

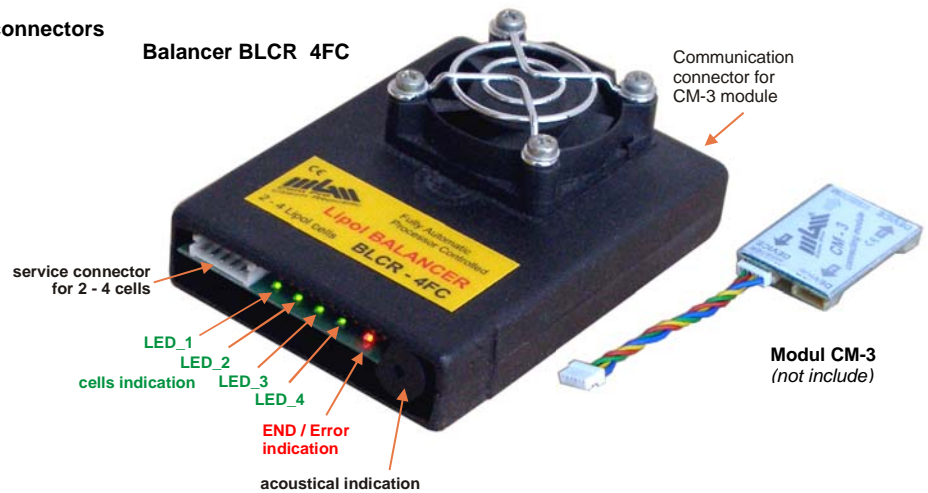
**Processor Balancers BLCR 4FC** are designed for quality, reliable and easy balancing of 2 up to 12 Lipol / Li-Ion cells in battery packs.

They may be used with chargers based on both – direct current and also pulse charging currents. They are processor controlled and are calibrated in manufacture therefore need no additional setting using trimmers etc. Cells are balanced shortly after connecting the balancer to the cells. Great advantage of this approach compared to "voltage limiters" is that cells may be balance if charging is finished early (e.g. cells are charged to 70% and you need to start flying immediately). Another big advantage is the possibility to charge cells with currents much higher than currents which balancer can balance. The main advantage however is that the cells are truly balanced which cannot be ensured by "voltage limiters" in principal. Thanks to processor, balancers identify defective, damaged or undercharged cells and inform the user of such situation acoustically and by LED. If voltage of one or all connected cells exceeds (from any reason, defective or incorrectly set charger, too high charging currents etc.) 4.25V/cell or other (user set) voltage, balancer will not allow another increase of voltage and informs of this acoustically and by LED.

**Example of battery pack with power conductors, connectors MP JET 2.5 and a service connector SCA\_4:**



Balancer BLCR 4FC



### Instructions for use:

Battery pack that should be balanced must be equipped with a service connector "SCA\_3" up to "SCA\_5", (battery pack with service connector may be ordered already completed or each part separately and soldered to any battery pack by yourself). If your battery pack is equipped with different than MGM compro service connector, make a reducing part, for example from "SET\_06" (see page 4 of this manual).

If you wish to charge and balance more than 4 cells in serial it is necessary to use more BLCR 4FC balancers (also possible to combine with BLCR 5FC) and a connection module CM-3. Balancers are connected to CM-3 using CC\_05 cables (cables and module CM-3 is not a part of the package).

Connection to PC is done using CC\_03 cable connected to module CM-3 and USBCOM+ (USBCOM+ version 2.11 and higher)

If you wish to connect only one balancer to PC (without CM-3 module) use the balancer and USBCOM+ and CC\_04 cable.

### How to connect balancer to battery pack:

- 1) Connect the battery pack that you wish to charge and balance to the charger, set a suitable charging mode and start charging.
- 2) Then connect the battery pack using service cable with "SCA\_x" to balancer.

Shortly after it is connected, balancer signals number of connected cells by number of beeps (for check) and using lit up **green LED 1 to LED 5** shows connected cells which voltage is in allowed limits. Cells that do not fall into the limits are signaled by blinking of the corresponding **green LED**. If voltage of any cell is lower than 2V, **LED** corresponding to this cell is not lit up. All **LEDs** are turned off after ca 5 sec.s, and start blinking which signals the start of balancing. If the overall voltage of the connected cells is <6V balancer works (to voltage ca 3.5V) but does not balance and is waiting for the overall voltage to rise above 6V - till then it beeps / blinks.

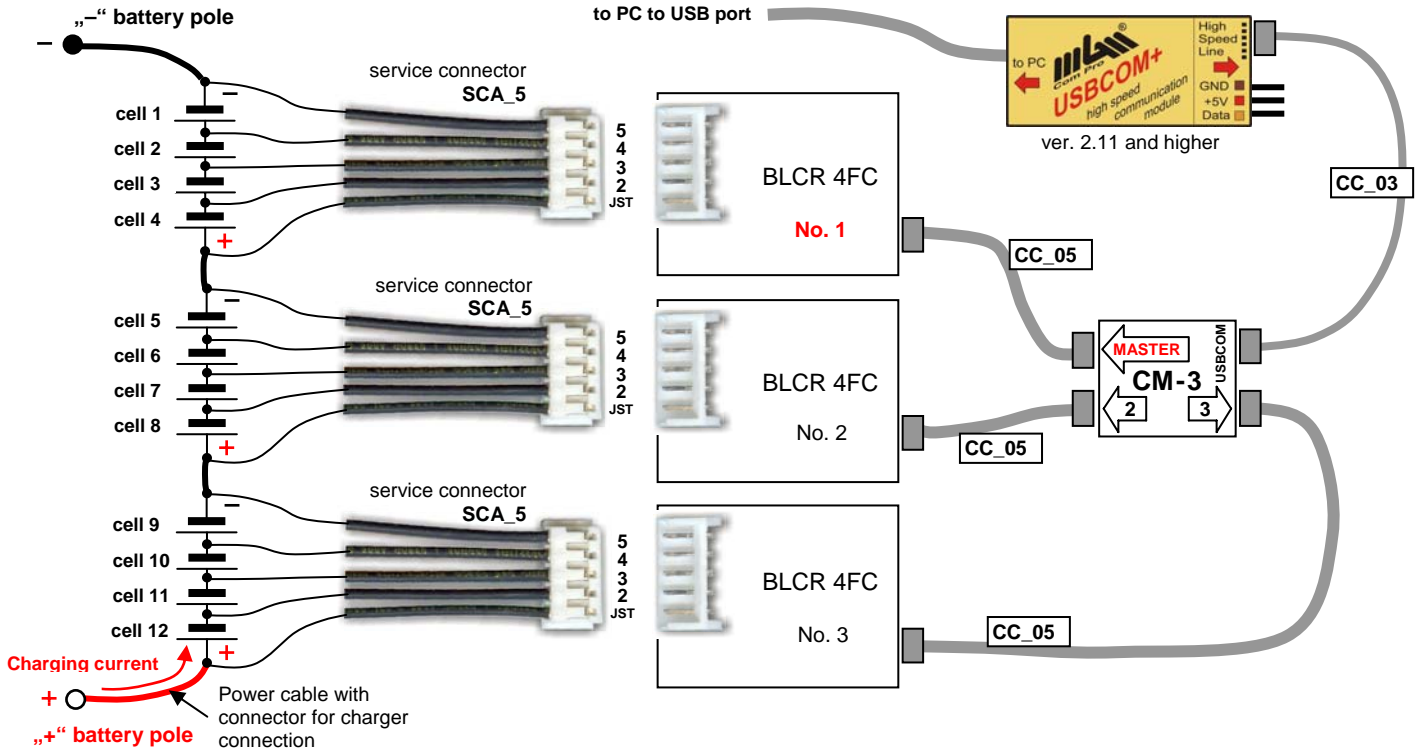
If the charging current is not higher than maximal balancing current of the balancer, the battery pack is balanced quickly and even if the charging is finished early the battery pack is balanced.

### Technical data:

temperature of the environment	0°C up to 40°C
compatible chargers:	any charger designed for Lipol, charging direct current or pulse
dimensions [mm]:	90x68x30
weight:	80 g
number of balanced Li-Ion / Li-Pol cells:	2 – 5
maximal balancing current (short time):	2A (3A)
maximal charging current (depends on differences in cells):	up to ~8A
accuracy of balancing (typical):	± 6mV
serial connection of balancers:	max. 3 units (max. 12 Lipol cells)
overcharging signalization (charger failure, not suitable settings etc):	yes
balancer connection to PC:	using USBCOM+ module, version 2.11 and higher
mutual connection of balancers	CM-3 module and CC_05 cables
balancing state indication:	by intensity of brightness of particular LEDs
state and error states indication:	LED and/or BEEP
error states	- voltage of cell < 2V / voltage of cells between 2V and 2.95V - disconnected cell, overall voltage < 6V

*Appearance and technical data may change without prior notice*

**Balancing more than 4 cell (up to 12 cells) – connecting balancers in serial:**

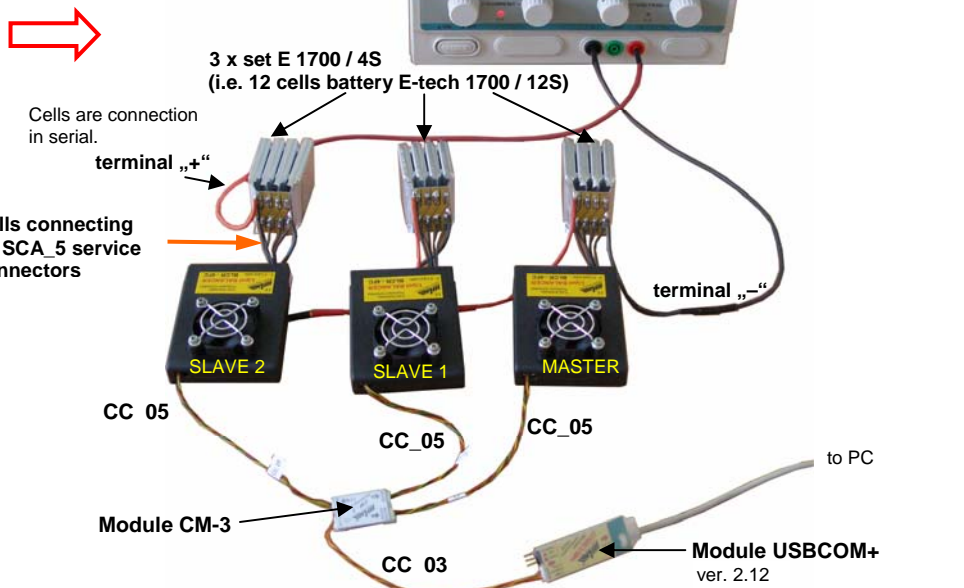


Service connectors of the accupack must be divided between the cells so that at least 2 cells are connected to each balancer. **Balancer that is connected to the "- " pole of the battery (No. 1) must be connected using cable CC\_05 to the "MASTER" position in the CM-3 module and must be connected to the battery using service connector SCA\_5 (No.1) as first one !** Then, balancers No. 2 possibly No. 3 are connected to the service connectors of other cells.

- 1) Run "Charge Monitor" application on your PC (it is similar for chargers AQCB -4FC and balancers BLCR – 4FC and BLCR – 5FC ). Application is installed automatically, see manual "Automatic\_Instalation\_Charge Monitor Application\_280506.pdf". **For details on how to control the program see "How to control Charge Monitor application Dddmmyy" (on CD or on [www.mgm-compro.com](http://www.mgm-compro.com) ).** Use stated or newer versions of these manuals and applications.
- 2) Connect USBCOM+ module to USB port of your computer and connect it with CM-3 module using CC\_03 cable.
- 3) Connect the cells for charging to the charger and start charging ( **when using automatic disconnection function this will be done at the end !** )
- 4) Connect balancer No.1 using cable CC\_05 to "MASTER" position on module CM-3. Connect cells 1 to 5 of the battery pack you wish to balance to this balancer using service connector **SCA\_x** (No.1). Soon, voltages of these cells will appear in graph on screen.
- 5) Connect balancer No. 2 using cable CC\_05 to "SLAVE 1" position on module CM-3. Connect cells 6 to 10 to this balancer using service connector **SCA\_x** (No.2). Soon, voltages of these cells will appear in graph on screen.
- 6) Connect balancer No. 3 using cable CC\_05 to "SLAVE 2" position on module CM-3. Connect cells 11 to 15 to this balancer using service connector **SCA\_x** (No.3). Soon, voltages of these cells will appear in graph on screen.

If you do not wish to watch the balancing state on the screen of your PC, skip running the program and connecting CM-3 module to USBCOM+. Start with 3).

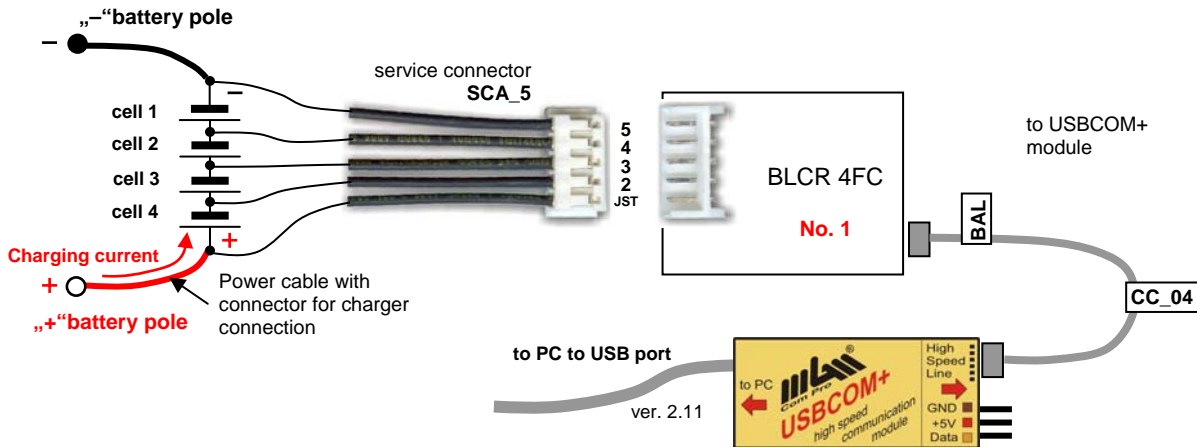
**Example of charging / balancing 12 Lipol cells.**



**How to connect balancer to PC: (2 up to 4 cells):**

If you wish to connect only one balance to PC it is done using cable CC\_04 (be careful not to interchange the ends of the cable – end marked as "BAL" or "BLCR xxx" **must plugged into balancer !!!, not the other way**).

- 1) Run "Charge Monitor" application on your PC (it is similar for chargers AQCB -4FC and balancers BLCR – 4FC and BLCR – 5FC ). Application is installed automatically, see manual "Automatic\_Instalation\_Charge Monitor Application\_280506.pdf". **For details on how to control the program see "How to control Charge Monitor application Dddmmyy "** (on CD or on [www.mgm-compro.com](http://www.mgm-compro.com) ). Use stated or newer versions of these manuals and applications.
- 2) Connect USBCOM+ module (version 2.11 and higher) to USB port of your computer and connect balancer using cable CC\_04. *The connection can also be done using cable CC\_05 to module CM-3 (into MASTER port) and from CM-3 module to USBCOM+ using cable CC\_03 (as if connecting more balancers).*
- 3) Connect the cells for charging to the charger and start charging (**when using automatic disconnection function this will be done in the end !** )
- 4) Connect the cells for balancing to balancer BLCR 4FC using service connector – you may watch the balancing process on the screen.

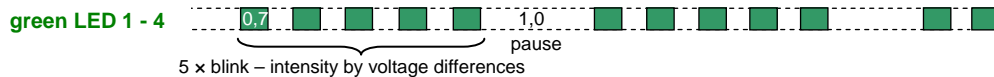


**Notice:** if the balancer is connected to PC or other balancers using CM-3 module, in between blinking of indication LEDs of particular cells (green), LED of cells 2, 3 and 4 blink. Thus a mutual communication between balancers and/or communication with PC is indicated.

**Indication after switch on:**

- after switch on (connecting the cells to balancer) the connected cells are indicated for ca 5 sec. by lit up corresponding green LEDs and also as many beeps as the number of connected cells will be heard.
- if in this time green LED of any cell is not lit up, the voltage of the cell is < 2V, the cell is missing or the wire / service connector is damaged !!! (**must be repaired !**)

After 5 sec. LEDs are turned off and balancing process starts. Intensity of brightness of particular **green LED** indicates its difference from the most charged cell. If the cells have similar voltages, LEDs are lit up with the smallest intensity. **These LEDs turn off in ca 1 sec. intervals for 0.25 sec. period - this indicates that everything is alright:**



The intensity of **red LED ST** indicates limitations of balancing currents due to raised temperature. Also this LED turns of in ca 1sec. intervals. This LED without acoustic indication is only informative, is not of warning character.

**Error indication:**

- voltage of particular cell 1 to 4 is between 2.0 and 2.95V !!!  
( cell is discharged too much !)

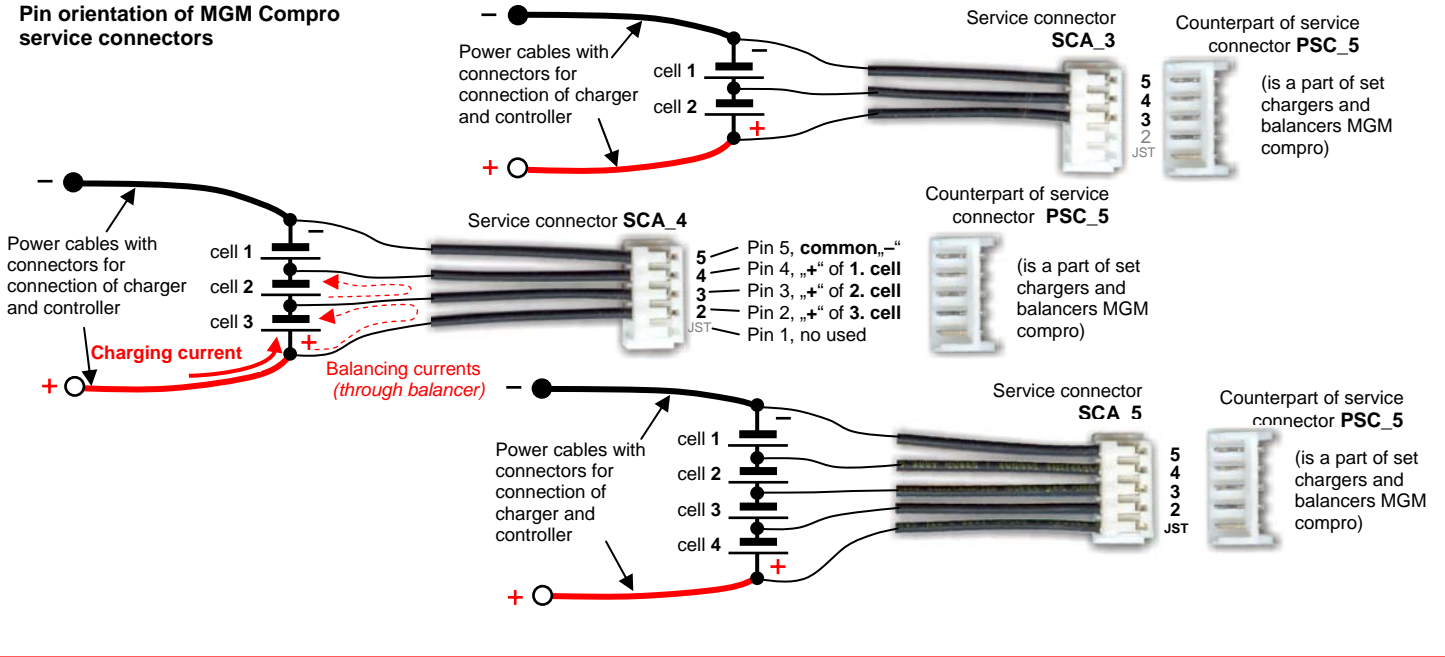


**EMERGENCY ERROR WARNINGS !!! (USER INTERFERENCE NECESSARY):**

- voltage of **some** cells exceeded set limits 4.25 V / cell  
(charging current are too high / cells are too different or defective – **necessary to lower charging current**) - balancer is not sufficient to balance)  
 BEEP (musical note)    red LED ST (red square)    0.25 0.25    BEEP (musical note)    red LED ST (red square)    0.25 0.25
- voltage of **all** cells exceeded set limits 4.25 V / cell  
(charging currents are too high– **necessary to lower charging current**) (charger is defective or incorrectly set – **must be turned off and repaired!**)  
 BEEP (musical note)    red LED ST (red square)    3.0 0.5    BEEP (musical note)    red LED ST (red square)    3.0 0.5
- overall voltage of cells < 6V (cell / cells are very undercharged)  
- wait for the voltage to raise, **watch the process carefully!**  
 BEEP (musical note)    red LED ST (red square)    0.1 4.0 sec.    BEEP (musical note)    red LED ST (red square)    0.1 4.0 sec.

**Recommended connections:**

**Pin orientation of MGM Compro service connectors**



**Charger Accessories:**

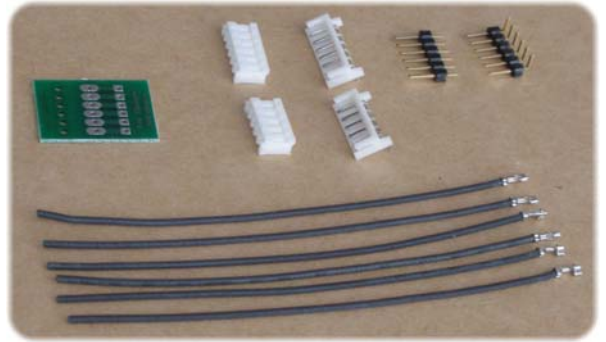
Extension 5 pins service cable **PSCA\_05**



Service connector **SCA\_2, SCA\_3, SCA\_4, SCA\_5** with wires 100mm or 300 mm (SCA\_5 on picture)



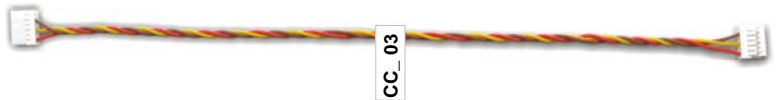
**SET\_06** – provide connect Li-xxx battery with any service connector to MGM compro devices (AQCB xx or BLCR xx)



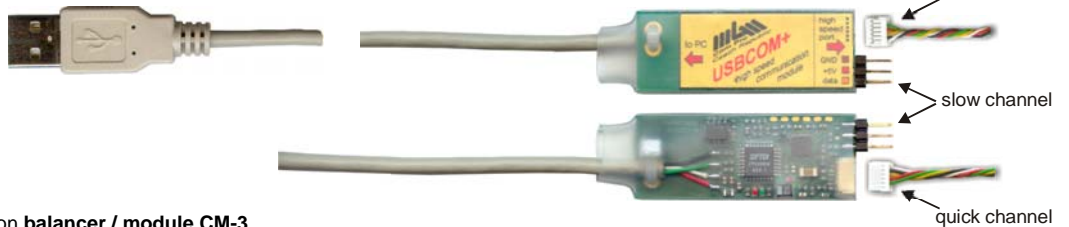
**SET\_02:** cable 1,5 mm<sup>2</sup> + connectors G3.5 + shrinking tube



Connection cable **CC\_03:** connection **Charger / USBCOM+**



Communication module **USBCOM+**



Connection cable **CC\_05:** connection **balancer / module CM-3**



Connection cable **CC\_04:** direct connection **balancer / USBCOM+**



Connection module **CM-3**



**Outstanding features of BLCR 4FC:**

- a) compared to regular “balancers – voltage limiters” which do not truly balance but only limit the voltage on maximal value (e.g. 4.25V) BLCR 4FC truly and actively balance during the whole charging
- b) no settings needed, high accuracy is ensured by calibration during manufacture
- c) cell are balanced with accuracy in mV (less than 10 mV)
- d) thanks to processor, it recognizes defective, damaged and undercharged cells, informs of error and emergency states
- e) permanent balancing from the very start of connection (also partially charged cells can be already balanced)
- f) may be used with all types of Lipol chargers (direct current as well as pulse)
- g) possibility of serial connection of balancers (using CM-3 module) and possibility to balance up to 12 Lipol cells
- h) high balancing currents
- ch) charging currents may be several times higher that balancing currents of balancer (applies for Li-xxx chargers not for sources of current!)
- i) reverse polarity protection
- j) small dimensions and weight
- kl) non-interchangeable industrial connectors PSC\_5 (for connection on service connectors SCA\_3 up to SCA\_5 used for battery packs)

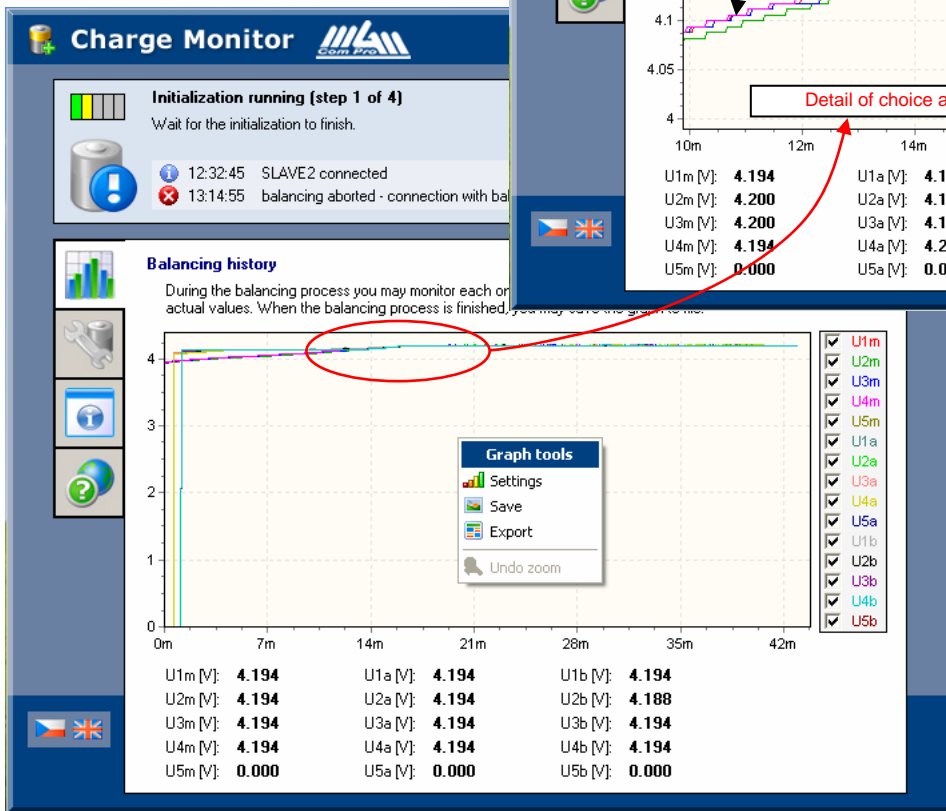
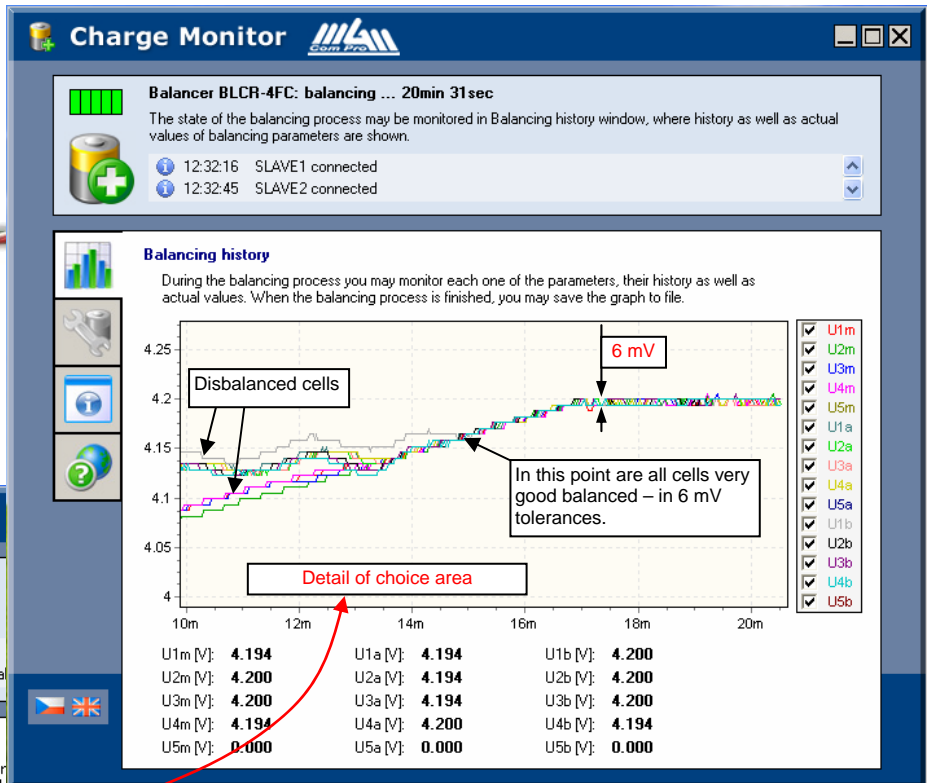
**Connection of the communication cable to the balancer.** For details see manual „Charge Monitor control Dddmmyy“.



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

Example of balancing 12 Lipol cells, whole and detail. Charge slightly overcharges because a bit higher overall voltage 50.6 V was set (that is 4.215 V / cell). It is obvious that voltage of each cell is balanced in tolerance of  $\pm 6$  mV and that from approximately 15<sup>th</sup> minute of charging. Then already balanced cells are charged.

When cells are charged and balancer is disconnected a notice “balancing interrupted ....” appears. Charging history and graphs may be saved to file.



Voltage of cells connecting to balancer No 1.      Voltage of cells connecting to balancer No 2.      Voltage of cells connecting to balancer No 3.

