

Vortex-Mod



1. Specification

- Power: from 1 to 200 W with step 0,1 or 1 W
- Voltage: from 1 to 8,4 V with step 0,1 V
- Temperature: from 100 to 300° C or from 200 to 600° F with step 1 or 5° C and 1 or 10° F
- Atomizer resistance: from 0,08 to 3 Ohms, accuracy at 0,001 Ohm (with manual correction)
- Amount of adjustable profiles – 8 (with ability to disable or rename each profile)
- Profile autoselect according to atomizer resistance.
- Amount of modes for each profile – 3
 - VV – variable voltage
 - VW – variable wattage (power)
 - TC – temperature control
- Temperature control operating modes:
 - TCR – according to constant resistance coefficient of the coil
 - TFR – according to resistance coefficient curve (more accurate temperature control)
- Adjustment of temperature control according to specific resistance, size and mass of atomizer coil (full PID-coefficient regulation)
- Temperature compensation
- Adjustable “smart” preheat (the preheat power value changes proportionally, according to time between puffs)
- Firmware upgrade via USB
- Companion software for convenient operating with device ([VTXtuner](#))

[Official project web site](#)

[Forum tread about custom firmware, repairing and technical support of Sigelei/Fuchai 213 \(russian forum\)](#)

2. Firmware install guide

From the developer

Remember that all the actions you make on your own risk.
I am not responsible for damages.

I'm glad to present you my project **VORTEX-MOD** – an alternative firmware for Sigelei / Fuchai 213W. This firmware drastically expands the possibilities of box-mod and designed, first of all, for "geeks". While creating this firmware, I have focused on functionality and design of DNA and YiHi firmware and tried to enable everything, including hidden resources of Sigelei boards.

General purposes:

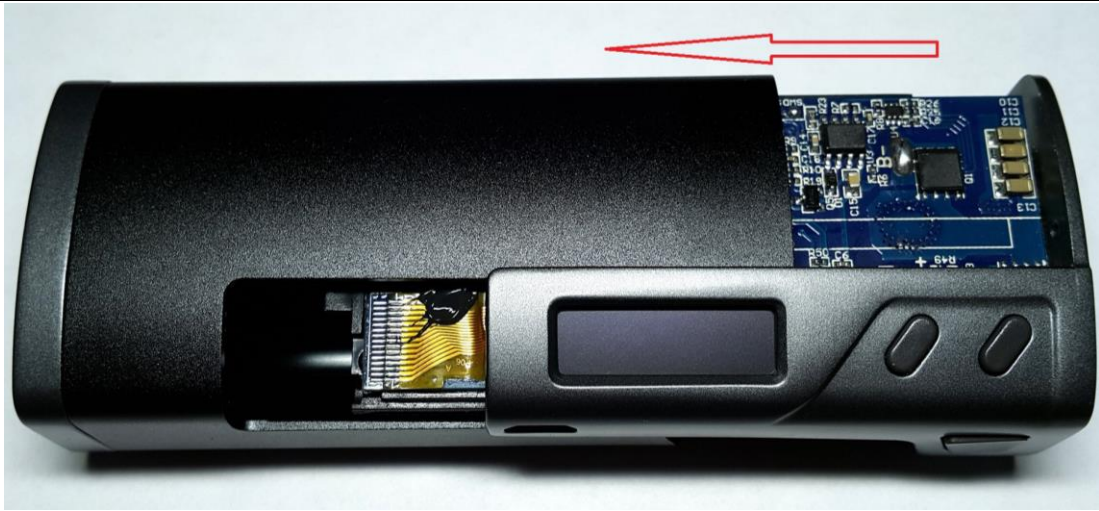
- Supported USB connection to PC for receiving telemetry and firmware upgrade;
- Expanding the abilities of FW (Eight profiles, battery profile, puffs count, selection from more than 20 parameters for onscreen display, preheat in watts and percent, additional variable voltage mode, custom logos, and... even a game);
- Complete support of hardware abilities (display brightness control, inversion, rotation of screen and buttons, stealth mode, sleep mode, ADC hardware survey, enabling of DMA-ADC, DMA-OLED, internal temperature sensor, special modes of charger, balancer, etc.);
- Companion software VTXtuner - analogue of Escribe for DNA. With it you can set up your box-mod, view telemetry and download logos.

Structure, disassembling:

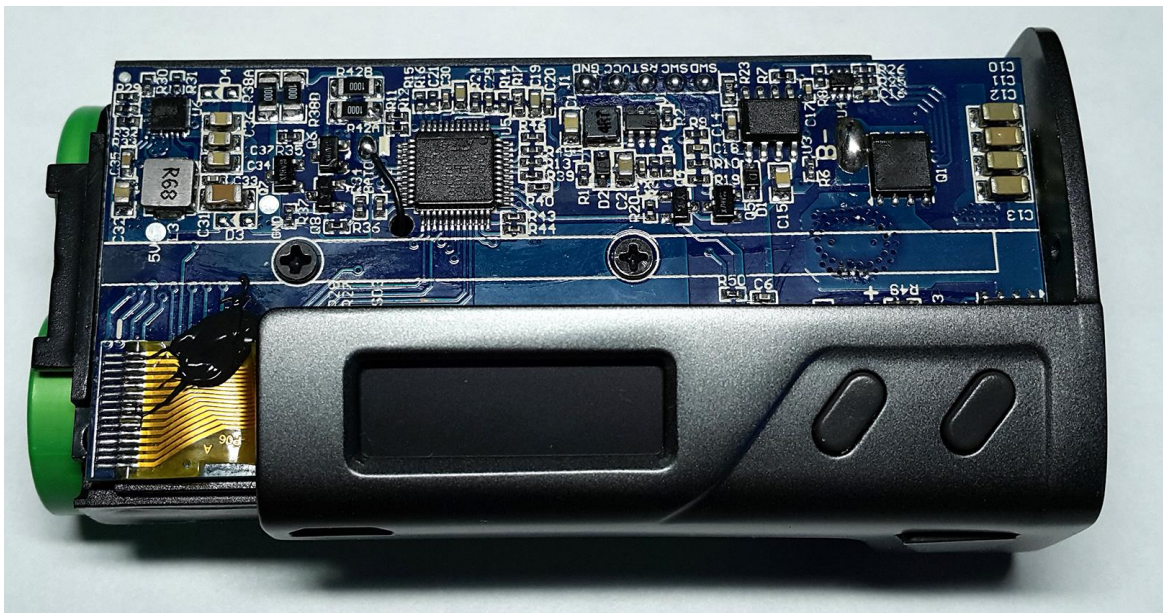
To disassemble the device you need to unscrew 2 H6 (or T6) screw on top, near the 510 connector. There is no need to unscrew screws from the bottom side near battery door!



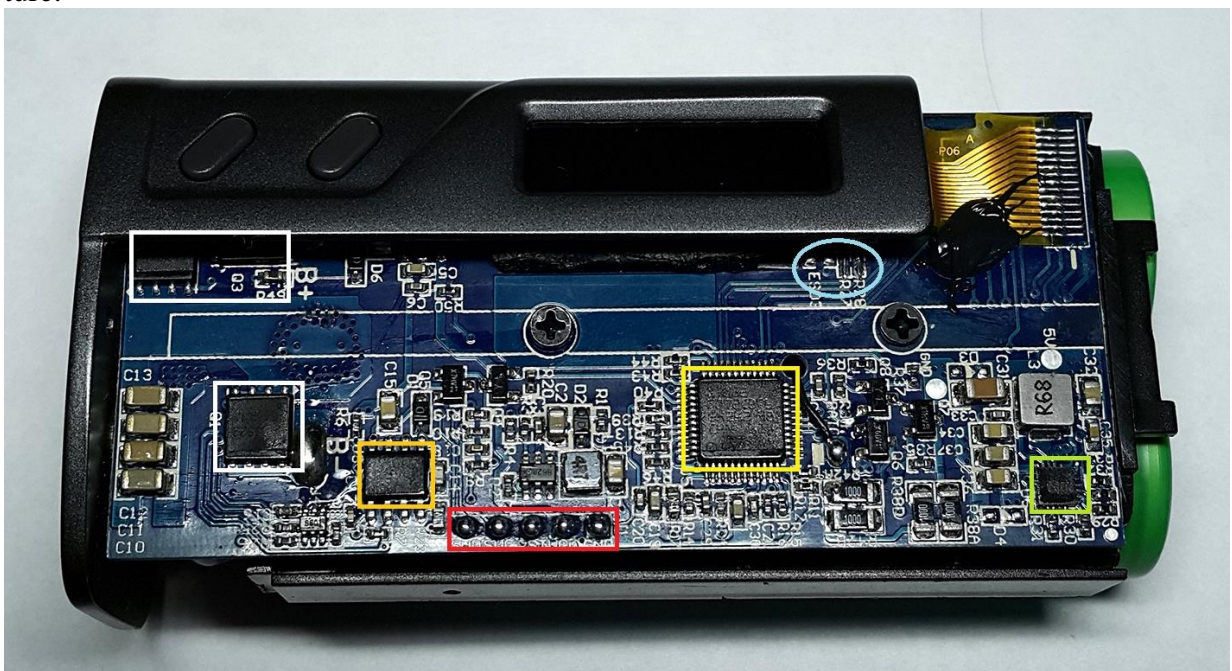
Then slide out parts of the body:



Device board:



Structure:



Yellow - [STM32F072C8](#) processor (64 Kb Flash, 16 Kb SRAM, 48 MHz).

Orange - DC-DC Buck converter (supposedly [L6743D](#)), PWM 160 KHz.

Green - USB charger with max. current >2A. Balancer represented as load resistors and works when

there is no charging.

White - Power keys (mosfets) [AON6512](#). Two on top for DC-DC, one on bottom for reversal polarity protection. All three are the same, N-channel.

OLED display has 128x32 definition and based on [SSD1306](#) controller.

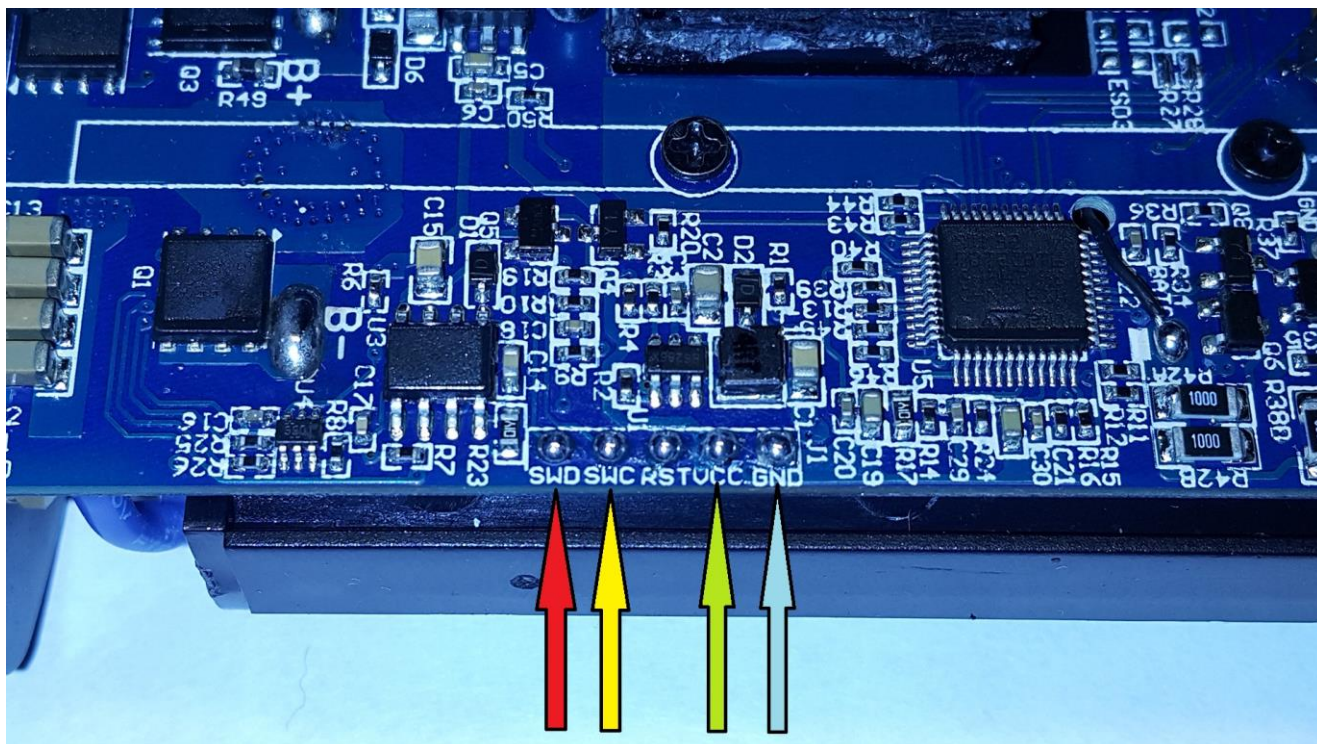
Board is supplied by LDO for 3.3 V. [HT75XX-2](#) from Holtek (placed near buttons, not represented on photo).

Current (1.5 mOhm bypass) is measured by bypass-monitor [INA199](#) from Texas Instruments, There is upconverter [SDB628](#), that makes 12 volts from 3.3 to form voltage on mosfet's gates.

Cyan ellipse – USB jumpers soldering place.

And **red** - carefully bred in a row SWD interface's pins for programmer connection for alternate way of firmware installation.

We need four of them: **SWD, SWC, VCC (3.3 V.)** и **GND** (ground). You can apply any "clip" connection of wires just for custom firmware installation, not soldering them at all.

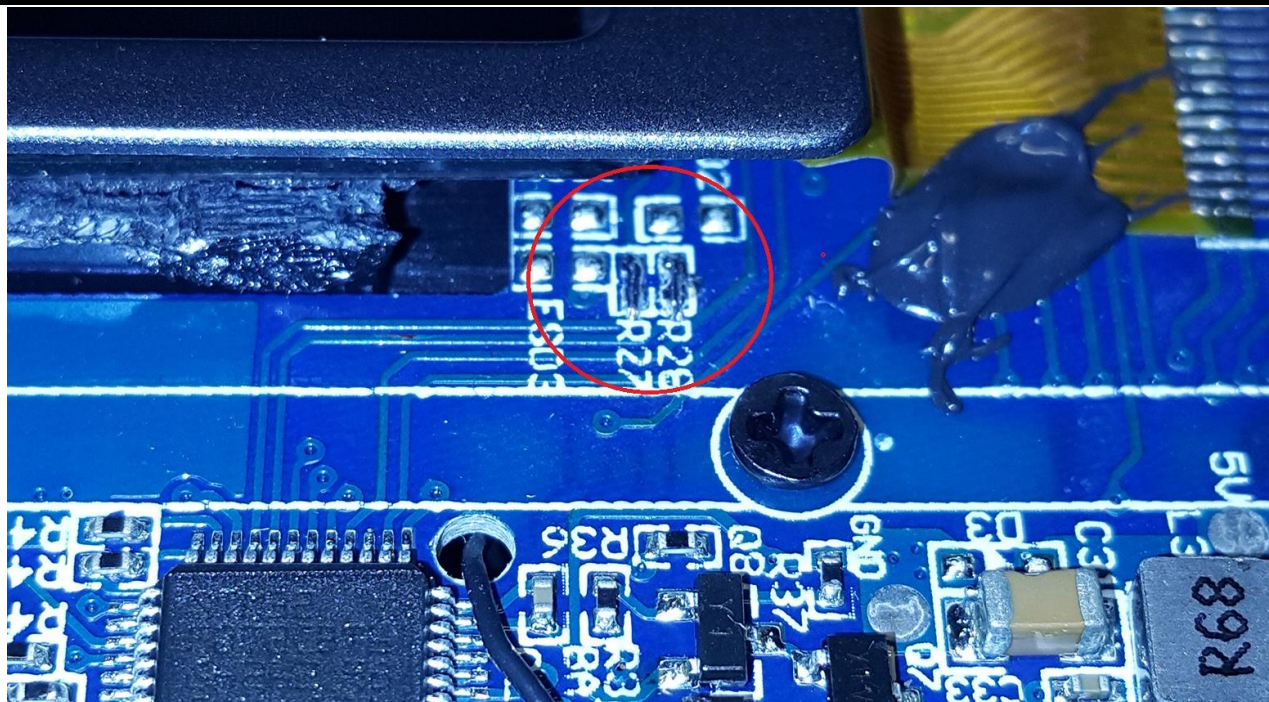


Firmware installation:

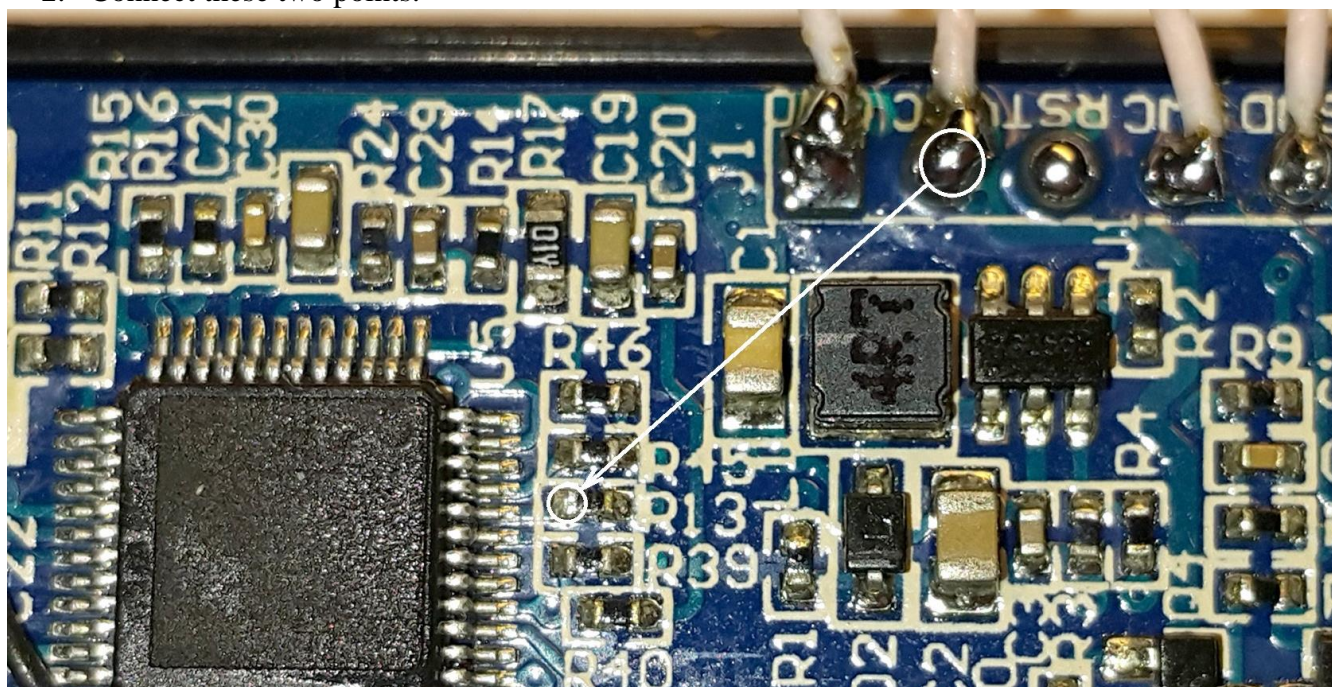
A feature of this box-mod is that the USB data connection is dissabled by "hadrware" – there are no necessary jumpers on board and no USB support in a factory firmware. So, to install custom firmware you need to disassemble the body of box-mod, install two jumpers and do some simple actions. There is an alternative (but former it was main) way of installation using the programmer. All next upgrades can be done with [VTXtuner](#) software, without resorting to this procedure.

So, let's begin:

1. Activating the USB. For this you need to solder either two 0 Ohm 0402 size SMD resistors to R26 and R27 places or two jumpers made from piece of wire or just connect the contacts with solder like of photo below.



2. Connect these two points.



There is no need to solder them together forever, just for installation process, so more convenient to do it so: to VCC point (on top of photo) solder/clip hard, but thin wire (for example, from UTP wire), with another end of it we gently touch the second point (R13). Pay attention, you need to touch R13 from the processor side! Don't mix yourself up and don't touch anything else with it.

3. Connect your box-mod with repaired data connection using USB cable to PC (holding the connection of VCC and R13 from step 2). If you see standard logo on the screen, unplug USB, attentively check all connections and repeat step 3. As result of right connection there will appear a new USB device in your OS. You do not need batteries in this activity. Power supply of board is taken from USB.
4. So, we are in DFU mode. For next step you need to install [VTXtuner](#) (has all needed drivers for install, upgrade and configuration) and [DeFuSE](#) and install firmware using this [instruction](#) (Russian forum) from **RaBiDka** from words "*После того как Вы запаяли перемычки и прошили программатором, доступна функция обновления прошивки по USB*". There is all simple – in Upgrade section select “Choose”, load .dfu file and press “Upgrade”. DeFuSE will warn you that Flash is protected – agree and go on.

5. Disconnect the wire from R13. You can disconnect it when USB has been connected, but then you will need to enter DFU mode again, because in first attempt program will warn you, that memory is protected and upload will end with an error. If it happened, unplug USB, connect VCC and R13 again and plug USB.

That is all. There is nothing super complicated and if somebody is interested, he can try to do it and get completely another device with unique opportunities.



3. Vortex-Mod

Buttons combination

When powers on (closing battery rack door):

- "FIRE" - shows FW version (also available in Main Menu);
- "PLUS"+"MINUS" - reset all settings (to default);
- "FIRE"+"PLUS"+"MINUS" - entering DFU mode.

Preinstalled (default settings):

- "FIRE" x 3 – opens main menu;
- "FIRE" x 5 – locks all buttons (locks mod);
- "PLUS"+"MINUS" – locks main parameter (volts, watts, degrees - depends on current mode);
- "FIRE"+"MINUS" – switches to alternate parameter (preheat for VW, power for TC mode; has inverted "black-on-white" on-screen appearance).

Set up by user (hotkeys)

Available events (button combinations)

There are almost 8 events, that can be set up by user.

Events:

<i>Fire x 2</i>	Quick pressing FIRE 2 times
<i>Fire x 3</i>	Quick pressing FIRE 3 times
<i>Fire x 4</i>	Quick pressing FIRE 4 times
<i>Fire x 5</i>	Quick pressing FIRE 5 times
<i>Plus + Minus</i>	Simultaneous pressing Plus + Minus
<i>Fire + Plus</i>	Simultaneous pressing FIRE + Plus
<i>Fire + Minus</i>	Simultaneous pressing FIRE + Minus
<i>Fire + Plus + Minus.</i>	Simultaneous pressing FIRE + Plus + Minus

You can **assign** your own **action** on each event.

Pay attention, if "Opening main menu" action is not set up for any event – you will not be able to open main menu at all!

This is also true for "Lock mod"!

If you're stuck, you can reset all settings in [VTXtuner](#) or holding PLUS+MINUS when closing battery rack door (power on).

Assignable actions (commands)

<u>None</u>	No action
<u>Main Menu</u>	Opens main menu (!)
<u>Mod Lock</u>	Lock all buttons (Lock mod) (!)
<u>Parameter Lock</u>	Lock main parameter (+/- buttons).
<u>Resistance Lock</u>	Lock/Unlock the resistance.
<u>Next Profile</u>	Switch to next Profile (“Profile Active” must be “Enabled”)
<u>Profile Mode</u>	Switching modes in current Profile (TC, VV, VW)
<u>Profile Active</u>	Switches current profile to Enabled/Disabled (affects only “Next Profile”) Shows/hides an alternative parameter for current mode.
<u>Alt. Parameter</u>	For TC mode main parameter is <i>Temperature</i> , alternative - <i>POWER LIMIT</i> . For VW mode main parameter is <i>Power</i> , alternative – <i>PREHEAT POWER</i> . For VV main parameter is <i>Voltage</i> , alternative parameter is absent When PARAMETR set to <i>ALTERNATIVE</i> the alternative parameter is shown on main screen in inversion style (black on white).
<u>Temperature Unit</u>	Switches temperature units between Celsius an Fahrenheit
<u>Coil Autoselect</u>	Switches On/Off “Coil Autoselect” feature.
<u>Screen Orientation</u>	Screen orientation: Normal/Reversed
<u>Screen Inversion</u>	Screen colours inversion
<u>Stealth Mode</u>	Stealth mode On/Off.
<u>Battery In %</u>	Switches battery indicator between Graphical/Percent
<u>Start Logo</u>	On/Off Start Logo (when powers on)
<u>Idle Logo</u>	On/Off logo when in idle
<u>Charge Logo</u>	On/Off logo when charging
<u>Sleep Logo</u>	On/Off logo when in sleep mode
<u>Swap Buttons</u>	Swaps +/- buttons
<u>1 Watt Change</u>	Switches power step between 0,1 W and 1 W
<u>1 Degrees Change</u>	Switches temperature step between 1° C F and 5° C, 10° F
<u>Sleep+-Exit</u>	On/Off mod awakening with +/- buttons
<u>Charger</u>	On/Off built in battery charger
<u>Balancer</u>	On/Off battery balancer
<u>Puffs Reset</u>	Puffs count reset
<u>Power Off</u>	Powers off mod (Deep sleep mode)
<u>Firmware Upgrade</u>	Switches into DFU mode for firmware upgrade (can be left only by opening and closing battery rack)
<u>Battery Info</u>	Shows on screen information about batteries
<u>Start Game</u>	Starts the Game (FIRE button tester)

Navigation in menu:

- "FIRE" selects the current item in menu or switches to current parameter setup;
- "MINUS" / "PLUS" changes current menu item or value of current parameter. Parameter is being changed is shown inverted (on white background).

MAIN MENU:

At least all mod settings can be made from menu, except profile renaming.

PROFILE SETUP

MAIN MENU
PROFILE SETUP

Profile settings menu:

Common settings for all modes

PROFILE 1
POWER

Selects current profile.

There are 8 different profiles.

Parameters of each profile can be adjusted separately.

Name of a profile can be changed in the [VTXtuner](#).

PROFILE
VV MODE

Profile mode:

VV - Voltage,

PROFILE
VW MODE

VW - Power,

PROFILE
TC MODE

TC - Temperature control.

Some profile parameters, not suitable for current mode, are hidden (exaple: "Preheat Power" for VV and TC modes).

PROFILE
ENABLED

Enabling/disabling current profile.

Profile is still available for chosing from main menu and [VTXtuner](#), but if

PROFILE
DISABLED

Disabled – will be ignored (skipped) when using hot keys binding (Next Profile)

PARAMETER
MAIN

Shows main or alternative parameter on main screen.

For **TC** mode main parameter is *Temperature*, alternative - *POWER LIMIT*.

For **VW** mode main parameter is *Power*, alternative – *PREHEAT POWER*.

PARAMETER
ALTERNATIVE

For **VV** main parameter is *Voltage*, alternative parameter is absent

When PARAMETR set to *ALTERNATIVE* the alternative parameter is shown on main screen in inversion style (black on white).

RETURN TO
MAIN MENU

Exit to *MAIN MENU*

Settings for TC mode

POWER LIMIT
60.0W

Limits peak power.

Can be set from 1,0 to 200,0 W with step 0,1 or 1 W.

TEMPERATURE
220C

Temperature

Can be set from 100 to 300 °C or from 200 to 600 °F with step 1 or 5 °C and 1 or 10 °F

Settings for VV mode

VOLTAGE
4.20V

Voltage

Can be set from 1.0 to 8.4 V with step 0.1 V.

Settings for VW mode

POWER
100.0W

Power.

Can be set from 1,0 to 200,0 W with step 0,1 or 1 W.

PREHEAT UNIT PERCENT	<u>Preheat units</u> In percent from regular power or in watts.
PREHEAT UNIT WATTS	
PREHEAT PWR 100.0W	<u>Preheat power</u> In watts. Can be set from 1,0 to 200,0 W with step 0,1 or 1 W.
PREHEAT PWR 110% (110.0W)	In percent. Can be set from 0 to 200 % . In brackets shown resulting power in watts, depending on regular.
PREHEAT TIME 0.5S	<u>Preheat time</u> In range from 0.0 to 10.0 seconds with 0.1 s step. (100 ms.)
	<u>Delay between preheats</u> (CoolDown) If you press "FIRE" in this time, preheat power will increase linearly during delay time. <i>For example: if delay is 10s, then in 1s preheat will be 10% of its amount, in 2s - 20%, 3s - 30% etc.</i> This parameter sets up depending on your vape style and weather. Can be set from 0 to 60 seconds with step 1 second.
PREHEAT DELAY 10S	
RETURN TO MAIN MENU	Exit to MAIN MENU

COIL SETUP

MAIN MENU COIL SETUP	<u>Coil (material) parameters setup menu;</u> Coil setup is a part of profile preferences, but is submitted separately for convenience.
RESISTANCE READ	<u>Read current coil resistance</u> When reading coil resistance environment temperature is being read.
RES=0.474Ω LOCK RES	<u>Remember (lock) coil resistance.</u> It is necessary for TC mode, and for correct working of atomizer autoselect feature.
RES=0.602Ω UNLOCK RES	<u>Forget (unlock) coil resistance</u>
RES CORR 0.474Ω	<u>Adjustment of the read/locked resistance.</u> Limits are 0.05 - 3.0 Ohm.

Settings for TC mode

TEMP CORR 26C	<u>Adjustment of basic temperature.</u> Basic temperature is temperature of coil when resistance was read. Box-mod measures it automatically (temperature of environment). Temperature, that is set for TC mode, will be determined relative to this value.
TC UNIT TCR	<u>Temperature control operating mode.</u> TCR – temperature control using linear coefficient (line)
TC UNIT TFR	TFR – temperature control using multiple pairs of temperature and resistance factor (curve), works more accurately.
COIL TCR 0.000000	<u>TCR amount input.</u> Range is from 0.000000 to 0.000999, like at steam-engine.org.
COIL TFR 100C: 1.0000	<u>TFR curve input.</u> Factors for 100, 150, 200, 250 and 300 Celsius are being set in series.
RETURN TO MAIN MENU	Exit to MAIN MENU

MOD SETUP

MAIN MENU MOD SETUP	<u>Box-mod configuration menu.</u>
PUFFS 0 RESET	<u>Shows and resets puffs counter.</u>
TEMP. UNIT CELSIUS	<u>Temperature unit selector:</u>
TEMP. UNIT FAHRENHEIT	Celsius or Fahrenheit
COIL AUTOSEL ENABLED	<u>Profile automatic selector</u> based on atomizer's resistance. Enabled or disabled
COIL AUTOSEL DISABLED	For correct work you need to lock atomizer's resistance in profile that you need and difference between atomizer's resistance must be $\geq 0,05$ Ohms.
PID REG P 600	
PID REG I 850	<u>PID regulator coefficients adjustment.</u> It affects the operation of the temperature control.
PID REG D 0	
VV MODE 1 Ω	
VV MODE 2 W	<u>Additional parameters shown in VV mode.</u> Three parameters are being chosen in series.
VV MODE 3 PROF. NAME	
VW MODE 1 Ω	<u>Additional parameters shown in VW mode.</u> Three parameters are being chosen in series.
TC MODE 1 Ω	<u>Additional parameters shown in TC mode.</u> Three parameters are being chosen in series.
CHARGE MODE 1 BATTS V	<u>Additional parameters shown in Charging mode</u> Three parameters are being chosen in series.
RETURN TO MAIN MENU	Exit to MAIN MENU

SCREEN SETUP

MAIN MENU
SCREEN SETUP

- Screen behavior configuration menu.

ORIENTATION
NORMAL

Screen orientation.

ORIENTATION
ROTATED

Normal or rotated.

Buttons for rotated orientation are changeable in other menu.

INVERSION
NORMAL

Screen inversion.

INVERSION
INVERTED

Normal or inverted (like in Smoant Battlestar 200W).

STEALTH MODE
DISABLED

Stealth mode.

Screen is usually off in this mode and can be activated by +/- buttons.

BATTERY IN %
DISABLED

Battery indicator selection.

BATTERY IN %
ENABLED

Graphical or percentage indicator.

START LOGO
ENABLED

Shows logo when box-mod powers on or awakens from deep sleep.

If custom logo is not set shows "VORTEX" by default.

IDLE LOGO
DISABLED

Shows logo in idle mode.

If custom logo is not loaded – showing main screen with parameters.

FIRE TIME
10S

Adjustment of maximum puff (firing) duration.

FIRE BRIGHT
100%

Adjustment of screen brightness when firing.

Follows the duration adjustment, like in other “time” parameters.

ACTIVE TIME
10S

Adjustment of time/brightness in active mode.

After firing mode.

IDLE TIME
10S

Adjustment of time/brightness in idle mode

After active mode. Here the custom logo can be shown.

CHARGE TIME
600S

Adjustment of time/brightness in charging mode.

Time doesn't play big role here.

SLEEP TIME
600S

Adjustment of time/brightness in light sleep mode.

Screen is off in this mode by default (brightness is set by 0%). This mode follows the idle mode. After light sleep mode box-mod goes to deep sleep. This parameter is set to 0S by default. If you have troubles with awakening the device – set this parameter to 0S

RETURN TO
MAIN MENU

Exit to MAIN MENU

BUTTONS SETUP

MAIN MENU
BUTTONS SETUP

Buttons configuration menu.

MOD LOCK
DISABLED

Locks all buttons.

Also can be enabled/disabled by 5x pressing "FIRE" button (default).

PARAM LOCK
ENABLED

Locks parameters (+/- buttons).

Also can be enabled/disabled by simultaneous pressing + and - (default).

BUTTONS SWAP
DISABLED

Change +/- buttons by places.

Useful for rotated screen or for left-handed users.

1 WATT INC.
ENABLED

Power adjustment by 1 W.

By default, power less than 100 W is being changed by 0,1 W, more - by 1 W.

1 DEG. INC.
ENABLED

Temperature adjustment by 1 degree.

By default, temperature is being changed by 5 degree Celsius or by 10 degree Fahrenheit.

SLEEP +/- EXIT
ENABLED

Enables device awakening by pressing +/- (only FIRE by default)

Assigning actions to key combinations

(further sorting mode is by FIRE, the choice by +/-)

KEY ACTION 2F
STEALTH MODE

Choose key action for quick pressing FIREx2

[List of available actions](#)

KEY ACTION 3F
MAIN MENU

Choose key action for quick pressing FIREx3

[List of available actions](#)

KEY ACTION 4F
NONE

Choose key action for quick pressing FIREx4

[List of available actions](#)

KEY ACTION 5F
POWER OFF

Choose key action for quick pressing FIREx5

[List of available actions](#)

KEY ACTION +/-
PROFILE MODE

Choose key action for simultaneous pressing Plus+Minus

[List of available actions](#)

KEY ACTION F+
NEXT PROFILE

Choose key action for simultaneous pressing FIRE+Plus

[List of available actions](#)

KEY ACTION F-
ALT PARAM

Choose key action for simultaneous pressing FIRE+Minus

[List of available actions](#)

KEY ACTION F+-
NONE

Choose key action for simultaneous pressing FIRE+Plus+Minus

[List of available actions](#)

RETURN TO
MAIN MENU

Exit to MAIN MENU

BATTERY SETUP

MAIN MENU
BATTERY SETUP

Battery configuration menu.

BATTERY INFO
096% 098% 095%
3.28V 4.16V 4.13V

Information about battery pack.

Summary, first and second battery voltage and charge in %.

CHARGER
ENABLED

Enabling/disabling charger function.

You can disable it if you don't need the device charging when connected to the PC. If batteries voltage difference more, than in 0.1 V, charger won't functioning also until batteries unbalanced.

BALANCER
ENABLED

Enabling/disabling balancer function.

If batteries voltage difference more, than in 0.1 V, balancer runs, until both batteries will be balanced, via discharging most charged battery.

CUT VOLTAGE
2.50V

Soft cutoff voltage under load.

Shows WEAK BATTERY and vaping is impossible any more.
2.5 Volts – is minimal possible voltage for Li-Ion batteries.

BATT ENERGY
17.720WH

Summary energy of two batteries.

Calculated as the Nominal voltage * Nominal capacity * 2. It is used for more accurate calculation of batteries power left. Is not used for cutoff.

BATT PROFILE
<0%>: 3.24V

Manual input/correction of batteries discharge profile.

11 pairs of parameters (% – V) are entered in series.

RETURN TO
MAIN MENU

Exit to MAIN MENU

Additional menu (VORTEX-MOD)

VORTEX-MOD
V0.99.11

Firmware vesion.

Enters an additional menu.

POWER
OFF

Manual power off (deep sleep).

In this mode power consumption of device is minimal.

FIRMWARE
UPGRADE

Firmware upgrade mode DFU.

Is necessary for manual upgrade. VTXtuner enters this mode itself when updating firmware. **Exit is possible only by disconnecting batteries.**

START
GAME

Game HELICOPTER.



Using FIRE button you need to fly through the tunnel as long as possible.

RETURN TO
MAIN MENU

Exit to MAIN MENU

MAIN MENU
EXIT

Exit from main menu to main screen.

4. VTXtuner

General description

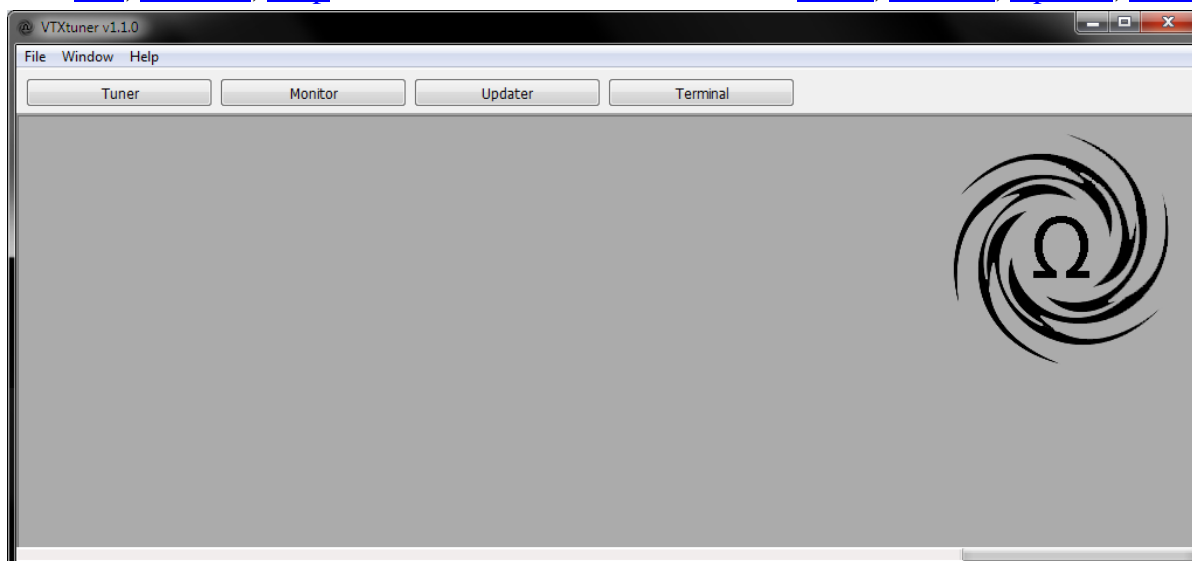
VTXtuner is a program for [Vortex-Mod](#) setup.

Abilities:

- Configuring of [Vortex-Mod \(Tuner\)](#);
- Saving and loading of configurations ([Tuner](#));
- Realtime monitoring of different box-mod parameters ([Monitor](#))
- Firmware updating ([Updater](#)) ;
- Debugging device and firmware through the Developer Console ([Terminal](#))

All settings could be made from [MAIN MENU](#) of box-mod, also available from [Tuner](#), besides in Tuner you may rename profiles and download custom logos.

After running *VTXtuner* using Start menu or desktop icon, main window of program is shown with standard menus: [File](#), [Window](#), [Help](#) and buttons of additional windows: [Tuner](#), [Monitor](#), [Updater](#), [Terminal](#)



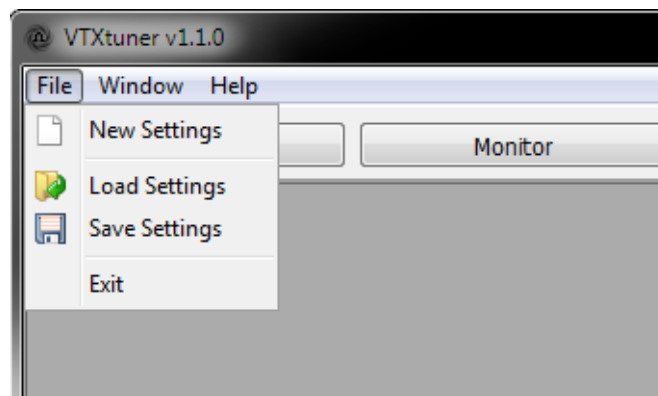
Main menu

File

Commands:

- New Setting Makes new configuration file using default configuration settings, opens *Tuner* window;
- Load Setting Loads configuration file made earlier and opens *Tuner* window
Configuration files by default are here: C:\Users\'Username '\AppData\Roaming\VTXtuner\Profiles\Settings;
- Save Setting Saves current configuration from *Tuner* to a file (you can specify File name and folder);
- Exit Closes the [VTXtuner program](#)

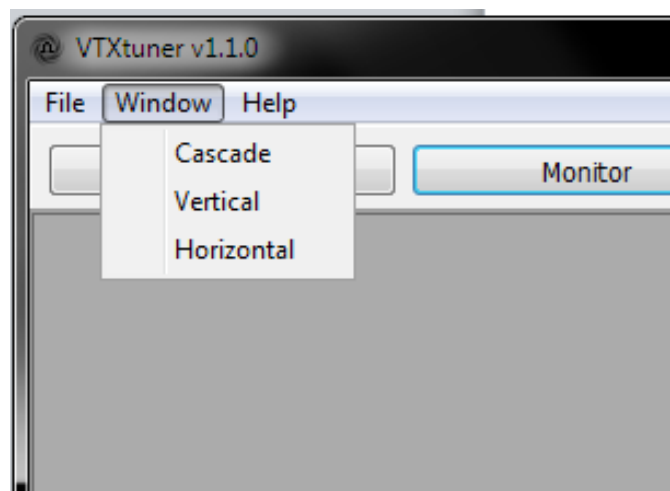
Important! Program closes without request, settings are not saved to configuration file and not uploaded to box-mod automatically. Make sure you've saved and/or uploaded changes you did.



Window

Commands:

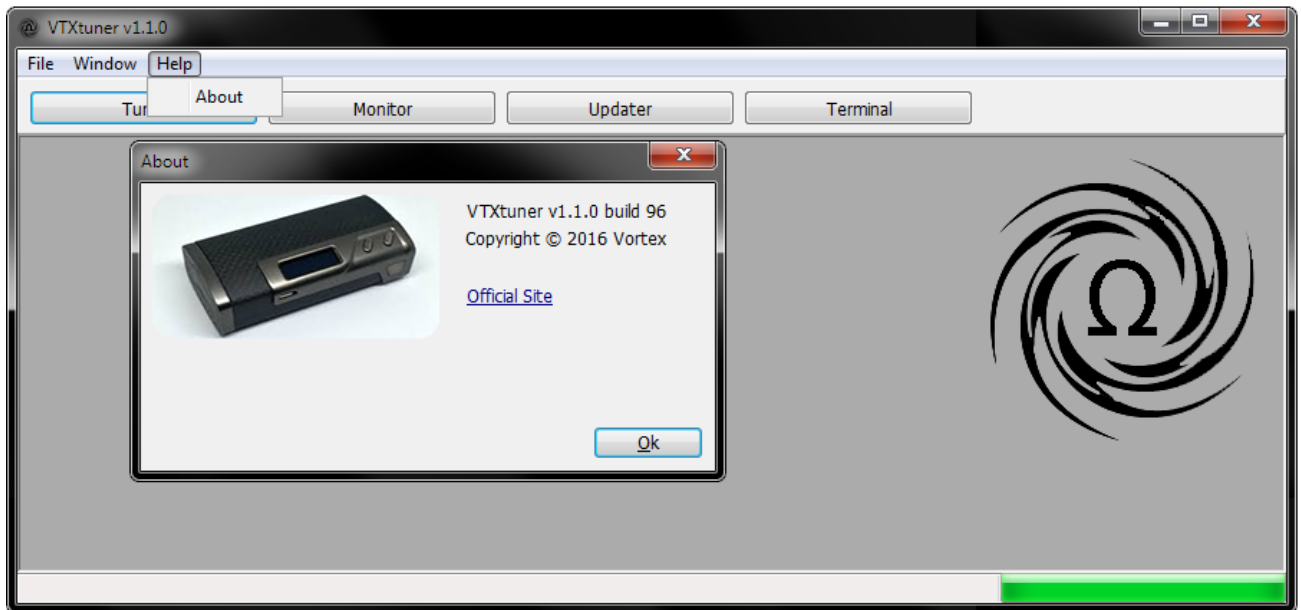
- Cascade opens windows in cascade;
- Vertical opens windows vertically (side-by-side);
- Horizontal opens windows horizontally (one above the other);



Help

Commands:

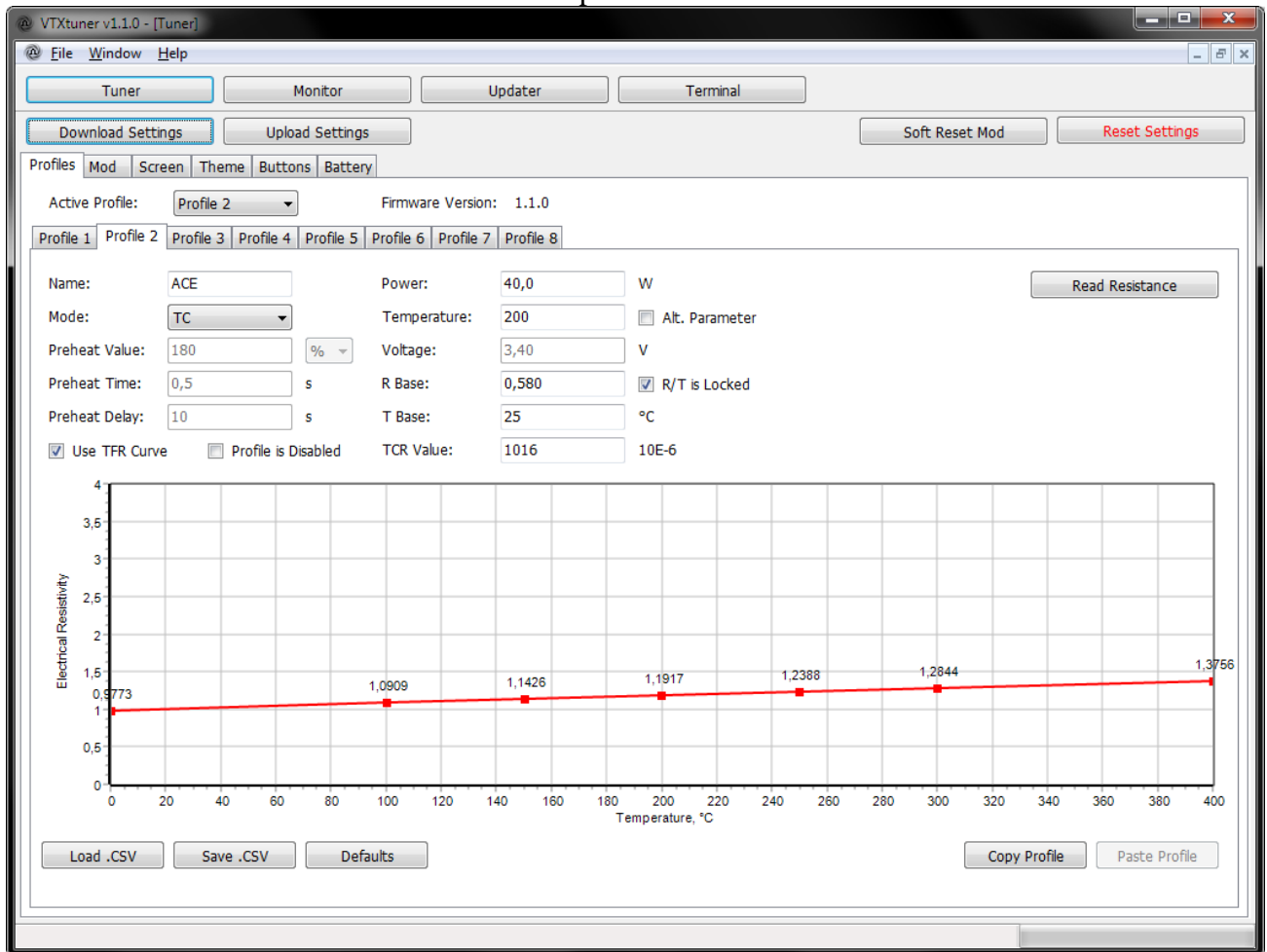
About Shows window with program information.



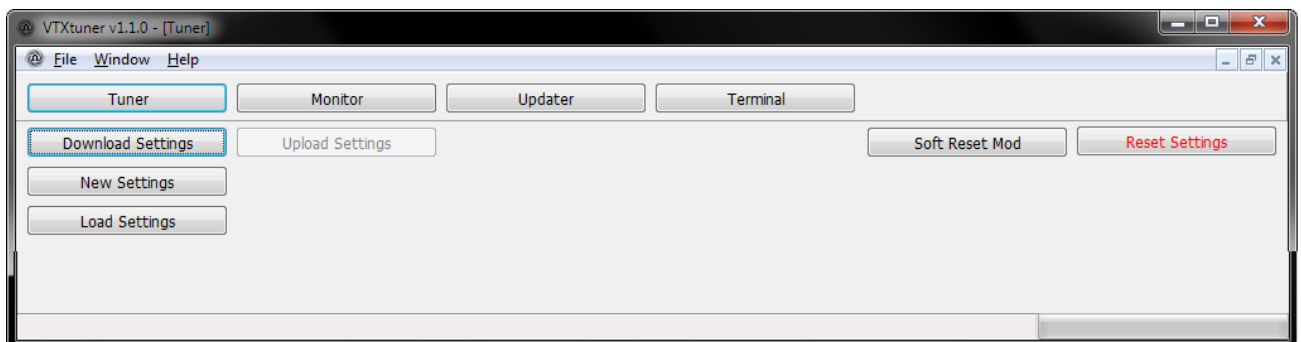
Tuner

Tuner button opens window with *Vortex-Mod* configuration.

If during the *Tuner*'s start there is a connection to *Vortex-Mod*, so automatically settings from box-mod will be downloaded and *Tuner* window will be opened



other way *Tuner* window will be opened with additional buttons showed:



Кнопки управления *Tuner*

<u>Download Setting</u>	Downloads settings from device <i>Vortex-Mod must be connected to PC and be powered on (not in deep sleep);</i>
<u>Upload Setting</u>	Loads settings to the device, button available if configuration is loaded; forced device reboot, same as PowerOFF->PowerON;
<u>Soft Reset Mod</u>	you may need to restart the VTXtuner because the connection with device can be lost.
<u>Reset Setting</u>	Resets current configuration of device to «default» settings;
<u>New Setting</u>	Makes new configuration file using default configuration settings, opens <i>Tuner</i> window;
<u>Load Setting</u>	Loads configuration file made earlier and opens <i>Tuner</i> window

Important! If connection between program and *Vortex-Mod* had been established, and then connection with device has lost (powered off / bad USB cable connection / gone to deep sleep), you may need to save current configuration from tuner and restart *VTXtuner* program.

This is a feature of the program and OS cooperation and is not a "bug" or hardware malfunction.

Profiles tab

In configuration you can set eight independent profiles for atomizer: Profile1-8. Each profile has independent settings for VW, TC and VV modes.

Setting the desired profile is produced in the corresponding tab.

Parameters are configured in *Profiles* tab are similar to the settings of the device menus:

[PROFILE SETUP](#), [COIL SETUP](#)

The screenshot shows the VTXtuner v1.2.3 software interface. The 'Profiles' tab is selected, and 'Profile 1' is active. The 'Name' field contains 'SS316'. The 'Mode' is set to 'TC'. The 'Preheat Value' is 40.0, and the 'Preheat Time' is 0.0. The 'Preheat Delay' is 10. The 'TCR Value' is 880. The 'VW Power' is 40.0 W, and the 'TC Power' is 40.0 W. The 'Voltage' is 4.20 V. The 'Temperature' is 220. The 'R Base' is 0.000, and the 'T Base' is 0. The 'Profile is Disabled' checkbox is checked. A graph shows 'Electrical Resistivity' vs. 'Temperature, °C' with data points: (0, 0.801), (100, 1.0795), (150, 1.1258), (200, 1.1678), (250, 1.2075), (300, 1.2463), (400, 1.3239). Buttons for 'Load .CSV', 'Save .CSV', 'Defaults', 'Copy Profile', and 'Paste Profile' are visible at the bottom.

Active Profile Sets current profile active (in this profile device works right now);

Firmware Version Version of currently downloaded firmware into the *Tuner*;

Name Profile name (can be 6 symbols in length, including spaces);

Mode Current profile mode (*VV*-voltage, *VW*-power, *TC*-temperature control), some elements are made active/inactive, depends on current mode.

Important! Regardless of the fact that some of the settings in the current mode are not available for editing, all profile settings are uploaded to device. When mode (*VV*, *VW*, *TC*) is changed in the device menu, corresponding settings will be applied.

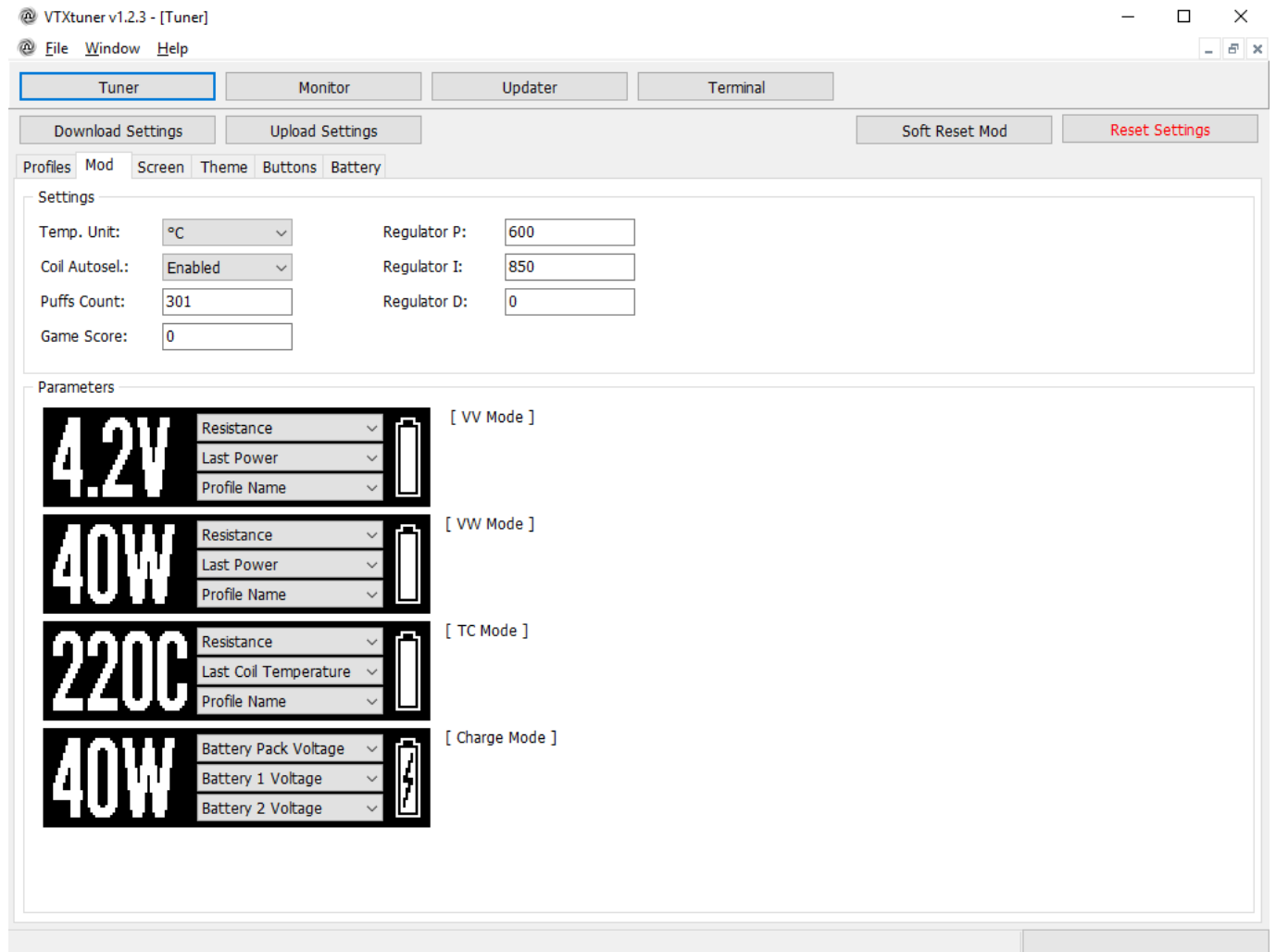
Preheat Value Amount of *Preheat Power* in *VW* mode, can be set in % relatively to *Power* set or in watts.
(when changing % to W and back, amount is calculated relatively to current *Power*);

Preheat Time Time, when *Preheat* power is used;

<u>Preheat Delay</u>	delay of Preheat activation for VW mode;
<u>VW Power</u>	Power target for VW mode;
<u>TC Power</u>	Power limit for TC mode;
<u>Temperature</u>	Temperature limit for TC mode;
<u>Alt.Parameter</u>	Showing the main or the alternative setting on main screen. For TC mode main is “ Temperature ”, alternative is “ TC power ”. For VW mode main is “ VW power ”, alternative is “ Preheat power ”. For VV main is “ Voltage ”, alternative is absent. Alt.Parameter is shown in inverted style (black-on-white).
<u>Voltage</u>	Voltage target for VV mode;
<u>R Base</u>	Coil resistance of atomizer;
<u>R/T is Locked</u>	Lock/unlock resistance of atomizer. You must lock resistance for correct working of TC mode, also it is recommended for correct working of atomizer autoselect feature.
<u>Read Resistance</u>	Read atomizer’s resistance.
<u>T Base</u>	Base temperature – temperature in the moment, when resistance of atomizer was read. It is measured automatically (environment temperature). Temperature target in TC mode will be measured from this amount.
<u>TCR Value</u>	Temperature coefficient of resistance (TCR) 10^{-6} , used for TC mode (“Use TFR Curve” is disabled)
<u>Use TFR Curve</u>	TC mode will use a TFR curve (more accurate, than TCR) Enabling/disabling of current profile.
<u>Profile is Disabled</u>	Profile still can be chosen from menu of device or in VTXtuner , but will be ignored (skipped) when scrolling profiles using key combination (Next Profile) and is not involved in atomizer autoselect
<u>Load CSV</u>	Loads TFR curve for material
<u>Save CSV</u>	Saves TFR curve
<u>Default</u>	Default TFR curve (straight, TCR=1)
<u>Copy Profile</u>	Copies all current profile parameters
<u>Paste Profile</u>	Pastes all copied parameters to current profile from “Copy Profile” command.

Mod tab

Settings are similar to [MOD SETUP](#)



Settings

Temp. Unit

Coil Autosel

Puffs Count

Game Score

Regulator P

Regulator I

Regulator D

Parameters

VV Mode

VW Mode

TC Mode

Device parameters

Temperature units selection:

Celsius or Fahrenheit

Profile autoselect according to atomizer resistance.

On/Off

Needs atomizer resistance to be locked in necessary profile and difference between atomizers resistances must be more than 0,05 Ohms.

Puffs counter

Game record.

Adjusting PID coefficients.

Affects TC working.

Section of parameters, displayed on the screen in different modes.

Displays main or alternate parameter and three additional parameters selected by the user

Voltage. Main is voltage, alternate is absent.

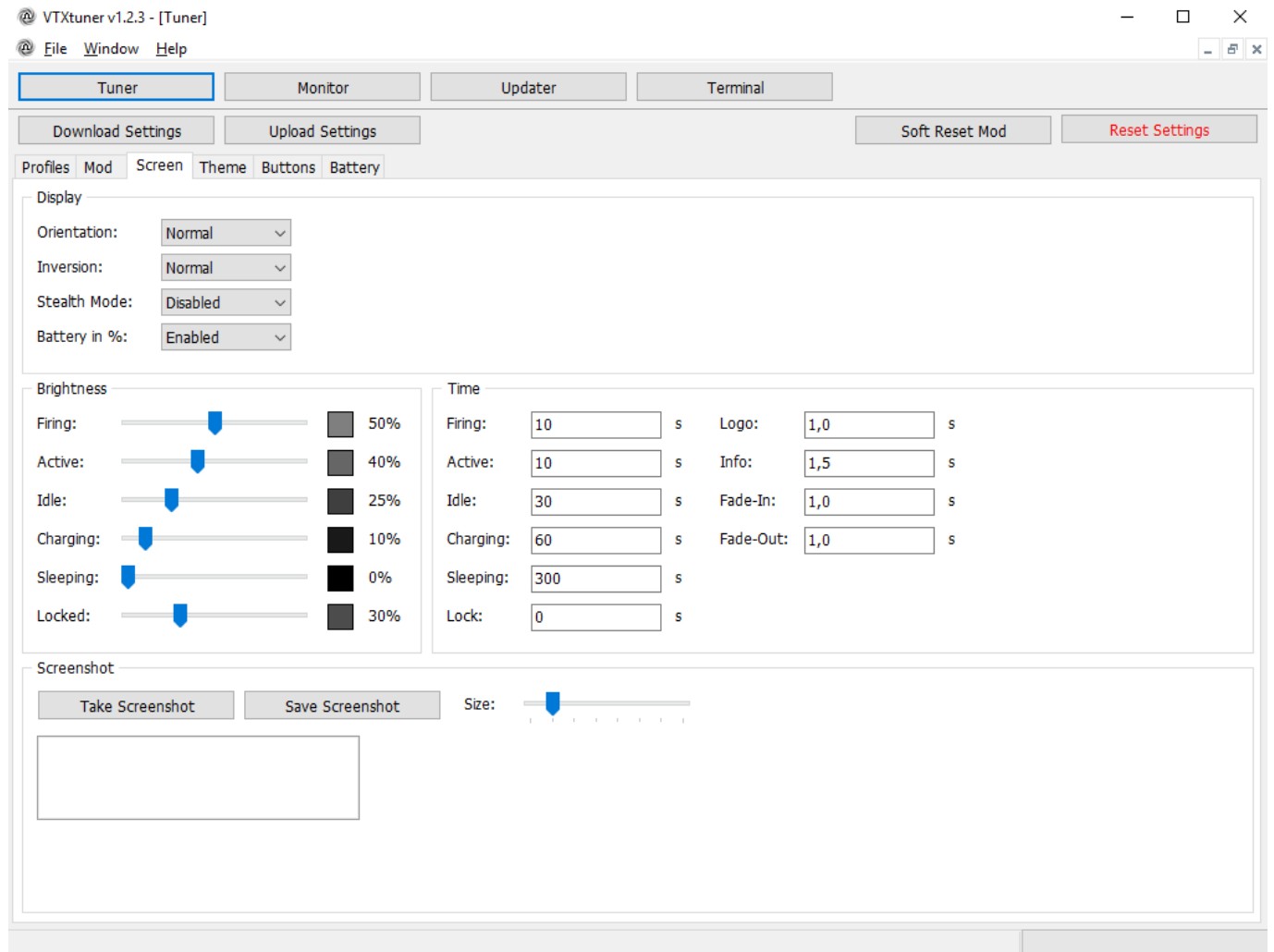
Wattage. Main is power, alternate is preheat power.

Temperature control. Main is temperature, alternate is power limit.

<u>Charge Mode</u>	Charging mode. Main parameter like in previous mode, also is alternate.
Additional parameters	
None	Blank field, no parameter
Resistance	Atomizer resistance
Voltage	Real-time voltage
Current	Real-time current
Power	Real-time power
Puff Duration	Current puff duration
Coil Temperature	Real-time coil temperature
Board Temperature	Board temperature
Room Temperature	Environment temperature
Batt Pack %	Summary charge of batteries in % (energy residue)
Battery 1 %	1 st battery charge in % (energy residue)
Battery 2 %	2 nd battery charge in % (energy residue)
Battery Pack Voltage	Summary voltage of batteries
Battery 1 Voltage	1 st battery voltage
Battery 2 Voltage	2 nd battery voltage
Battery Energy	Total battery energy
Puffs Count	Total puffs counter
Profile Name	Name of current profile
Last Resistance	The last Resistance value
Last Voltage	The last Voltage value
Last Current	The last Current value
Last Power	The last Power value
Last Duration	The last puff duration value
Last Coil Temperature	The last Coil Temperature value
Last Energy	Battery energy left

Screen Tab

Settings are similar to [SCREEN SETUP](#). Also here you can take screenshots from the device.



Display

Display settings

Orientation

Display orientation.

Normal or rotated.

Buttons for rotated orientation are changeable in other tab.

Inversion

Screen inversion.

Normal or inverted (like in Smoant Battlestar).

Stealth Mode

Stealth Mode.

In this mode main screen is off, can be seen by pressing +/- buttons.

Battery in %

Switches battery indicator.

Graphical or text (in %)

Brightness

Screen brightness settings according to current mode

Firing

Screen brightness when “Fire” is pressed.

Active

Screen brightness in active mode.

After making a puff

Idle

Screen brightness in idle mode

After active mode.

Charging

Screen brightness in charging mode.

Sleeping

Screen brightness in sleep mode.

By default, in this mode screen is off (brightness is 0%). This mode follows the idle mode.

Time

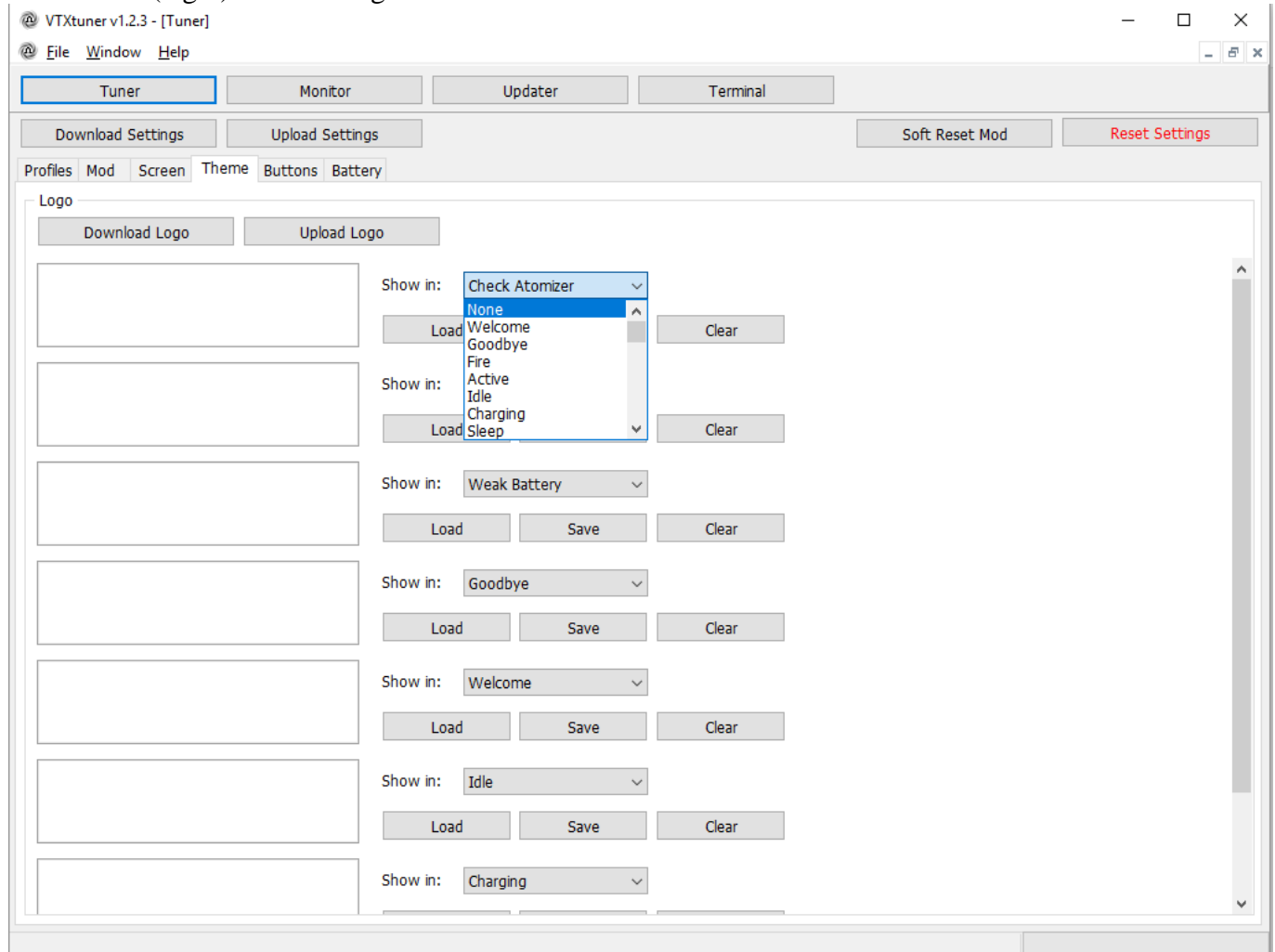
Screen timings settings according to current mode

<u>Firing</u>	<u>Sets maximum puff time. 0-999 sec.</u>
<u>Active</u>	<u>Sets active mode time.</u> After puff
<u>Idle</u>	<u>Sets idle mode time</u> After active mode
<u>Charging</u>	<u>Sets charging mode time.</u> Time is not playing a big role here. <u>Sets light sleep mode time.</u>
<u>Sleeping</u>	By default, in this mode screen is off (brightness is 0%). This mode follows the idle mode. After this mode, device goes to deep sleep mode. If you have troubles with awakening your device – set this parameter to 0.
<u>Logo</u>	<u>Sets welcome logo showing time.</u>
<u>Warning</u>	<u>Sets warning messages showing time, also screen showing in stealth mode by +/-</u>
<u>Fade-In</u>	<u>Sets time of smooth start of the screen</u>
<u>Fade-Out</u>	<u>Sets time of smooth extinction of the screen</u>
<u>Screenshot</u>	<u>Taking screenshots from device.</u>
Take Screenshot	Take a screenshot from device.
Save Screenshot	Save a screenshot to a file
Size	Screenshot ratio from 1x to 8x

Theme tab

Here you can customize your devices appearance with different logos for different events.

There are 8 (eight) different logos for 35 different events.



Logo

Download Logo

Upload Logo

Show in:

None

Welcome

Goodbye

Fire

Active

Idle

Charging

Sleep

Mod lock

Mod unlock

Param. lock

Enable/Disable displaying logos and download them to the tuner or the device

Download logos from device into tuner

Upload logos from tuner into device

For every logo

Choose the event for current logo (35 events available)

Logo won't be showed

Logo is showed when device powers on

Logo is showed when device powers off

Logo is showed when FIRE is pressed

Logo is showed when device is in active mode

Logo is showed when device is in idle mode

Logo is showed when device is charging

Logo is showed when device is in light sleep mode

Logo is showed when device locks

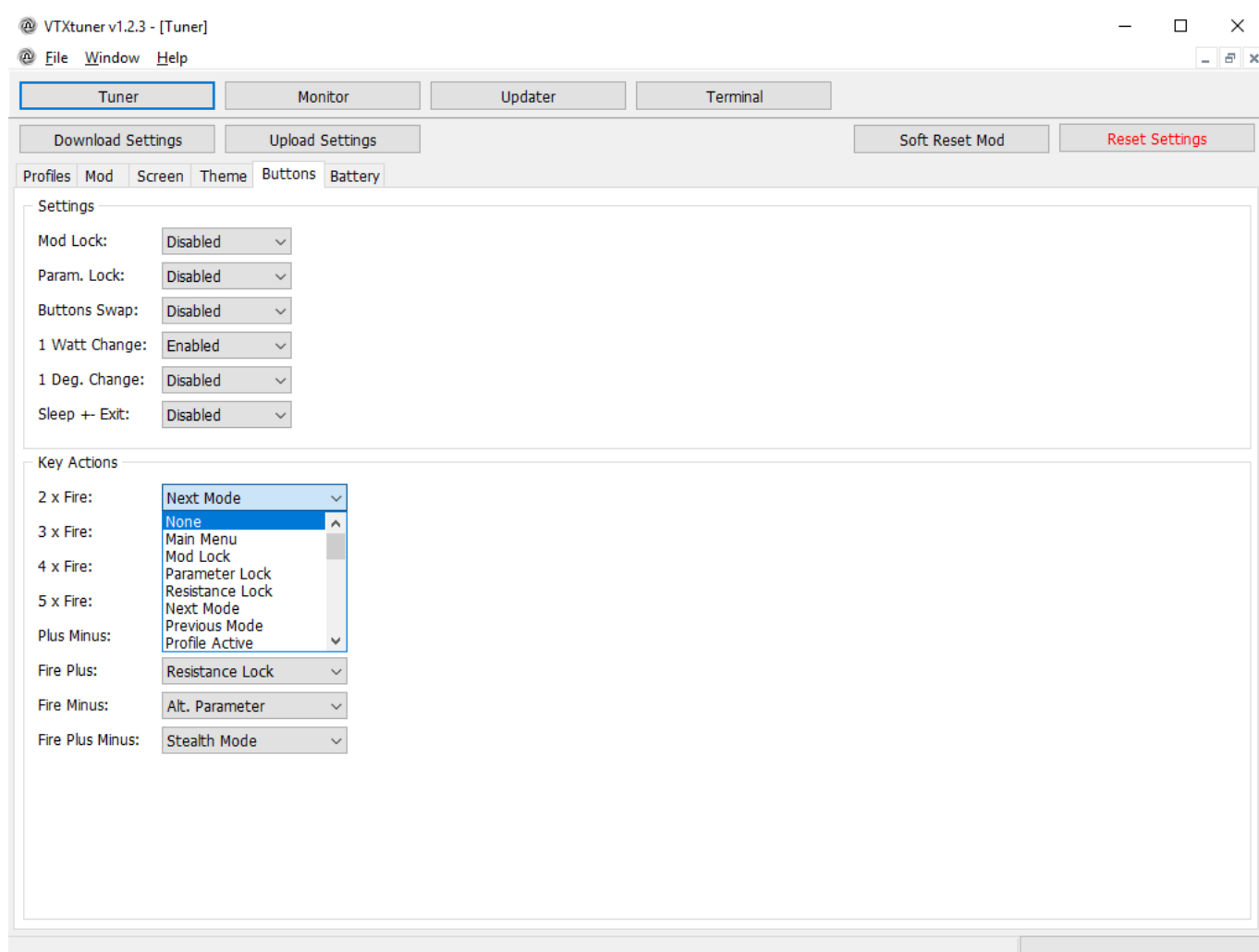
Logo is showed when device unlocks

Logo is showed when parameters are being locked

Param. unlock	Logo is showed when parameters are unlocked
Too hot	Logo is showed when board temperature is too high
Shorted	Logo is showed when atomizer is shorted
Check atomizer	Logo is showed when there is no atomizer
Time cut	Logo is showed when firing time gets the limit
Imbalanced	Logo is showed when batteries are unbalanced
Weak battery	Logo is showed when batteries voltage is not enough to use them with current settings
Dead battery	Logo is showed when batteries voltage is too low
New coil	Logo is showed when another atomizer is installed in “autoselect” mode
Profile 1-8	Logo is showed when corresponding profile is selected
VV/VW/TC mode	Logo is showed when corresponding mode is selected
Charge 0 / 25 / 50 / 75 / 100%	Logo is showed when batteries are charged to 0-24 (25-49, etc.) % in charging mode.
Load	<u>Load logo from a file on PC.</u> Supported images with resolution of 128x32 px, and file types: *.bmp, *.png, *.jpg, *.gif. Colored or gray scale images will be converted to b/w type.
Save	<u>Save logo into a file on PC</u>
Clear	<u>Clear logo in tuner</u>

Buttons tab

Settings are similar to [BUTTONS SETUP](#)



Settings

Mod Lock

Locks all buttons.

Param. Lock

Locks parameter (+/- buttons).

Buttons Swap

Swap +/- buttons.

It is useful with rotated screen and for left-handed users.

1 Watt Change

Changes power with step 1 W.

By default, power less than 100 W is changed with step 0,1 W, higher - 1 W.

1 Deg. Change

Changes temperature with step 1 degree.

By default, temperature changes with step 5 degrees Celsius or 10 degrees Fahrenheit.

Sleep +/- Exit

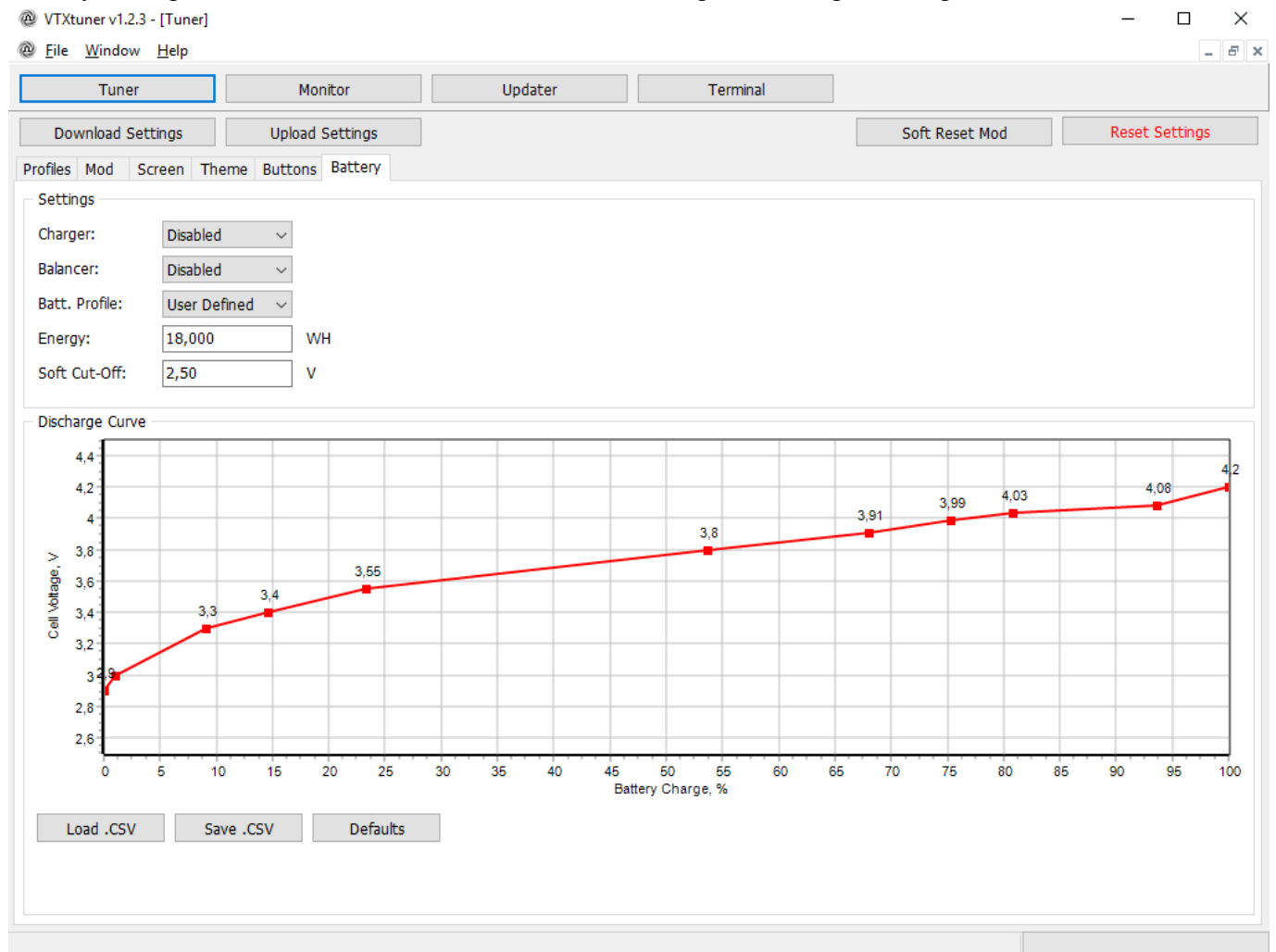
Enables/disables device awakening by pressing +/- buttons

Общие параметры кнопок

<u>Key Actions</u>	<u>Assigning actions to key combinations</u>
<u>2 x Fire</u>	<u>Choose key action for quick pressing FIREx2</u> List of available actions
<u>3 x Fire</u>	<u>Choose key action for quick pressing FIREx3</u> List of available actions
<u>4 x Fire</u>	<u>Choose key action for quick pressing FIREx4</u> List of available actions
<u>5 x Fire</u>	<u>Choose key action for quick pressing FIREx5</u> List of available actions
<u>Plus Minus</u>	<u>Choose key action for simultaneous pressing Plus + Minus</u> List of available actions
<u>Fire Plus</u>	<u>Choose key action for simultaneous pressing FIRE + Plus</u> List of available actions
<u>Fire Minus</u>	<u>Choose key action for simultaneous pressing FIRE + Minus</u> List of available actions
<u>Fire Plus Minus</u>	<u>Choose key action for simultaneous pressing FIRE + Plus + Minus</u> List of available actions

Battery tab

Battery settings, are similar to [BATTERY SETUP](#), loading and saving discharge curves for batteries.



Settings

Enabling/disabling built-in charger.

Charger

Can be disabled to avoid charging when connected to PC. When batteries imbalanced (more than 0,1 V) charger won't work.

Enabling/disabling built-in balancer.

Balancer

If batteries imbalanced more, than 0,1 V, balancer begins to work, discharging more charged battery.

Can be selected one of preinstalled profiles of general battery models.

Battery profile

Also can be selected default profile or "User defined". Next two parameters can be changed only for "User defined" profile

Summary energy of battery pack.

Energy

Calculates as "nominal capacity" * "nominal voltage" * 2. It is used for more accurate calculation of batteries power left. Is not used for cutoff.

Cutoff voltage under load.

Soft Cut-Off

Message WEAK BATTERY is shown and vaping is impossible.
2.5 Volts - the minimum allowable for Li-Ion batteries.

Discharge Profile

It is used for more accurate indicating of batteries power left

Load .CSV

Load discharge profile

Save .CSV

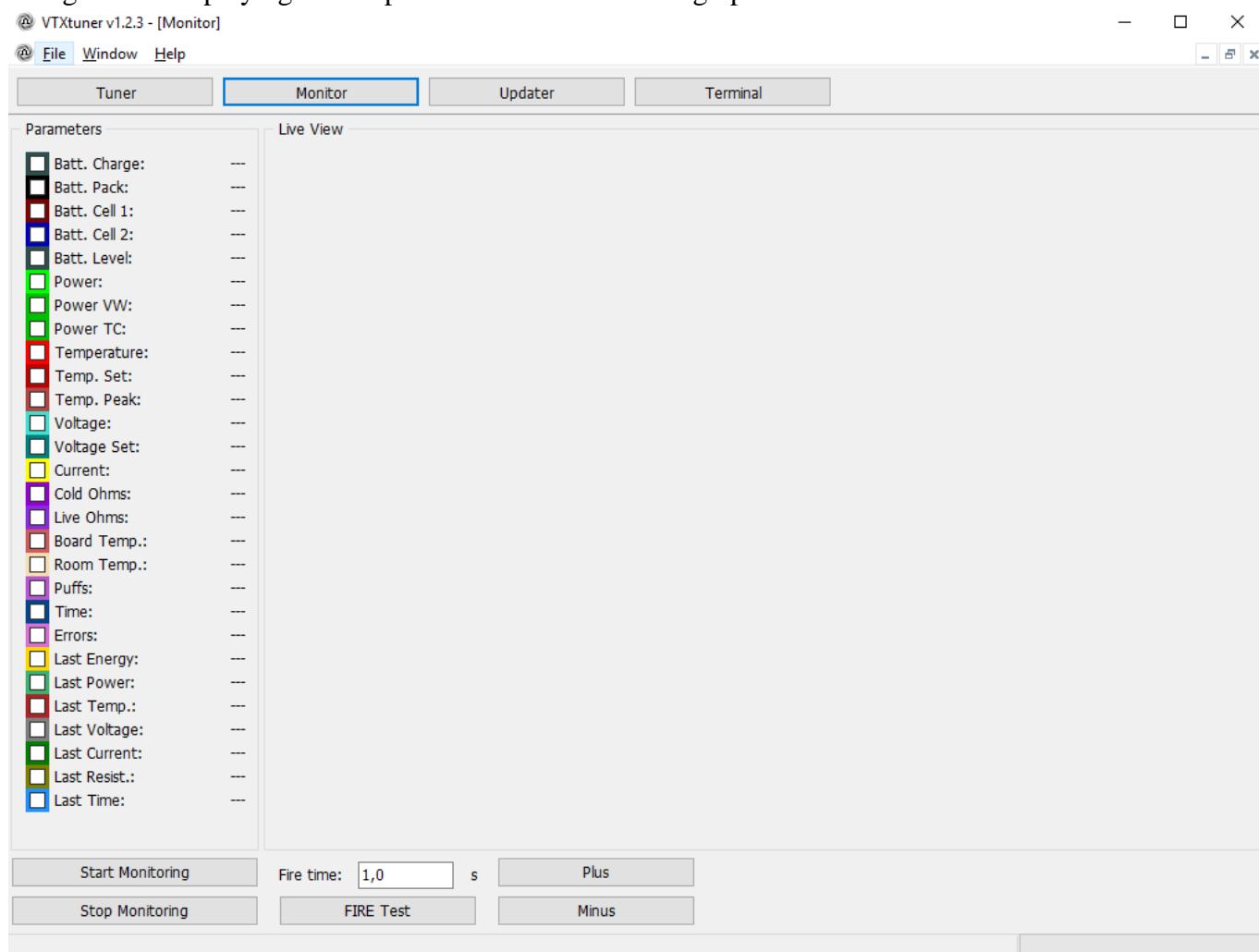
Save discharge profile

Defaults

Set discharge profile to default.

Monitor

Designed for displaying device parameters in the form of graphs in real-time.



Parameters

Batt. Charge

Check that you want to be shown in graph

When *Monitoring* is *started* actual values will be displayed near parameter name.

Battery energy in Wh

Batt. Pack

Summary batteries voltage

Batt. Cell 1

1st battery voltage

Batt. Cell 2

2nd battery voltage

Batt. Level

Battery charge in %

Power

Current power

Power VW

Power set for VW

Power TC

Power limit for TC

Temperature

Current coil temperature

Temp. Set

Temperature limit

Temp. Peak

Maximal coil temperature

Voltage

Current voltage

Voltage Set

Voltage set for VV

Current

Current current

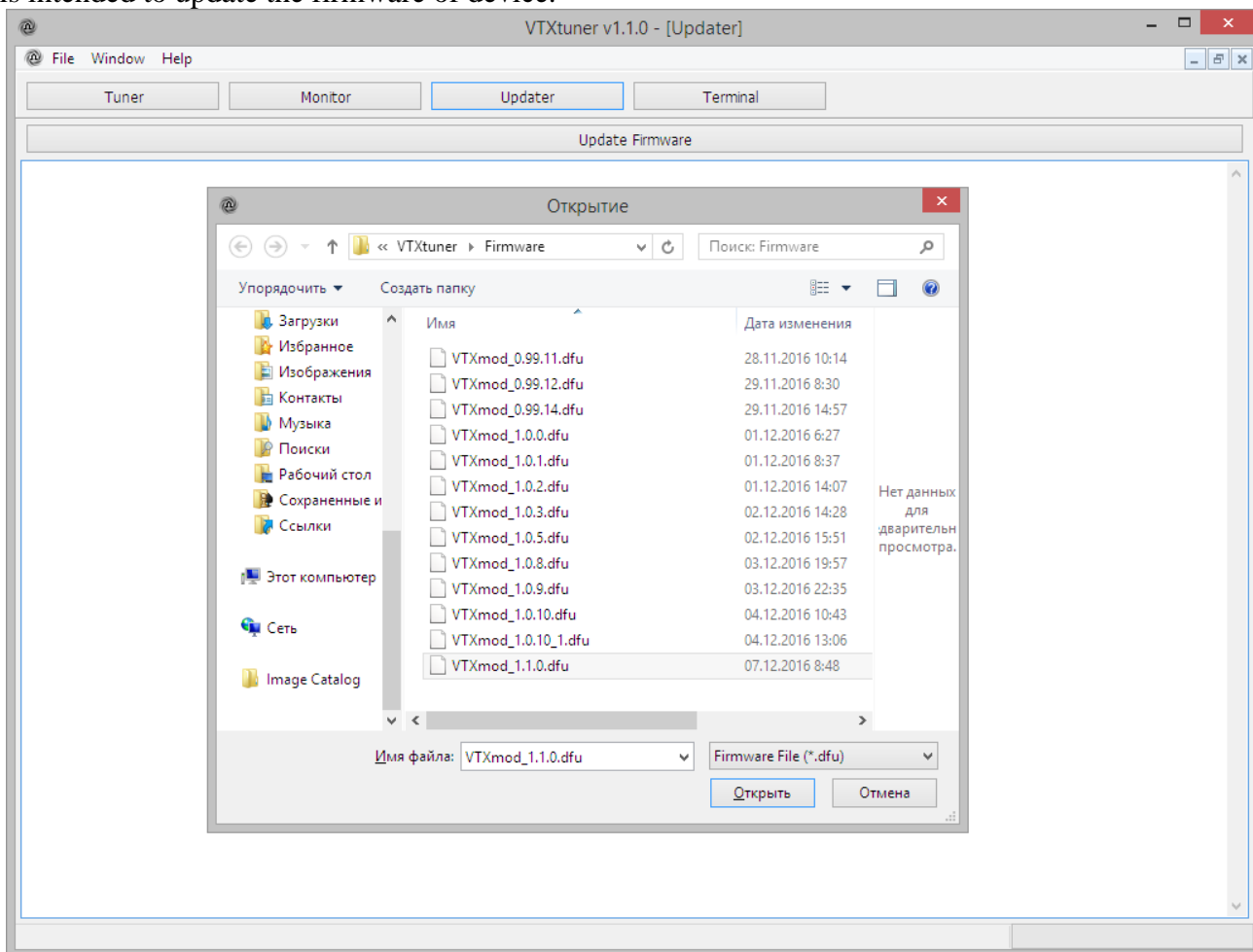
Cold Ohms

Cold coil resistance, Ohms

<u>Live Ohms</u>	Current coil resistance, Ohms
<u>Board Temp</u>	Board temperature (from thermal sensor)
<u>Room Temp</u>	«Environment» temperature (from sensor in microprocessor)
<u>Puffs</u>	Total puffs amount
<u>Time</u>	Current puff time
<u>Errors</u>	Errors amount
<u>Last Energy</u>	Last spent energy amount
<u>Last Power</u>	Last power
<u>Last Temp</u>	Last coil temperature
<u>Last Voltage</u>	Last voltage
<u>Last Current</u>	Last current
<u>Last Resist</u>	Last resistance amount
<u>Last Time</u>	Last puff time
<u>Live View</u>	<u>The window display of selected parameters in graphical form</u>
<u>Start Monitoring</u>	Starts reading parameters from the device
<u>Stop Monitoring</u>	Stops reading parameters from the device
<u>Fire time</u>	Time of virtual pressing FIRE. Can be set from 0,1 to 9999 sec. Virtual FIRE button.
<u>FIRE Test</u>	If <i>Fire time</i> = 0,1 sec, there is ability to control the device by mouse clicking on FIRE button: FIREx2 , FIREx3 etc. Virtual <i>Plus</i> button.
<u>Plus</u>	Can be used for changing main or alternate parameter or navigation through MAIN MENU of device. Virtual <i>Minus</i> button.
<u>Minus</u>	Can be used for changing main or alternate parameter or navigation through MAIN MENU of device.

Updater

It is intended to update the firmware of device.



By pressing *Update Firmware* button opens a standard Windows dialog box, that prompts you to select the firmware file.

Directory by default: *C:\Users\ИмяЮзера\AppData\Roaming\VTXtuner\Firmware*

After selecting the file, the program will put the device itself into programming mode (DFU), after finishing will return the device to a working state.

After device updating if you want to use Tuner with device you'll may need to restart the VTXtuner.

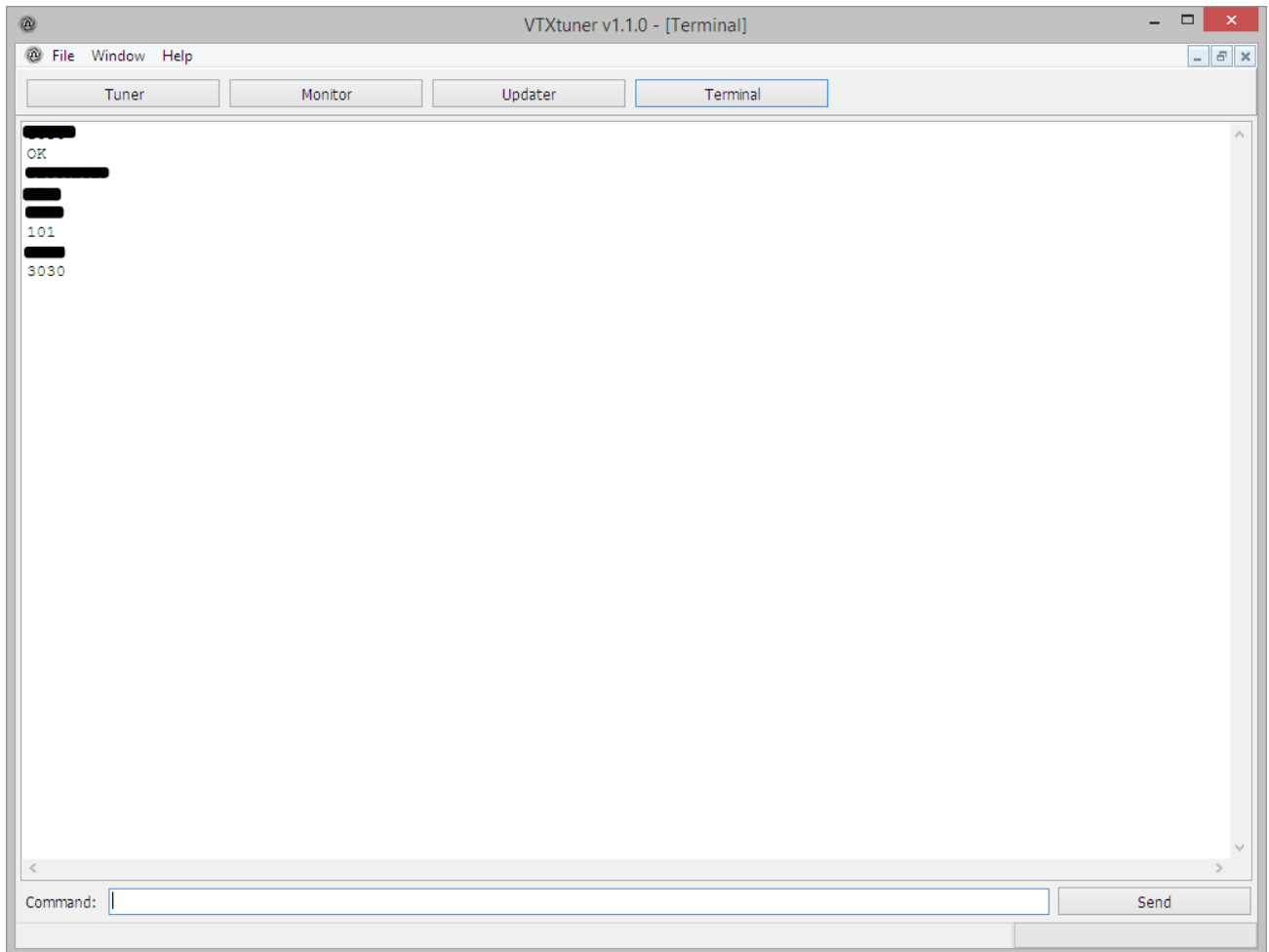
Terminal

Console to set parameters and read them directly, bypassing the GUI.

Designed for software developers and testers of device and firmware.

It provides a somewhat broader range of the parameter settings and so on.

For ordinary user all this is not required.



5. FAQ

This section is no more than an assembly of disparate information gathered from forums and other places, slightly brushed by editor (not all and not everywhere).

I hope it will be useful in understanding the operation and settings of [Vortex-Mod](#), as well as some of the common questions of vaping.

Resistance locking from Vortex (developer)

Now I will explain what is resistance locking and what it affects.

Couple “resistance / temperature” is stored for each profile, and may be locked or not.

If it is locked, so device will not change it, no way.

If it is not locked, so device can change it at the beginning of each puff and in cases with SS, it can "crawl" away.

For Power mode it is not critical, but for TC it is important.

If you are using atomizer auto-select feature, it becomes important for Power and Voltage mode too, so I recommend to lock the resistance.

Well, Kanthal’s resistance hardly changes from heat. Kanthal has no need in locking and auto-select will work without it.

When auto-select of atomizer works, device is not looking at zero resistance after FIRE, but at its own flag - "FIRE was pressed without atomizer", so, either there is zero in the resistance field or there is not zero and locked - there is no difference.

Setting auto-detect of the atomizer “Coil Autosel” - Enabled

Setting on device, atomizer removal and entering menu of resistance determination is necessary only for coils with $TCR > 1$, to exclude coil heating by clicking FIRE.

If you are using [VTXtuner](#) steps 1-5 are not necessary.

1. Coil Autosel must be Enabled
2. Remove atomizer;
3. Enter profile you need
4. There enter resistance determination
5. Screw atomizer on.
6. Read its resistance
7. Lock resistance
8. For another profile and atomizer repeat from step 1

When all profiles are configured

9. **Without atomizer press FIRE**
10. Screw on the atomizer that you have remembered in profile before.
11. Press FIRE, device will recognize atomizer and will automatically set its profile.

Attention!!!

- If in several profiles locked similar resistances, then automatically the first profile in order will be selected.
- If screwed atomizer is for profile, that currently selected – there will be no profile switching!!
- For correct work of atomizers auto-select, differences between resistances of atomizers must be more 0,05 Ohms.
- If you’re using only materials with $TCR \sim 1$ (kanthal, nichrome etc.), locking resistance is not necessarily. Auto-detection will work correctly, until you forget to press FIRE without atomizer. In this case profile will not switch, device will read current resistance and it will become "native" for this profile. So, you’d better to lock.

Adjusting PID coefficients

To maintain the temperature in the TC mode, the device has an fully implemented PID controller. Standard settings provide precise temperature maintenance in a wide range of coils. If the default settings do not suit you, it is possible to adjust the coefficients.

Dimension and the formula:

$$dt = t_s - t_m$$

$$P = KP * dt + KI * \text{SUMM}(dt) + KD * \text{DIFF}(dt)$$

t – in Celsius degrees
 P - mW/°C
 I - mW/°C/s.
 D – mW*s./°C.

So, with the initial $KP = 600$, we have a contribution of proportional term $600 \text{ mW}/^\circ\text{C} = 0.6 \text{ Watt}$ for degree.

Power Update Period (time constant) - 20ms (50Hz).

Similarly, the contribution of the integral term is calculated - $850 \text{ mW}/^\circ\text{C}/\text{s} = 0.85 \text{ W}/^\circ\text{C}/\text{s}$.

Differential member though implemented, but almost useless in our reality.

The power is limited above with the maximum power limit.

If you manage to pick up the factors under your coil, please report the material, the base resistance, P, I and (D).

From the editor

All written below the result of my experiments, and it may not reflect the real state of things, if someone will correct, I will be glad

P- this is what value will oppose maintaining the temperature of the cooling of the coil... (increase on light coils) if you have a dry-hit on first puff - increase...

I – it is the speed with which the regulator will counteract the cooling / overheating (better not to touch to find out)

D – if simply – this is prediction, as you will be tightened in the next moment, how much will cool down or warm up coil (better not to touch or touch the minimum, within 0-5, more is not interesting ... cold steam)

Intelligent preheat

If “Preheat Delay” is not equal to zero.

Works so: Preheat Time with current set Preheat Power changes through Preheat Delay time from zero to Preheat Time.

For example, you set Preheat Delay = 10 seconds, and Preheat Time = 1 second.

So:

within 1 second after puff, next puff will begin with Preheat Time = 0.1 seconds,
 within 2 seconds after puff, next puff will begin with Preheat Time = 0.2 seconds,
 ...
 within 5 seconds after puff, next puff will begin with Preheat Time = 0.5 seconds,
 ...
 within 10 seconds after puff, next puff will begin with Preheat Time = 1 second.

Battery

About graph. Attention! Warning! Uwaga!

- There are 11 points on graph (don't ask more – memory limit)
- The graph should increase monotonically (it is not checked yet), both the X axis, and the Y axis. T.e. unacceptable that it was, for example, two times 90%, or twice the 4.00 volts or point of 90% in volts is greater than 100% point.
- Points 0% and 100% must be present necessarily(!).

Setting charge indication (or Vortex)

Who has strange behavior of battery indicator do the following:

- 1) Select and set in tuner a profile for your batteries.
 - 2) From profile name pick energy amount (Wh) and also write in tuner (or though menu).
 - 3) Fully charge the battery in device (until flash indicator is gone) or in external charger (recommended).
 - 4) In device go to battery info and watch a summary voltage (1st number) and divide it by 2.
 - 5) On battery profile number, corresponding to 100% decrease to number, you got in step 4)
- (Ideally, all numbers are needed to be reduced in the battery profile to the difference between 4.20 and that in you got in step 4) To do this, save profile to csv, edit with notepad and load back).

That's all, after this, reading your batteries will be correlated with actual with high precision.

Setting charge indication (от редактора):

In tuner load profile for your batteries.

Wh set like in name of file with curve.. (ex. for LG HG2 18,666 Wh)

charge batts, vape and don't mention... if everything is ok – device will recalculate and show correctly. If battery voltage in percent and battery energy in percent may not be the same – it's normal.

if we have done with the settings, and are aware of the actions – edit battery curve and Wh, if not – leave them by default.

This is absolutely has no effect on anything!!!!

Percent of voltage are taken from battery curve.

Battery indicator calculates its amount from curve and Wh set.

so, if you inserted fully charged batts and device saw, that voltage is 4,2 V (100% on curve) and Wh is 18.666, then he calculates by itself...

if you change Wh with discharged batts - naturally the device will show the weather.

You tuned the curve and Wh, inserted fresh batts (or charged them in device)... everything must be shown correct.

Built-in charger does not controlled by firmware and does not depend from Wh or discharge curves, charges as it sees fit.(4,2 V or less)

Battery Soft Cut-Off is tuned by user, if you do not want to kill batteries do not put less than 2,5 V.