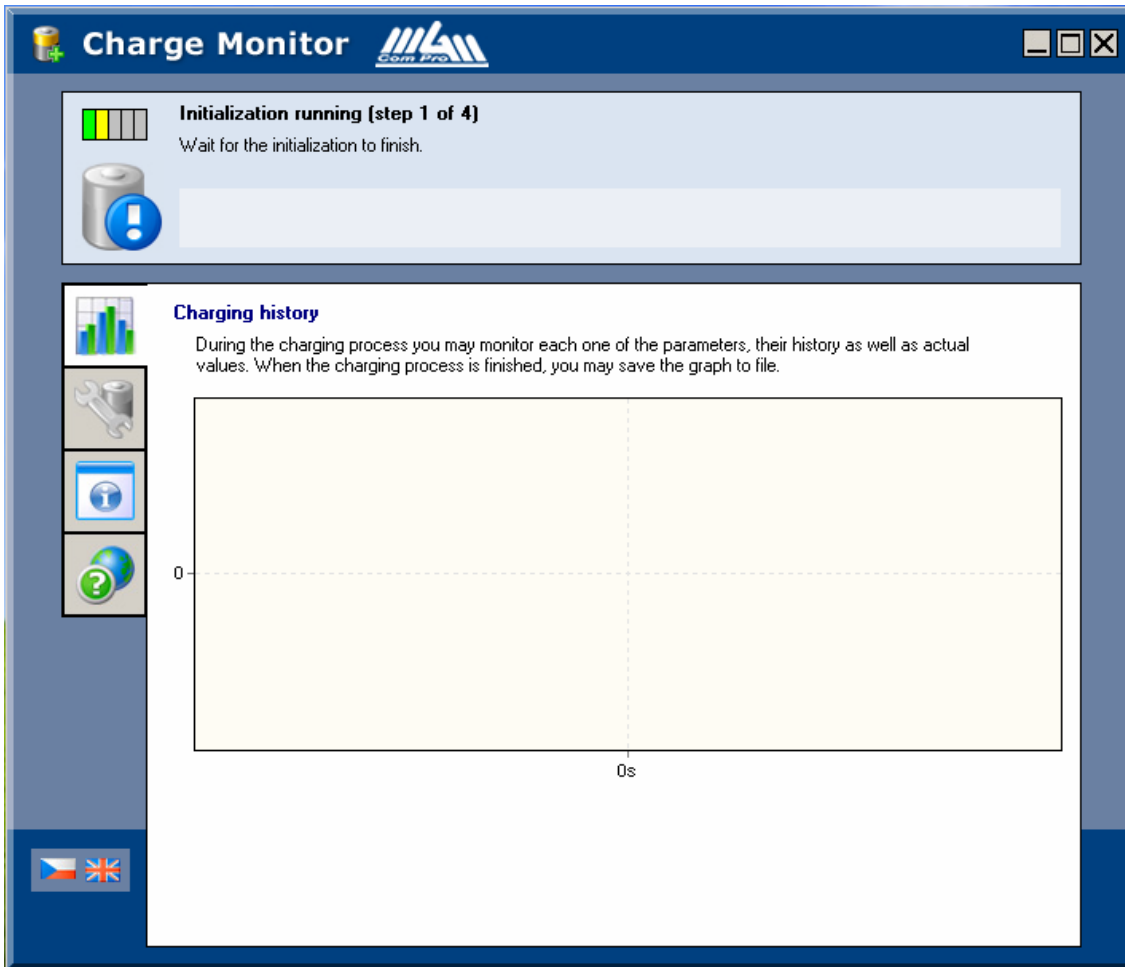
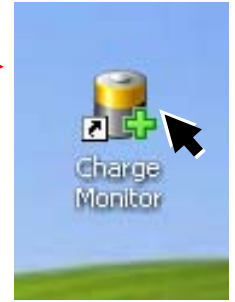


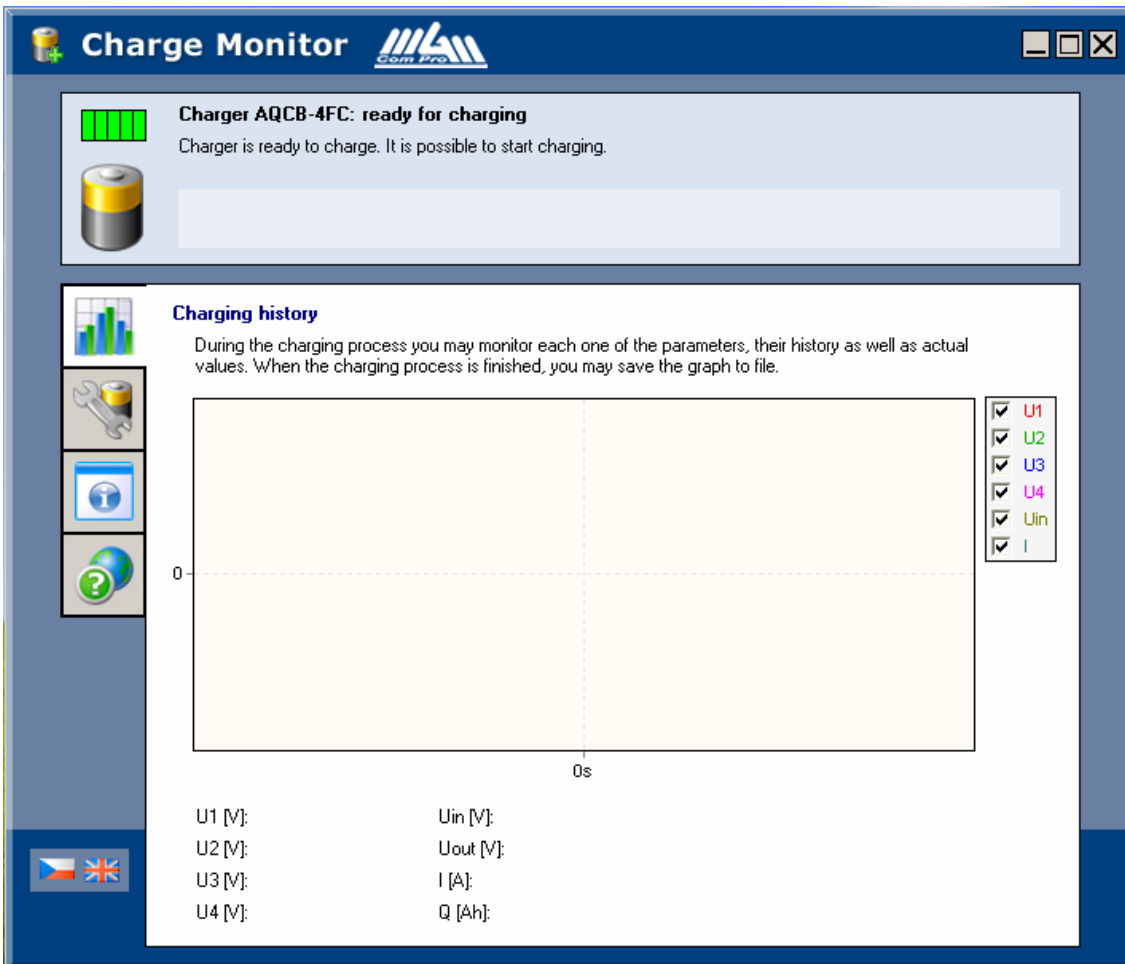
## How to control Charge Monitor application (chargers – A section, balancers – B and C section)

### A) Section Charger

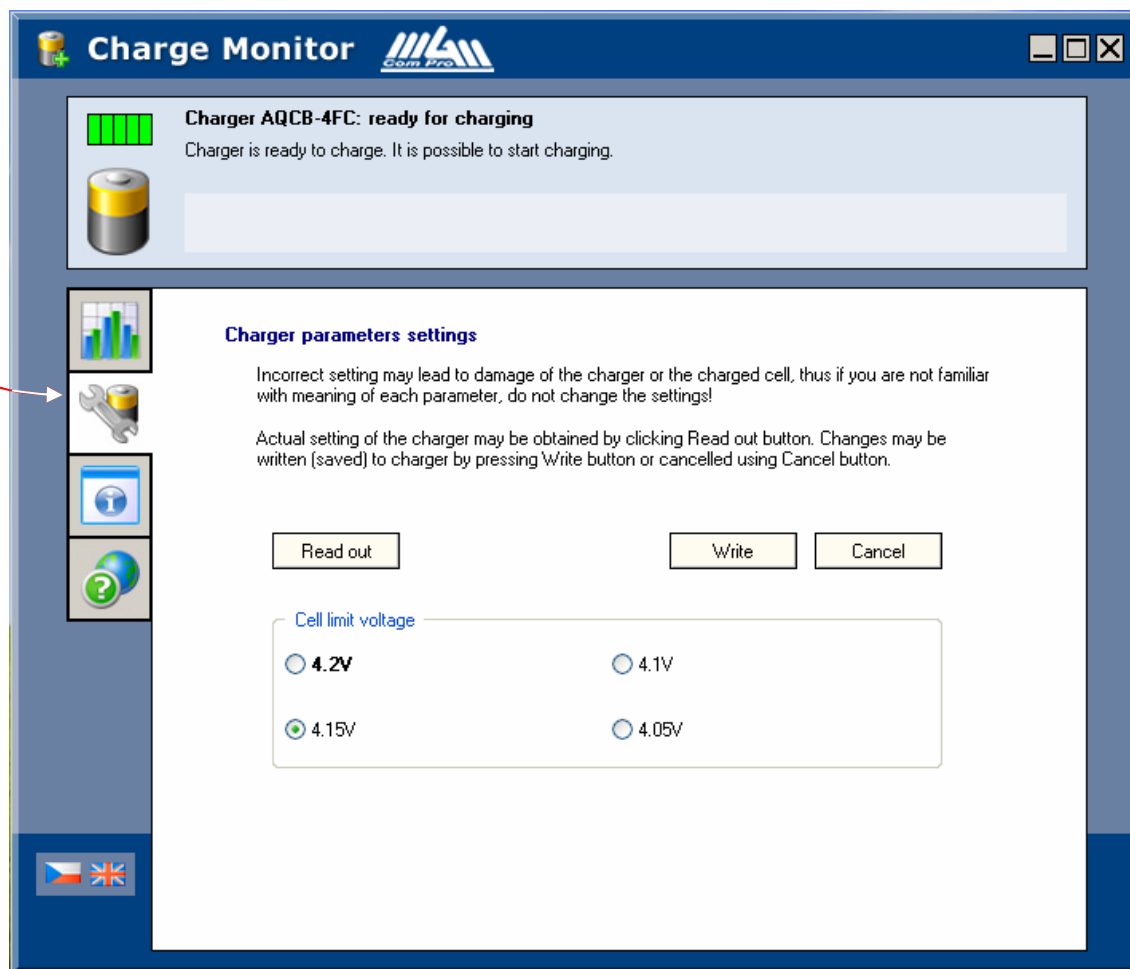
Run „Charge Monitor“ program by clicking on its shortcut.



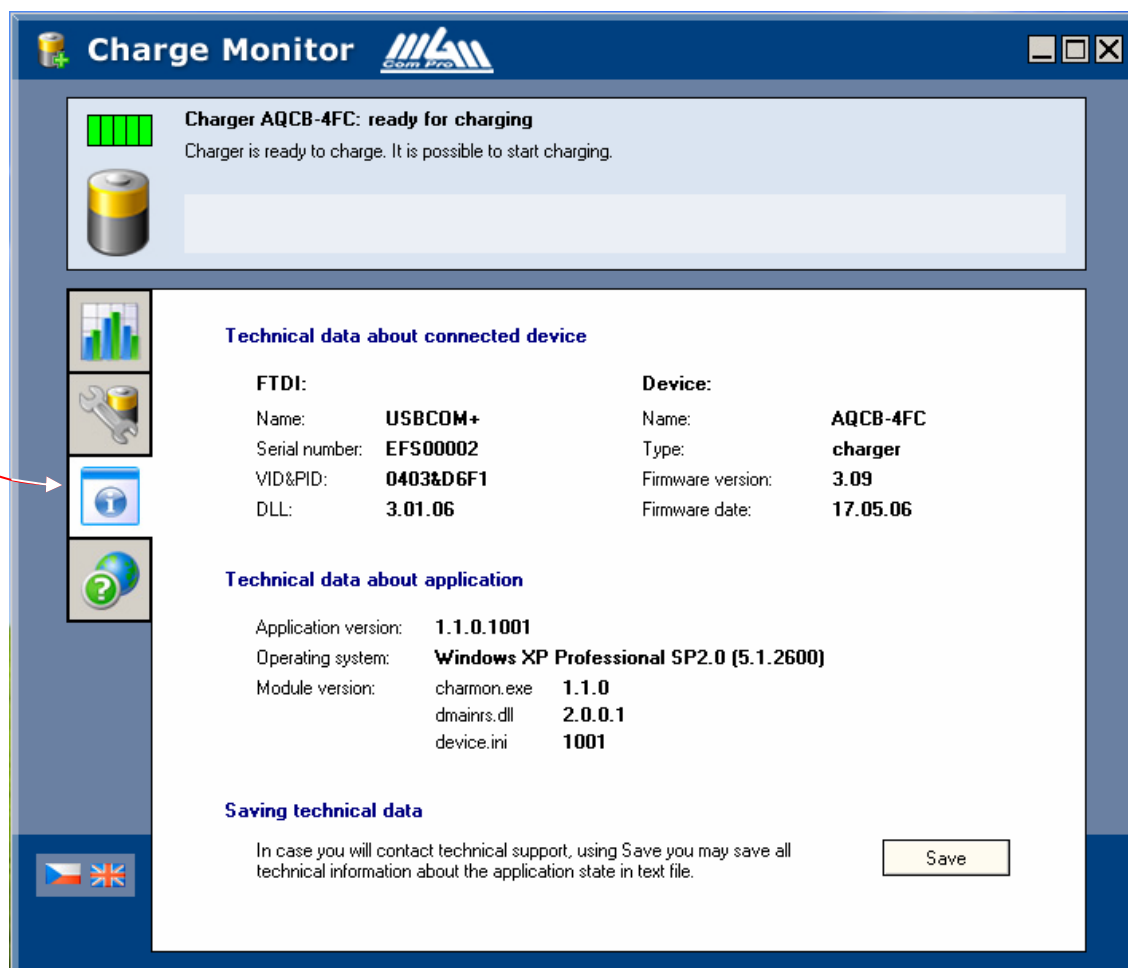
Connect USBCOM+ to your PC (or connect the module first and then run the program) When charger is connected to its source and to USBCOM+ module the window will change:



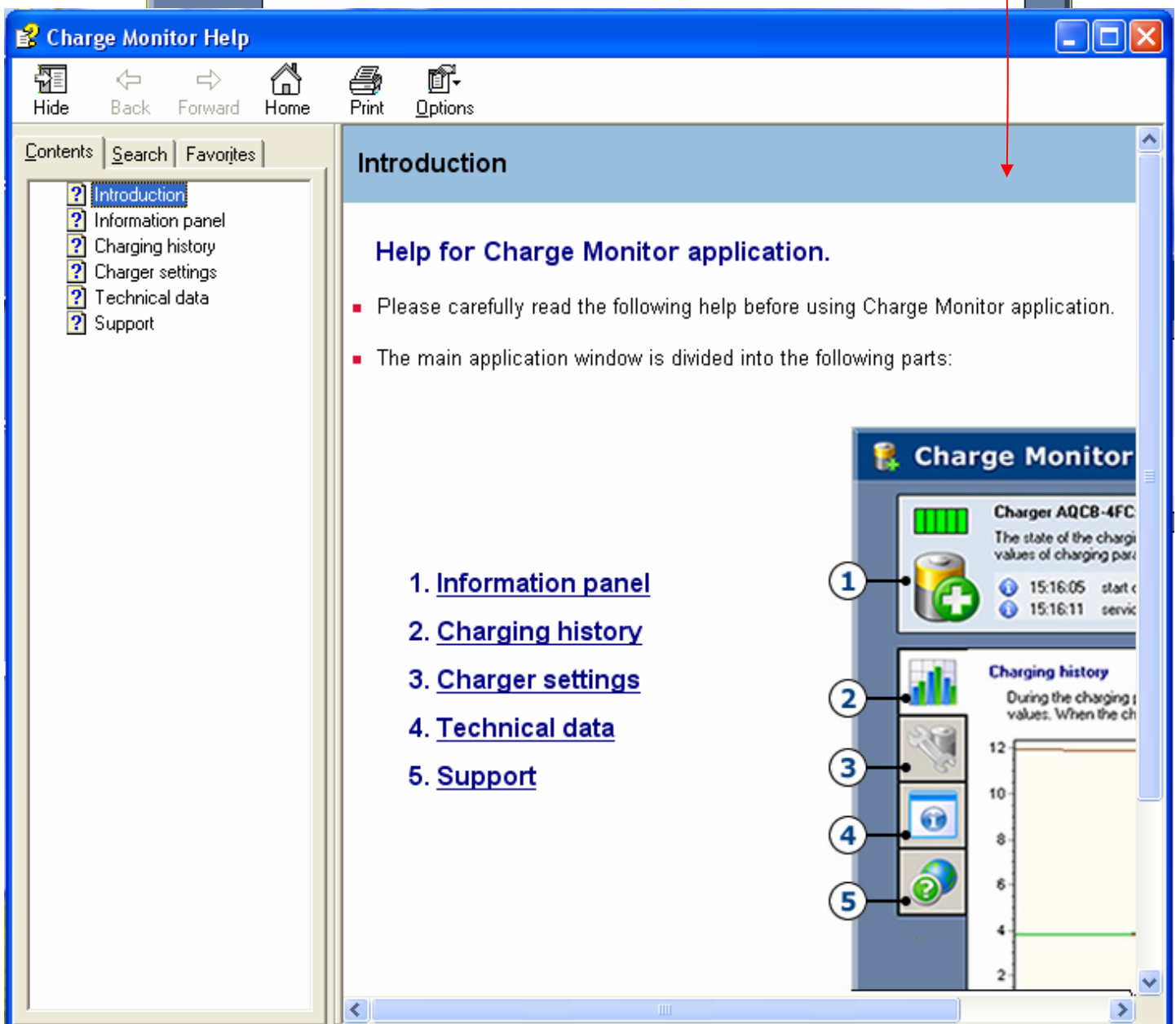
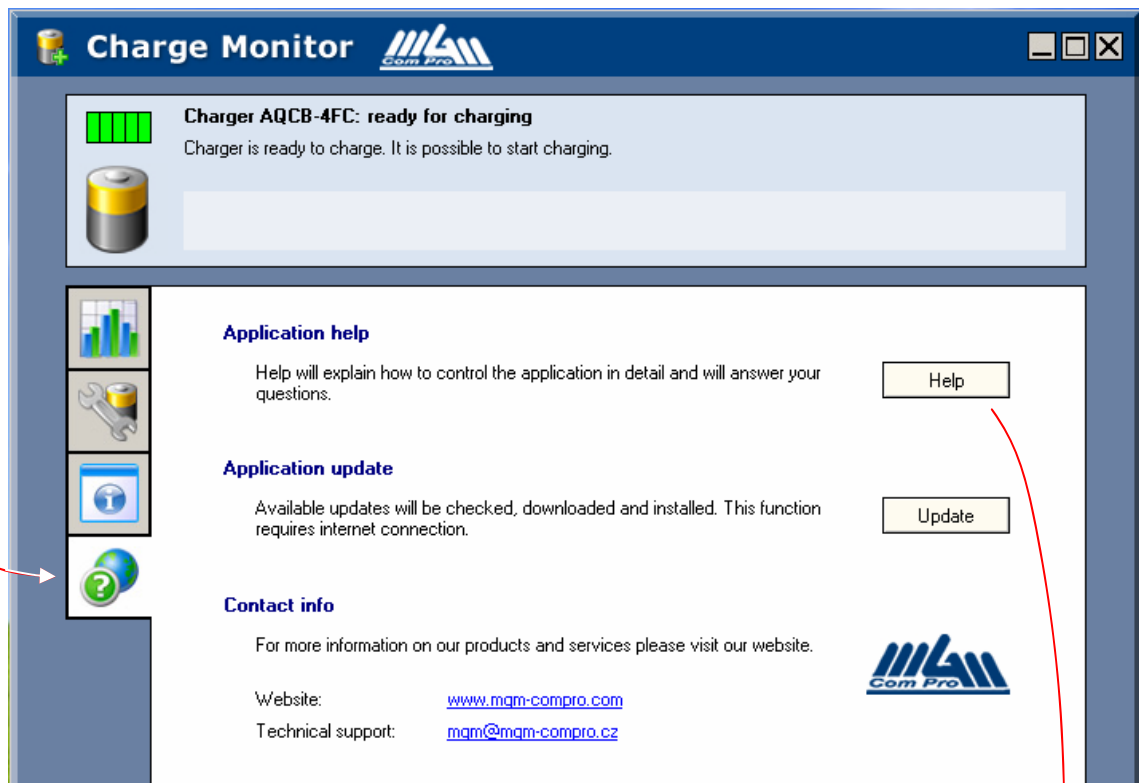
In the "Parameter settings" window it is possible to read out or change the charger settings.



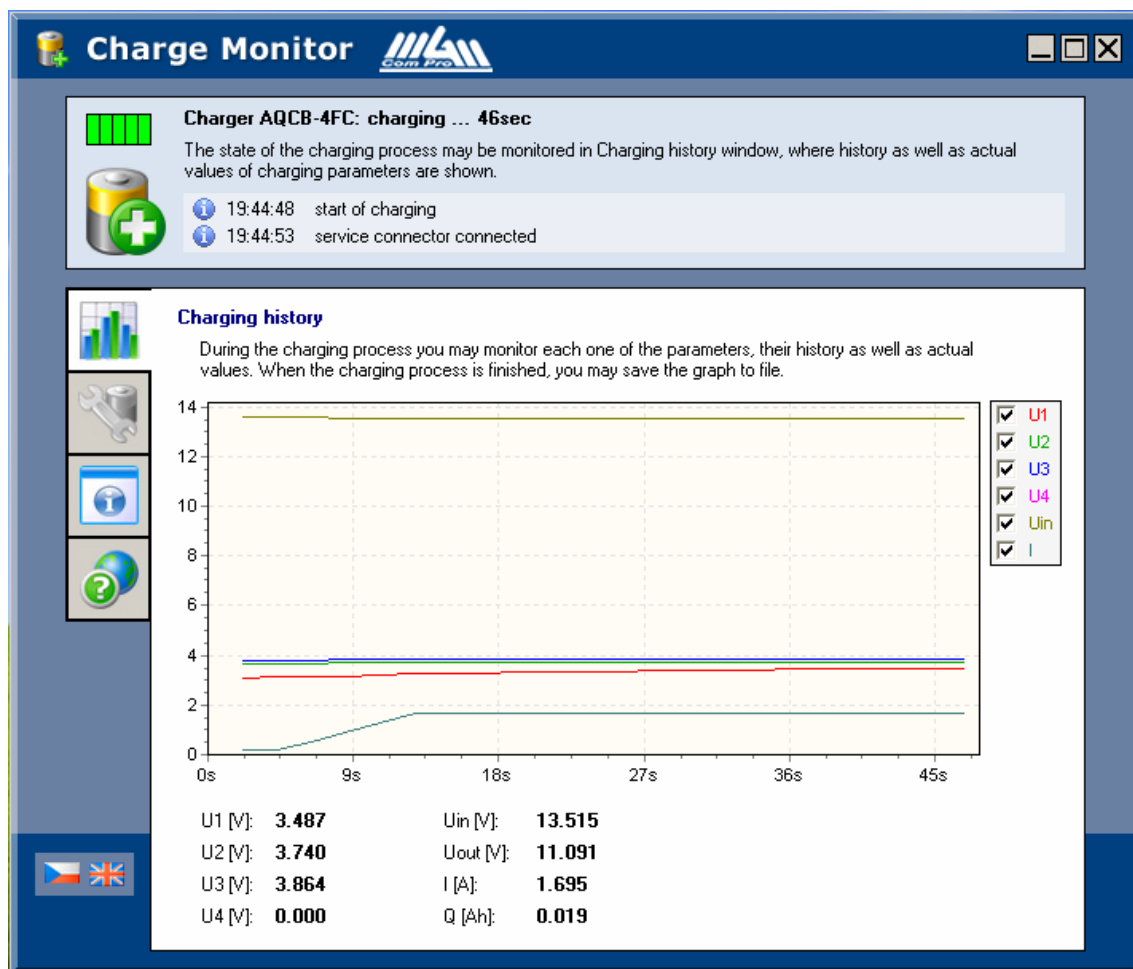
In the "Technical data" window the version of your charger firmware may be found.



In the "Help..." window it is possible to access detailed help and information on the program and its control.

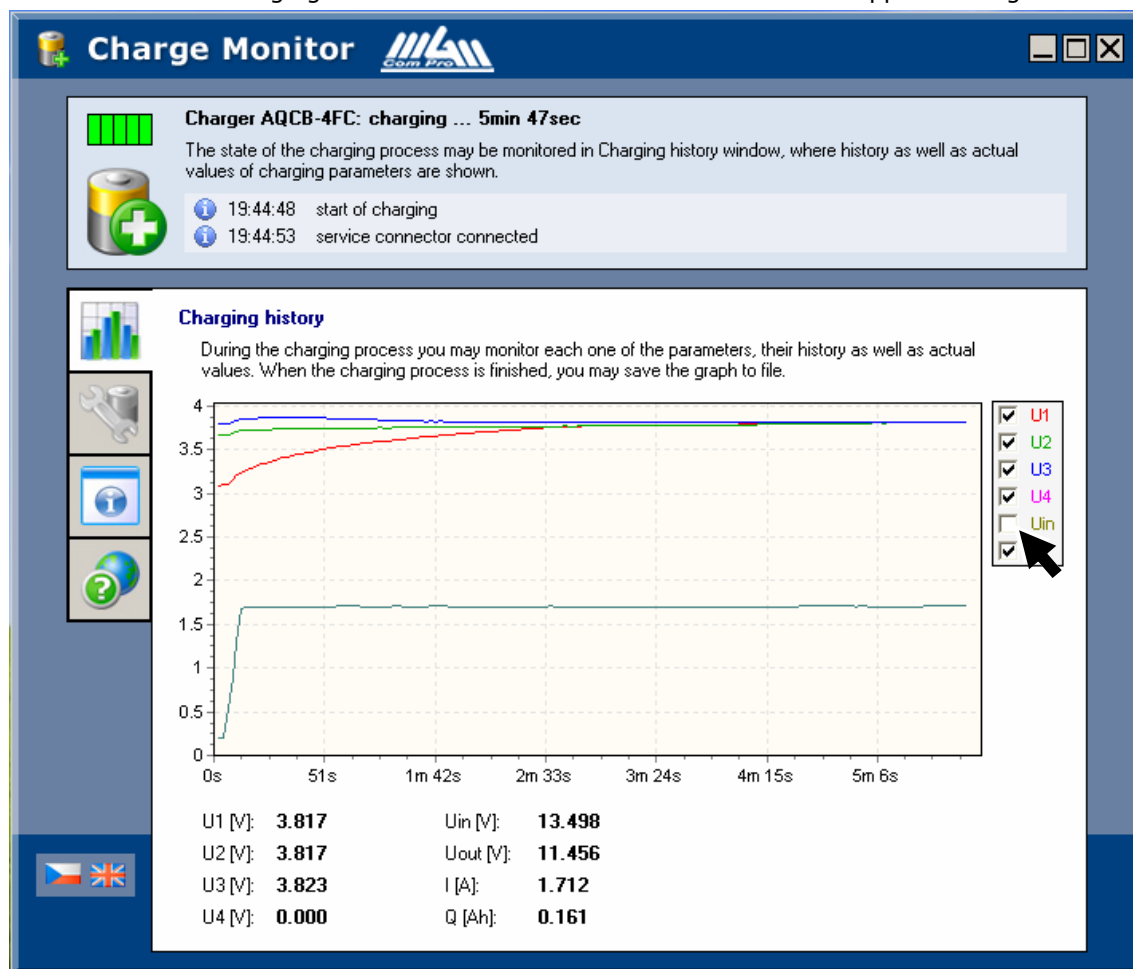


Charging starts automatically after the battery is connected to the charger. Its history with actual values of voltages of each cell, overall voltage of the battery, currents and supplied charge is displayed in the main window. Values as well as graphs are being constantly updated.

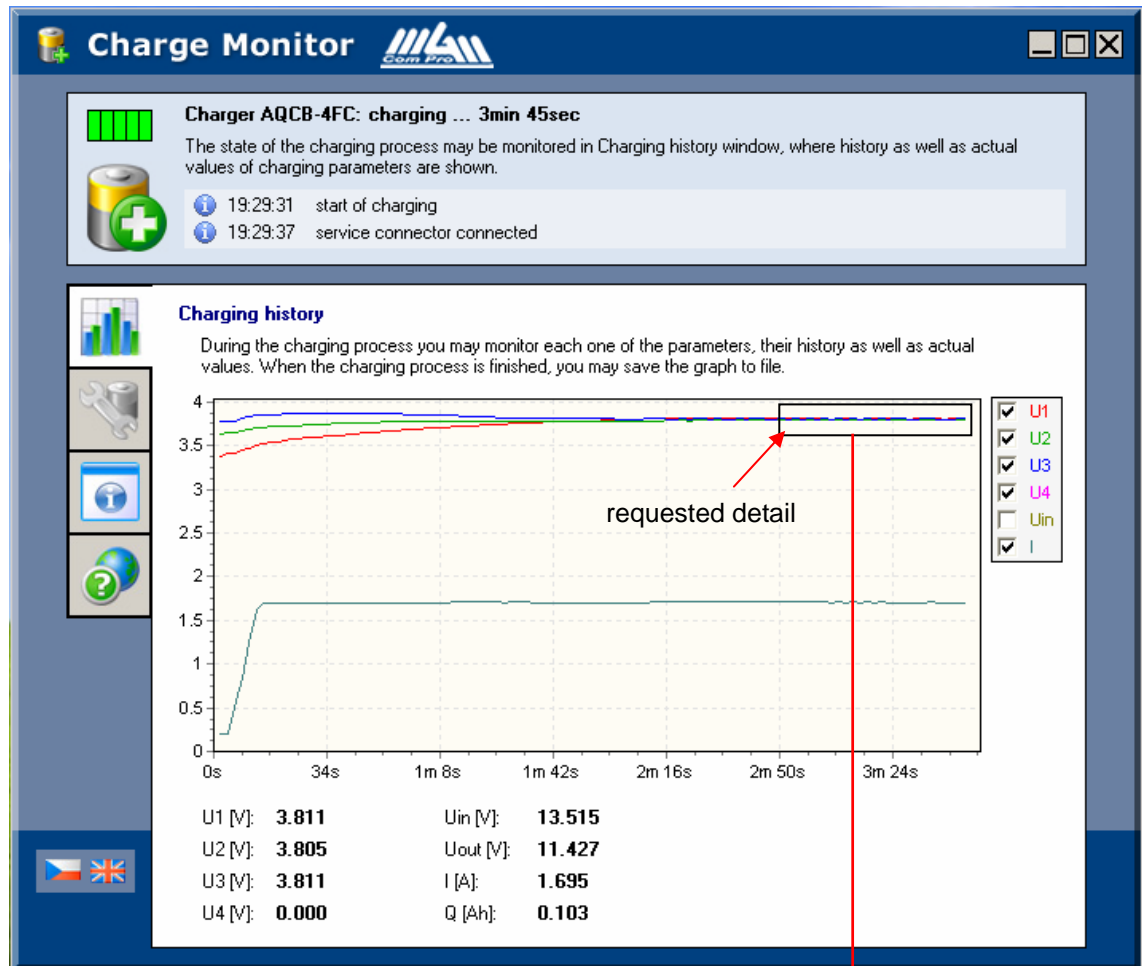


**U1 – U4:** Voltage of each cell      **Uin:** Input voltage (voltage of power supply)      **Uout:** Overall voltage of cells  
**I:** Charging current      **Q:** Supplied Charge

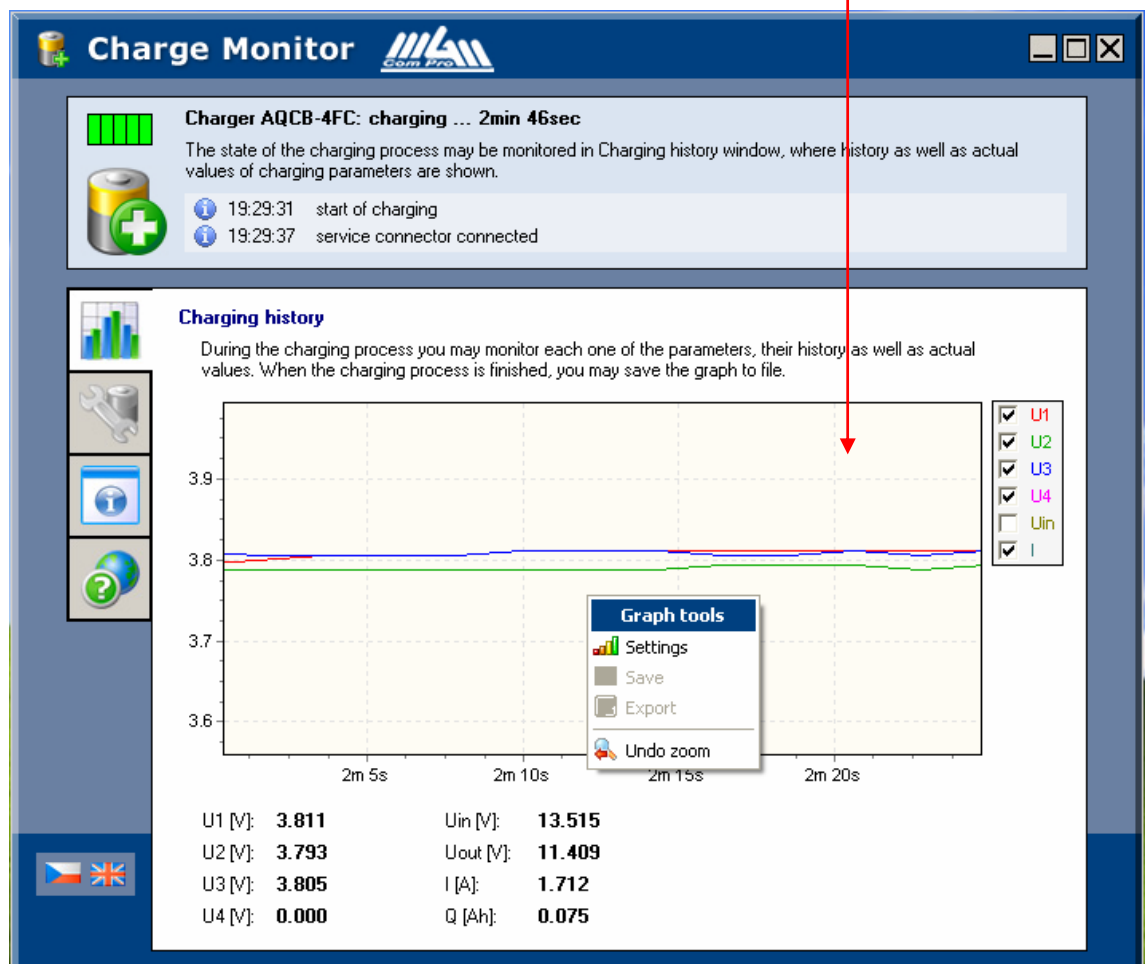
Suppressing display of input voltage Uin curve.

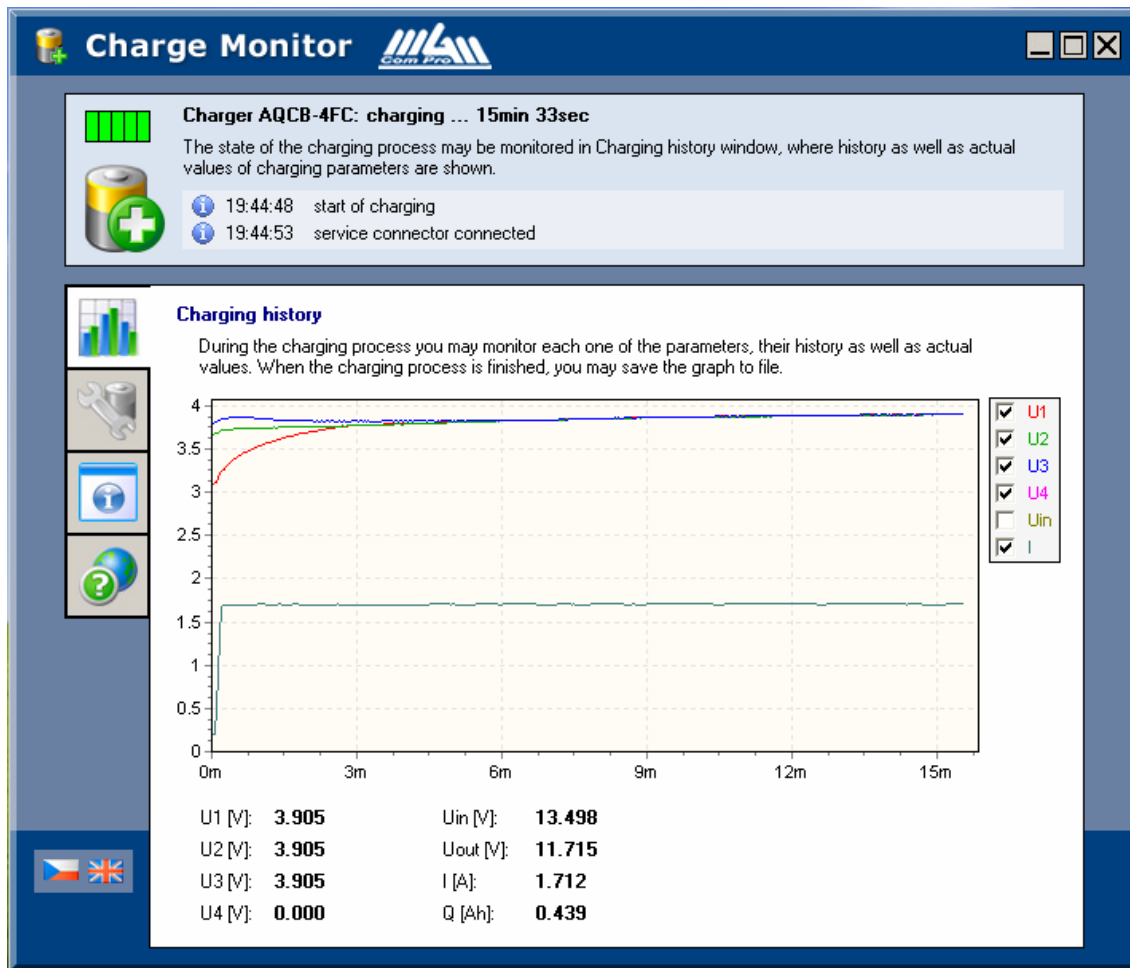


It is possible to maximize the window as usual in OS Windows. To zoom in the graph simply chose the area with mouse holding left mouse button.



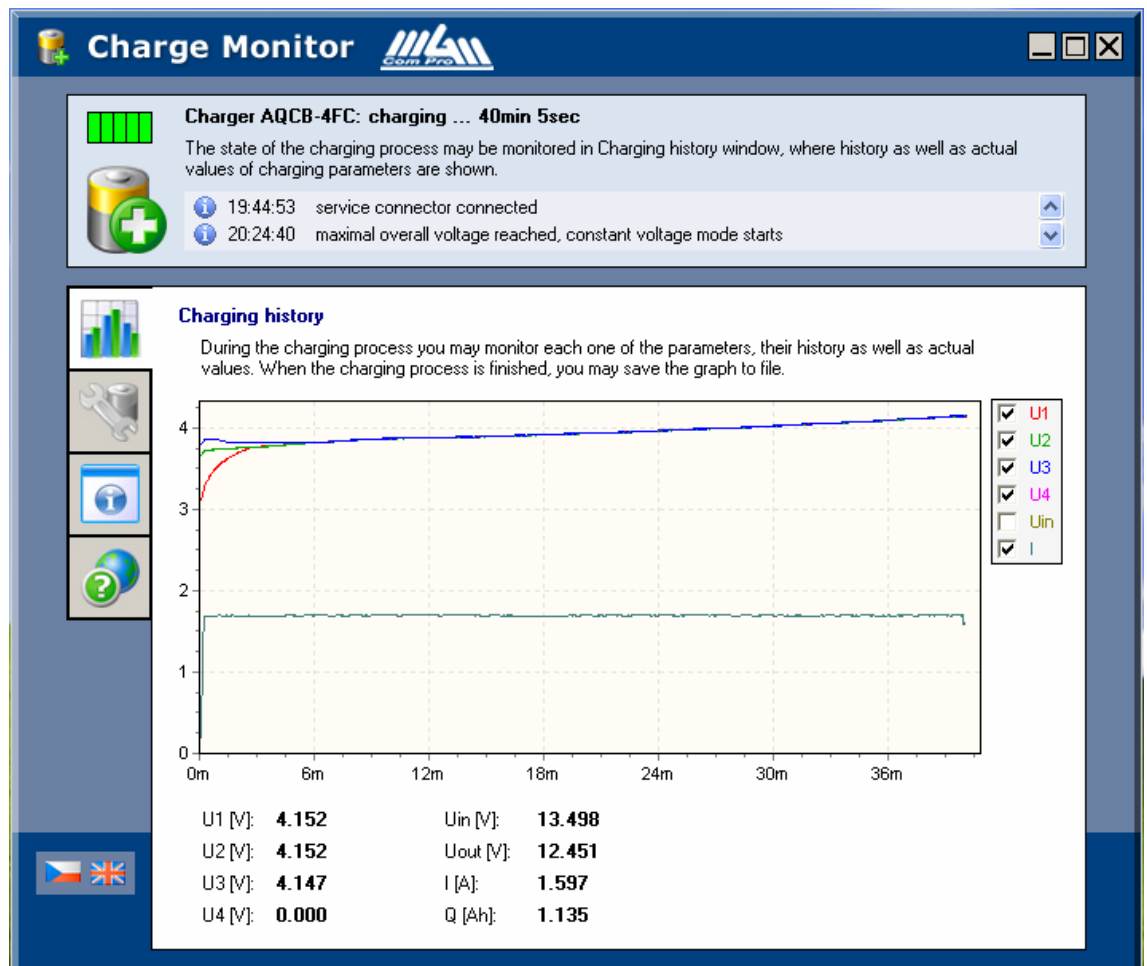
Detail of the chosen area. Right click enables the access to graph settings as well as it zooms back out. If you hold the right mouse button (in the chosen area of the graph) it is possible to move the area freely.



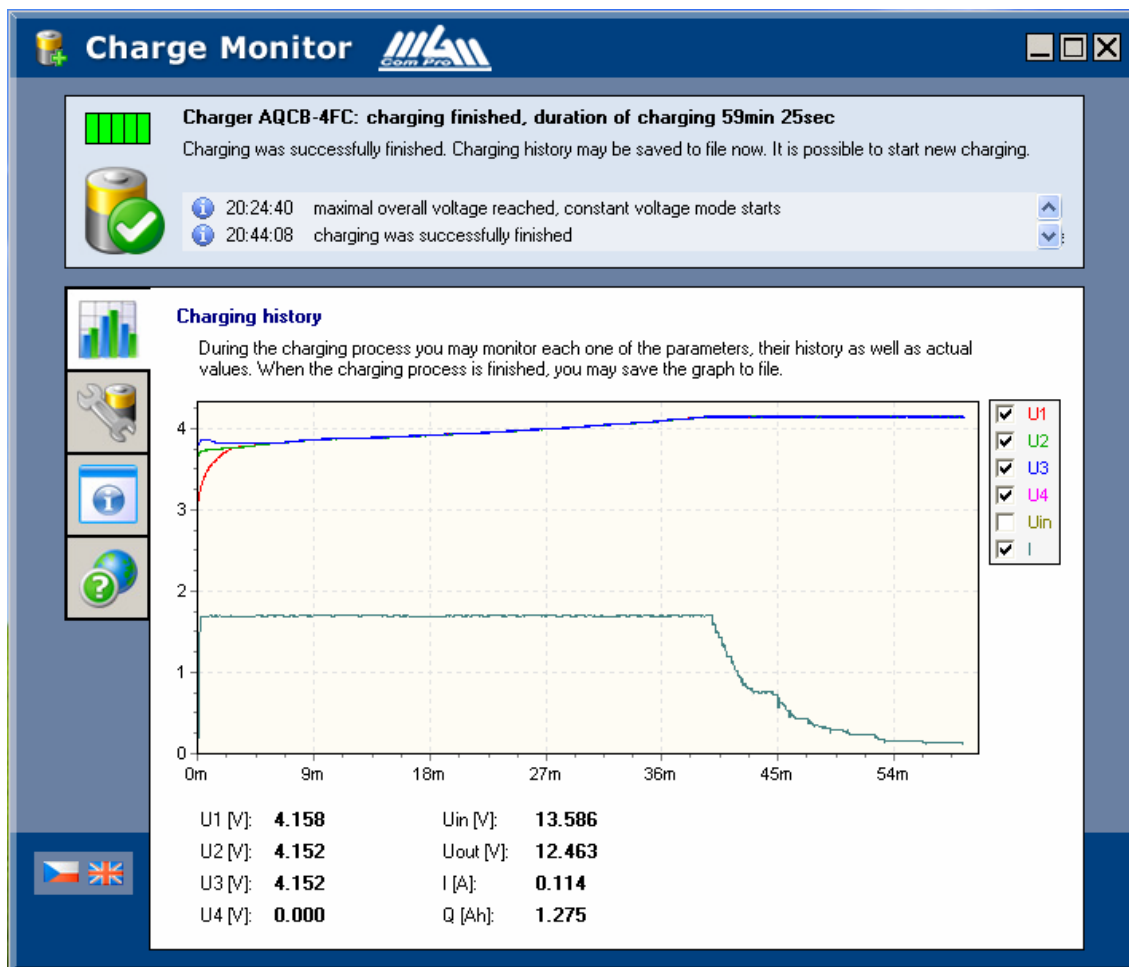


Here an example of the beginning of charging significantly unbalanced cells 1200mAh is shown. The set charging current is 1.6A. It is obvious that cells were balanced very fast (in 6 minutes). From now on, the already balanced cells are being charged. That means even if you finish charging in 50% the cells will be balanced. This is not ensured by any other method. Balancing is with tolerance of 6mV!!! (U1, U2, U3).

Here it is obvious how the already balanced cell are being charged. Difference between the cells is in the limit of 6mV. When the set voltage is reached (here 4.15/cell) after 40 minutes the charger switches from constant current mode to the constant voltage mode.

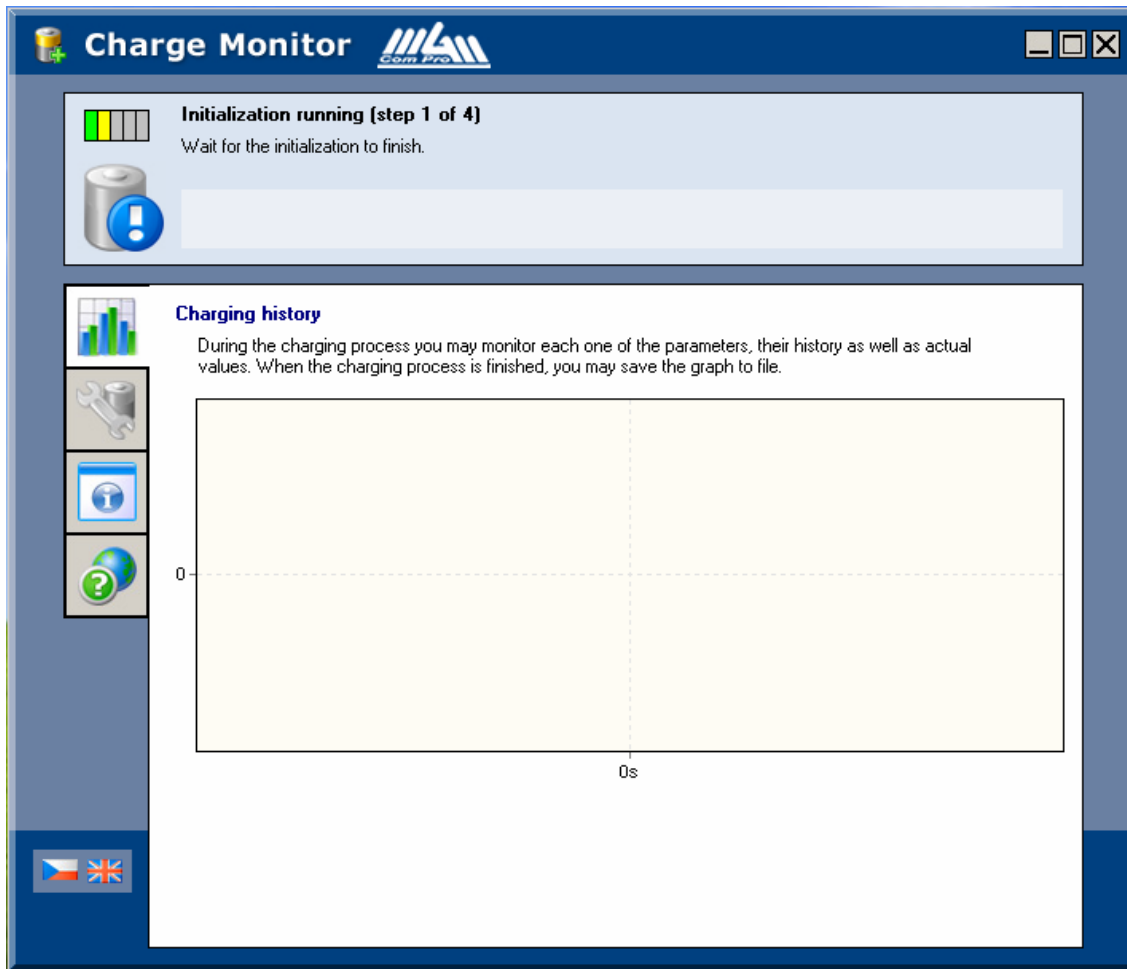


When the charging current drops to 1/16 of the set starting current the charger finishes charging.



## B) Section Balancery – one balancer

Run „Charge Monitor” program by clicking on its shortcut.



Connect your battery to charger and start charging. Wait for requested current from charger.

Connect balancer to k USBCOM+ using CC\_04 cable (or by cable CC\_05 to CM-3module and though CC\_03 to USBCOM+). Plug the cable to the connector on the rear side of the balancer. Make sure to carefully plug in the cable to balancer (e.g. using small screwdriver without sharp edges) as the connector is quite far from the casing. Be careful not to damage the cables. Cable CC\_05 may stay connected permanently in the balancer so you do not have to repeat this action. If you need to take CC\_05 cable out, do so by gently pulling the cable.

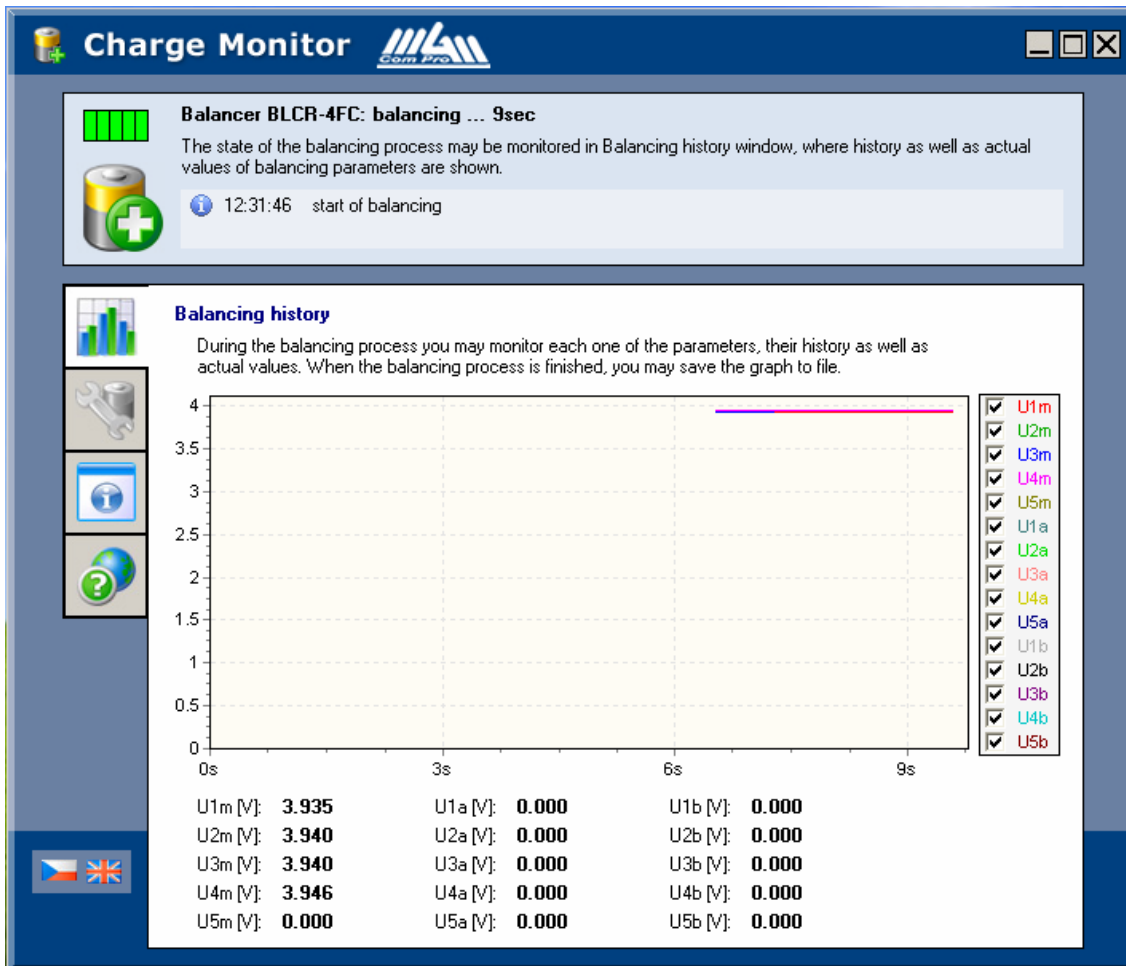


Correct orientation  
of connector:  
(flat part of connector top)

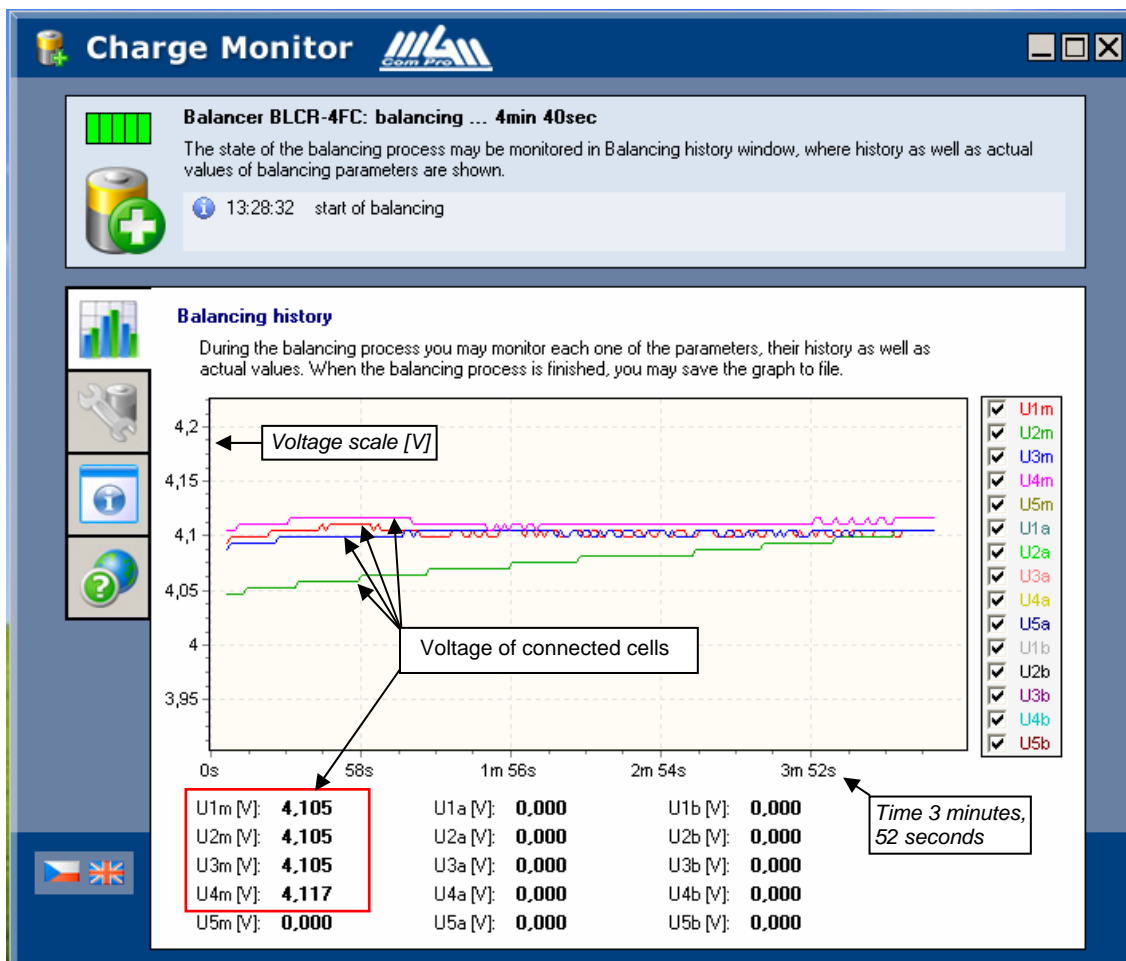




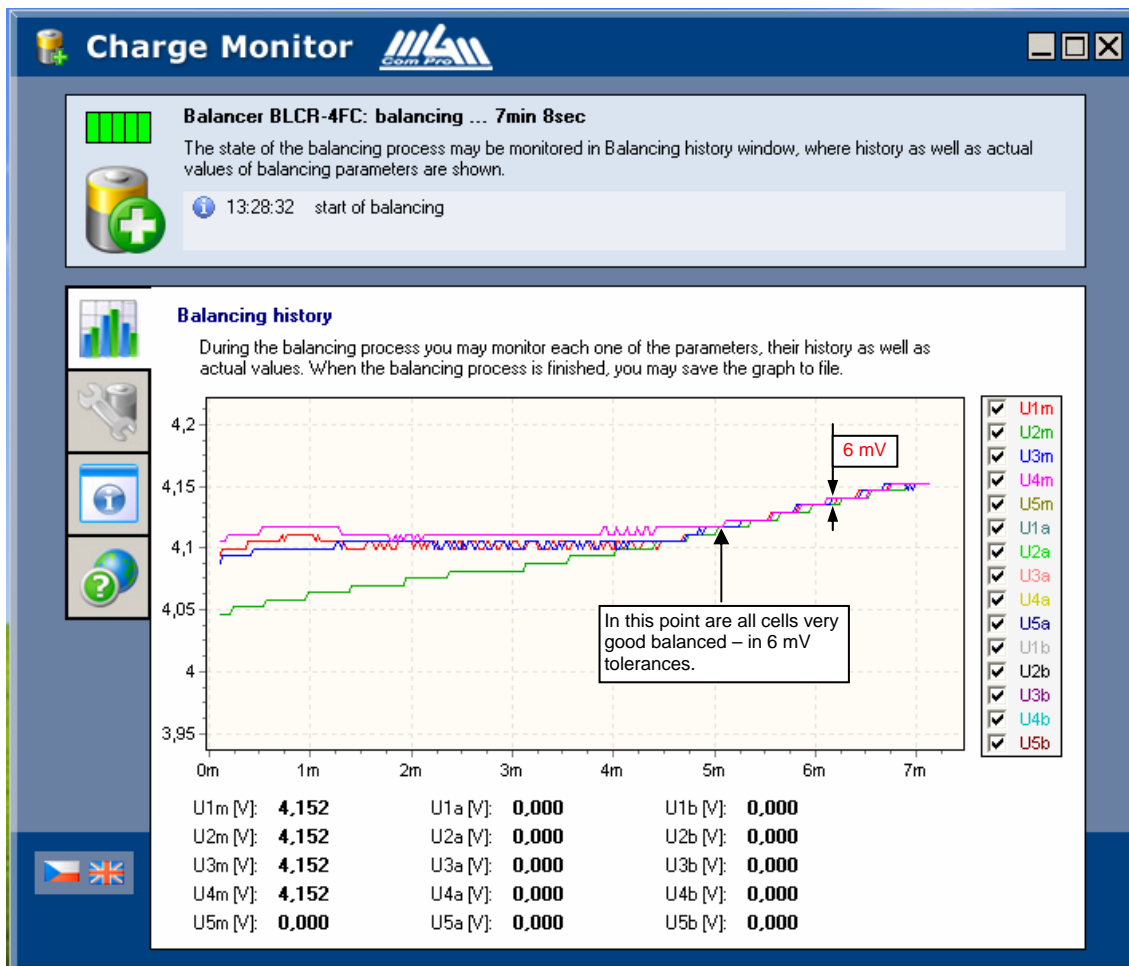
When the charger starts charging on full currents connect the balancer to the cells using service connector.  
After few second, the screen will look like:



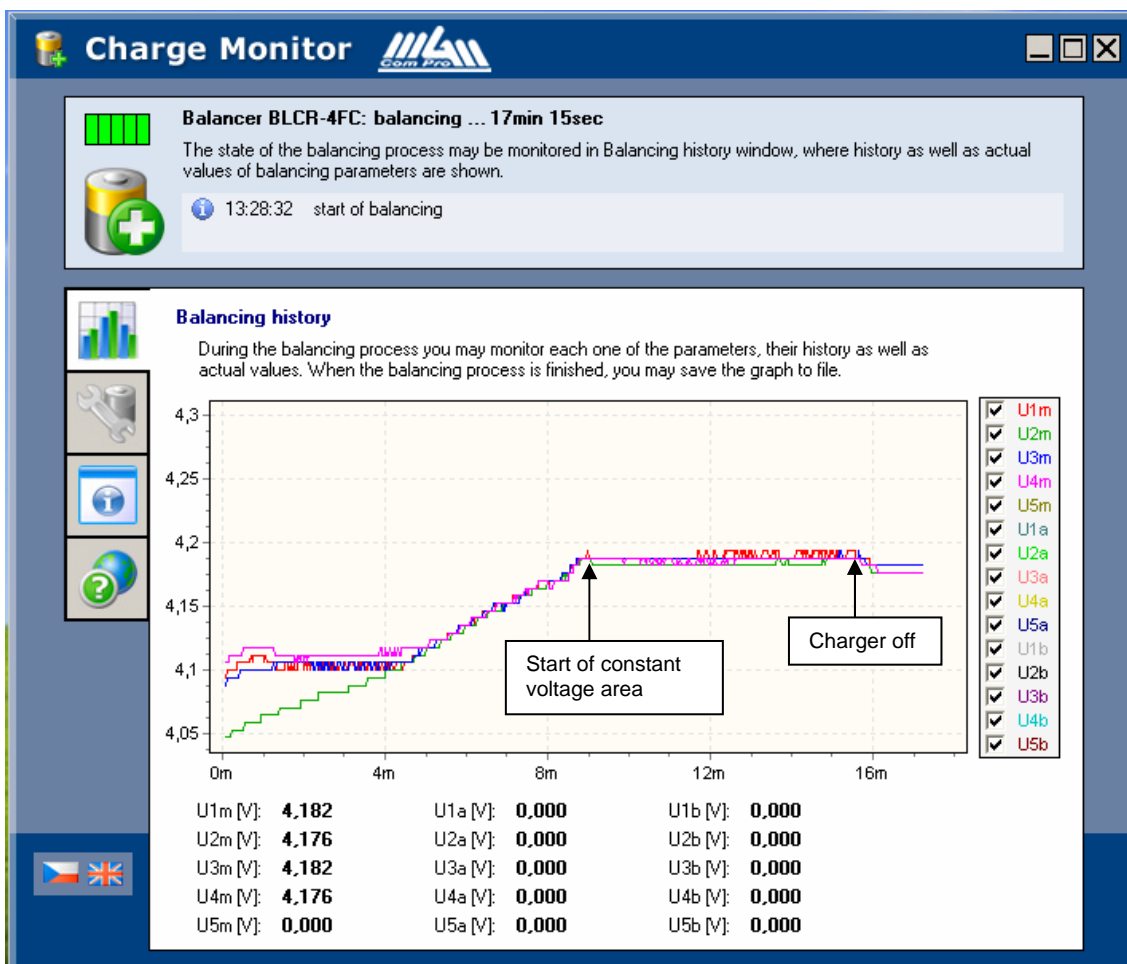
Possibilities and control of the application is quite similar to that described in section "A – Charger". The start of charging / balancing is shown here - cells are misbalanced (the graph window is zoomed in for better view).



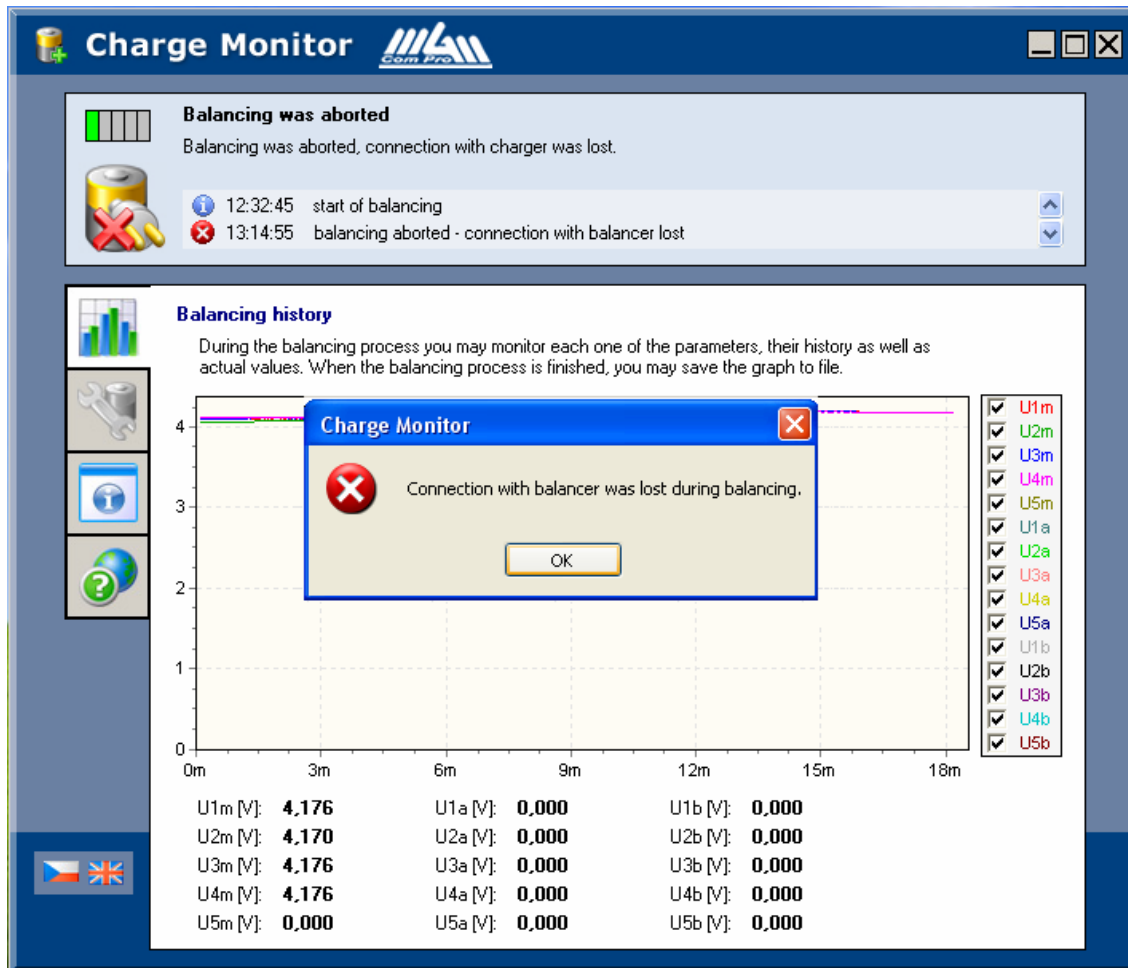
Balancer balances the cells intensively from the very beginning, and when they reach same voltages, balanced cells are being charged from then.



Charging process runs until cells are fully charged and the charger is disconnected. Cells are balanced with tolerance of 6mV !!!

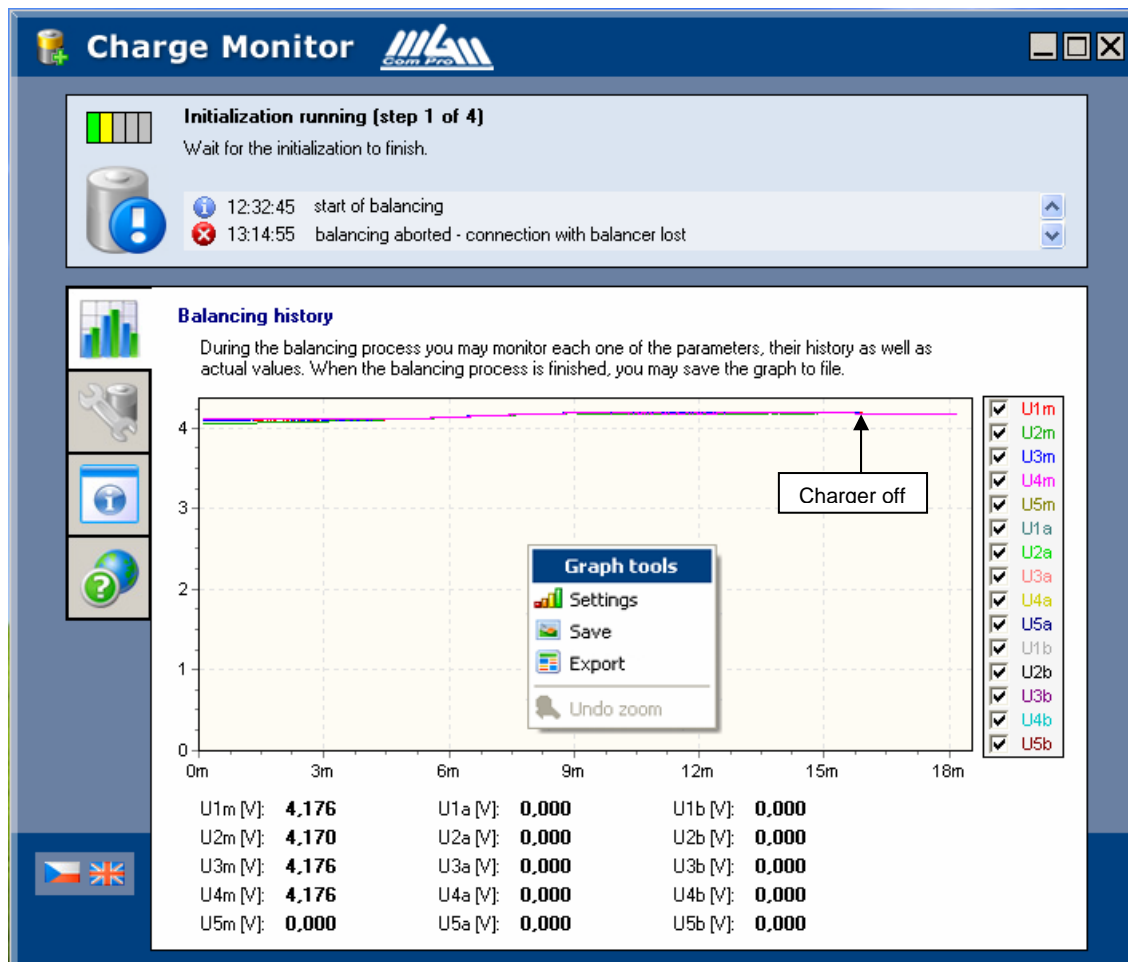


When the cells are disconnected from the balancer the following is displayed:



Click on "OK" and right click on mouse displays this submenu:

It is possible to save graph as a picture or export it in Excel (\*.xls) format for further processing, both to any folder.



## C) Balancers Section – two or three balancers (up to 12, or 15 Lipol článků)

To balance more cells than one balancer BLCR 4FC or BLCR 5FC can, it is necessary to connect more balancers together (also possibly with PC).

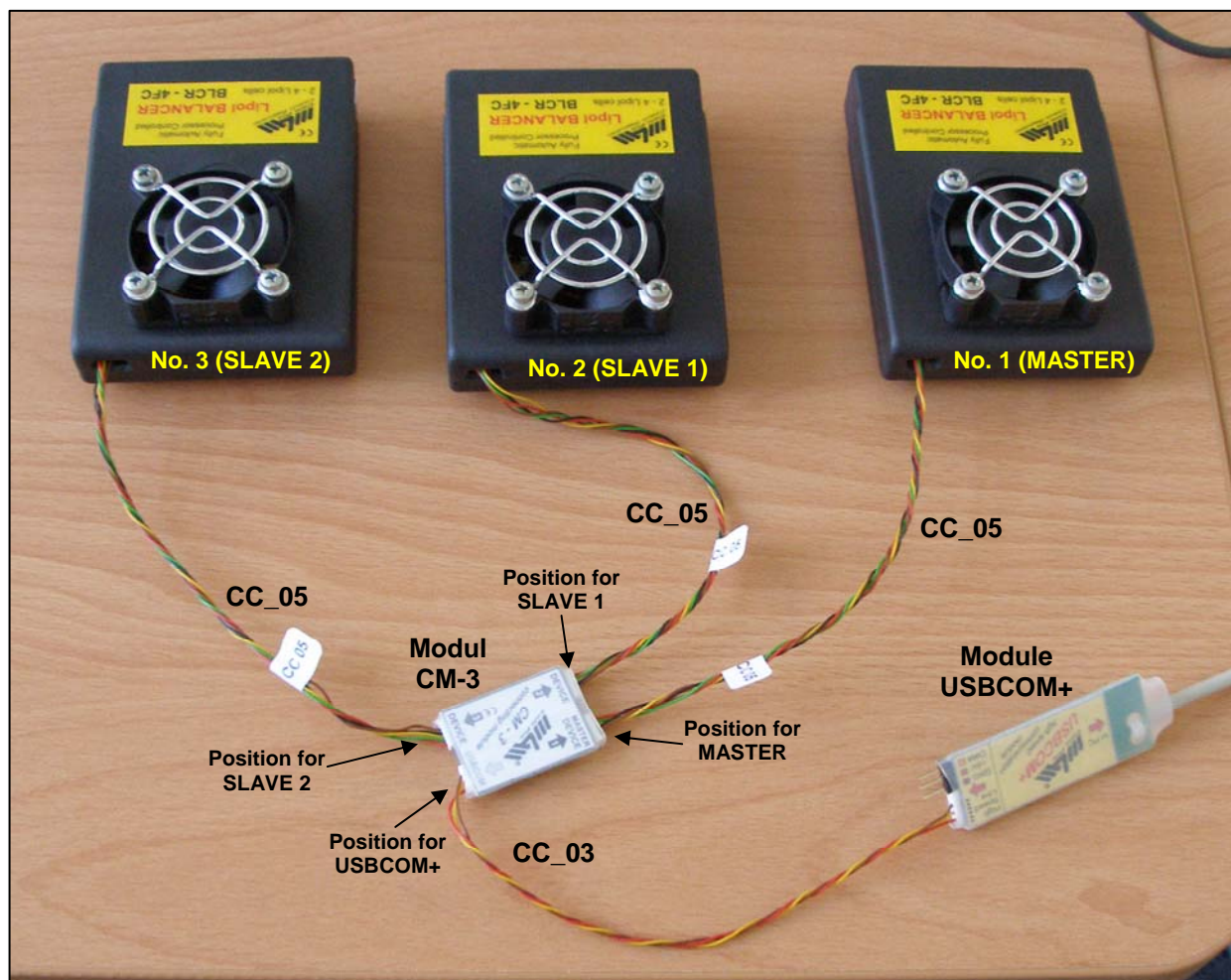
First, connect CC\_05 cable to the connector on the rear side of the balancer casing. Make sure to carefully plug in the cable to balancer (e.g. using small screwdriver without sharp edges) as the connector is quite far from the casing. Be careful not to damage the cables. Cable CC\_05 may stay connected permanently in the balancer so you do not have to repeat this action. If you need to take CC\_05 cable out, do so by gently pulling the cable.



Correct orientation of connector:  
(flat part of connector top)

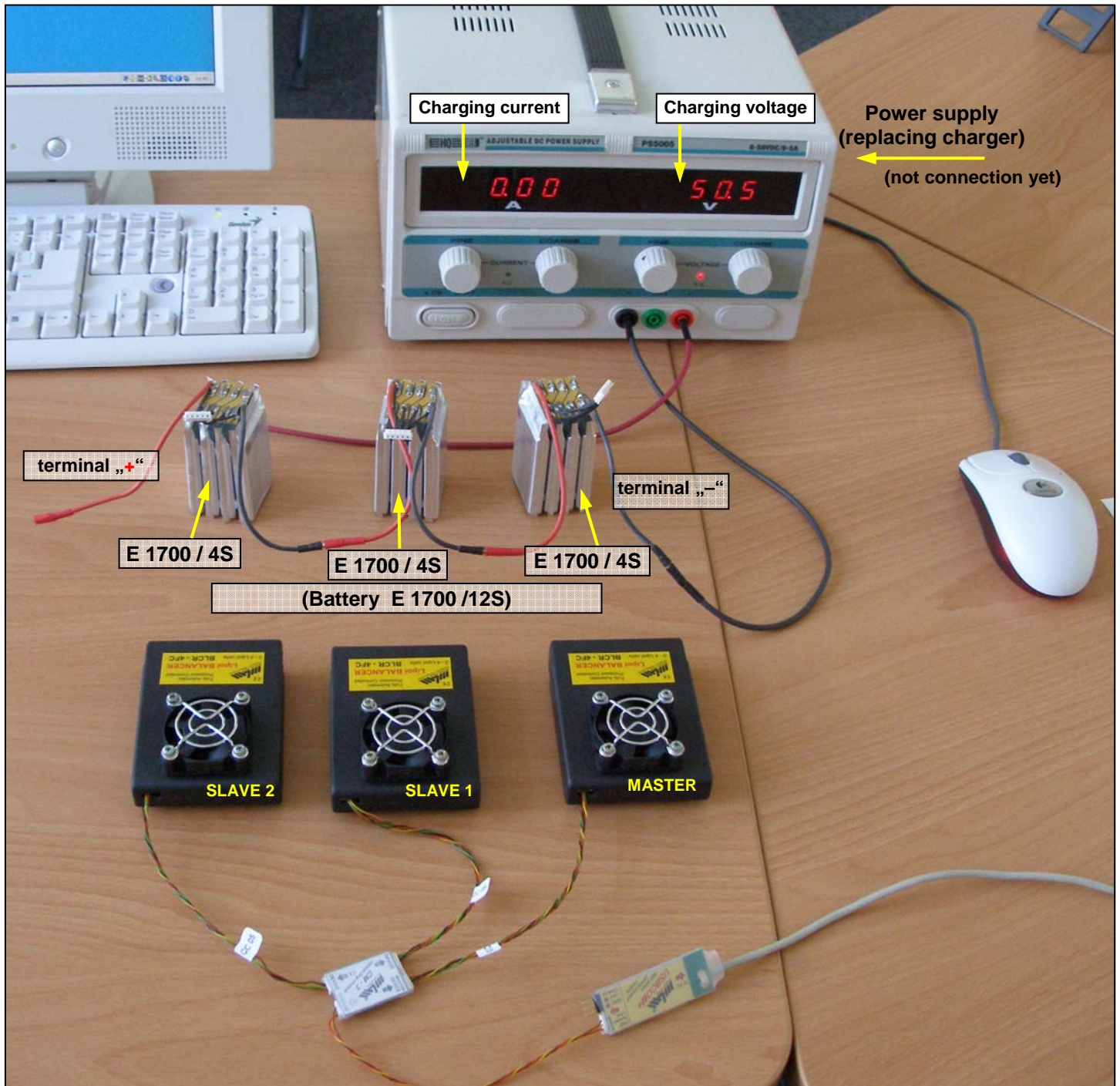


Connect the needed number of balancers (here three) through CM-3 module using CC\_05 cables. **2 or more cells** (see instructions for use BLCR 4FC or BLCR 5FC) to each balancer. To connect the PC, connect CM-3 module to USBCOM+ using cable CC\_03.

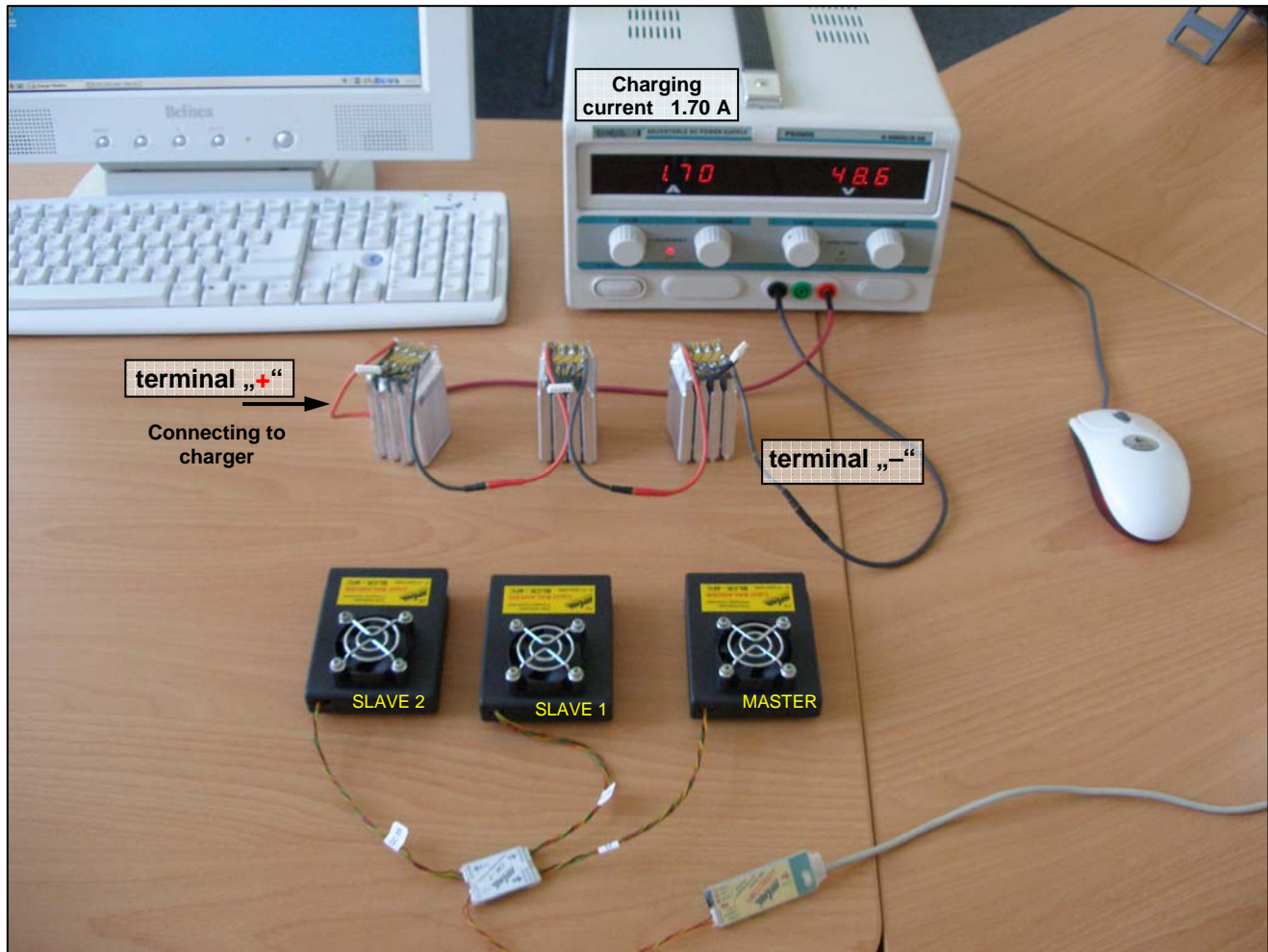




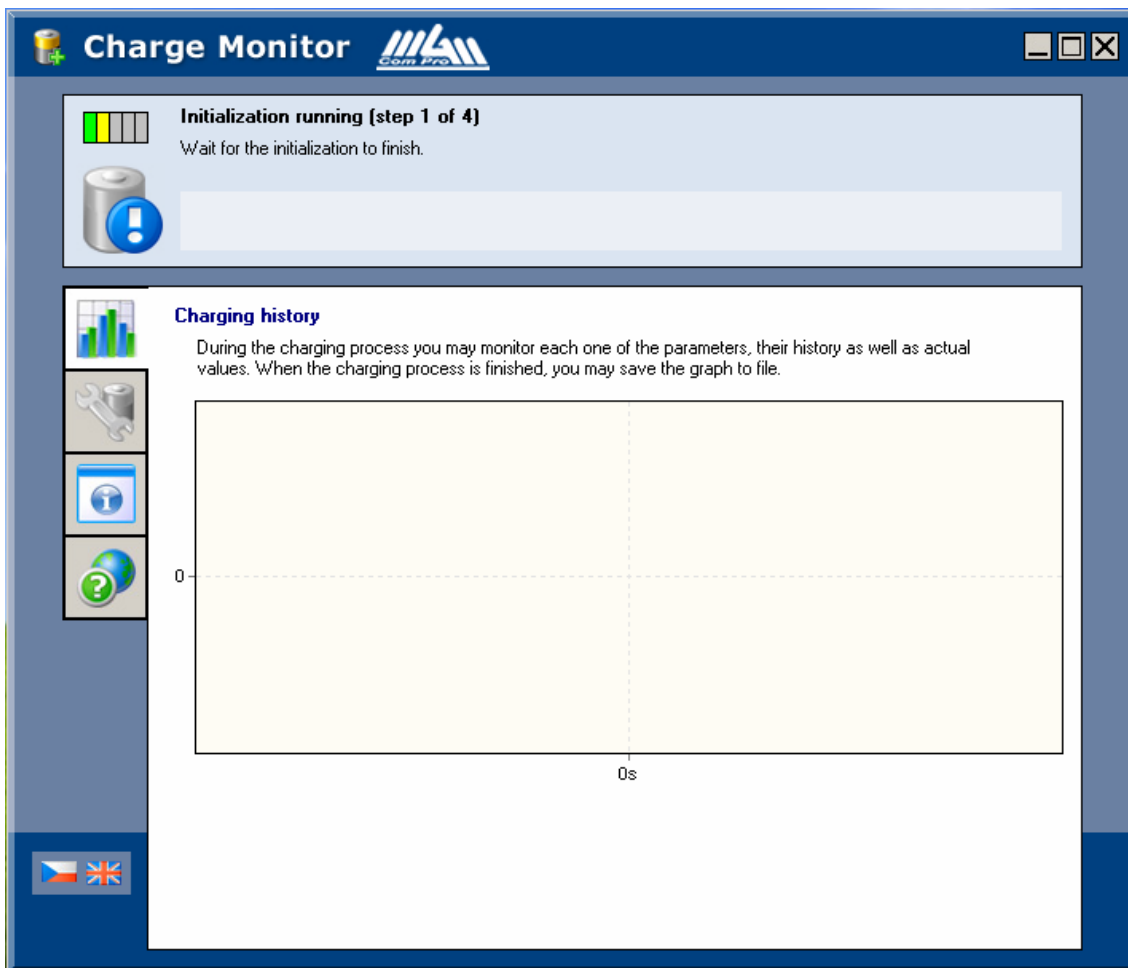
Example of setting the charging workplace. In the front, BLCR 4FC balancers are connected, behind them 3 packs Etec 1700 / 4S (one 12 cells pack) with three service connectors SCA\_5. In the rear, a laboratory source replacing charger for 12 Lipol cells. It is set to 50.5V (should be  $12 \times 4.2 = 50.4V$ ). The voltage must be set using precision voltmeter, the voltmeter of the source is not usually precise enough. Battery pack is not yet connected.



Connecting the cells to the source = beginning of charging. Charging current is 1.70A. Source now works in the constant current area (as charger). Voltage of the source adapts to the cells. Balancers are not yet connected to cells. Run the "Charge Monitor" application on your PC (if it is connected using USBCOM+).

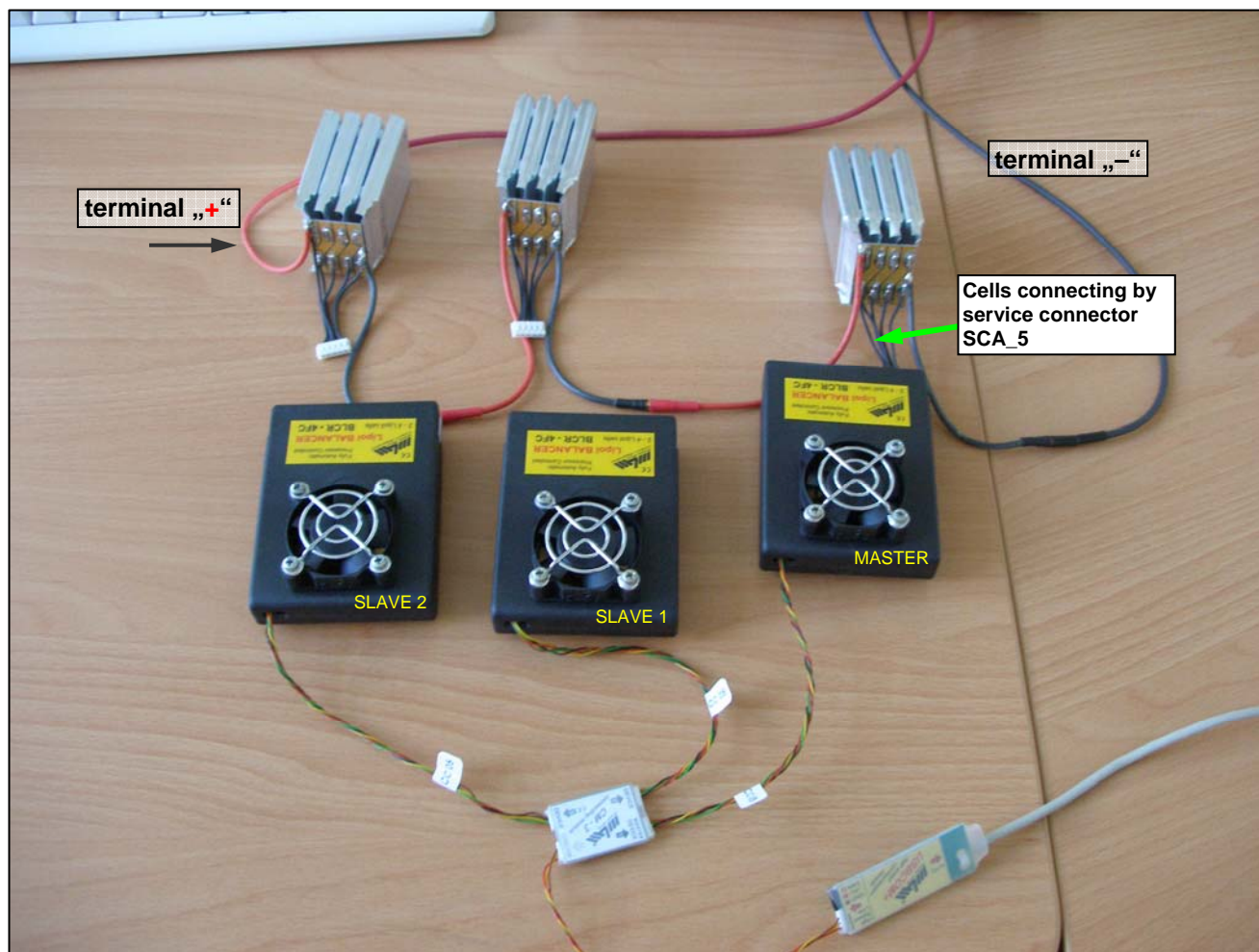


Start „Charge Monitor“ program by clicking on its shortcut

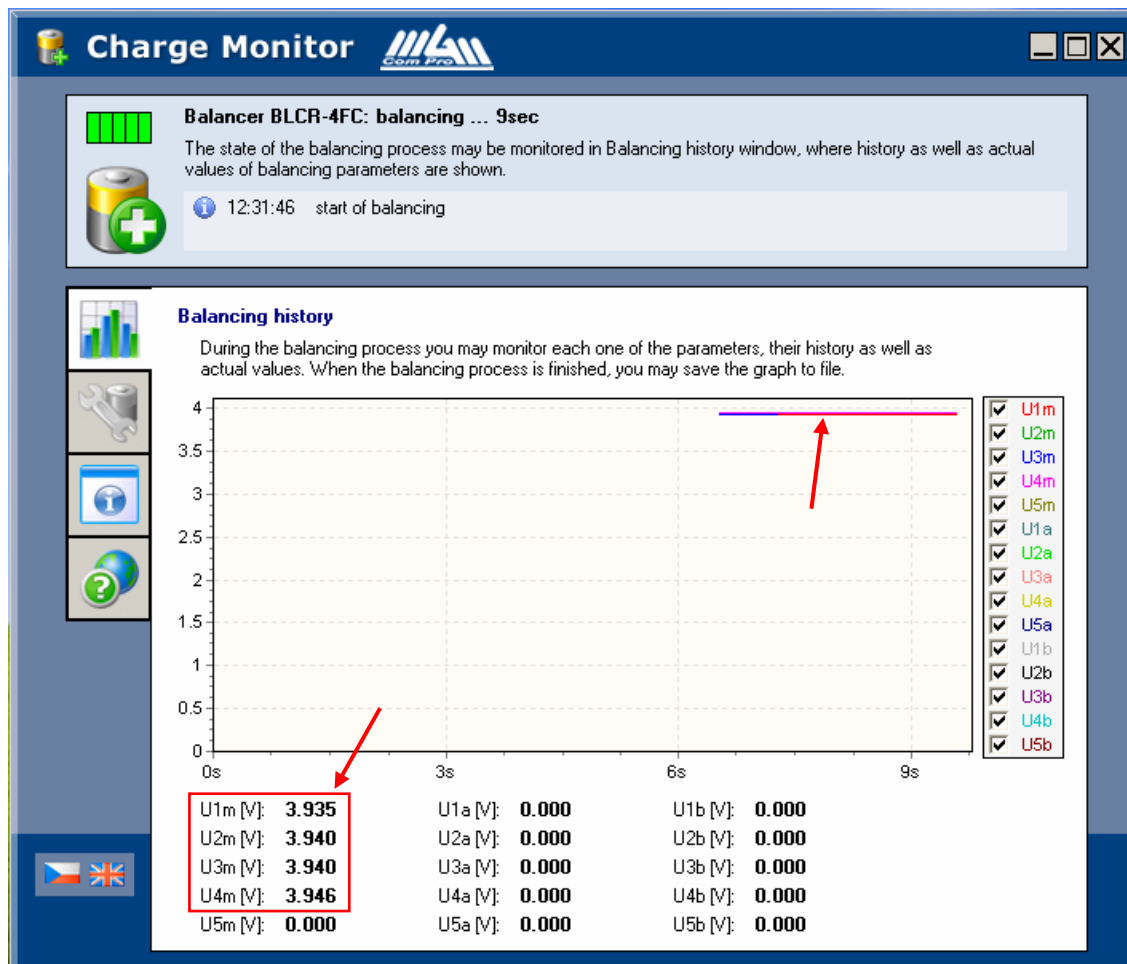




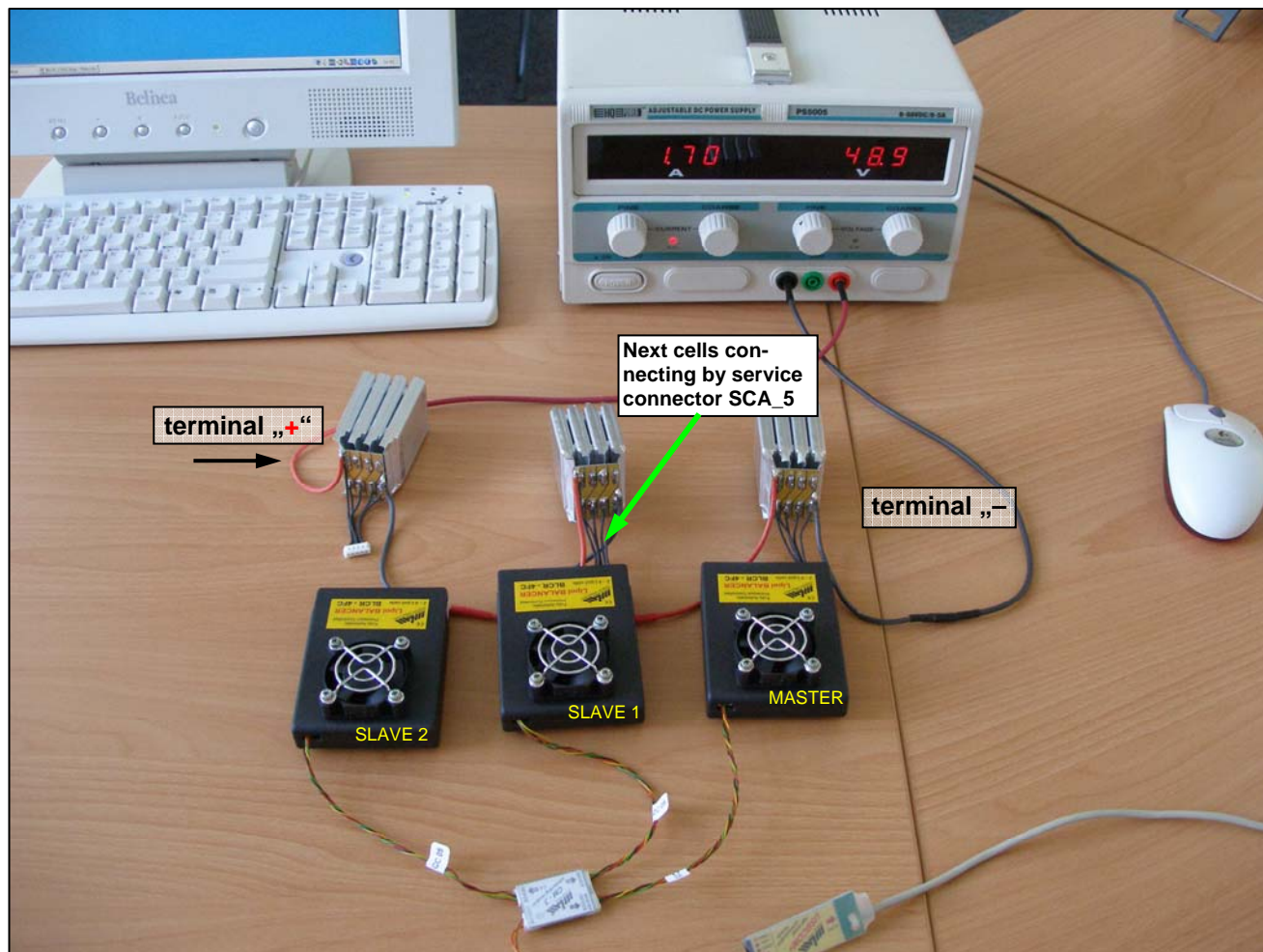
How to connect the 1<sup>st</sup> balancer (MASTER) to cells (at "minus" pole).



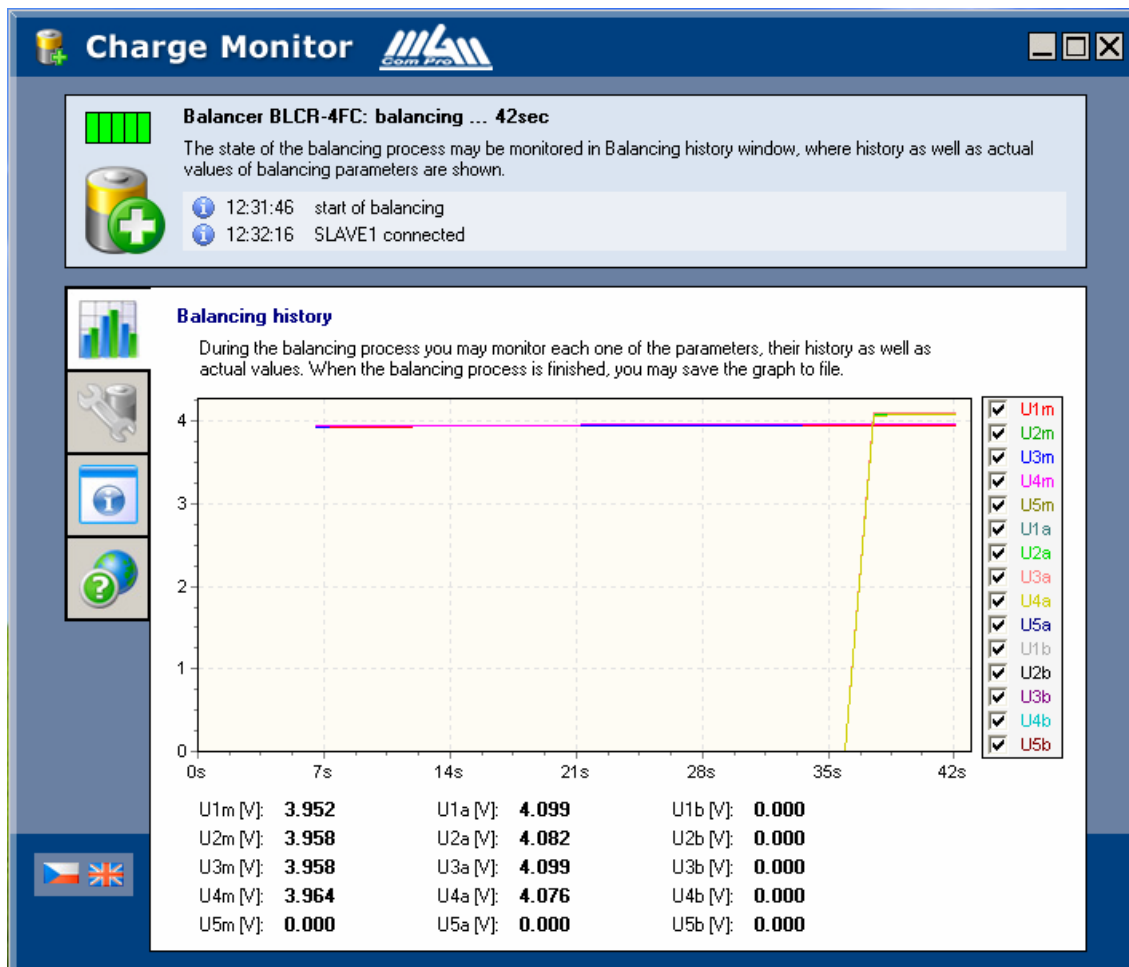
After few seconds, voltage of cells connected to the balancer (curves and numbers) is displayed on the screen.



How to connect the 2<sup>nd</sup> balancer (SLAVE 1) to cells.

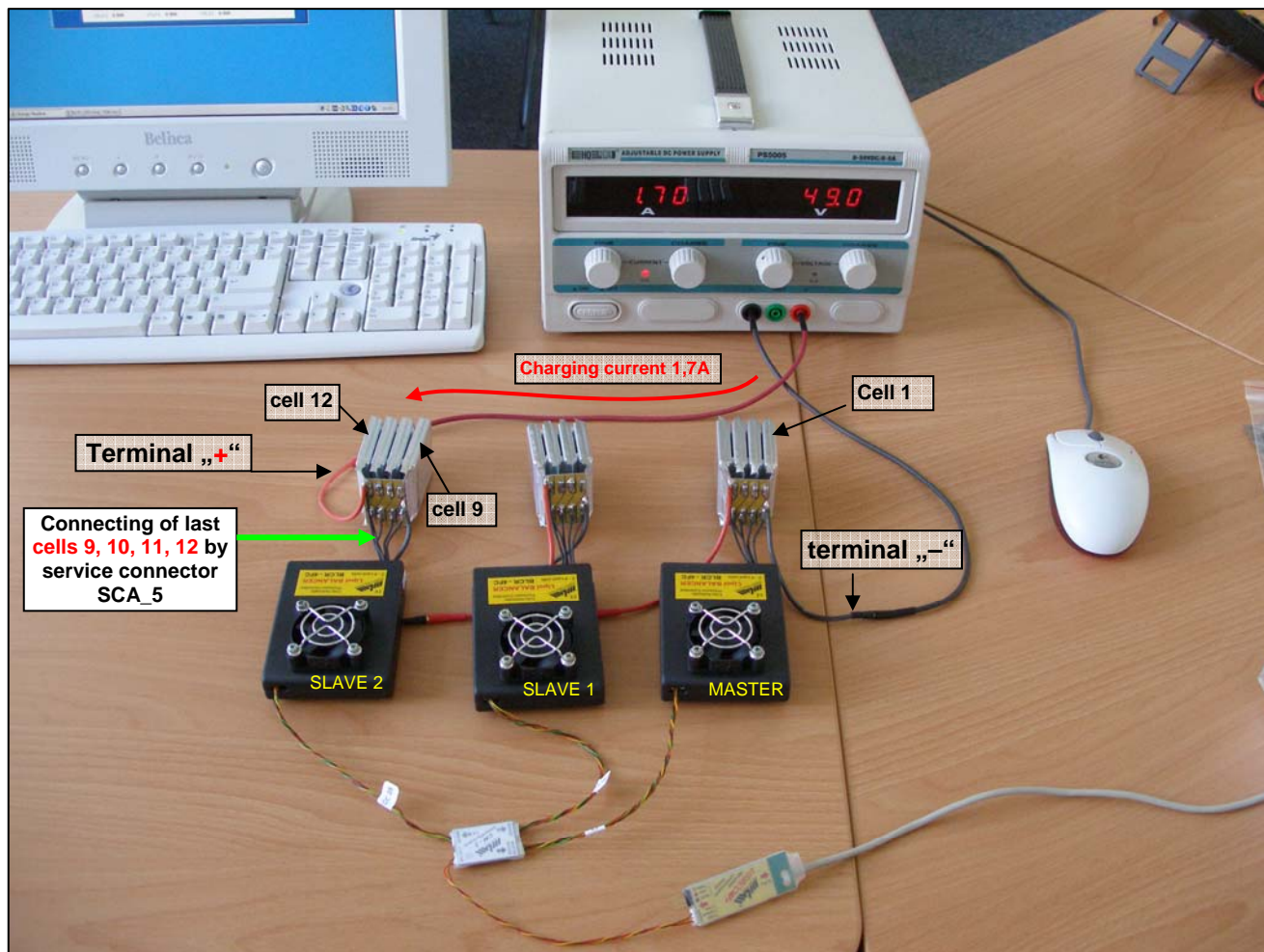


Again after few seconds, voltage of cells connected to the balancer (curves and numbers) is displayed on the screen.

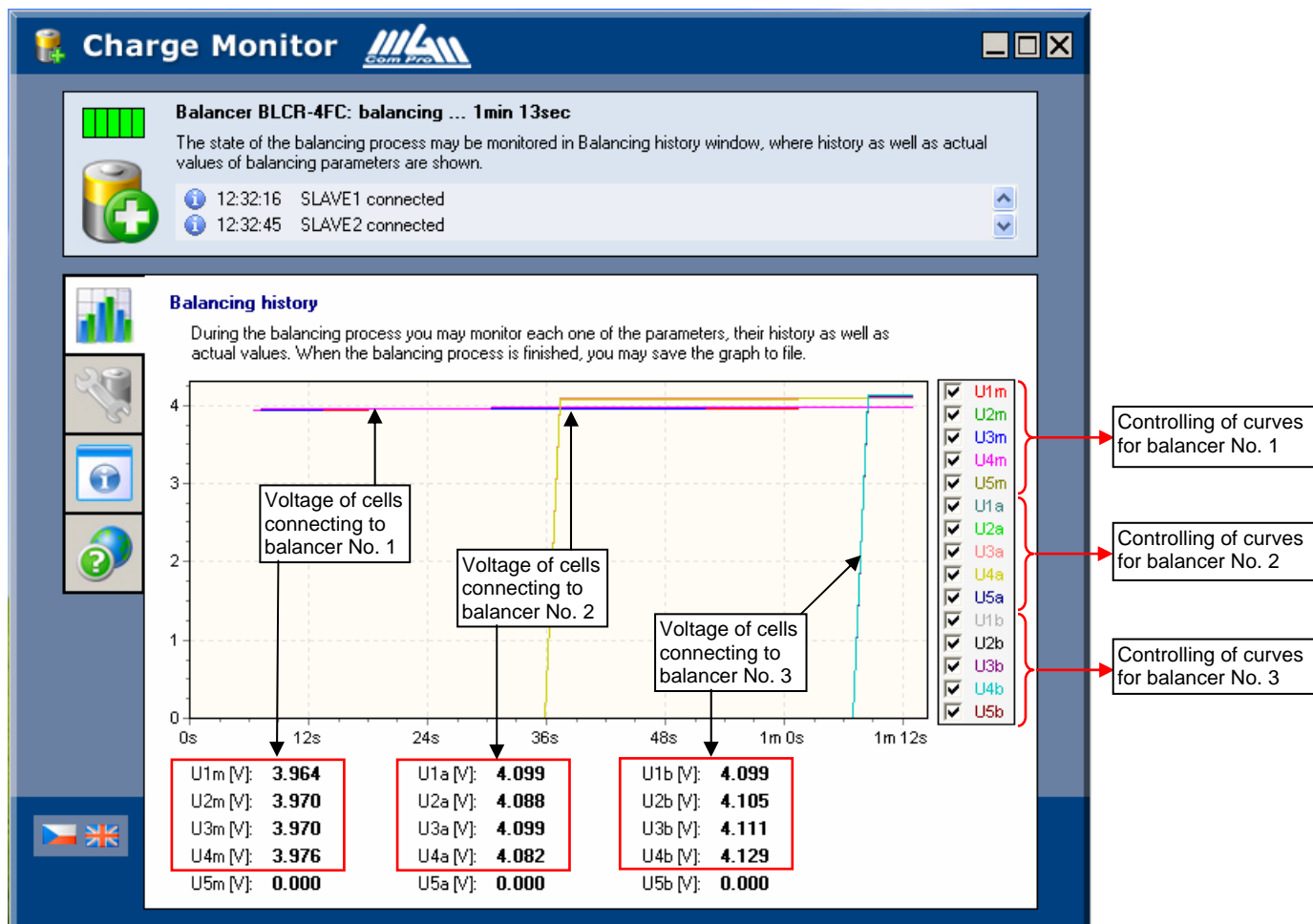




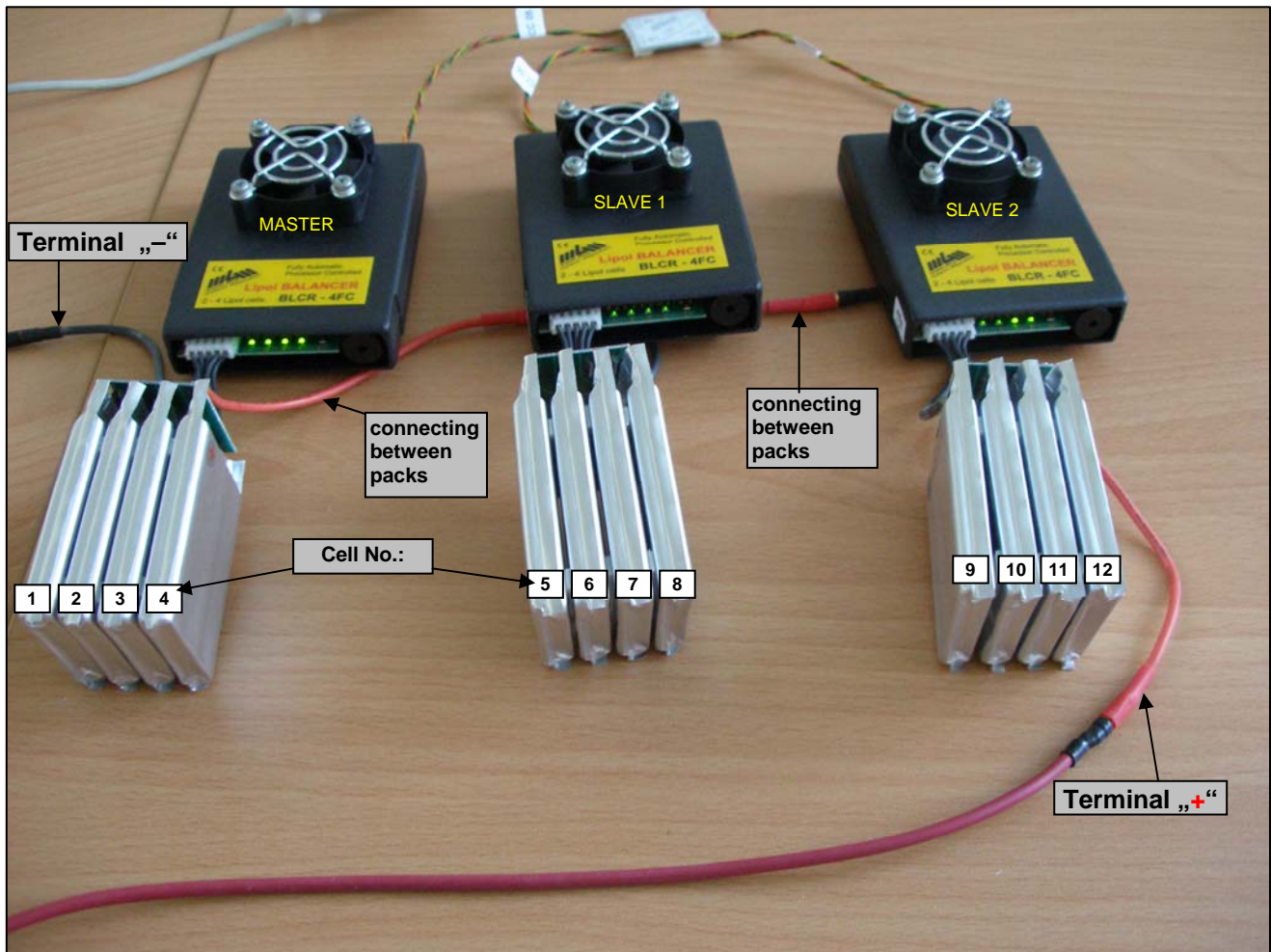
How to connect the 3<sup>rd</sup> balancer (SLAVE 2) to cells.



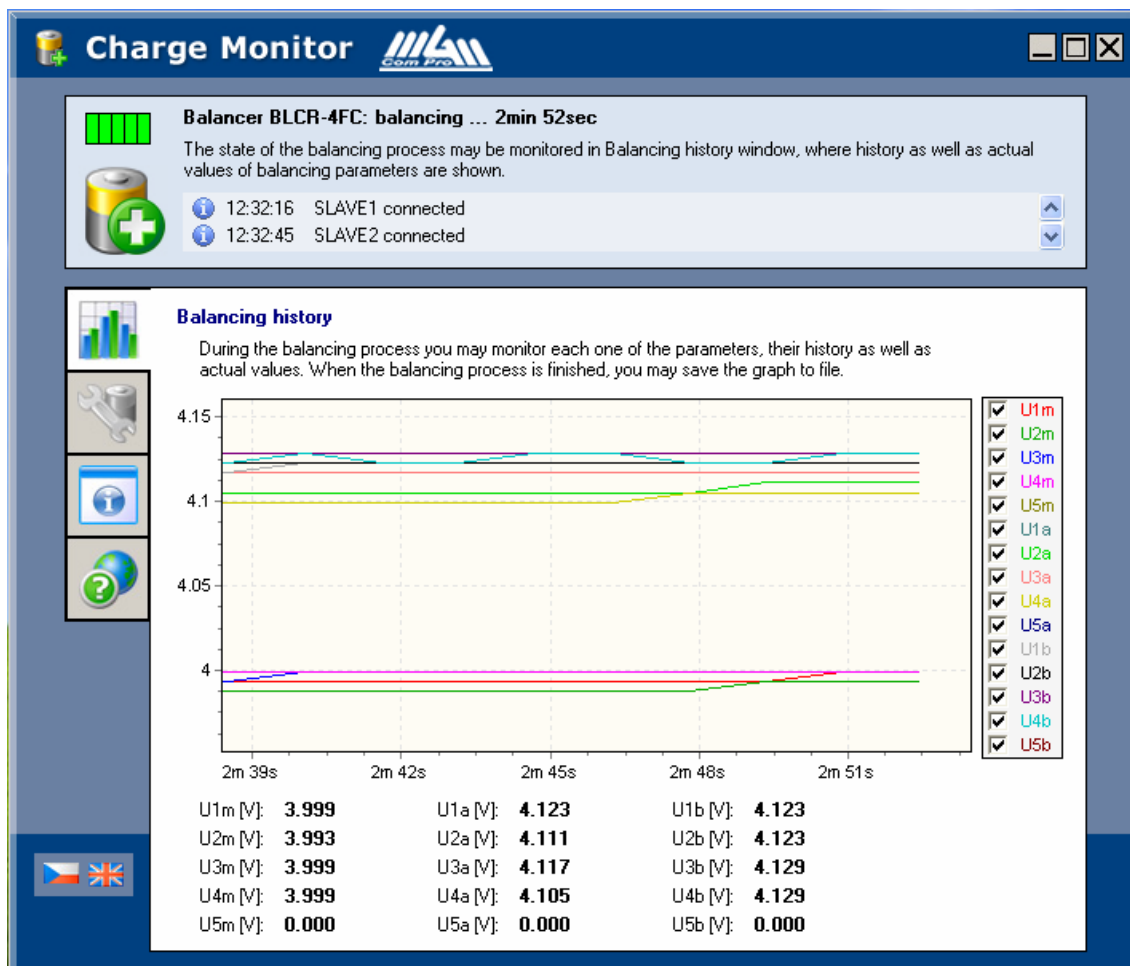
Again after few seconds, voltage of cells connected to this third balancer (curves and numbers) is displayed on the screen.



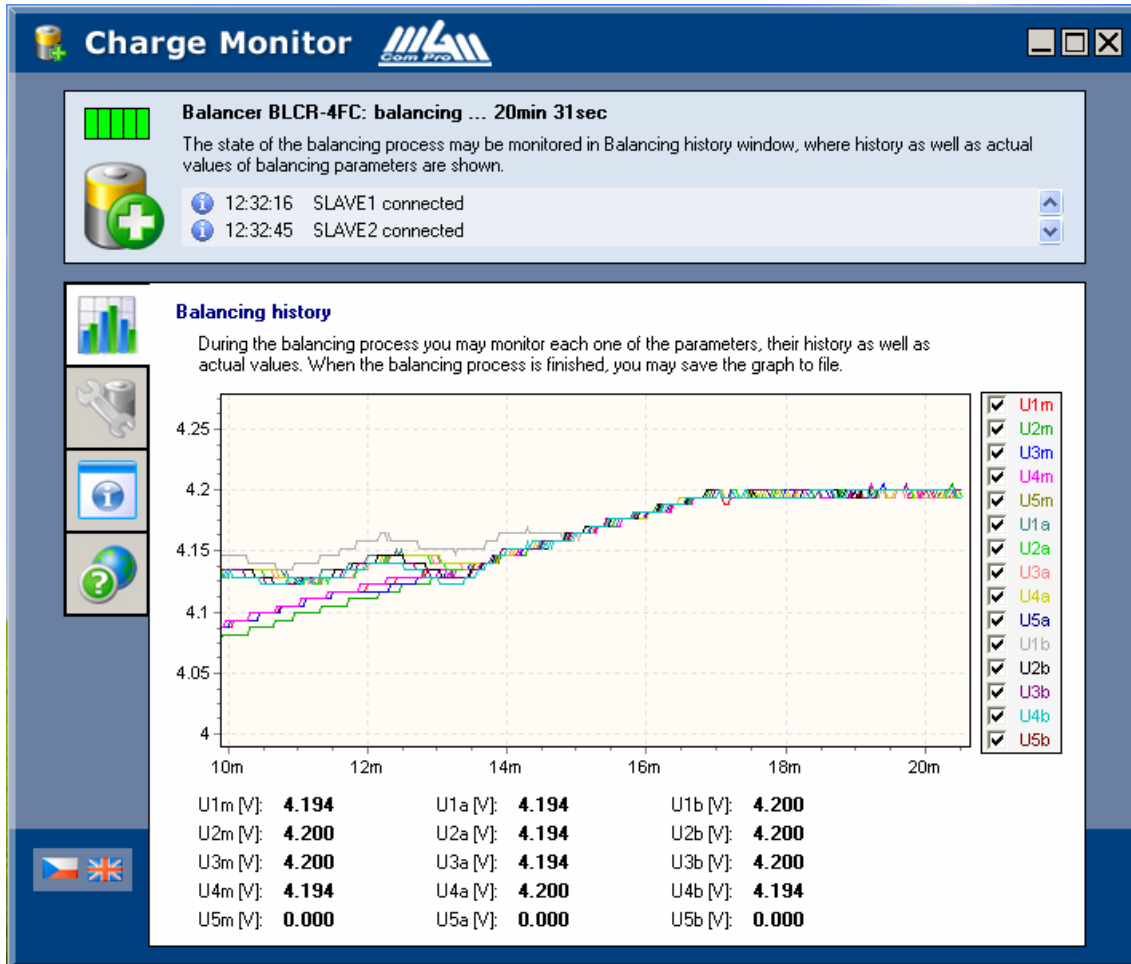
Detail of indication LEDs shortly after connecting all balancers. It is obvious that cells in the middle – no. 4, 5, 6 and 7 (connected to SLAVE 1) almost balanced; cells 9 and 10 (SLAVE 2) also. Cells 1,2,3 and 4 connected to balancer MASTER are much misbalanced. Cells 11 and 12 connected to SLAVE 2 also.



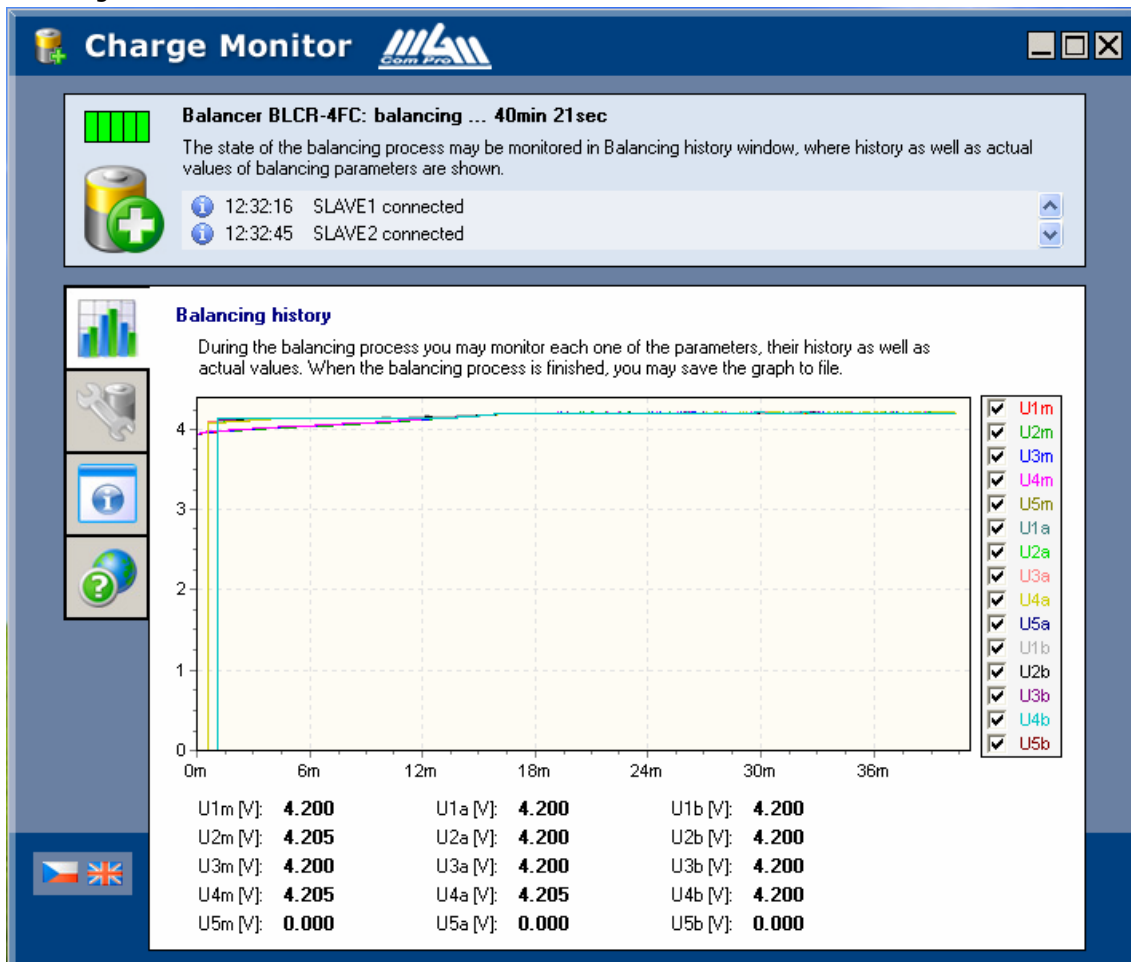
Detail voltages of particular cells shortly after connecting all balancers (all 12 cells).



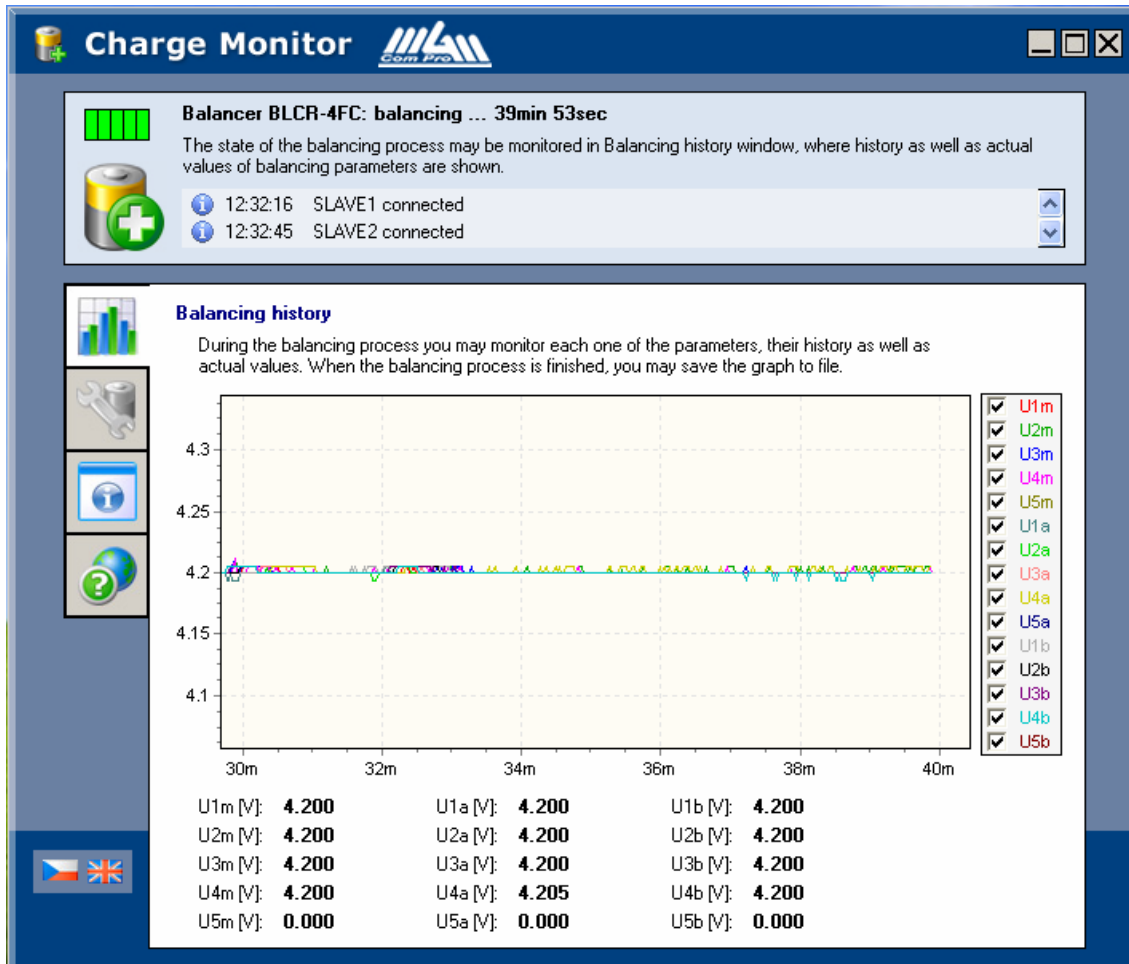
Detail of voltages of particular cells in greater time scale. The balancing of all cells in the beginning is shown, their charging to the end voltage (here 4.200 V) and a flat part when the charging current drops.



The same in greater scale.



Detail of last part of charging / balancing. Charging current dropped to ca 100 mA and charging was finished. It is obvious, that all 12 cells are balanced with tolerance of 6mV !!!



Disconnect the balancer from cells and right click on mouse to save graph or export the data to excel format as in the previous section.

