | USB driver setup for the Smarty |
| FTDI Driver | USB driver for the Smarty |

3.3 Details of the setup

During the installation the following parts are loaded on the "C" drive of your computer:

- the folder ...**<program files>\MADS\SmartyUDCsw** with the applications:
 - **SmartyUDCsw.exe** and it's related files;
 - **SmartyUSB.exe**;
 - the folder ...**Documents\SmartyUDCsw** contains the sub-folders:
 - **Demo** contains the files:
 - **Demo documents**.
 - **Dodge** contains the folder:
 - **CTD** contains the folders:
 - **JR, S06P e SSR** each of those is then again organized in sub folders for the different models and MY. They contain the:
 - **Sample documents**.
- The folder ...**<common application data>\SmartyUDCsw** contains:
 - the file "**UDC settings**" **SmartyUDCsw.dat**;
 - The folder ...**<user application data>\SmartyUDCsw** is empty, ready to store the files produced when the SmartyUDCsw is first launched:
 - **ApplicationOptions.dat** with the **Basic options...**;
 - **ApplicationUserData.dat** with the **User data...**.

A folder in the path: **Start\All programs\M.A.D.S. Electronics Srl** is installed. It contains:

- the link to **Uninstall SmartyUDCsw and Tools**;
- the folder **SmartyUDCsw** contains the links to:
 - **Link to Application settings**;
 - **Link to User settings**;
 - **SmartyUDCsw Guide**;
 - **SmartyUDCsw Quick Guide**;
 - **SmartyUDCsw Tuning Tips**;
 - **SmartyUDCsw**.
- the folder: **Tools** contains the links to:
 - **FTDI Driver Setup**;
 - **Smarty USB Update Program**.



SmartyUDCsw - Application Guide

4 License management

There are two different types of licenses. The "Main" license which enables the full functionality of the UDC tuning Software and the eventually added "VIN#" license. Both consist in a USB dongle.

The VIN# license dongle works only in combination with the Main license dongle. If more than one VIN# needs to be worked on, both need to be inserted into USB ports on the PC the UDC tuning software is installed.

4.1 Application license (Main Dongle)

The "Main" license dongle is essential for the use of the full functionality of the "Smarty UDC tuning software". The Main dongle contains also the license for **ONE** VIN#. AKA, it is possible to tune **one** vehicle with this license. Should the need arise to tune more than one vehicle then additional VIN# licenses need to be purchased.

When the UDC tuning software is started without the main dongle inserted into an USB port on the PC, the software will be executed in Demo mode with limited functionality.

When the software for the vehicle you intend to tune is read for the first time from the Smarty, you will be asked if you want to use the available VIN# license for that vehicle. If confirmed, the available license will be used for the vehicle and the tuning file is generated and saved on the PC allowing the customer to gain access to the full functionality of the UDC tuning software.

Attention!

Once the VIN# license has been used for a vehicle it is not possible to use the same license on a second vehicle. You need to purchase an additional VIN# license dongle!

4.2 Vehicle license

The VIN# license dongle is **NOT** essential for the use of the UDC tuning software! It contains only one additional VIN# license should you need to tune more vehicles than the VIN# contained in the main dongle.



SmartyUDCsw - Application Guide

5 UDC settings

The "UDC settings" (the definitions for the tuning maps) are contained in the file SmartyUDCsw.dat which can be found in the the folder <Application Data>\SmartyUDCsw of your computer.

The installation of the UDC software prepares a link to the folder with the file SmartyUDCsw.dat **Start\All programs\M.A.D.S. Electronics Srl\SmartyUDCsw\Link to Application settings.**

Every time the UDC software is started, by default, the function [Auto Update 'UDC settings'](#), checks through the internet if a new(er) version has become available (No data is collected from your PC!). If there is a newer version, the information about the previous and the new version are displayed. The customer is then asked if he wishes to download and install the new version.

During the update of the "UDC settings" an update of the already present tuning files is done automatically.

It is also possible to update the "UDC settings" manually through the internet or from the hard disk drive through the function [Update 'UDC settings'...](#)



SmartyUDCsw - Application Guide

6 Using Smarty with SmartyUDCsw

6.1 Connecting Smarty

The Smarty becomes available for the communication with the PC after a few seconds after it has been connected to the USB port. You need to wait for the main menu to appear on Smarty's display. Typically a couple seconds.

If more than one Smarty are connected to the USB ports, only the one connected to the lowest numbered port will communicate with the UDC.

6.2 Setting the Smarty for the UDC

For the Smarty to work with the UDC tuning software you first need to update it's software with a UDC enabled version from our website (If not already installed).

6.3 Read the stock file from the Smarty

Once the Smarty is connected to the USB port with a standard USB printer cable (included with the Main Dongle) the stock tables for your vehicle can be transferred from the Smarty to the PC for modification with the UDC tuning software (From the top UDC menu select **Smarty** then **Read stock from Smarty**).

Should the USB cable become disconnected during this process, no document will be created and saved on the PC!

Warning!

The command [Read stock from Smarty](#) does NOT allow to read a custom tuned file from the Smarty but only the stock one! Please keep a backup of your *.smarty files!

6.4 Write the UDC to Smarty

Once the modifications to the table(s) have been done, to transfer those into the Smarty select **Smarty** from the top menu and then "**Write file to Smarty...**" This process takes about 10 seconds. Now you're ready to update your truck with the modified UDC parameters.

The Smarty stores only one User Defined CaTCHER (stands for Clutch and Traction Challenger, a performance software) which is overwritten at every update of the Smarty.



SmartyUDCsw - Application Guide

Warning!

Please keep a backup of your *.smarty files!

Should the USB cable become disconnected during this process, please repeat the update.

Warning!

The User Defined CaTCHER file is erased from Smarty's memory during every firmware update of the Smarty!

PLEASE! KEEP A BACKUP OF YOUR .smarty TUNING FILES!!!



SmartyUDCsw - Application Guide

7 SmartyUDCsw Documents

All files created by the UDC tuning software use the extension .smarty (Dot smarty). We refer to those files as "Documents" since they contain not only the tuning tables but also various information about the vehicle, the UDC version used to create the file and so on.

7.1 Demo document

The **Demo** documents are for UDC software evaluation purposes only. The Demo documents do not provide the full functionality of the UDC software. The Demo documents are included in the UDC software as downloaded from our website.

Features:

| | |
|-----|------------------------------|
| YES | Edit maps |
| YES | Compare maps |
| NO | Save the changes |
| NO | Write the UDC file to Smarty |

7.2 Standard document

The standard document is normally used for all UDC tuning software modifications and operations. The standard document also contains the VIN# of the vehicle it is associated to.

The standard document can be opened / modified / written into Smarty, only if a matching VIN# has been used in the Main or VIN# dongle! In addition, the standard document can be written into a Smarty only if that Smarty is associated (VIN# locked) to the same VIN#.

The standard document is created automatically by the UDC tuning software when a file is read from the Smarty. It is also possible to rename the standard document to your needs.

See also [Read stock from Smarty...](#), [Save as...](#) and [Document File Behavior](#).

Feature:

| | |
|-----|---------------------------|
| YES | Edit maps |
| YES | Compares maps |
| YES | Save the changes |
| YES | Write the UDC into Smarty |

7.3 Sample document

The scope of a Sample document is file sharing. If a customer wishes to share his work with others the standard document needs to be exported as a Sample. The Sample file **does not contain a VIN#** and can be opened by all UDC customers without needing to use a VIN#



SmartyUDCsw - Application Guide

license. Several Sample documents are included in the UDC tuning software download and are meant as a base to start your own modifications. Not all features can be used with a Sample document!

See also [Export sample...](#).

Feature:

- NO Edit maps
- YES Compares maps
- NO Save the changes
- NO Write the UDC into Smarty

7.4 Protected document

The scope of a protected document is to protect your know how and hard work. The protected document can only be written into a Smarty with the matching to the document VIN#. It can not be viewed, used for comparison, or copied. The professional tuner can send these files to his customers without allowing anybody to see what modifications he has done to the tables contained in it. The encryption of a protected file depends upon the individual Main dongle used for the file. It can NOT be decrypted without THAT dongle! Please keep a back-up of your files!!!

See also [Export protected...](#).

Feature:

- NO Edit maps
- NO Compares maps
- NO Save the changes
- YES Write the UDC into Smarty



SmartyUDCsw - Application Guide

8 User interface

Title

Menu

Document tab

Left panel

Document Data

Map Selection

Map Info

Selected Map User Notes

Width

Horizontal scroll bar

| Load (%) | Engine (rpm) | | |
|-----------|--------------|--------|--|
| 0.0/6.3 | 5,074 | 5,074 | |
| 6.4/12.5 | 5,074 | 5,074 | |
| 12.6/18.8 | 5,803 | 5,803 | |
| 18.9/25.0 | 5,803 | 6,500 | |
| 25.1/31.3 | 7,254 | 8,000 | |
| 31.4/37.5 | 7,254 | 8,000 | |
| 37.6/43.8 | 7,976 | 9,400 | |
| 43.9/50.0 | 8,705 | 10,000 | |
| 50.1/56.3 | 8,847 | 10,000 | |
| 56.4/62.5 | 9,427 | 10,000 | |

Rail pressure (psi) vs Engine (rpm) chart data:

| Engine (rpm) | Rail pressure (psi) |
|--------------|---------------------|
| 620 | ~4,000 |
| 1,000 | ~6,000 |
| 1,550 | ~8,000 |
| 2,000 | ~12,000 |
| 2,600 | ~16,000 |
| 3,000 | ~18,000 |
| 3,500 | ~17,000 |



SmartyUDCsw - Application Guide

The screenshot shows the SmartyUDCsw application interface. On the left, there is a 3D surface plot of rail pressure (psi) and a bar chart showing engine rpm and load percentage. The right panel contains a grid of control buttons and a data table. Red arrows point to specific UI elements with labels.

Control box: Located at the top right of the window, containing minimize, maximize, and close buttons.

Right panel: A vertical panel on the right side of the main display area, containing a grid of control buttons.

Main commands Panel: A sub-section within the right panel containing various control icons such as directional arrows, a folder icon, a floppy disk icon, and a refresh icon.

Vertical track bar: A vertical slider control located below the main commands panel.

Info cell Current / Cursor: A data table below the track bar showing engine rpm and load percentage for two different states.

Vertical scroll bar: A vertical scrollbar located to the left of the data table.

Unit Changes: A section at the bottom of the right panel for changing units and multipliers.

Check button pan / rotate: A button at the bottom left of the right panel, used for panning or rotating the view.

| Info cell Current / Cursor | |
|-----------------------------------|----------|
| Engine (rpm) | 2,600 |
| Load (%) | 6.4/12.5 |
| Rail pressure (psi) of Actual | 16,681 |
| Rail pressure (psi) of Original | 16,681 |
| Rail pressure (psi) of Comparison | 15,952 |
| Cursor Act. - Orig. | 0 |
| Cursor Act. - Comp. | |

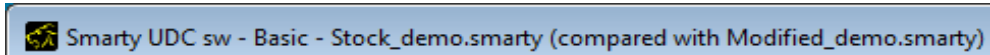
| Unit Changes | |
|----------------------------|---------------|
| Percent | Multipl... |
| <input type="checkbox"/> % | 100 x 1 = 100 |



SmartyUDCsw - Application Guide

8.1 Title bar

8.1.1 Title



The title shows the <product name> - <product configuration name> - <active document name>.

If a comparison file is opened then the file name is added at the end of the string (compared with <compared document name>).

If the file is read-only, the text "(Read Only)" is added to its name. The read-only files can not be edited.

8.1.2 Control box



The control box provides buttons to minimize, maximize, or close the window. Closing the window prompts the user to the confirmation to save the changed files.



SmartyUDCsw - Application Guide

8.2 Menu

8.2.1 File menu



8.2.1.1 Read stock from Smarty (CTRL+N)

Allows to read the stock file of your vehicle. In order to upload the stock file to your PC the Smarty first needs to know with which vehicle he has to work with. This can be done in two different ways:

- 1) The Smarty is already VIN# locked to a vehicle. No further action needs to be taken. The Smarty is ready to upload the stock file to the PC.
- 2) The Smarty is not yet VIN# locked to a vehicle (like new out of the box). In this case the Smarty needs to be connected to the vehicle you intend to tune first (key in run position, engine not running) and wait for the main menu to appear on Smarty's display. Once the main menu is displayed, press:
 - a) with the Smarty senior key # "9";
 - b) with the Smarty Junior press keys "<" and ">" at the same time.

Follow the instructions on Smarty's display. This routine will take about two seconds to complete.

The Smarty has to be connected to a free USB port on your PC. The Smarty becomes available for the communication with the PC after a few seconds after it has been connected to the USB port. You need to wait for the main menu to appear on Smarty's display. This takes typically a couple seconds.

A document with the stock software will only be created if a valid VIN# license is available for the connected Smarty. OR if a free VIN# license is available (dongle connected to a USB port) and the customer agrees to use that license.

In the case that several free licenses are connected to the USB ports of the PC, the one connected to the lowest numbered USB port will be used. See also [License](#).

By default the new document is automatically saved on your PC. See the option [Folder Automatic Saving](#), [File Name Numbering](#), with a 3 digit # see the option [File # Length](#).

Warning!

Once a VIN# license has been associated to a VIN# it is NOT possible to unlock it from that VIN#!

See also [Using Smarty with SmartyUDCsw](#) and [SmartyUDCsw documents](#).



SmartyUDCsw - Application Guide



8.2.1.2 Open... (CTRL+O)

Allows to select a file you want to open. It is possible to open multiple files and each of them can be compared to a different file. It is possible to open a Standard and protected file only with a matching VIN# license.

SmartyUDCsw has a (Multi Documents Interface), every time a document is opened a [Tab with file name and close button](#) is added which allows to activate and close the document.

8.2.1.3 Recent documents

Allows to open one of the files that have been opened recently.



8.2.1.4 Save (CTRL+S)

Saves the opened file with the same name.

Modifications can be saved to the Standard documents ONLY. All other document types can NOT be edited and saved!

When the option automatic saving has been disabled, see also [Folder Automatic Saving](#), when a document is saved the customer will be requested to specify a file name and a path where to store the file.



8.2.1.5 Save all

Saves all the opened files with their original names exactly like the [Save](#) command.



8.2.1.6 Save as... (CTRL+MAIUSC+S)

Allows to rename a file and then save it.

The customer can change the path and file name at will for a [Standard document](#).

8.2.1.7 Export sample...

Allows to export a Standard document in .sample format for file sharing. If a customer wishes to share his work with others the standard document needs to be exported as a Sample. The Sample file **does not contain a VIN#** and can be opened by all UDC customers without needing to use a VIN# license. Several Sample documents are included in the UDC tuning software download and are meant as a base to start your own modifications. Not all features can be used with a Sample document!

Feature:

| | |
|-----|---------------------------|
| NO | Edit maps |
| YES | Compare maps |
| NO | Save the changes |
| NO | Write the UDC into Smarty |



SmartyUDCsw - Application Guide

8.2.1.8 Export protected...

Allows to export a standard file on the protected format. The scope of a protected document is to protect your know how and hard work. The protected document can only be written into a Smarty with the matching to the document VIN#. It can not be viewed, used for comparison, or copied. The professional tuner can send these files to his customers without allowing them to see what modifications he has done to the tables contained in it. The encryption of a protected file depends upon the individual Main dongle used for the file. It can NOT be decrypted without THAT dongle! Please keep a back-up of your files!!!

Feature:

| | |
|-----|---------------------------|
| NO | Edit maps |
| NO | Compares maps |
| NO | Save the changes |
| YES | Write the UDC into Smarty |

8.2.1.9 Close

Closes the **active** document. If the [Folder Automatic Saving](#), option has been disabled the user will be asked to specify where the file has to be saved and with which name it has to be saved.

8.2.1.10 Close all

Closes **all** files that have been opened.

Similar to the close command but closes all documents that have been opened at the same time.

8.2.2 Edit menu

8.2.2.1 Foreword undo and redo commands

It is not possible to use the undo and redo commands in the document notes.

By default the max number of consequential undo or redo is limited to 50.

See also the option [Maximum # Of Undo](#).

8.2.2.2 Undo (CTRL+Z)

Allows to return the file to the previous situation before the last change.

See also [Foreword undo and redo commands](#).

8.2.2.3 Redo (CTRL+Y)

Allows to return to the situation before the [Undo](#) has been used.



SmartyUDCsw - Application Guide

See also [Foreword undo and redo commands](#).

8.2.2.4 Foreword selection echo commands

The Echo commands are not active when a multiple selection (in several load ranges at once) has been made. In order to use these commands a selection in a SINGLE load range needs to be done.

At the same time, the Echo commands are active if a selection (one cell or several cells) has been made in a load range.

8.2.2.5 Backward selection echo (ALT+Left)

Allows to repeat the cells that have been [selected](#) in a certain load in the previous load range (numerically lower load range).

Of course, this command can not be active when a selection in the first load range has been made.

8.2.2.6 Full selection echo (ALT+Down)

Allows to repeat the cells [selected](#) in a certain load range in ALL load ranges.

See also [Foreword selection echo commands](#).

8.2.2.7 Forward selection echo (ALT+Right)

Allows to repeat the cells that have been [selected](#) in a certain load in the following load range (numerically higher load range).

Of course, this command can not be active when a selection in the last load range has been made.

See also [Foreword selection echo commands](#).

8.2.2.8 Foreword editing commands

When the unit change has been selected as a percent (%), selected cells which value is zero will not be changed using any of the edit commands. 100% of zero makes still zero...

Furthermore, in the tuning software changes in percent to negative values is considered as if the value was a positive number. This was done to avoid confusion. When a "increase" (facing UP) button is hit, one expects the graph to go UP not down...

It is possible to increase and decrease the values of the single cells only to the max and min limits set for the Map in use.

Remember, a [Sample document](#) is read only.



SmartyUDCsw - Application Guide

8.2.2.9 Large increase (CTRL+Up)

Increases the value(s) of the **selected** cell(s) based upon the settings in the **Unit Changes** window.

See [Foreword editing commands](#).

8.2.2.10 Small increase (CTRL+SHIFT+Up)

Increases the value(s) of the **selected** cell(s) by the **smallest** possible value for the table in use. For example, the smallest value for degrees is 0.1 degrees. The smallest change for the time is 1 micro second. The smallest change for pressure is 1 PSI.

See [Foreword editing commands](#).

8.2.2.11 Restore original values (CTRL+Space)

Returns the value(s) of the the **selected** cell(s) to the original values (previous value(s) to any and all changes).

See [Foreword editing commands](#).

8.2.2.12 Paste from compared values (CTRL+SHIFT+Space)

Copies and pastes the value(s) from the file in comparison of the **selected** cell(s).

This function is available only when the a document (.sample!) is being compared with a .smarty document.

Please see also [Compare with file](#), [Foreword editing commands](#) and [Comparison](#).

8.2.2.13 Small decrease (CTRL+SHIFT+Down)

Decreases the value(s) of the **selected** cell(s) by the **smallest** possible value for the table in use. For example, the smallest value for degrees 0.1 degrees. The smallest change for the time is 1 micro second. The smallest change for pressure is 1 PSI.

See [Foreword editing commands](#).

8.2.2.14 Large decrease (CTRL+Down)

Decreases the value(s) of the **selected** cell(s) based upon the settings in the **Unit Changes** window.

See [Foreword editing commands](#).



SmartyUDCsw - Application Guide

8.2.2.15 Foreword changes ramp

The direction of the selection (left to right rather than from the right to the left) determines the first and last cell used for this function. Thus different selection directions give different results.

8.2.2.16 Increase ramp (CTRL+Add)

Increases the values of the **selected** cells. The maximum percentage is applied in order of the selection (from left to right OR from right to left) to the last selected cell. It is used to help to completely re-shape a "curve" in a load range.

See [Foreword changes ramp](#) and [Foreword editing commands](#).

8.2.2.17 Decrease ramp (CTRL+Subtract)

Decreases the values of the **selected** cells. The maximum percentage is applied in order of the selection (from left to right OR from right to left) to the last selected cell. It is used to help to completely re-shape a "curve" in a load range.

See [Foreword changes ramp](#) and [Foreword editing commands](#).

8.2.3 View menu

8.2.3.1 Default view (CTRL+D)

Returns the selected / active map (1D-2D-3D) to the default view.

8.2.3.2 Zoom fit (CTRL+F)

Returns the 3D map that has been zoomed to a dimension that fits the size of the window.

8.2.4 Smarty menu

8.2.4.1 Read stock from Smarty (CTRL+N)

Allows to read the stock file of your vehicle. In order to upload the stock file to your PC the Smarty first needs to know with which vehicle he has to work with. This can be done in two different ways:

- 1) The Smarty is already VIN# locked to a vehicle. No further action needs to be taken. The Smarty is ready to upload the stock file to the PC.
- 2) The Smarty is not yet VIN# locked to a vehicle (like new out of the box). In this case the Smarty needs to be connected to the vehicle you intend to tune first (key in run position, engine not running) and wait for the main menu to appear on Smarty's display. Once the main menu is displayed, press:



SmartyUDCsw - Application Guide

- a) with the Smarty senior key # "9";
- b) with the Smarty Junior press the keys "<" & ">" at the same time.

Follow the instructions on Smarty's display. This routine will take about two seconds to complete.

Same as [Read stock from Smarty](#) in the File menu.

See also [Using Smarty with SmartyUDCsw](#).



8.2.4.2 Write file to Smarty... (CTRL+F)

When the Smarty is connected to the USB port with a standard USB printer cable (included with the Main Dongle) the UDC modified (or not, this means that it is also possible to write the the stock parameters into Smarty) tables for your vehicle can be transferred from the PC to the Smarty.

Attention!

The .smarty software (standard document) contains the VIN# of the vehicle you're tuning. Only when the VIN#'s in the tuning file & Smarty & the vehicle are matching will this process be completed. It is not possible to write a Demo or Sample software into the Smarty! These documents do NOT contain a VIN#.

Please keep a backup of your custom tuned files! It is not possible to read them from the Smarty!

See also [Using Smarty with SmartyUDCsw](#).

8.2.4.3 Read info of Smarty...

Allows to read the firmware version from the Smarty (when connected to the PC).

See also [Using Smarty with SmartyUDCsw](#).



SmartyUDCsw - Application Guide

8.2.4.4 Smarty update...

The “**Detect**” button verifies which Smarty is connected to the PC and selects it from the drop down menu. In addition, the most relevant parameters like firmware revision and level are displayed.

When the “**Detect**” button is used, the text windows display the information read from the Smarty like **Model**, **Firmware version** and **Software version**.

The drop down menu **Smarty model** allows to select manually which Smarty model needs to be updated. Use this menu if the Smarty does not already have a UDC firmware installed since the previous (older before UDC) firmware's do not have the ability to communicate automatically with the PC.

If the check box **Show the ME softwares** is checked, the list will contain only ME softwares, if present, and show the related disclaimer.

The drop down menu **Smarty updates available** allows the selection of the update for the selected Smarty. Depending upon the Smarty model more than one update can be available. Please select the one you need to install.

The **Comments** window displays the eventual information of the selected update.

The **Download** button downloads (through the web!) the selected update onto the PC in use and stores it on the hard drive. **Internet connection is needed!**

Once the right update has been downloaded onto the PC, the **Update >** button does the un-zip of the .smt file and launches the SmartyUSB software. The update of the Smarty through the Smarty USB software is **NOT** automated! The customer needs to acknowledge and click on the **Send** button menu. Now the update process starts and completes without any further customer intervention.



SmartyUDCsw - Application Guide

8.2.5 Comparison

8.2.5.1 Compare with a file... (CTRL+K)

Opens a second file and lays it over the first file that has been opened.

It is only possible to compare files for the same Smarty and vehicle! i.e. it is not possible to compare a file from a JR with an SSR file.

The sample files are read only and can not be modified!

The colors and way of visualization of the comparison file can be customized in the basic options.

Please see also [Document Appearance](#).

The basic option [Mode Of Default Folder Of Document Compare](#) is set by default so that ta file is saved automatically in the folder where the files for that vehicle and Smarty model reside.

8.2.5.2 Remove comparison (CTRL+SHIFT+K)

Closes the active comparison file.

8.2.6 Tools menu

8.2.6.1 Update 'UDC settings'...

Checks for updates for the "[UDC settings](#)" parameters used by the tuning software.

Updates the UDC definitions from the hard drive or the inter net.

During the download from the internet NO information are collected from your PC!

8.2.6.2 Quit the download of the 'UDC settings' update...

Quit the download of the "[UDC settings](#)" update.

8.2.6.3 Info of 'UDC settings'...

Displays the version and revision of the "[UDC settings](#)" in use.

8.2.6.4 Info of document 'UDC settings'...

Provides all information about the "[UDC settings](#)" used to edit the file in use.



SmartyUDCsw - Application Guide

8.2.6.5 Basic options...

Allows for the customization of several functions in the tuning software.

Some changes to the options become active immediately. Others will be applied only to the next document, others again only upon the next start of the tuning software! In the last two cases an alert window will appear and display the needed information.

See [Basic options details](#).

8.2.6.6 User data...

The Tuner information which will be saved in the "Protected" files and displayed when a protected file is opened.

8.2.7 Help menu

8.2.7.1 Quick guide...

Opens the quick guide.

8.2.7.2 Application guide...

Opens this guide.

8.2.7.3 Tuning tips...

Opens the tuning tips.

8.2.7.4 Web site 'SmartyUDCsw'

Opens the MADS Electronics home page.

8.2.7.5 About...

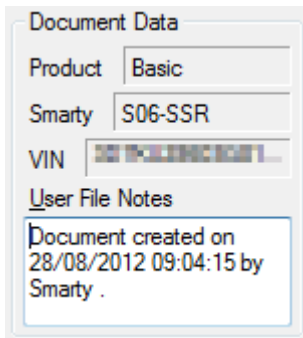
Displays the version of the UDC Tuning software.



SmartyUDCsw - Application Guide

8.3 Left panel

8.3.1 Document Data



8.3.1.1 Product version

The UDC tuning software product version.

It displays whether the software is run as a Demo or fully functional Basic version. If the UDC software is started without the main dongle connected to a USB port on the PC then by default it'll start as a Demo version only.

8.3.1.2 Smarty

The Smarty type of the opened document.

8.3.1.3 VIN

The VIN# used in the opened document and it has been locked to.

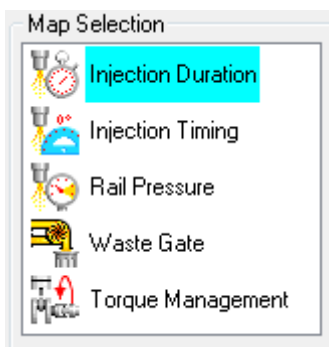
8.3.1.4 User File Notes

For user notes and input on the tuning file.

Displays the user notes for the active document.

The User File Notes are in read only for the **Demo documents**, **Sample documents** and protected **Protected documents**, while they are in read and write mode for the **Standard documents**.

8.3.2 Map Selection



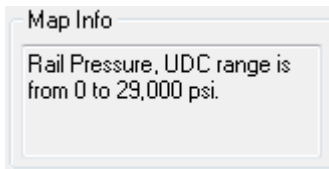
Selection of the table(s) in which modifications need to be done.

A single (left)click to select a table.



SmartyUDCsw - Application Guide

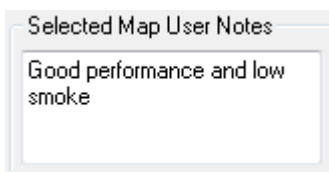
8.3.3 Map Info



Important information about the tables which can be worked on are displayed here. The defined maximum and minimum values are found here.

This window is read only for all documents.

8.3.4 Selected Map User Notes



Customer notes for each single Map can be input here.

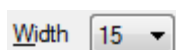
The Selected Map User Notes are in read only for the [Demo documents](#), [Sample documents](#) and [Protected documents](#), while they are in read and write mode for the [Standard documents](#).



SmartyUDCsw - Application Guide

8.4 Controls around the document

8.4.1 Width



To set the number of cells displayed in the 2D graph.

Then lower the value then more cells are displayed.

8.4.2 Check button pan / rotate

The use of this button allows to rotate the 3D graph with the scroll bars.



In Scroll mode.



In rotation mode.

8.4.3 Horizontal scroll bar



Moves the selected graph left / right (where possible).

8.4.4 Vertical scroll bar



Moves the selected graph up / down (where possible).



SmartyUDCsw - Application Guide

8.5 Right panel

8.5.1 Main commands panel



The main panel with the most used tools for the modifications to the software tables. For details please see also the [Edit menu](#).

Only the buttons with a dark gray border are active. Which buttons and functions become active depends upon which kind of document has been opened, if a selection of points has been made, which view has been selected (Table, 2D or 3D), etc.

All functions in the Main commands panel are also present in the file menus.

See also [File menu](#), [Edit menu](#) and [View menu](#).

8.5.2 Vertical track bar



The vertical track bar is most important for smoothing the "curves". It's function is meant to work mainly with the 2D graph. (It works also with the 3D view but it's more difficult to actually see the smoothness or roughness in the 3D graph.)

Dragging up the cursor "deforms" the view of the table in it's X axis so that the differences between the single cells become more evident. What may look smooth without activating this function may in reality not be so. It is always a good idea to use this function after the first rough adjustments have been done. Anyhow, depending upon the goal of the tuning, smoothness is not always a good thing.



SmartyUDCsw - Application Guide

8.5.3 Info cell Current / Cursor

| Info cell Current / Cursor | |
|-----------------------------|------------|
| Engine (rpm) | |
| 3,300 | 3,600 |
| Load (%) | |
| 93.9/100.0 | 93.9/100.0 |
| Duration (µs) of Actual | |
| 2,897 | 3,471 |
| Duration (µs) of Original | |
| 1,316 | 1,890 |
| Duration (µs) of Comparison | |
| 1,800 | 2,794 |
| Cursor Act. - Orig. | 1,581 |
| Cursor Act. - Comp. | 677 |

This panel shows the value(s) of the cell(s) that have been selected with the cursor. It displays also the RPM and the load range of the selected cell.

“Original” displays the value of a selected cell like it originally was when the document has been opened.

“Actual” displays the value of a selected cell that has been modified since the document has been last opened. When the value of cell has been modified then “Original” and “Actual” will display two different values. If no changes have been made then the fields “Original” and “Actual” will display the same value.

The field “Cursor Act. - Orig.” displays the numerical difference between the original and actual value of the selected cell.

The field “Cursor Act. - Comp.” displays the numerical difference between the original and the value of the file in comparison of the selected cell.

The left column is to the current point, the right one the point under the mouse cursor.

The second last line displays the value difference between the current (actual) point and the original value of that point.

The last line displays the value difference between the current (actual) point and the value of the comparison file in use.

8.5.4 Unit Changes

| Unit Changes | | | |
|----------------------------|------------|-----------|---------|
| Percent | Multipl... | Small ... | Larg... |
| <input type="checkbox"/> % | 100 x | 1 | = 100 |

This field allows to define by how many units the large change buttons will increase or decrease the selected cell(s). The small change unit is fixed and can not be changed by the customer. It's value is always as small as possible for the table in use. This allows for very fine changes.

To set the large changes to a value of choice, a number needs to be typed into the “Multiplier” field. As in the picture, “Multiplier” = 100 “Small” = 1 the result is that the large change buttons will change the value of the selected cells 100 times the value of the small change, AKA “100”. When the “%” check box is selected then all changes made will be in percent.

8.5.4.1 Percentage (%)

The percentage works only with the [Large increase](#) and [Large decrease](#) commands!



SmartyUDCsw - Application Guide

8.5.4.2 Multiplier or Percentage (X)

The multiplier applied to value of the small change to set the desired large change value. If the Percentage box has been checked (is active) then the applied changes are in %.

8.5.4.3 Small change (S)

Value set by default to the commands [Small increase](#) and [Small decrease](#).

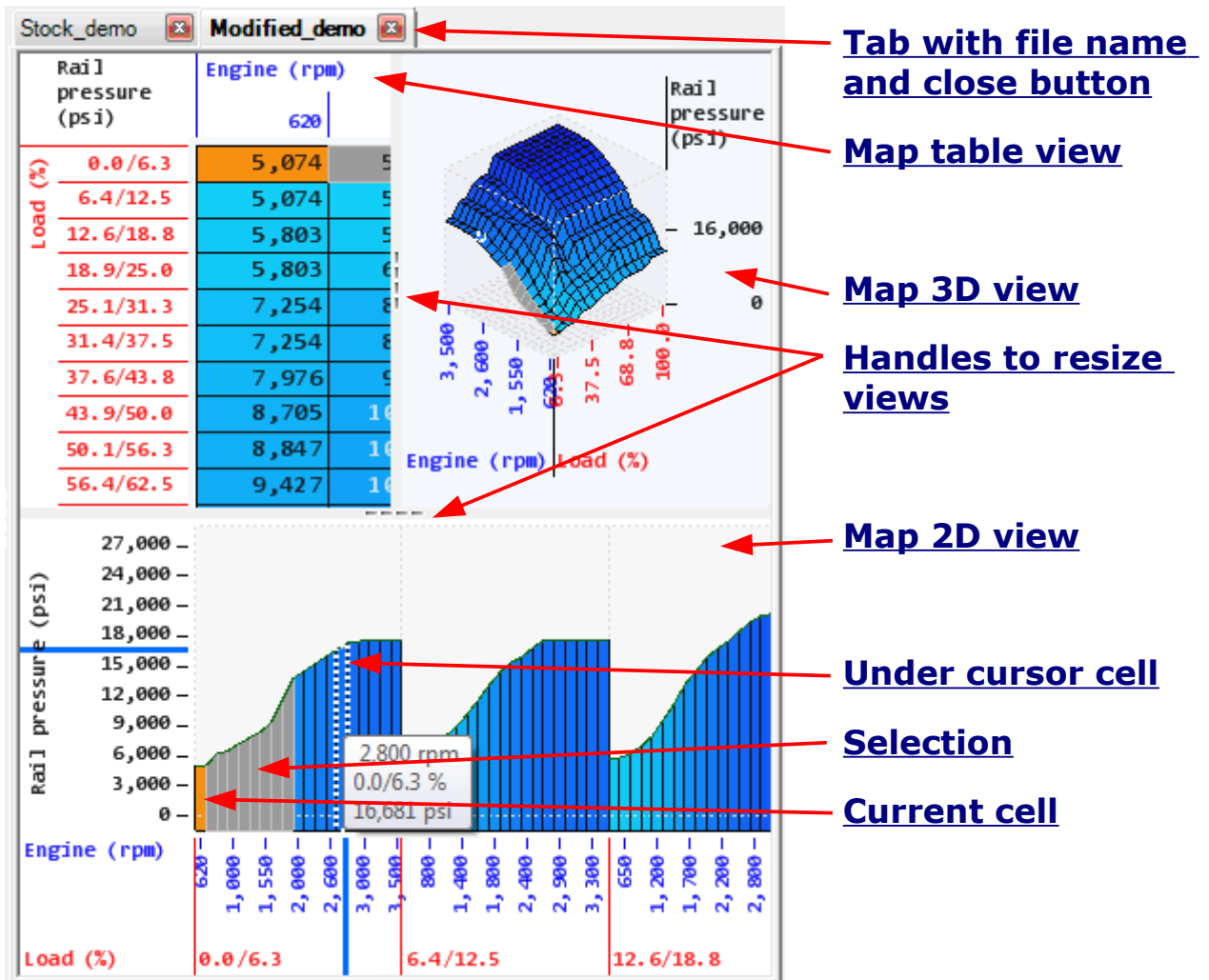
8.5.4.4 Large change (L)

Calculated value of the [Large increase](#) and [Large decrease](#).



SmartyUDCsw - Application Guide

8.6 Document tab



8.6.1 Tab with file name and close button

The active (in use) document-tab is displayed in a clear color and **bold** text.

If multiple documents have been opened, only one of them can be used at a time. Clicking on one of the tabs will select that document and that Tab will turn clear and bold. Opening several documents at the same time can become confusing and is recommended only for exercised users!

Clicking on the X in the tab will close that document.

Any action or change done will become effective only in the active document!





SmartyUDCsw - Application Guide


8.6.2 Handles to resize views


Left clicking and dragging the handle is used to resize the view of a table. These commands are interactive.


 Vertical resize.

 Horizontal resize.


 Vertical resize. This icon appears when a window (view) becomes too small to display any useful information. Releasing the left click the split view will be moved to the lower border of the screen in order to maximize the area of the windows on the top of the screen. To return the window to it's original size simply double click (left) on the icon.


 Vertical resize. This icon appears when a window (view) becomes too small to display any useful information. Releasing the left click the split view will be moved to the upper border of the screen in order to maximize the area of the windows on the bottom of the screen. To return the window to it's original size simply double click (left) on the icon.

 Horizontal resize. This icon appears when a window (view) becomes too small to display any useful information. Releasing the left click the split view will be moved to the left border of the screen in order to maximize the area of the windows in the right side screen. To return the window to it's original size simply double click (left) on the icon.


 Horizontal resize. This icon appears when a window (view) becomes too small to display any useful information. Releasing the left click the split view will be moved to the right border of the screen in order to maximize the area of the windows in the left side screen. To return the window to it's original size simply double click (left) on the icon.


8.6.3 Images of the cursor in the maps views


 No change to the views is allowed.

 Only vertical movements of the screens are allowed.

 Only horizontal movements of the screens are allowed.

 Both vertical and horizontal movements of the screens are allowed.

 Moving the mouse rotates the 3D view.

 Zoom to the active window. Moving the mouse up / down will zoom in and zoom out. (3D only).



SmartyUDCsw - Application Guide

8.6.4 Map table view

| Timing (°) | Engine (rpm) | | |
|------------|--------------|-------|-------|
| | 400 | 600 | 650 |
| 0.0/6.3 | 3.0- | 4.0- | 4.0- |
| 6.4/12.5 | 3.0- | 4.6- | 4.0- |
| 12.6/18.8 | 3.0- | 4.6- | 4.0- |
| 18.9/25.0 | 3.0- | 5.0- | 4.0- |
| 25.1/31.3 | 5.0- | 8.5- | 7.0- |
| 31.4/37.5 | 8.9- | 9.9- | 10.1- |
| 37.6/43.8 | 12.1- | 11.1- | 10.8- |
| 43.9/50.0 | 12.1- | 11.5- | 11.5- |
| 50.1/56.3 | 12.1- | 12.3- | |
| 56.4/62.5 | 12.1- | 12.8- | |
| 62.6/68.8 | 8.1- | 12.8- | 12.8- |
| 68.9/75.0 | 0.0+ | 12.8- | 12.8- |
| 75.1/81.3 | 0.0+ | 12.8- | 12.8- |
| 81.4/87.5 | 0.0+ | 12.8- | 12.8- |

X-axis: Engine (rpm) values (400, 600, 650)
Y-axis: Timing (°) values (0.0/6.3 to 81.4/87.5)
Z-axis (cells): Individual data points in the table cells
Current cell: The cell currently selected (e.g., 5.0- at 18.9/25.0°)
Selection: A group of cells highlighted together
Under cursor cell: The cell currently under the mouse cursor (e.g., 10.8- at 37.6/43.8°)
Under cursor cell info: A tooltip showing details for the under cursor cell: 650 rpm, 37.6/43.8 %, 10.8- °

8.6.4.1 Keyboard and mouse buttons

Navigation:

Pan

Right Mouse

Selection:

Single
 Sequential
 Zone
 Multiple add/remove
 Remove all

Click **Left Mouse** over map cell
 Press **Left Mouse** and drag mouse over map cells
SHIFT + Click **Left Mouse** over start and end map cells
CTRL + Click **Left Mouse** over map cells
ALT + Click **Left Mouse** or Click **Left Mouse** in the background of the map

Editing:

Change

CTRL + **SHIFT** + Press **Left Mouse** and drag mouse

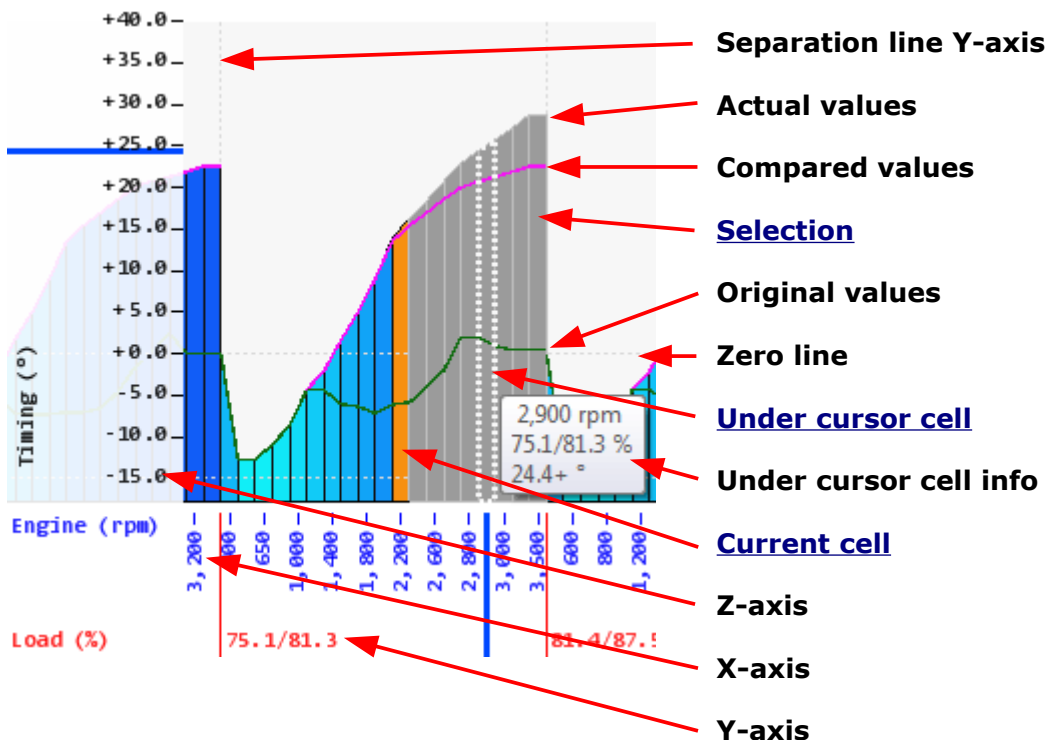
See [Edit menu](#) and [View menu](#) for other key combinations.

To customize the appearance of the documents please see [Document Appearance](#).



SmartyUDCsw - Application Guide

8.6.5 Map 2D view



8.6.5.1 Keyboard and mouse buttons

Navigation:

Pan

Right Mouse

Selection:

Single

Sequential

Zone

Multiple add/remove

Remove all

Click **Left Mouse** over map cell

Press **Left Mouse** and drag mouse over map cells

SHIFT + Click **Left Mouse** over start and end map cells

CTRL + Click **Left Mouse** over map cells

ALT + Click **Left Mouse** or Click **Left Mouse** in the background of the map

Editing:

Change

CTRL + **SHIFT** + Press **Left Mouse** and drag mouse

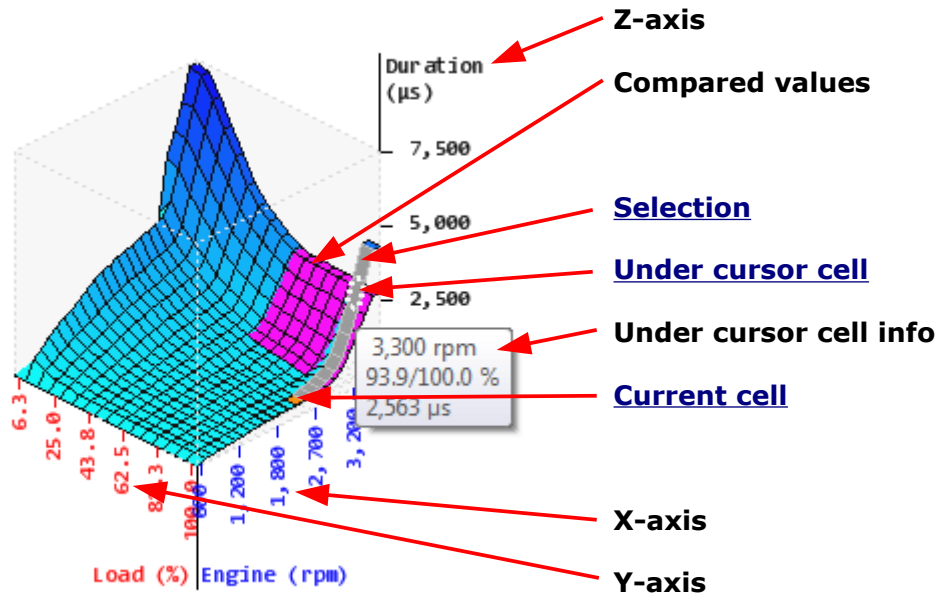
See [Edit menu](#) and [View menu](#) for other key combinations.

To customize the appearance of the documents please see [Document Appearance](#).



SmartyUDCsw - Application Guide

8.6.6 Map 3D view



8.6.6.1 Keyboard and mouse buttons

Navigation:

Pan
Rotate
Zoom

CTRL + Right Mouse
Right Mouse
SHIFT + Right Mouse

Selection:

Single
Sequential
Zone
Multiple add/remove
Remove all

Click **Left Mouse** over map cell
Press **Left Mouse** and drag mouse over map cells
SHIFT + Click **Left Mouse** over start and end map cells
CTRL + Click **Left Mouse** over map cells
ALT + Click **Left Mouse** or Click **Left Mouse** in the background of the map

Editing:

Change

CTRL + SHIFT + Press **Left Mouse** and Drag Mouse

See [Edit menu](#) and [View menu](#) for other key combinations.

To customize the appearance of the documents please see [Document Appearance](#).



SmartyUDCsw - Application Guide

8.6.7 Selection

Several cells may be selected at the same time. To do this, select the initial cell with the mouse (left click) then keep the left click pressed and drag to the last cell of the selection of choice. When a selection has been made, the values of the selected cells can be changed all at the same time. By how much the value will be changed depends upon the selection made in the [Unit Changes](#) window.

It is also possible to "echo" the selection to the previous or next load range(s)

Please see also the [Edit menu](#) menu or the [Main commands panel](#).

The color of the selection can be customized. Please see also [Selection Color](#).

There are several possible ways to make a selection:

| | |
|---------------------|--|
| Single | Click Left Mouse over map cell |
| Sequential | Press Left Mouse and drag mouse over map cells |
| Zone | SHIFT + Click Left Mouse over start and end map cells |
| Multiple add/remove | CTRL + Click Left Mouse over map cells |
| Remove all | ALT + Click Left Mouse or Click Left Mouse in the background of the map |

8.6.8 Current cell

The current cell (or point) is part of a selection.

The current cell (or point) can be the first or the last point in a selection. This depends upon the setting made in the options: [Last Cell Selected Is Current](#). This again depends upon if the highest or lowest value in a selection needs to be displayed and analyzed.

It is possible to customize the color of the current cell (or point) with the option [Current cell Color](#).

The information about the current cell (or point) are displayed in the first column of the [Info cell Current Cursor](#) windows.

8.6.9 Cell under the mouse cursor

Used to visualize the information of one cell. Even when a selection has been made it is still possible to move the mouse cursor over the active graph. A pop up window will display the information about the selected cell.

The information about the cell under the mouse cursor are displayed in the second column of the [Info cell Current / Cursor](#) windows.



9 Basic options details

9.1 Foreword basic options

The customer information are saved in the file: ApplicationOptions.dat which can be found in the folder: <User Application Data>\SmartyUDCsw on your computer.

During the installation a link to the folder is created which contains the ApplicationOptions.dat **Start\All programs\M.A.D.S. Electronics Srl\SmartyUDCsw\Link to User settings.**

Any value that has been changed is in evidence as a **bold** text, except the the font options.

9.2 Generic Application Behavior

9.2.1 Activation Application Tips

If set to "true" the application tips are active. Set to "false" disables the application tips.

9.2.2 Display Application Tips (ms)

Time the tips are shown in milliseconds.

9.2.3 Active Application LOG

When True, the software produces a log file in the folder ...\Documents\SmartyUDCsw.

9.2.4 Auto Update 'UDC settings'

When true, checks for the presence of updates to the "[UDC settings](#)" and eventually downloads and installs the most recent version.

9.3 Document file Behavior

9.3.1 Auto Open File

Allows to define which document has to be opened at the next start of the UDC software. The possible options are:

| | |
|-------------------------------|--|
| None | no document will be opened; |
| ActiveWhenWindowsClose | the document that was open when the UDC software |



SmartyUDCsw - Application Guide

LastOpened
LastSaved

has been closed;
the last document which has been opened;
the last document that has been saved.

9.3.2 Folder Automatic Saving

The documents will be saved in the path specified in this field. By default the documents will be saved in: **<MyDocuments>\SmartyUDCsw**. When this field is blank there will be no automatic saving for the new documents and the customer needs to specify a folder where to save a document every time he wants to save a file.

This option also determines which folder will be used to open .sample documents. By default it is set to: **DefaultFolderForSavingAutomatic**.

9.3.3 File Name Numbering

There are two different ways to save a document automatically:

Sequential the suffix of the file name is numbered sequentially,
see also [File # Length](#);
DateAndTime suffix of the file name with date and time.

9.3.4 File # Length

The number of digits used for the suffix with the automatic-sequential file name numbering.

9.3.5 Mode Of Default Folder Of Document Compare

There are two different ways to choose from which folder a comparison file is opened:
DefaultFolderForSavingAutomatic the same folder as the automated file saving;
CurrentDocumentFolder the folder of the active document.

9.4 Document Behavior

9.4.1 Activation Cursor On Maps Tips

If set to true the tips for the cursor on the maps are displayed.

9.4.2 Display Cursor On Maps Tips (ms)

The time in milliseconds for displaying the tips for the cursor on the maps.

9.4.3 Activation Hardware Acceleration

If true the hardware acceleration for the views (Table, 2D & 3D) is active. If set to false no hardware acceleration is used. Without the hardware acceleration the view refresh rate will become slower.



SmartyUDCsw - Application Guide

9.4.4 Maximum # of undo

Max number of undo for every table in the document.

9.4.5 Last Cell Selected Is Current

When set to true the last cell of a selection will be used as the current point and displayed in the values windows. If set to false the first point in the selection will become the current point and it's values will be displayed.

9.4.6 Shift Direction

Set to standard the direction of the movement of the maps will be in the same direction as the mouse is moved. When this option is set to Reversed then the movement of the maps will be in the opposite direction of the mouse.

9.4.7 Rotation Direction

Set to standard the direction of the rotation of the maps will be in the same direction as the mouse is moved. When this option is set to Reversed then the rotation of the maps will be in the opposite direction of the mouse.

9.5 Document Appearance

9.5.1 Layout Viewports Map

The way the three different windows are arranged on the screen:

Horizontal_Table_Left_Top_3D_Right_Top_2D_Bottom;
Horizontal_2D_Top_Table_Left_Bottom_3D_Right_Bottom.

9.5.2 Actual Color

The text color used in the tables.

9.5.3 Shows Original in 1D

When set to true shows the original map in the table window.

9.5.4 Shows Original in 2D

When set to true shows the original map in the 2D window.

9.5.5 Shows Original in 3D

When set to true shows the original map in the 3D window.



SmartyUDCsw - Application Guide

9.5.6 Original Color

The color in which the original values (values of the table when it has been opened) of a table are displayed. This color is used for the text and for the lines of the original values in the 2D and 3D views.

9.5.7 Original Thickness Proportions

The thickness of the lines used to show the original values.

9.5.8 Shows Comparative 1D

When set to true, shows the values of the file in comparison in the 1D (table) window.

9.5.9 Shows Comparative 2D

When set to true, shows the values of the file in comparison in the 2D window.

9.5.10 Shows Comparative 3D

When set to true, shows the values of the file in comparison in the 3D window.

9.5.11 Comparative Color

The color in which the original values (values of the table when it has been opened) of a comparison file are displayed. This color is used for the text and for the lines of the original values in the 2D and 3D views.

9.5.12 Comparative Thickness Proportions

The thickness of the lines used to show the values of the file in comparison.

9.5.13 Load Map Colors

The possible colors for the single load ranges are:

| | |
|--------------------|--|
| Alternate | alternating colors, CyanoToBlue and YellowToRed; |
| CyanoToBlue | from cyan to blue (minimum to maximum value); |
| YellowToRed | from yellow to Red (minimum to maximum value). |

9.5.14 Current Cell Color

Color of the cell selected as the current one. Depending upon the setting in [Last Cell Selected Is Current](#) it can be the first or the last point of a selection.

9.5.15 Selection Color

The color in which a selection is displayed.



SmartyUDCsw - Application Guide

9.5.16 Font of Maps Labels

The Font used for the labels.

9.5.17 Font of Table Map Values

The Font used for the values in the tables.

9.5.18 Ratio Threshold Values Clear Text

The ratio used for the passage of the colors from dark to light in regards of the values of the table.



10 Shortcuts

10.1 File

| | |
|-------------------------|------------------------|
| CTRL + N | Read stock from Smarty |
| CTRL + O | Open... |
| CTRL + S | Save |
| CTRL + SHIFT + S | Save as... |

10.2 Edit

| | |
|-----------------------------|----------------------------|
| CTRL + Z | Undo |
| CTRL + Y | Redo |
| ALT + Left | Backward selection echo |
| ALT + Down | Full selection echo |
| ALT + Right | Forward selection echo |
| CTRL + Up | Large increase |
| CTRL + SHIFT + Up | Small increase |
| CTRL + Space | Restore original values |
| CTRL + SHIFT + Space | Paste from compared values |
| CTRL + SHIFT + Down | Small decrease |
| CTRL + Down | Large decrease |
| CTRL + Add | Increase ramp |
| CTRL + Subtract | Decrease ramp |

10.3 View

| | |
|-----------------|--------------|
| CTRL + D | Default view |
| CTRL + F | Zoom fit |

10.4 Smarty

| | |
|-----------------|-------------------------|
| CTRL + N | Read stock from Smarty |
| CTRL + W | Write file to Smarty... |

10.5 Comparison

| | |
|-------------------------|-----------------------|
| CTRL + K | Compared with file... |
| CTRL + SHIFT + K | Remove comparison |



11 Mouse buttons in the map views

11.1 Map table view

Right Mouse

Pan

Click **Left Mouse** over map cell

Single selection

Press **Left Mouse** + drag mouse over map cells

Sequential selection

SHIFT + Click **Left Mouse** over start and end map cells

Zone selection

CTRL + Click **Left Mouse** over map cells

Multiple selection

ALT + Click **Left Mouse** or Click **Left Mouse** in the background

Remove selection

CTRL + **SHIFT** + Press **Left Mouse** + drag mouse

Change values

11.2 Map 2D view

Right Mouse

Pan

Click **Left Mouse** over map cell

Single selection

Press **Left Mouse** + drag mouse over map cells

Sequential selection

SHIFT + Click **Left Mouse** over start and end map cells

Zone selection

CTRL + Click **Left Mouse** over map cells

Multiple selection

ALT + Click **Left Mouse** or Click **Left Mouse** in the background

Remove selection

CTRL + **SHIFT** + Press **Left Mouse** + drag mouse

Change values

11.3 Map 3D view

CTRL + **Right Mouse**

Pan

Right Mouse

Rotate

SHIFT + **Right Mouse**

Zoom

Click **Left Mouse** over map cell

Single selection

Press **Left Mouse** + drag mouse over map cells

Sequential selection

SHIFT + Click **Left Mouse** over start and end map cells

Zone selection

CTRL + Click **Left Mouse** over map cells

Multiple selection

ALT + Click **Left Mouse** or Click **Left Mouse** in the background

Remove selection

CTRL + **SHIFT** + Press **Left Mouse** + drag mouse

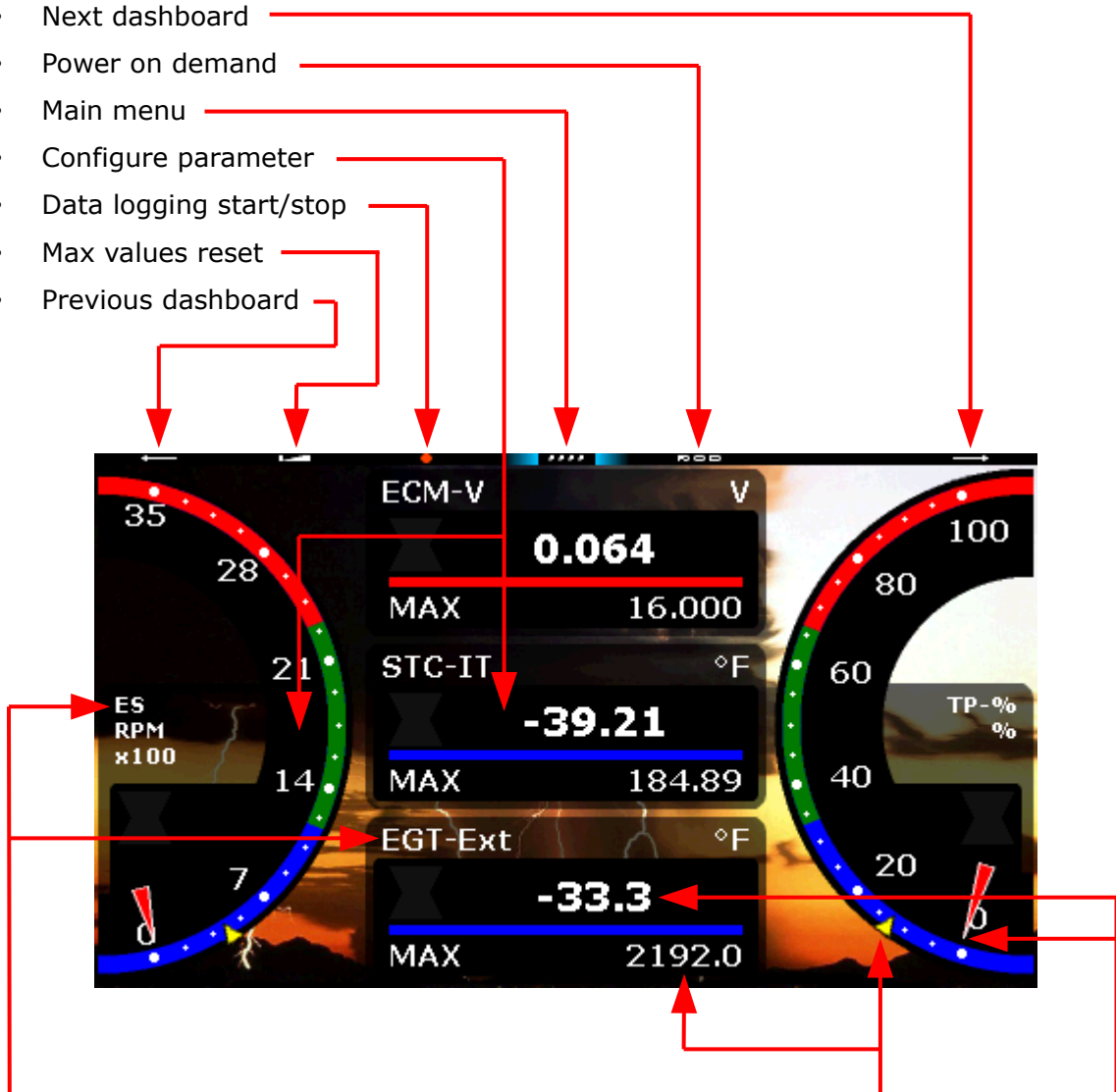
Change Selection

1 User interface

1.1.1 Dashboard

Touch here to:

- Next dashboard
- Power on demand
- Main menu
- Configure parameter
- Data logging start/stop
- Max values reset
- Previous dashboard



ECM Parameter:

- Short name, measurement unit and multiplier
- Maximum value reached
- Actual value



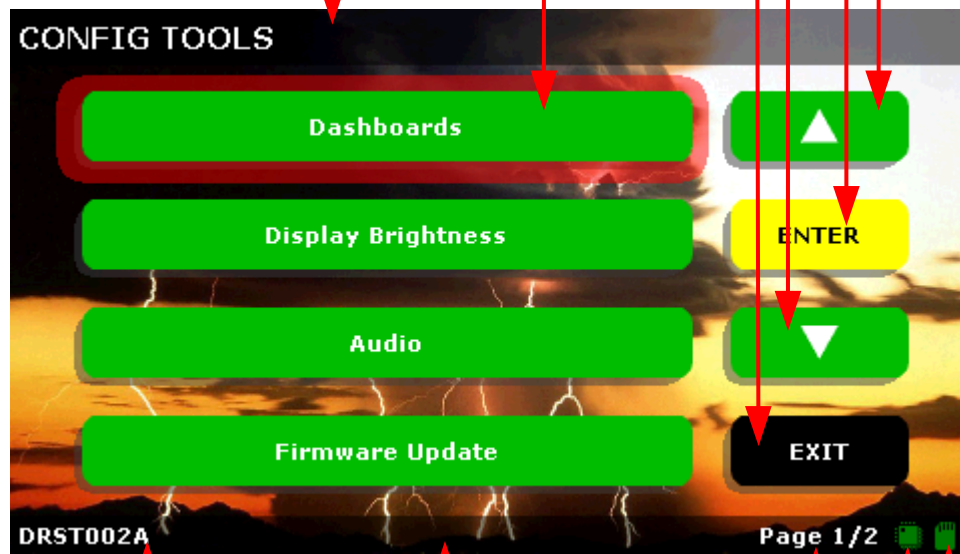
SMARTY Touch - Quick Guide

1.1.2 List menu

Touch here to:

- Select previous item
- Enter the selected item
- Select next item
- Exit
- Directly enter the selected item

Title bar



Data version/Notes

Status bar

Number of actual and total pages

ECM communication status:

- Red = no communication
- Yellow = partial communication
- Green = complete communication

SD card status:

- Red = not present or faulty
- Yellow = check in progress
- Blue = check in pause
- White = not readable
- Green = ready



#1 in Dodge Cummins Performance

Smarty UDC Software - Custom tuning made Easy

Introduction

UDC stands for **User Defined CaTCHER**. The Smarty **UDC** tuning software (PC based) is an ADDITION to the already existing Smarty tuners. This means that the tuning software can be used with any Smarty product, both already sold or new.

The concept

The Smarty tuner retains all of its actual features. I.E. all power levels, options and possible settings remain "as is". In addition to the previous features there is now the possibility for the customer to program the Smarty with his own modified parameters to fine tune his truck. One more power level is added to Smarty's menu. The **User Defined CaTCHER**.

How it works

First thing, the Smarty tuner needs to be upgraded with the **UDC** feature. This is simply done by updating the tuner with a new software release which will become available for free download from our website. (Once the **UDC** software is released the tuners will leave our facility with the **UDC** feature already installed)

Then the Smarty **UDC** software will be able to identify the software for THAT truck and provide certain STOCK parameters to the customer which can be tuned at will.

Once the customer has modified the stock parameters on the PC to his needs, he will then download that SW to the Smarty. Now, the Smarty can program his truck with the **User Defined CaTCHER** level.

Easy tuning!

Our highest priority for the **UDC**: **"it has to be as simple as possible!"**. Any professional tuner will tell you that the most time consuming part in custom tuning is working out the right "base tune". I.E. a tune where all the parameters needed for the increased performance (like: torque limiters, fuel limiters, boost limiters, just to mention very few) are finely matched. There are hundreds of parameters that need to come together for a smooth, powerful and trouble free base tune! That requires broad knowledge and hundreds if not thousands dyno runs! AKA weeks if not months or years!

With the **UDC**, as the base software, the highest **CaTCHER** in the Smarty is used and the customer then needs to fine tune only the most performance relevant parameters.

For the CR 5.9L these engine operation parameters are :

- 1) Duration (how long the fuel is injected->The fuel quantity.)
- 2) Timing (when the fuel is injected in relation to the TDC)
- 3) Rail Pressure
- 4) Wastegate opening pressure (where applicable)
- 5) Torque management (more or less sensitive throttle)

It is now possible in very short time to finely match the above mentioned parameters to the truck's needs. **In addition**, we will provide "**sample**" tunes from the **real** tuning world. It is then possible to copy all (or part !) of these into each customer's software. A very good starting point for everybody's needs! Combine this with the "**tuning tips**" that we provide in the **UDC** software and fine tuning becomes **E A S Y !**



#1 in Dodge Cummins Performance

A few SW operation details

- The previously mentioned tuning "sample files" can be modified and if wanted shared.
- It is possible to write a modified file into Smarty but it can **NOT** be read later on! This is most important for example the tuning shop that needs to protect the hard work.
- The software(s) we write into the ECM is protected against read out. Same reason as above.
- We do NOT read out the ECM! We don't need to. We don't want to! Smarty already has the software's for all trucks on board. Smarty only needs to identify the truck (Year / Tranny / Emissions / VIN#) this takes two seconds (Needed only if Smarty is not already VIN# locked).
- The features like the ability to alter certain parameters like for example the speed limiter ; rev limiter; shift defuel; depend upon the Smarty (JR or Sx) NOT upon the **UDC** SW!
Example: the JR does not provide the option to raise the rev limiter; that's not going to change even with the **UDC**. Those parameters remain in Smarty's options.
- Today, we're bringing to you the "Basic" tuning software version which allows to change the most important performance parameters. The "Professional" version is also in the works. The professional version will have hundreds of possible parameters to be worked on.
Of course the professional version will be more expensive than the Basic one. It will be possible to upgrade the Basic license to the Professional one.
- The first release will be for the S06PoD (Covers the 5.9L CR from 2003 to 2007). The SSR version is in the works and will follow shortly after the initial release. All other versions for the VP and 6.7L trucks will follow ASAP. It's a lot of work...
- The Smarty **UDC** software will work only in combination with USB dongles.
There will be a "main" dongle which enables the software to run and also contains **ONE** VIN# license. If more than one truck (VIN #) needs to be tuned with the **UDC** SW (tuning shops come to mind) then separate "license" dongles will be needed. One dongle, one VIN# license.
- There is no limit to the number of licenses that can be used with the same software but the Smarty will remain as is; one truck at a time. In other words, multiple vehicles require multiple Smarty's and license dongles but only one tuning software.
- The **UDC** SW will be downloadable from our web site but will work only when combined with a main dongle



#1 in Dodge Cummins Performance

THIS IS A HIGH PERFORMANCE PRODUCT USE AT YOUR OWN RISK

**This product is intended for OFF ROAD USE ONLY
This product is not intended to be used to break the law**

Do not use this product until you have read the following agreement.
This agreement sets forth the terms and conditions for the use of this product.

The installation of this product indicates that the buyer has read and understands this agreement and accepts the terms and conditions.

DISCLAIMER OF LIABILITY

Smarty Performance King, it's distributors, jobbers and dealers (hereafter Seller) shall be in no way responsible for the product's proper uses and service. THE BUYER HEREBY WAIVES ALL LIABILITY CLAIMS.

The buyer acknowledges that he is not relying on the Sellers skill or judgement to select or furnish goods suitable for any particular purpose and that there are no liabilities which extend beyond the description on the face hereof, and the buyer hereby waives all remedies or liabilities expressed or implied, arising by law or otherwise (including without any obligation of the seller with respect fitness, merchantability and consequential damages) whatever or not occasioned by thesellers negligence.

The Seller disclaims any warranty and expressly disclaims any liability for personal injury and damages. The buyer acknowledges and agrees that the disclaimer of any liability for personal injury is a material term for this agreement and the buyer agrees to indemnify the Seller and to hold the Seller harmless from any claim related to the item of the equipment purchased. Under no circumstances will the seller be liable for any damages or expenses by reason of use or sale of any such equipment.

The Seller assumes no liability regarding the improper installation or misapplication of its products.
It is the installers responsibility to check for proper installation and in doubt contact the manufacturer.

The buyer is solely responsible for all warranty issues from the manufacturer.

LIMITATION OF WARRANTY

Smarty Performance King (Hereafter Seller) gives Limited Warranty as to description, quality, merchantability, and fitness for any particular purpose, productiveness, or any other matter of the Seller's product sold herewith. The Seller shall be in no way responsible for the products proper use and service and the buyer hereby waives all rights other than those expressly written herein. This warranty shall not be extended, altered or varied except to be a written instrument signed by Seller and Buyer.

The warranty is limited to one (1) year from the date of sale and limited solely to the parts contained within the products kit. All products that are in question of warranty must be returned prepaid to the Seller and must be accompanied by a dated proof of purchase receipt. All Warranty claims are subject to approval by **Smarty Performance King**.

Under no circumstances will the Seller be liable for any labour charged or travel time incurred by in diagnosis for defects, removal, or reinstallation of this product or any other contingent expenses.

Under no circumstances will the Seller be liable for any damage or expenses incurred by reason of the use or sale of any such equipment.

In the event that the buyer does not agree with this agreement: THE BUYER MAY PROMPTLY RETURN THIS PRODUCT, IN A NEW AND UNUSED CONDITION, WITH A DATED PROOF OF PURCHASE TO THE PLACE OF PURCHASE WITHIN TEN (10) DAYS FROM THE DATE OF PURCHASE FOR A FULL REFUND.

THE INSTALLATION OF THIS PRODUCT INDICATES THAT THE BUYER HAS READ AND UNDERSTANDS THIS AGREEMENT AND ACCEPTS THE TERMS AND CONDITIONS.