digital controlled devices

dicodes

SBS18350USBC

manual

01 dicodes SBS18350USBC

The dicodes SBS18350USBC is an electronically controlled mod to be used with various atomizers of different sizes and diameters of up to 24mm.
SBS stands for side by side and describes a mechanical construction, where the atomizer is positioned at the side of the battery compartment, rather than being screwed on top of the device. This provides a very compact design, even when using very long atomizers.
The SBS18350USBC is powered by a single Li-Ion battery of size 18350, 18500 or 18650. Depending on the type of battery used, power should be limited.
The power electronic inside the device is capable of delivering up to 60W to the atomizer and the device is delivered with a size 18650 battery tube. Beside the 18650 tube, there are battery compartment tubes available for the use of 18500and 18350 batteries as well. We recommend a maximum power of 30W for 18500 and 20W for 18350 batteries.
Note: Using non authorized battery tubes without spring may damaged the device and will void the warranty.
As the name SBS18350USBC indicates, the device provides the option for battery charging using a USB-C cable connected to a USB source.
Different battery sizes must be charged with different currents. Therefore the charge current is selectable to 0.5A (low), 1A (mid) and 2A (high) for 18350, 18500 and 18650 respectively. An automatic current selection is also available for a battery voltage > 3.4V. Below 3.4V the charge current is 0.5A in this automatic mode (auto).

The body and the battery compartment tube are manufactured from high quality solid stainless steel with a brushed surface finish.
The 510 contact is made of a spring loaded beryllium copper contact, which is harder than steel, thus avoiding scratches or splinter.

The dicodes SBS18350USBC is equipped with a 0.5” OLED display at the side. By means of a sophisticated one button menu structure, the user can adjust all main parameters as well as all kinds of preference settings.

The device provides 5 different operation modes: Power, Boost, Heater-Protection, Bypass and temperature controlled vaping with many different kinds of wire-materials (dicodes-wire, nickel, titan, stainless steel, and others). Further information about the operation modes can be found below in this datasheet.

The SBS18350USBC provides several safety-features referring to its high power capability. Beside the limitation of the output current and output voltage, it continously checks the input voltage and current and limits the output power accordingly, to always keep the system in a safe condition.
As part of this safety concept, the system’s source resistance is determined, i.e. the combined resistance of the battery, contacts and internal wiring. Please see chapter 5, page 3 for further information.

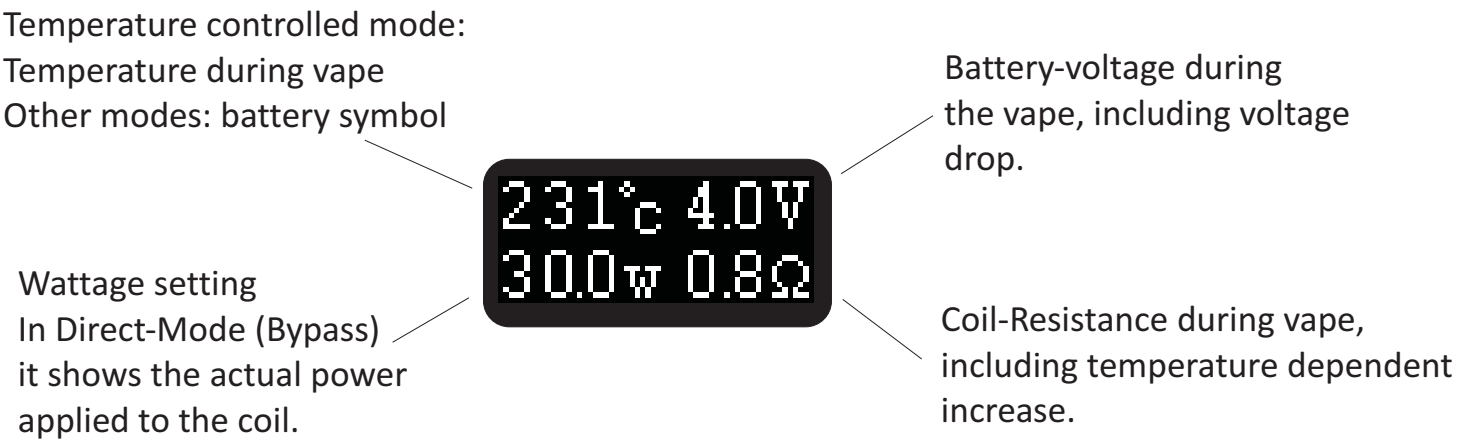
02 Feature List SBS18350USBC

- Side by Side mod for use with 3 different battery sizes
- optional use of 18350, 18500 and 18650 batteries (diff. battery tubes)
- Use of atomizers with up to 24mm diameter
- USB-C charge port with slectable charging at about 0.5A, 1A or 2A
- Delivered with USB-C to USB-C cable (*)
- Adjustable battery discharge level (2.5-3V)
- Up to 10V output voltage
- Up to 20A output current
- System source resistance determination
- spring loaded 510 contact made of Beryllium-Copper
- Temperature controlled vaping mode with various wire-types
- Mechanical MOD mode
- 10 Power boost modes
- 10 Heater protection modes
- Atomizer resistance range 0.05 to 5 Ohms, total
- Atomizer resistance range at 60W 0.15-1.67 Ohms
- Reverse battery protection
- Versatile menu structure
- Individual user preferences selection
- spring loaded center pin made of copper beryllium
- charging contact on the bottom (requires charger station CS1)
- 2 years warranty on electronic (terms and conditions, see chapter 08)
- stable stainless steel housing

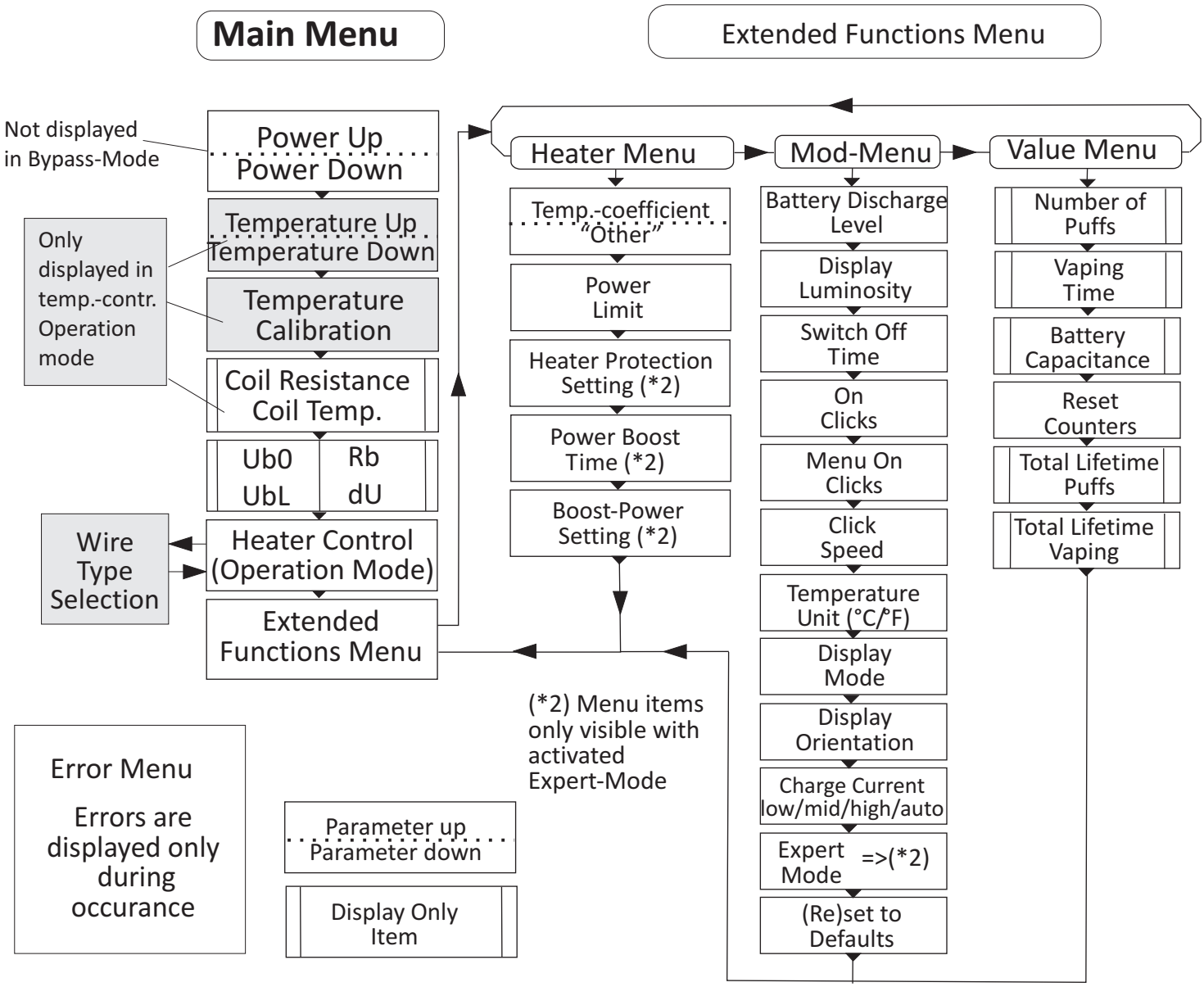
(*) Also separately commercially available

03 Display Operation

The SBS18350USBC is equipped with a graphical OLED display which provides all important information about the status during and for 4 seconds after each vape.



04 Menu Overview



05 Main Menu (Page 1)

Switching On/Off and Menu-Operation

The dicodes SBS18350USBC is switched on by pressing the button shortly 5 times. The display shows “Hello” and the user is led to the main menu. For actively switching off the device there is menu item “Switch Off”. When the value “0” is highlighted and pressing the button, the mod displays “Bye..” and switches turns off shortly afterwards. Important Note: The dicodes SBS18350USBC differentiates between active switch off and the automatic switch off after the selectable switch-off-time. When the mod was switched off driven by the automatic timer, the device is switched on by pushing the button “On Click” times.

“On Click” is a user selectable parameter. When “On Click” is set to 0 (zero), the device will immediately switch on and pressing the fire button longer than about 0.2seconds will let you vape immediately, even if the mod was completely powered down.

After an active switch off, the device can only be switched on again by pushing the button 5 times shortly. It is recommended to actively switch the device off during transport to avoid unintended vaping or change of parameters (when the button is mechnically pressed by coincidence).

The menu is entered by shortly pressing the button “MenuOn Click” times. By default, this user selectable parameter is set to 3. By further pressing the button within a certain adjustable time (parameter Click Speed) the user gets to the next menu item. If this certain time elapses without button actuation, the value of the currently displayed parameter is inverted (highlighted) and can be modified then by pressing the button several times or by keeping the button pressed, which activates an auto-repeat operation.

When the button is not pressed any more, the display goes off and the parameter is permanently stored.

Vaping is activated, whenever the button is pressed for longer than about 0.2 seconds.

The maximum vape time is - depending on the power setting - limited between 10 and 20 seconds. The limitation is 10 seconds for power >40W and 20 seconds for power < 20W. In between it is linearily increased. When the limit is reached, the error message “timeout”, error 7 is diplayed. This error must be acknowledged by waiting for the error number being highlighted and then pressing the button shortly. “Err -” is displayed.

Changing the Power Setting

By means of menu item power-up and power-down, power can be adjusted between 5W and the power limit value, a user adjustable parameter in the extended functions/ heater menu. “Power Limit” provides a limitation for atomizers requiring low power or limiting power depending on the battery size. We recommend to limit power to 20W for 18350 batteries and to 30W using 18500 batteries. For 18650 batteries full power of 60W might be released, which is the default “power Limit” value. Power can be changed in steps of 0.5W up to 30W and in steps of 1W above 30W.

In the operation mode “Bypass” (mechanical mod), changing the power setting is not available, because the power is defined by the battery voltage and coil resistance. The menu “Power” is not displayed in this case, but the value display during and after the vape shows the actual power output to the coil.

With temperature controlled vaping activated, the power setting is the power limit for the temperature regulator. If the power level is smaller than the value needed to achieve the selected temperature, the operation changes from a temperature regulator to a temperature limiter. If the power level is sufficiently high, it sets the heating up speed of the coil until the set-point temperature is reached.

When the battery voltage decreases, power is reduced starting from the voltage set by the parameter Ubat,min (Extended Functions / Mod menu) plus 0.5V and ending at 10W at Ubat,min.

E.g. UbatMin=2.6V and Power=60W => Full 60W until battery voltage is at 3.1V, and then reduced to 50W at 3.0V, 40W at 2.9V and so forth.

When the power is reduced, the battery symbol on the display will toggle with the message “Low” and the reduced power level is shown. Further information to be found in chapter 06.

Using 18350 batteries, we recommend the settings for Ubat,min to 2.7V, otherwise 2.5V.

05 Main Menu (Page 2)

Setting the Temperature

This Menu items are ***only available and displayed if temperature controlled vaping is selected*** (see Heater-Control menu item below). So the menu structure adapts to the selected operation mode.

The Temperature Up/Down menu sets the setpoint for the coil temperature during vaping. The temperature setpoint can be selected from 120°C to 280°C (250°F- 540°F) in steps of 5°C (10°F). To achieve a high precision temperature control, a correctly performed reference measurement (TempCal Init) is mandatory, see next item.

Manual Coil Temperature Calibration

This Menu item is ***only displayed if temperature controlled vaping is selected*** (see Heater Control menu item below). For the use of temperature controlled vaping, the calibration measurement is a very important part of it.

The Temperature calibration measures the coil resistance at room temperature (20°C/68°F) as the reference for temperature controlled vaping. This, together with the wire's temperature coefficient enables the mod to calculate the coil's temperature. The calibration must be confirmed in a second step to avoid accidential activation. After confirmation the display shows "process" until the calibration is completed. It is extremely important to understand, that, if the calibration is performed at a temperature other than 20°C, the control will regulate a constant temperature, but with an offset deviation. So take the ambient temperature during the temperature adjustment in to account. For example, if the ambient temperature is 40°C during calibration the actual regulated temperature will be 20°C higher than the set-point.

Similiar, if a wrong temperature coefficient was adjusted, the actual temperature might deviate dramatically from the set-point (here it is a factor and not an offset). Always perform a calibration, when a new atomizer is attached, even if it is made from the same coil material.

We recommend to use a wire with a high temperature coefficient of it's resistance and a (cold) resistance of >0.7 Ohm to get a high precision regulation. When using popular stainless steel wires the regulation accuracy is limited due to the low temperature coefficient.

Coil Resistance and Coil Temperature

This is a display only menu item. The coil resistance is displayed in a range from 0.00 to 9.90 Ohms. If temperature controlled vaping is selected, the measured/calculated coil temperature is also displayed, if not, the display shows T ---.

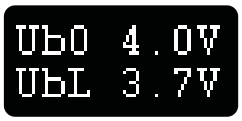
Note that the display will be continously updated, if the button is kept pressed after the values have been highlighted (or inverted). This can help during problem diagnoses.

In TC-mode, if the display does not show 20°C after calibration, even with a cooled down atomizer, we recommeded to perform the calibration again.

Note that for coils with very low resistance, like Nickel-coils, a slight mechanical rearrangement (tightening the atomizer) can lead to drastical changes in the temperature control due to the change of contact resistances. We therefore recommend to use other than Nickel coils, e.g. the NiFe30 (RESISTHERM) wire from dicodes.

05 Main Menu (Page 3)

Battery Status Part1



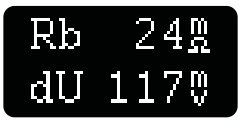
The Check Battery item shows the battery voltage with little current drained in standby (Ub0) and the battery voltage under load during the last puff (UbL). The difference is the voltage drop of the battery (dU). A high drop (e.g. dU>0.4V@20W and dU>0.7V@60W) indicates a poor battery and/or contact problems (18650 battery size)..

Please note that every battery has an inner resistance and that therefore the voltage at it's contacts always drops when current is drained. The more current is drained, the higher the drop will be. Always remember this behaviour.

Commonly used batteries of 18350 size have inner resistances of about 50mΩ up to 100mΩ.

Batteries of size 18500 have slightly lower inner resistance and those of size 18650 have lower values of 18..35mΩ. Generally speaking, the batteries with high capacity have higher inner resistance and vice versa.

Battery Status Part2



The SBS18350USBC has an additional feature supporting the user to evaluate the quality of the battery and the system contacts on the battery side.
This feature is gaining importance because the device can handle power output of up to 60W.

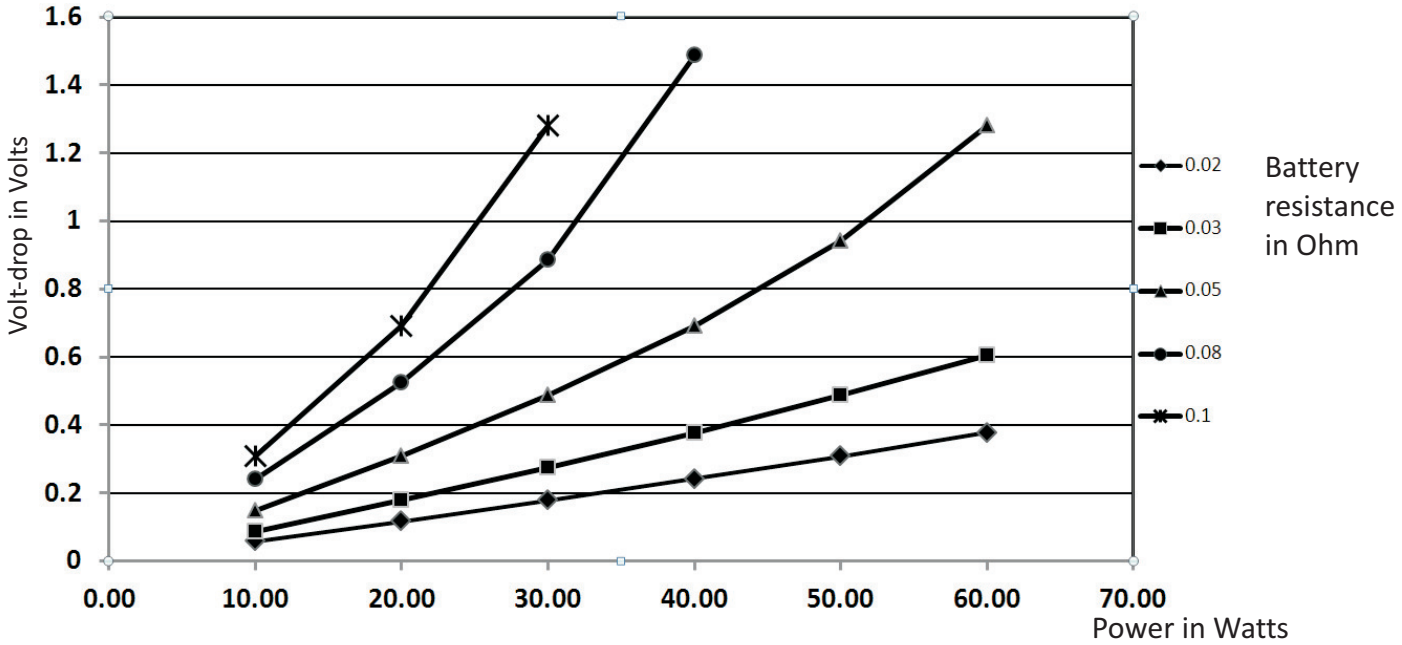
When at the display menu item of Ub0 and UbL described above, the mod will display the system's source resistance Rb and a more accurate measurement of the voltdrop Ub, as soon as the values of Ub0 and UbL are highlighted and the button is pressed. Every time the button is pressed then, the display will toggle between the values of Ub0/UbL and Rb/dU.

Note that these values might change a bit when toggling back and forth, because the battery voltage without load (Ub0) can change, mainly due to the temperature change (cooling) after vaping.

The systems source resistance is the sum of the batteries inner resistance as the main contribution and all contact and wiring resistances of the device. As already stated, typical battery resistances vary from 18mΩ to 100mΩ depending on the type and age. The typical contact and wiring resistance of the SBS18350USBC sums up to about 10mΩ.

At high power, the current drained from a battery will lead to a significant voltage drop at the systems source resistance. The by far biggest part of the voltage drop is created INSIDE the battery and NOT in the device. Please keep this always in mind.

The diagram below shows the voltage drop depending on the source resistance based on a battery charged to 3.8V. When the battery is not fully charged the drop will increase even more, because of the increasing current needed to provide the same ouput power.



05 Main Menu (Page 4)

Notes about high power vaping

As the SBS18350USBC can be used up to 60W using a size 18650 battery, here some explanations for vaping at high power, i.e. 50-60W with one battery.
It is strongly recommended that only the best in class batteries are used and that all contacts are kept clean. Always keep in mind that 60W taken even from a high drain battery will create power losses (heat) in the batteries inner resistance as well as at all mechanical contacts, which finally will reduce the total vape time and lead to volt drop. The power-losses inside the battery can be significant as a simple calculation shows:
Example (neglegting efficiency of electronic):

Inner battery resistance 25mΩ
Voltage at battery under load 3.3V
Output Power 60W

} Power-loss,battery = $(60W/3.3V)^2 * 25m\Omega = 8.3W$ (14% of output power)

The box is equipped with different kinds of power reduction mechanisms to keep the operation in a safe range for the battery and the electronic. If the power is reduced, the actual power output is displayed instead of the setpoint.

1. The output current is limited to 20A: When the atomizer or coil resistance is comparably low and when the power is set to high values, the actual output power will be limited according to the formula
$P_{out} <= I_{max}^2 * R_{coil}$
Example: Rcoil=0.12 Ω=> Pout,max= $(20A)^2*0.12\Omega = 48W$, regardless of the power setting (unless it is set lower than 48W)
The limitation works dynamically, i.e. if the wire changed (e.g. a TC-wire), the limitation will adapt to this.During limitation the display shows a blinking “Io” (not to mix with “low”).

2. The output voltage is limited to 10V: When the atomizer or coil resistance is high, power is limited according to
$P_{out} <= U_{max}^2/R_{coil}$
Example: Rcoil=1.8Ω => Pout,max=$(10V)^2/1.8\Omega = 55.5W$
The limitation works dynamically. For example when using a TC-wire the initial power can be very high and as soon as the wire is hot, the power will be reduced. During limitation the display shows a blinking “Uo”.

3. The output power is reduced, when the battery voltage drops to a value dependent of parameter Ubat,min (range 2.5 to 3.0V) according to the formula
Pout,max= the lower of [60W and 10W+(UbL-Ubat,min)*10W/0.1V]
Example: Ubat,min=2.7V, UbL=2.9V (battery voltage including drop during power output)
=> Pout,max = 10W+ (2.9V-2.7V)*10W/0.1V = 30W
During limitation, the display shows a blinking “low”.

Note that the power is less reduced, when the battery inner resistance is low. Also note that power is reduced only if the battery voltage drops below 2.9V in the example (at Ubat,min=2.7V).

The limitation automatically leads to drastic power reduction, when using small 18350 batteries, because of their high inner resistance , thus preventing the battery from heavy overload.
Please note to set Ubat,min to 2.7V or higher when using 18350 batteries.The default setting is 2.7V.

05 Main Menu (Page 5)

Heater Control (Operation modes)

The SBS18350USBC can be used in up to 5 operation modes. The mode can be selected in this menu:
The default operation is either power (0) or temperature controlled vaping (1).
With the “Expert Mode” (Extended Functions /Mod-Menu) enabled, additional operation modes are Heater Protection (2), Power Boost (3), and Bypass (4, mechanical mod).
With Expert Mode disabled, the menu options 2..4 are masked out.

0. Power Mode
In the power operation mode the wattage selected in the power setting menu is applied to the coil, unless the voltage would get greater than 10V or the current greater than 20A, which depends on the coil resistance.

For example with a coil resistance of 3 Ohms and a power setting of 60W, the required voltage at the coil is 13.4V. In this case the pwer would be limited to 33.3W ($(10V)^2/3R=33.3W$).
Or, if the coil resistance is 0.1 Ohm the maximum power is 40W, because $(20A)^2*0.1Ohm=40W$.
As can be seen from the examples, with high coil resistance the power is limited by the maximum voltage of 10V and with low resistances by the maximum current of 20A. The fact is also reflected in the feature list: A power of 60W is guaranteed from 0.15 to 1.67 Ohms.
Resistances of 0.05 to 5 Ohms are possible but with a reduced power.
See proceeding page about power limitation as well.

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1. Temperature controlled vaping

In this mode the mod will regulate the temperature of the coil to the pre-set value, except the power setting is too low to achieve the temperature. So please note to adjust the power setting to a value high enough, if you choose temperature controlled vaping. Otherwise the temperature regulation changes to a temperature limitation mode.

When HCtrl is set to 1, the menu directly jumps to the selection of the wire type. Here the user can select between dicodes-wire (NiFe30), Nickel 200 (Ni), Titanium (Ti), several sorts of stainless steel, NiFe48 and “Other”. With “Other” selected, the temperature coefficient defined in the Extended Functions / Heater Menu under item “Temp. Cof” is used. The value of the selected coefficient is displayed behind “Wire”.
For commonly used wires, the predefined coefficents are: NiFe30=320, Nickel200=620, Titanium=350, SS304=105, SS316=88, SS316L=92 and NiFe48=480. Note that there are different alloys for Titanium and Stainless Steel on the market, so the predefined values can deviate from the actual wire-value you use. In these cases it is preferable to choose “Other” as the wire type and set the value of the wire in the extended functions heater menu “TempCof”. The range for the coefficient is 050 to 650.
If you use the dicodes wire (RESISTHERM) it is guaranteed that the wire will always have the same coefficient, because the wire was especially designed for temperature regulation purposes. The regulation accuracy is best then, as the combination of resistivity and high coefficient is very good.
Note for using Nickel wire: Nickel has a high and always precise temperature coefficient (Ni200). But Nickel is not so easy to handle, because it is quite soft and it leads to very low resistance coils, because of it’s high conductivity. For the regulation accuracy smallest changes of contact resistances due to atomizer movements (tightening) or mechanical thermal elongations lead to poor regulation accuracy.

05 Main Menu (Page 6)

Main Menu

Parameter

Extended Functions
Heater Menu

2. Heater Protection Mode (only when Expert Mode=1)

The heater protection mode is a periodic interruption of the power applied to the coil. The duration and the repetition rate of the interrupts is selected by means of the parameter “Heater Prot” in the extended functions mod-menu. The repeated power interrupt helps to avoid a break in liquid flow and thus an increase in temperature.

The table below shows the relation between power interrupt and appliance time in dependence of the parameter “Heater Prot”:

Value Heater Prot	On-Time [ms]	Off-Time [ms]	Powerfactor
1	400	100	0.80
2	600	100	0.86
3	800	110	0.88
4	1000	120	0.89
5	1350	150	0.90
6	2000	200	0.91
7	2000	180	0.92
8	2000	150	0.93
9	2000	100	0.95
10	2000	80	0.96

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3. Power Boost Mode (only when Expert Mode =1)

The Power Boost Mode enables an initial short term high power pulse applied to the coil (boost). The boost power is the value of the parameter “Power Limit”. Beside 5 selectable initial boost lengths, further options generate a periodic boost pulse with different length and repetition rate. An initial boost is for quick coil heat-up. The periodic boost lets the coil temperature pass a certain range all the time. In this case different flavours within the liquid, which all develop their taste at different temperatures, are all addressed by the varying temperature.

Main Menu

Parameter

Extended Functions
Heater Menu

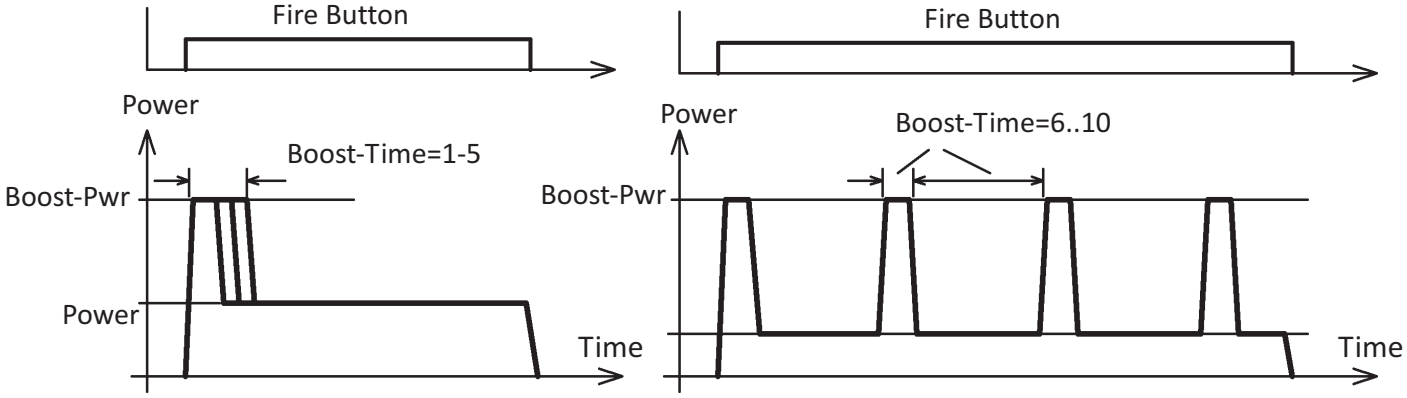
We recommend to set the normal power (not the boost) to much lower values, when using the periodic boost, because the average power is increased by the boosts and temperature gets higher therefore.

Boost Time Index	Boost-Time [ms]	Time of set power [ms]	effective power (at 5W power setting)
1	300	-	Start-Boost
2	450	-	Start-Boost
3	600	-	Start-Boost
4	800	-	Start-Boost
5	1000	-	Start-Boost
6	100	700	6.9
7	150	800	7.17
8	200	900	7.36
9	250	1000	7.6
10	300	1000	8.0

The next page shows a graphical representation of the boost mode.

05 Main Menu (Page 7)

Diagram for Boost-Function



Active Switch Off

The device is actively switched off using this menu item. As soon as the 0 is highlighted/inverted, pressing the button will switch off the device. Then, it can only be switched on by 5 consecutive clicks on the button.

Extended Functions Menu

The Extended Functions Menu provides three logically grouped sub-menues:

Heater Menu ➡ Settings related to the heater or coil
Mod Menu ➡ Settings related to the individual usage and appearance
Value Menu ➡ Provides several statistics of vaping

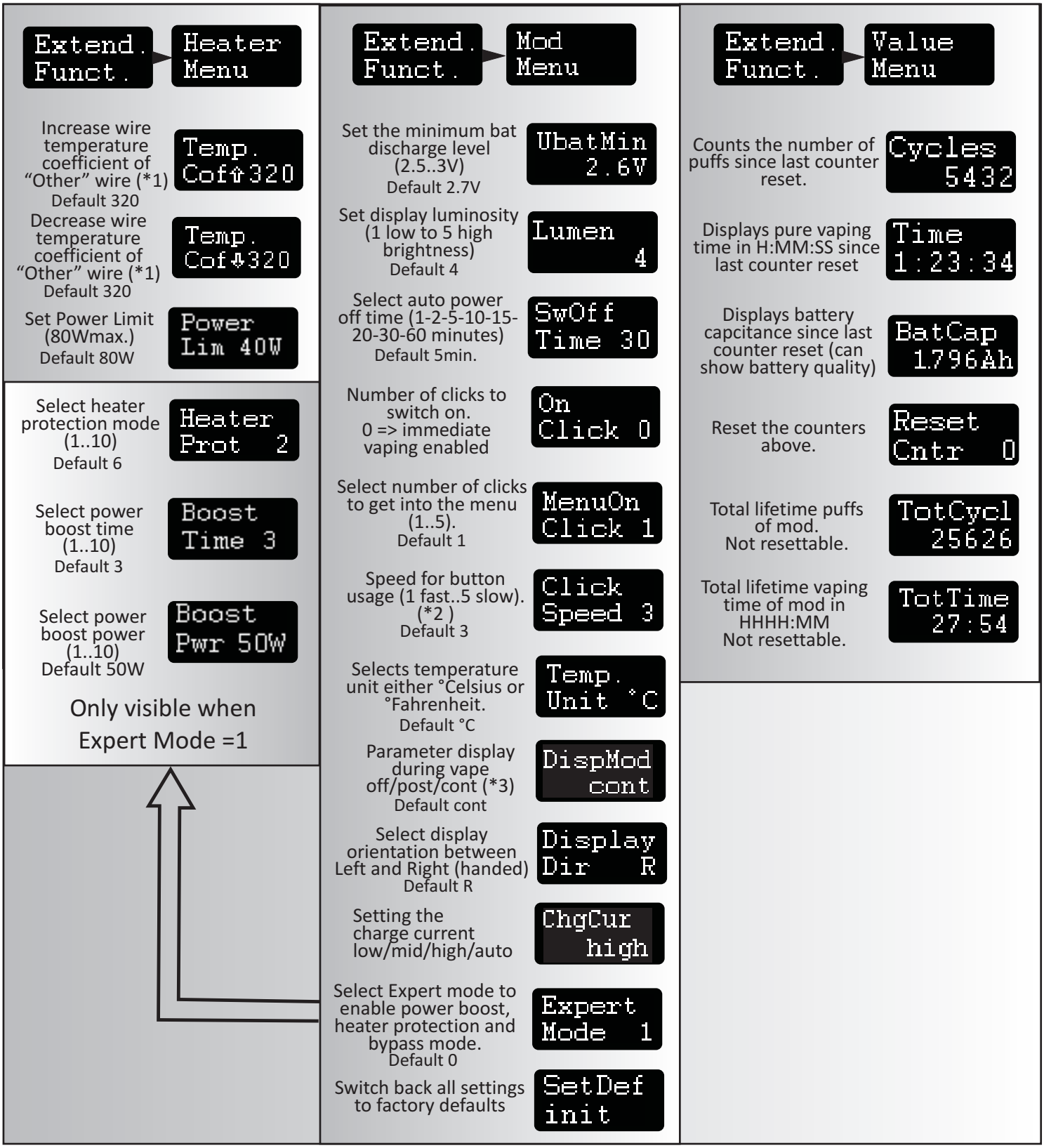
The Extended Functions Menu offers a lot of setting options of the mod, to provide the highest possible flexibility for the user to individually adjust it to whatever preferences. Normally, once the settings were made, the user will need to change the parameter rarely. In order to keep the main menu as short as possible, the extended functions menu was created.
The many options may frighten some of the users initially. But without the extended functions menu the mod would not be able to address all different customer requirements. Please take a bit of time to get familiar with the menu. We are sure, as soon as you have gained an overview, the individual setup is a walk-over.

Error Messages

If an error occurs, the mod directly jumps to the error menu and displays the error number and a mnemonic (short-term) description.
The possible error messages are:

0 OvrVolt: The input voltage is too high. The SBS operates with one battery. If the input voltage exceeds 4.5V this error message is displayed. Reduce the input voltage to the specified range.
1 ChkAtom: No atomizer detected or open coil.
2 TempRef: A problem during the temperature reference measurement occured
3 N/A
4 OverCur: Short on coil or coil breakdown (open)
5 LowBat: The battery voltage under load (with current drained from it) has reached the minimum discharge level, defined with parameter UbatMin in the extended function mod-menu.
6 EleHot: The electronics have heated up too much and needs to cool down. This error will not occur with normal usage of the mod.
7 TimeOut: The maximum puff-time is limited depending on power. For a power <20W it is 20 seconds. Above 20W it decreases by 0.5seconds per Watt, above 40W it is 10seconds.
8 LowR: In Bypass mode the coil resistance is too low.

06 Extended Functions Menu (Page 1: Overview)



(*1) The temperature coefficient selects the type of wire material in the range 050 to 650: When TC-mode is selected (Main menu HCtrl=1), the user must select the wire type to be NiFe30 (320, dicodes wire), Ni200 (620), Titanium (350), SS304 (105, V2A), SS316 (88), SS316L (92), NiFe48 (480) or "Other". The value for "Other" is adjusted here. Value to select = Literature-value*10E5 K. Example: Ni 6.2E-3*1/K * 10E5*K => 620

(*2) Setting 1 (fastest) up to3 without animation (visual shift effect), setting 4 slowest with shift animation

(*3) When temperature controlled vaping mode is selected and with diplay mode=post/cont, the current values of "Power", "Temperature" and "Wire-Resistance" can be observed 4 seconds after/during the vape. In power mode, the battery voltage, power and resistance is displayed. In Bypass mode the measured power is displayed. With display mode = off no parameters are displayed after or during the vape

06 Extended Functions Menu

Additional Explanation to several menu items, page 1

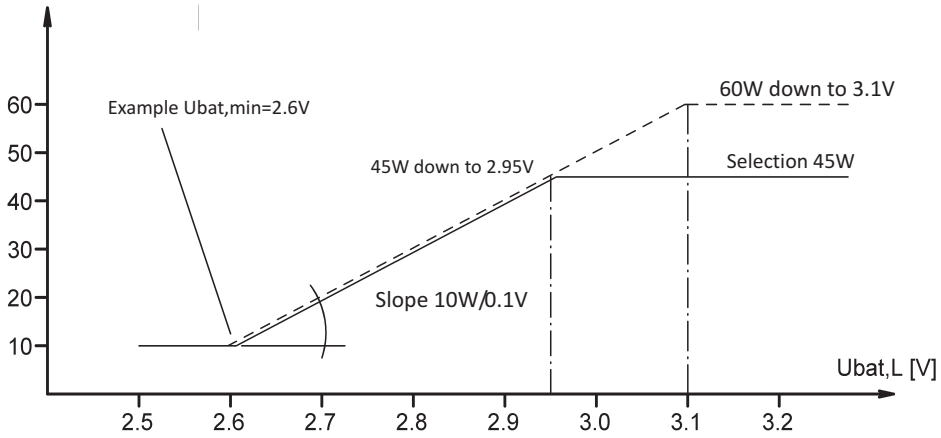
In the following paragraphs, explanations are given for those parameters and items, which are not self explanatory or which have inter-dependencies with other parameters or functions.

The selection of the correct wire-temperature-coefficient is very important for the correct operation of the mod, when temperature controlled vaping is selected.
As soon as TC-mode is selected, a multiple choice list of commonly used wires types with predefined coefficients is displayed and the wire type “Other”. The coefficient of this “Other” wire is adjusted in this menu item.
Note that stainless steel wires and also titanium wires often have not well defined coefficients, depending on their exact alloy composition. The TCoef item in the menu is visible, even if the operation mode is not selected to temperature controlled vaping.

Power Limit defines the adjustment range of the power in the main menu. As stated in the main menu already, the limit value sets the roll-over or stop point of the menu “Power”. The power limitation makes sense especially in the power vaping mode to reduce the range to the used atomizer and the battery size.

All dicodes devices have a functionality to adjust the minimum discharge level of the battery between 2.5V and 3.0V. Almost all available batteries on the market specify the minmum discharge level of 2.5V to 2.7V. If the user is unsure whether their specific battery meets this specification, the level should be set to 2.7V.

The selected voltage is the voltage at the electronics input, when current is drained from the battery (Ub,L). In contrast to other available tube- and box-mods on the market, which stop operation already at 3.4V, the lower discharge level on dicodes mods lead to a better battery utilization.



At UBatMin+ 0.5V a power reduction is activated depending on the actual power setting. The reduction starts when the power selected hits the slope from Ubat,min@10W to Ubat,min+0.5V@60W as show in the diagram above.

The time to automatic power off of the mod can be selected between 1 minute up to 60 minutes. We recommend to choose 1 or 2 minutes, because the mod is always immediately on and ready to vape, when the fire button is pressed. This provides the best utilization of the battery. When off, the device draws zero current from the battery.
Note that if the mod was actively switched off by the user (menu item “switch Off”), the instant power on is not available. In this case the mod has to be switched on with 5 clicks first.

06 Extended Functions Menu

Additional Explanation to several menu items, page 2

The display mode switches on and off the dynamic display of several parameters during and after the puff. The setting “cont” (continous) will display values during and 4 seconds after the vape. With “post” the values are displayed only after the puff and off disables the display.

The values shown depend on the operation mode: In temperature controlled mode, the parameters are the temperature, coil resistance, temperature regulating power and a battery symbol.
For the modes power, boost and heater protection, the selected power (or limited power in case), the coil resistance and the battery voltage are displayed. When Bypass mode is selected, the coil resistance and the battery voltage dependent, measured power is displayed, as there is no fixed power setting in bypass mode.

The SBS18350USBC provides the selection of the charge current in 3 steps:
“low” selects a current of about 0.5A, “mid” selects about 1A and “high” selects 2A.
These currents refer to the constant current charging phase.

The charging of Li-ion batteries typically uses 3 phases. Below about 3V, the current is reduced to a precharge current of 10% of set constant current. Above 3V the fast charge phase starts and the charge current is the selected current up to 4.2V (CC). When the battery is nearly full, the constant voltage phase begins (CV).
The SBS18350USBC measures the charge current and displays the value, as soon as an USB- source is plugged in. I.e. The devices is switched on when the battery is charged and does not switch off.
Note that when the charge circuit has fully charged the battery to 4.2V, it stops charging and will resume charging only when the battery voltage has dropped to about 4.05V. Because of the stand-by current of the device a “fully” charged battery will have a voltage between 4.05V and 4.2V, depending on the time the USB-C source is disconnected.

The dicodes mods can be used in 5 different modes. But in order to keep the menu as short and simple as possible, 3 of the 5 modes are only available, if the Expert-Mode is set to 1. The name is Expert-Mode, because the use of the additional operation modes requires additional knowledge about their functionality.

The additional modes available with Expert Mode set to 1 are “Power Boost”, “Heater Protection” and “Bypass”.
Here again the modes in an overview:

Mode0 Power	Vaping with a constant power setting. The selected power is applied to the coil, unless the coil’s resistance affords a different power setting or power is limited due to other reasons..
Mode1 Temp-Cont.	The power applied to the coil is calculated by a temperature controller which keeps the coil’s temperature constant. Important to note: Set the correct temperature coefficient and perform a calibration at room temp.
Mode2 Heater-Prot.	The power applied to the coil is repetively interrupted to enable a liquid flow und thus to limit the temperature.
Mode3 Power-Boost	The coil is quickly heated up initially. Moreover an repetitive boost can be selected. We recommend not to set the boost-power value too low but adjust a lower normal power setting to limit the coils temperature rise.
Mode4 Bypass	The mod behaves like a mechanical mod, i.e. the battery voltage is directly applied to the coil. This, with the restriction, that the maximum current is 22A. Note that the vape now depends on the charging level of the battery, and the coil should not be too low in resistance as then 22A is the limiting factor. If the resistance is too low in Bypass-mode, Err8 LowR is displayed and vaping is disabled.

06 Extended Functions Menu

Additional Explanation to several menu items, page 3

With “Set Defaults” it is possible to reset all settings to the delivery status. The reset is initiated by selecting the menu and pressing a button. To avoid unintended resetting the user has to confirm the procedure by pressing the button again when “confirm” is displayed. “Process” shows that the values were changed to the defaults.

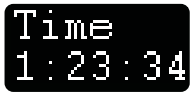
Most of the defaults are listed in the overview diagram of the Extended Functions Menu.

Those settings missing there, are:

Power:	10W
Temperature:	210°C
Heater Control Mode:	0 (Power, normal VW)
Wire Type:	NiFe (320)

The Extended Functions Menu has another sub-menu showing several statistical values.

There are two types of value-counters, either re-settable to zero or not.



The following statistical values are stored:

- Cycles Number of puffs. The counter can be reset to 0.
- Time The timespan during which power was applied to the coil, i.e. vaping time.The counter can be reset to 0.
- BatCap This value counts the charge/energy used for vaping. When reset after a battery change and checked shortly before the battery is discharged, it shows the effective vaping capacity of the battery.
- TotCycl “Total Cycles” is the number of puffs throughout the entire mod’s life. It cannot be reset.
- TotTime “Total Time” is the total time of vaping (not stand by) in a format HHHH:MM that is 4digits of hours and 2 for minutes. It cannot be reset.

The menu item **Reset Cntr**, i.e the resetting of the counters, is intentionally positioned between resettable counters and thos which cannot be reset. So it is easier to remember, which are resetable.

Important note: All counter values are updated and permanently stored immediately after the puff. During production, each device is tested and calibrated at several voltage and power settings in an automated test system and manually after assembly.

Therefore the counters are not at 0, but will show values between 10 and 20.

This behaviour is different compared to other dicodes devices.

07 Charging

The SBS18350USBC can be charged using the provided USB-C to USB-C cable and a commonly available charger or PC. But note that the source must be capable to deliver at least 2A, in case the charge current setting is selected “high”.

As soon as the cable is plugged in, the device will show “charge” in the display and the measured charge current. A tiny red LED is also lid below the OLED display.

The charge current is selectable in the Extended Functions / Mod menu to be “low” (about 0.5A), “mid” (about 1A), “high” (about 2A) and “auto” (automatic selection).
We recommend to charge batteries of size 18350 with 0.5A, size 18500 with 1A maximum. 18650 batteries typically can be charged with 2A.
But always consult the batteries manufacturers datasheet to check the allowed maximum charge current.
The automatic evaluation of the charge current starts charging at 0.5A until the battery voltage is at 3.4V
Then the change of the battery voltage over several minutes is measured and decided, which type of battery is probably used.
When using the automatic mode, we recommend to check the selected charge current being correct and in accordance with the batteries manufacturers specification using the menu item “charge” (measured charge current).
If you are unsure which maximum charge current is allowed, set the charge current to “low” !

Company dicodes assumes no liability whatsoever for damages of the battery, when using the USB-C port on the device, regardless of the setting of parameter “ChgChr” (charge current setting).

The battery will be charged up to almost 4.2V. When reaching 4.2V the charging is changed from constant current to constant voltage (CC to CV). The charger circuit will provide that the battery is not charged higher than 4.2V.
When the battery is fully charged to 4.2V, remove the cable. When the cable is not removed, the device will slowly discharge the battery down to about 4.05V before the charger circuit resumes to charge the battery again.

The SBS18350USBC also provides a charge contact at the bottom of the device, as many other dicodes devices.
By inserting a fitting inlay into the dicodes charger station CS1, the device can be charged as well. The inlay is separately available as a 3D printed part.
But note that the charger station charges with 2A ! So strictly avoid to charge batteries of size 18350 and 18500 using the CS1.

08 Warranty and Disclaimer

Warranty
All devices produced by dicodes must pass extensive electrical tests, calibrations and optical inspections before being packed and shipped. If nevertheless an erroneous operation is detected, dicodes will take care about within two years after purchase. The customer is therefore requested to keep the invoice.
The warranty refers to the error free operation of the electronics hardware and software during normal use.
In case the device shows a permanent electric fail or if a software bug is detected, the user is free to send the device back to dicodes for repair without cost.
The customer is requested to check the devices housing for scratches or marks, prior to any use. Company dicodes cannot accept claims after any use of the mod. In the case the customer is not sure whether the malfunction is covered by the warranty, please contact dicodes by email prior to sending back the device.
If a sent back defective device is not covered by the warranty, dicodes will give the customer a quote for repair, before any repair action takes place.
The postal fee or shipping charge from the customer to dicodes is not covered by the warranty in any case.
Please send the device to:
dicodes GmbH
Friedrich der Grosse70
D-44628 Herne, Germany
Our email address is : info@dicodes-mods.de

The warranty does not cover:
- defects or fails due to misuse, contamination by liquid or dirt, damage, tampering, lack of care, exposure to temperatures higher than 45°C or lower than 0°C
- scratches or marks due to normal wear and use
- defects due to the use of faulty or incorrect batteries
- defects by overloading the battery
- defects induced by the battery
- defects caused by use of non-OEM battery tubes (non dicodes or pipeline)

The warranty voids, when:
- dropping the device on the floor (*)
- attempting to open or opening the device
- maintaining or repair by unauthorized persons

(*) Do not use a device which dropped, because the electronic could be damaged.
Remove the battery immediately. For any questions contact dicodes for help.

09 Remarks and Notes

Battery
Always use batteries with high drain or very high current capability, flat top, unprotected from high quality manufacturers. Avoid to use no-name products. Problems caused by low quality batteries will void the warranty. Insert the battery with the plus terminal in the direction towards the electronic/body.

Warranty
Opening the device, other than the battery tube to change the battery, will void the warranty!

Electronic cigarettes
Electronic cigarettes are NOT healthy. But so far all studies indicate, that they are less harmful compared to tobacco- cigarettes. Electronic cigarettes are an alternative to tobacco-products, but should not be regarded as an dehabituation to smoking. Electronic cigarettes are not suited for children and youngster below 18 years of age, non-smokers, pregnant women, persons with allergies against Nicotine, Propylene Glycol and persons with cardiovascular disease. Selling to persons below 18 years of age is prohibited!

Battery Disposal
You bought a rechargable battery powered product. The rechargable battery lasts long, but wears out nevertheless. Li-Ion batteries may not be disposed in household waste. Customers are obligated by law to dispose wear out batteries to apporiate gathering points.

Mod Disposal
The symbol below indicates that this product should not be treated as household waste, but according to WEEE (waste electrical/electronical equipment) should be reused or recycled. Thank You!

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