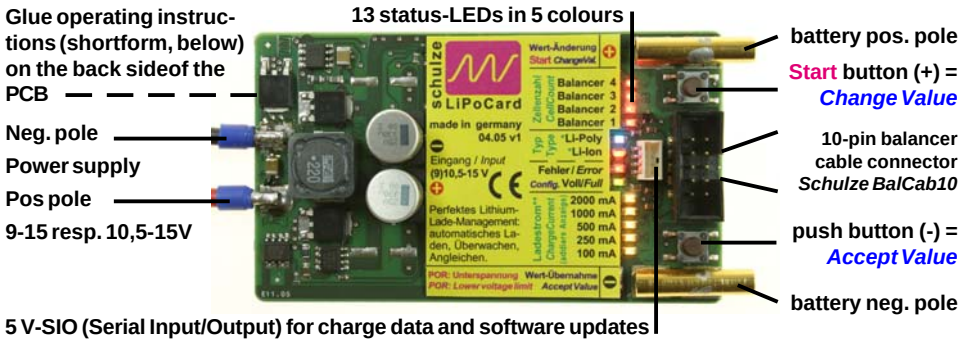


Contents

Short-Operating instructions for the LiPoCard back side

Configuration of the under voltage level: Hold *POR: Lower voltage limit* pressed while connecting power source. LEDs go out in sequence. v-limit = 9V. Limit is only valid until power supply is disconnected.

Configuration of c.type, c.count, current: Press **Accept value(-)** & **Change value(+)** simultaneously. **LiPo** resp. **Lilo** lights up. Change cell type by pressing **Change value**. Store cell type with **Accept value**. **CellCount**=Balancer LED(s) glow. **Change value** changes cell count. Store cell count by **Accept value**. **Charge current** LED(s) glow. Change current by **Change value**. Pressing continously = fast change. Store displayed current value by pressing **Accept value**. **All** aboved selected configurations glow.

Charging without Balancer: Connect battery - Type-LED* flashes. Press **Start** - battery charges, Current-LEDs** are flashing. Charge current decreases near end of charge. Battery full: Current off, green „full"-LED glows.

Charging with a conventional Balancer connection: Connect battery, Type-LED* flashes. Plug in the Balancer cable, Cell count is displayed. Press **Start** - battery is charging, Current-LEDs** are flashing. Charge current decreases near end of charge. Battery full: Yellow current-LED(s) off, green „full"-LED glows.

Charging with the *Schulze Balancer Cable*: Connect the balancer cable - Configured battery type, cell count, current are displayed. Using >1 A charge current: also connect charge leads. Battery type-LED* flashes. Press **Start** - battery is charging, Current-LEDs** are flashing. Charge current decreases near end of charge. Battery full: Yellow current-LED(s) off, green „full"-LED glows.

Error messages: *) flashing type-LED: Press **Start**. **) flashing current-LEDs: LiPoCard is charging, all OK.
1) "Error"-LED glows. Current (yellow) & cell count (red)-LEDs flashing alternately: **Reversed polarity!**
2) "Error"-LED glows. Current-LEDs (yellow) displaying sequential from outside->inside: **Car battery flat!**
3) "Error"-LED glows. Cell-count-LEDs flash betw. two cell counts: **Discrepancy configurated/actual cell count.**
4) "Error"-LED glows. One LED in the cell count display (red) flashes: **This cell has under-/over-voltage!**

Dear Customer,

In principle you can charge any Lithium-Ion or Lithium-Polymer battery with up to four cells using the ***Schulze LiPoCard*** without the balancer socket. Lithium batteries with a conventional balancer socket can also be connected to the ***Schulze LiPoCard***, if necessary using a balancer adaptor. However, if you use either of these methods it is essential to set the ***Schulze LiPoCard*** to the permissible charge current for the pack in question, and - if no balancer cable is connected - you must set the cell count (number of cells) manually for reasons of safety.

To avoid having to re-configure your ***Schulze LiPoCard*** separately for each battery, the ***Schulze LiPoCard*** features a quasi-automatic function: a special Schulze LiPoCard Balancing Cable is used to inform the ***Schulze LiPoCard*** of the battery-specific data.

The cable can easily be assembled using the parts contained in the ***BalCab10 set*** (10-way balancing cable set). This cable features three more connectors than usual. The electronic circuitry of the ***Schulze LiPoCard*** uses these additional terminals to detect the type of battery connected to it, and the permissible charge current for that battery type. The instructions supplied with the ***BalCab10 set*** describe how the completed Balancer cable should look, and how the three configuration connectors have to be wired.

The balancer included in the ***Schulze LiPoCard*** really does justify this name. It is a genuine balancer which analyses the cells connected to it, and matches them to each other after the first minute of charging. The result: faster matching of the cell voltages, faster full detection, reduced heat generation.

This is a real advantage compared to the many "balancers" currently available commercially, which in fact should be called "limiters", as they simply limit the cell voltage to a "Full voltage" defined by the manufacturer of the unit; in any case they often have insufficient capacity to do the job properly.

1 Warnings

When batteries are charged using the charge lead, and the balancer plug is also used, it is absolutely essential to start by connecting the battery to the ***Schulze LiPoCard*** via the charge lead, and to ensure that the connections are made with correct polarity - only then should the (tested) balancer cable be connected. This ensures that the conductor tracks on the circuit board between the battery connections and the balancer plug cannot burn out. Since the unit is designed to permit charging of batteries directly via the balancer lead, there is a connection between **battery -, pin 1 and pin 2,** and between **battery +, pin 9 and pin 10.**

The CE symbol does not entitle you to be careless when using or handling the charger, the power supply and the batteries.

Before you connect the charger to a 12 V car battery ensure that the vehicle's engine is stopped. The charger may only be operated with the vehicle stationary and the engine stopped.

The charger must be used with the original cables in unmodified form. The only permissible change is to use 4 mm gold-contact connectors. Never use wander plugs!

To meet the CE standards the length of the charge leads must not exceed 20 cm.

Never leave the charger unsupervised whilst rapid-charging is in progress.

Before using the charger place the unit and the batteries to be charged on a non-flammable, heat-resistant and electrically non-conductive surface.

Keep inflammable objects and volatile materials well away from the charging station.

When you wish to charge batteries, remove them from the model or electrical device.

Protect the ***Schulze LiPoCard*** from moisture, water, shock and pressure.

The unit must not be used if it exhibits any fault or is displaying an error message.

The following types of battery / pack / cell must **not** be connected to the charger:
- packs consisting of different types of cell
- mixtures of old and new cells, or cells of different make
- non rechargeable (dry-)cells, nickel batteries (NiCd, Ni-MH), lead-acid batteries, Li-MNo batteries (Tadiran).

2 How to obtain reliable, trouble free operation

It is essential to protect the charger from direct sunshine, dust, damp and rain. If the unit gets wet, dry it out thoroughly and have it checked and cleaned before re-use.

The unit produces considerable heat in use. Allow excess heat to dissipate.

Check the unit regularly for damage and/or poor contact between cab-les and connectors.

Keep the charge cables as short as possible. Cables longer than 20 cm cannot be used if you wish to conform to CE regulations. The internal battery wiring must also be as short as possible - especially to protect the connected speed controllers against damage in use. Cable cross-section should be 2.5mm^2 when you charge with more than 2 amps charge current.

The charge cable should be fitted with high-quality gold-contact connectors at both ends.

Twist charge leads together to minimise interference radiation.

It is not permissible to operate the ***Schulze LiPoCard*** while the power source (car battery) is being charged by a conventional battery charger. It is generally possible to operate the unit from a stabilised mains PSU (11 - 13.8 V), provided that it has a current capacity of at least 7 A, but it is still essential that you check the compatibility of the system.

Where individual cells are to be charged simultaneously, they must be soldered together to ensure that the ***Schulze LiPoCard*** operates correctly.

The ***Schulze LiPoCard*** only sets the charge current calculated for a particular pack if that current does not cause any of the charger's parameters to be exceeded.

The information and charging currents stated by the battery manufacturer must be observed at all times.

3 Commonly used terms

Final charge voltage: the voltage at which the battery's charge limit (or capacity limit) is reached. When the ***Schulze LiPoCard*** is in use, the current is reduced to less than 8% of the configured value at this point. The charger then switches off, and displays the "battery full" indicator.

Final discharge voltage: the voltage at which the battery's discharge limit is reached. The chemical composition of the batteries determines the level of this voltage. Below this voltage the battery enters the deep discharge zone. Deep discharged cells can cause permanent damage

Power-On (- reset): the status of the ***Schulze LiPoCard*** after it has been connected to the car battery.

Ready display: the charger is ready (batteries disconnected) to operate at the currently selected configuration. When in this state the unit displays the set configuration by means of continuously glowing LEDs.

Lademenge, Kapazität: siehe C und Ah bzw. mAh.

C: Coulomb or capacity: Unit of measurement relating to the quantity of charged energy. In conjunction with charge current data this unit is used to determine the recommended / prescribed charge current of a battery of a given capacity. Example: if the charge current of a 1100 mAh battery is 2,2 A, we refer to this as a charge of 2 C.

A, mA: unit of measurement relating to charge or dis-charge current. 1000 mA = 1 A (A=Ampere, mA=Milliampere). Do not mix up with:

Ah, mAh: unit of measurement for the capacity of a battery (Amperes x time unit; h = hour). If a pack is charged for one hour at a current of 2 A, it has been fed 2 Ah of energy. It receives the same quantity of charge (2 Ah) if it is charged for 4 hours at 0.5 A, or 15 minutes (=1/4 h) at 8 A.

4 Useful information about Lithium batteries (Li-Io & Li-Po) and their maintenance

Li-Io (Lithium-Ion) cells are housed in a strong metal can, usually of cylindrical shape. Their designation is derived from the toxic ion-conducting fluid electrolyte. The rigid metal container is required to ensure that the electrodes are pressed firmly enough against the separator. Li-Io cells of cylindrical and prismatic format have been in existence for many years; they were originally stated to have a nominal voltage of 3.6 V, with a maximum charge voltage of 4.1 V.
Some distribution companies now state a maximum charge voltage of 4.2 V for the Li-Io cells which have been developed more recently. In our opinion we should always rely upon the voltages stated by the cell manufacturer, i.e. the company which designed the cell.
As a basic rule the Li-Io cells stated to be safe at 4.2 V can also be charged to 4.1 V. If you do this, you can usually - depending on the cell design - expect a slight extension of useful battery life, combined with a reduction in usable capacity.

Li-Po (Lithium-Polymer) cells derive their designation from the polymer foil which was originally used as the electrolyte. This "solid" electrolyte was only capable of supplying current at temperatures of around 60ºC or higher; later the electrolyte was enriched with various supplementary materials to provide improved conductivity. The characteristics of these new cells made it possible to house them in a lightweight foil pack ("flat-pack"); these cells now provide a very high performance even at room temperature, although they still have slightly more to offer at 60ºC.
The uniform nominal voltage of these cells is stated as 3.7 V, the maximum charge voltage as 4.2 V.

As the differences between the types is generally not made clear in the modelling world, we provide the following definitions:

Nominal voltage	**LiIo:**	**3.6 V** / cell (SAFT)
Nominal voltage	**LiIo/LiPo:**	**3.7 V** / cell (SANYO, KOKAM)
Max. charge voltage	**LiIo:**	**4.1 V** +-40mV / cell (SAFT)
	LiPo:	**4.2 V** +-50mV / cell (MoliCel)
		absolute limit 4.3 V / cell
Min. discharge voltage	**LiIo:**	**2.5 V** / cell (MoliCel), **2.7V**/Z.(SANYO)
	LiPo:	**3.0 V** / cell (KOKAM)
		absolute limitt 2.3 V / cell

Number of cells to be selected on the ***Schulze LiPoCard***:
Nominal voltage of LiPo-pack div.by nominal cell-voltage = cell count.
--> 11,1 V LiPo-pack divided by 3.7 V => select 3 cells!
If you would select more, the pack would explode during charging - if the cell count monitoring circuit of the ***Schulze LiPoCard*** would fail.
Example: The ThunderPower TP8200 3s4p pack consists of 12 cells.
4 of 2050mAh are connected parallel (4p) -> 4 * 2,05 Ah = 8200mAh.
3 of the paralleled cells are connected in series (3s)-> 3*3,7V= 11,1 V.

Selecting the fitting cell type:
Select that battery type (Li-Ion bzw. Li-Poly), which characteristics match best with the data sheet of the battery manufacturer.

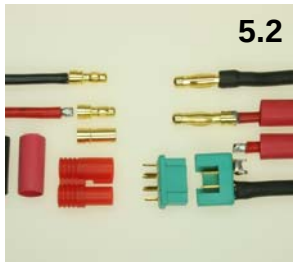
Selecting the fast charge current - if the manufacturer does not specify other values:
Charge current = 1 C (SANYO / KOKAM) or less (0,7 C PANASONIC) (C = nominal battery capacity).

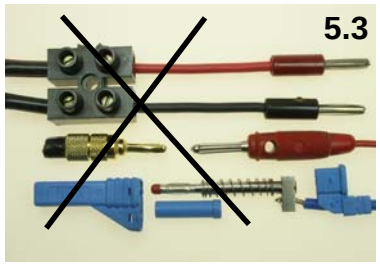
Maximum continous discharge current when used as a drive battery:
Depending on the cell type: 1 ... 20 C continous current..

Long time storage:
Empty, i.e. discharged to the discharge voltage cut off level (see maintenance), at low temperature (-20°C bis +10°C).

Maintenance: Discharge up to 1 C down to the above listed discharge voltages. Always store these cells in the discharged state. If stored fully charged over a longer period, the result can be a permanent reduction in capacity.
When stored at +40°C or more charge them additionally a little bit every two months.

5 Using the charger for the first time





Take the ***Schulze LiPoCard*** out of the packaging and solder your choice of connectors to the 2.5 mm² charger cables: **-5.1-** crocodile clips or **-5.2-** 3.5 mm / 4 mm / MPX high current gold-contact plugs. **-5.2-** Never use segmented or metal sheet connectors, as they represent a high risk of intermittent contact.

Ensure that the power supply you intend to use (e.g. 13.8 V mains PSU) delivers stable power and has no reciprocal side-effects. A 12 V car battery is a suitable alternative. Flight / drive batteries of 1.5 Ah capacity or larger can also be used (3-cell Lithium batteries (3s…), 10-11 cell nickel (Ni-Cd, NiMH) battery).

First switch on the mains PSU. Connect the ***Schulze LiPoCard*** quickly and confidently to the power supply. If you are using a flight / drive battery as power source, you must remember to reduce the low voltage limit.

-5.4- Mains PSU / car battery, 11-15 V: after the LED test (1 sec.), the unit displays the configuration which is stored in the ***Schulze LiPoCard*** (**-5.6-**).

-5.5- Other battery, 9-15V: hold the **POR: Lower voltage limit** button (-) pressed in while you connect the power source, and hold it pressed in until the end of the LED test. The LED test ends when the LEDs go out in sequence from red to yellow. The unit then displays the configuration which is stored in the ***Schulze LiPoCard*** (**-5.6-**). Limit is valid until power supply disconnected.

6 Configuration (setting the operating parameters)

If you connect a battery using a ***Schulze BalancerCable*** (special balancer lead for the ***Schulze LiPoCard***), you could skip this section (Chapter 6). The ***Schulze BalancerCable*** passes on the essential configuration information to the ***Schulze LiPoCard***, so that the charger does not need to be re-configured in order to charge this particular battery. However, we still recommend that you store a configuration for those battery packs which are not fitted permanently with a ***Schulze BalancerCable***. These are generally the smallest and lightest packs used for indoor flying, where every gramme of saved weight counts.

It is only possible to enter the configuration mode when the flight battery is disconnected. The configuration process starts when you press **Accept value (-)** and **Change value (+)** simultaneously. The **"Config."** LED (green, "Full") lights up at the same time as one of the two battery type LEDs.

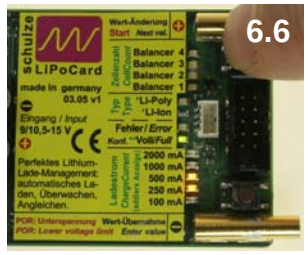
Selecting the battery type is the first of three steps which must be carried out in the correct sequence.

If you arrive at the configuration menu by mistake, you can close it without changing the configuration by pressing the **Accept value** button repeatedly (at least three times).

-6.1- Enter the configuration mode of the ***Schulze LiPoCard*****:** press **Accept value (-)** and **Change value (+)** simultaneously. The card is now ready for entering the battery type.

-6.2- Li-Poly (blue) or **Li-Ion (orange)** glows. Every time you press **Change value** the cell type changes, i.e. the blue and orange LEDs light up alternately.

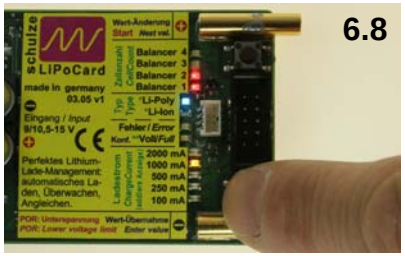
-6.3- Press **Accept value** to store the indicated cell type from 6.2 in the charger's memory. The ***Schulze LiPoCard*** now waits for you to enter the cell count (one or more red LEDs light up).



-6.4- One to four LEDs now glow. Every time you press **Change value** the cell count increments by one from 1 to 4, in bar graph form, i.e. the more LEDs that light up, the higher the cell count.

-6.5- Press **Accept value** to store the indicated cell count from 6.4 in the charger's memory. The ***Schulze LiPoCard*** now waits for you to enter the maximum charge current (one or more yellow LEDs light up).

-6.6- The charge current is displayed in digital form: each LED indicates a particular current value. The total charge current is found by adding together all the indicated current values. Example: 1000 + 100 = 1100; 500 + 250 = 750.



-6.7- If the LEDs display 100 + 250 + 500 = 850 mA, pressing **Change value** once increases the charge current to 1000 mA (only one (yellow) LED glows). Pressing the pushbutton (+) continously leads to a fast change.

-6.8- Pressing **Accept value** stores the indicated charge current (from 6.7) in the charger's memory. This completes the configuration process for the ***Schulze LiPoCard***, and the unit displays the overall configuration. The charger is now ready to use, and waits for you to connect the battery you wish to charge, or the ***Schulze BalancerCable.***

LiPoCard - Operating instructions for V 5 up

7 Charging without the Balancers

-7.1- Connect the battery to the 4 mm sockets, taking care to maintain correct polarity. Check the cell count and battery type. If polarity is correct and the charger does not detect an incorrect cell count, the battery type LED flashes (= "Ready").

-7.2- Press the **Start (+)** button to initiate the charge process. The battery type LED now lights up continuously, and the yellow current LED(s) are flashing (= "Charging").

-7.3- The current fed to the battery declines towards the end of the charge process. When the battery is full, the charge current is switched off (LEDs out) and the "Full" LED (green) now glows constantly.

8 Charging with a conventional Balancer connection

-8.1- Connect the battery via the charging cable to the two outside 4 mm banana sockets, taking care to maintain correct polarity.

If everything is in order, the battery type LED flashes "Ready" for the charge process (even if the cell terminals are not connected). If the pack is connected with reversed polarity, the Error LED glows; it also lights up if the cell count is incorrect (see Chapter 10: Display: Error messages). If a reverse-polarity connection is present, this MUST be corrected **before** you connect the cell count detect socket. Neglecting to do this could result in damage to the ***Schulze LiPoCard***, with the result that the Balancer plug can no longer be used.

In contrast, if the cell count is false, the error is corrected immediately when the Balancer plug is connected.

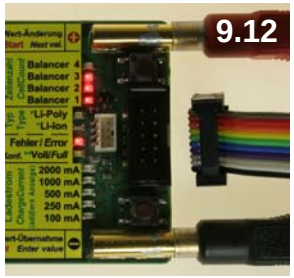
-8.2- Plug in the Balancer cable.

The pack's cell count now would displayed correctly if it had been configurated unsuitable in the ***Schulze LiPoCard***. The battery type LED flashes to indicate "Ready". Check the battery type configuration: this parameter cannot be detected automatically by the ***Schulze LiPoCard***.

Note: Before you connect one of the non-standard cell count detect sockets to the odd pin row (start with pin 1, 3, 5, 7, 9) of the ***Schulze LiPoCard***, please ensure that it fits physically, i.e. in terms of dimensions, and that the pin sequence is correct (see Chapter 11), otherwise you might damage the Balancer plug. If the connectors are not compatible, an adaptor must be used; even better: switch to the ***Schulze BalancerCable*** system, so that you can exploit its advantages and foolproof characteristics.

Please continue now reading at Chapters 9.3 and 9.4. The sequence is identical to sections 8.3 and 8.4.

9 Charging with the *Schulze BalancerCable10* (accessory)



-9.11- Configurated to LiPo, 2s(1p), 350 mA(h).

-9.12- If you have set a charge current above 1 Ampere connect the battery to the two outer 4 mm banana sockets on the ***Schulze LiPoCard***. Maintain correct polarity! For charge currents up to 1 A this charge lead does not need to be used (go to section 9.2).

If everything is in order, the battery type LED flashes. If the pack is connected with reversed polarity, the Error LED glows; it also lights up if the cell count is incorrect (Error: see pict.9.12; LiPoCard is configurated to 2 cells and has detected three cells. See also Chapter 10: Display: Error messages).

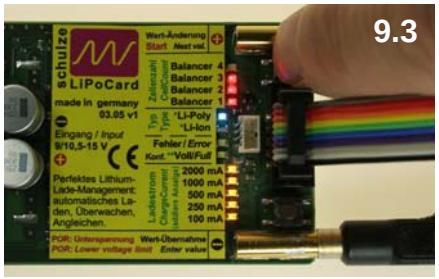
If a reverse-polarity connection is present, this MUST be corrected before you plug in the ***Schulze BalancerCable***.

In contrast, if the cell count is false, the error is corrected immediately when the cell count detect connector is plugged in (9.2).

Since the contacts of the Balancer plug are connected directly to the banana sockets of the ***Schulze BalancerCable***, the battery can be charged directly via the Balancer connector pro-vided that the charge current is no higher than 1 A.

However, the connection between the Balancer plug contacts and the banana sockets is also the reason why the ***Schulze LiPoCard*** is susceptible to damage if the polarity of the Balancer plug is not the same as the polarity of the charge lead.

-9.2- Connect the ***Schulze BalancerCable*** to the Balancer socket. The ***Schulze LiPoCard*** now displays the battery type, the cell count and the maximum charge current as configured by the cable (LiPo, 3 cells, Max.current). The "LoPo" LED flashes to indicate that the charger is "Ready" (9.21/9.22).

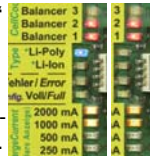


-8.3/9.3- Press the **Start (+)** button to initiate the charge process. The battery type LED now lights up continuously, and the charge current LED(s) are flashing to show that the charger is working. Hint: The LED(s) are switched off for a short period every second.

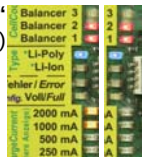
-8.4/9.4- The current fed to the battery declines towards the end of the charge process. Picture 9.41 shows that cell no. 1 is just in balancing process (LED 1 out). When the battery is full, the charge current is switched off and the "Full" LED (green) glows constantly(9.42). The yellow LEDs then show by short blinking the capacity charged in (Example: A display of 1500 mA means 1500 mAh charged in).

10.1 LED display - Status messages

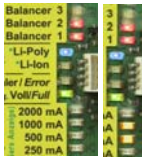
-10.11- „Ready“ Li-Poly (blue) or Li-Io (orange) flashes when the battery is connected. Press **Start**.



-10.12- „Charging“ Current LEDs (yellow) are flashing. ***LiPoCard*** charges. No intervention is required.



-10.13- „Full“ “Full” LED (green) glows continuously. The yellow current LEDs are flashing the charged amount.

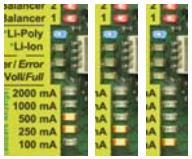


10.2 LED display - Balancer function

-10.21- Four cells are being charged. Cells 2 and 4 are being balanced **-10.22-**

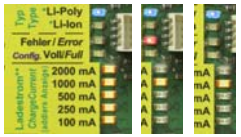
The Balancer LEDs normally indicate the cell count. When the Balancer is operating, the LED for the cell(s) currently being balanced goes out, to indicate that the cell concerned is “no longer available” for charging. A reduced charge current flows into this cell compared to the other cells, i.e. the Balancer diverts part of the charge current past this one cell (or several cells).

10.3 LED display - Charge current display



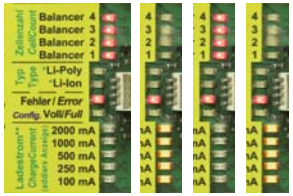
10.31 **10.32** **10.33**

The unit indicates the charge current in digital form: each LED displays a particular current value. The actual charge current is found by adding together all the indicated current values.
-10.31- 500 + 250 = 750 mA: 740 mAh battery 0 … 80% full
-10.32- 250 + 100 = 350 mA: 740 mAh battery more than 80% full
-10.33- 100 + 100 mA: battery almost 100% full.
-10.13 (!)- “Full” display = current switched off; see above.

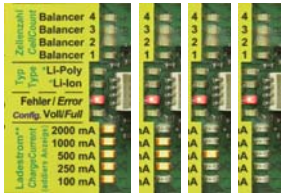


-10.47- Current too high for the balancer cable. Use additional charge leads.

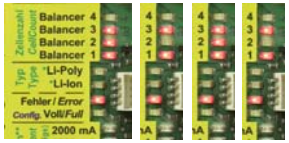
10.4 LED display - Error messages (Red error LED glows)



-10.41- Reversed polarity Current LED (yellow) and cell count LED (red) flash alternately. **Re-connect charge lead / Balancer plug the other way round!**

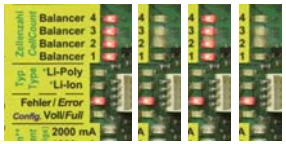


-10.42- (Car) battery flat Current LEDs (yellow) light up in a sequential display from outside to inside. **Charge power supply battery (e.g. car battery).**

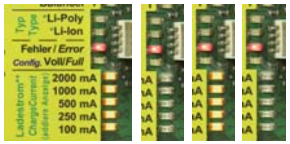


-10.43- One cell outside permissible voltage range (too low / too high). One of the cell count LEDs (red) flashes. **Bring the corresponding cell into the permissible voltage range (2.5 … 4.2 V), or replace it if the cell is defective.**

-10.44- Discrepancy between configured and actual cell counts. Cell count LEDs (red) flash, alternating between two cell counts. The error display disappears if a Balancer plug is connected. Otherwise: **re-configure the cell count on the Card.**



-10.45- Balancer wiring incorrect. All four cell count LEDs (red) flash together when the Balancer plug is connected. **Check and correct the Balancer cable wiring.**



-10.46- Current resistance not acceptable. All five current LEDs (yellow) flash when the Balancer plug is connected. **Current resistor defective; replace resistor or pot.**

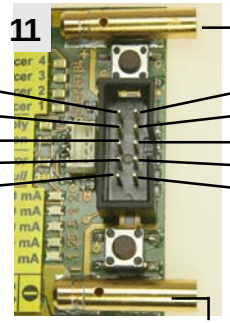
11 Pin assignment of the *Schulze BalancerCable10 plug/socket*

- 11- Table: Pin assignment

***LiPoCard* Balancer plug**

Cable colour	Assignment	Pin
brown	battery +	10
orange	cell type	8
green	charge curr.(2)	6
lilac	charge curr.(1)	4
white	battery -	2

Note: pins 1 (black) and 2 (white) are always connected to the negative charge lead terminal; pin 9 and 10 is connected to the positive terminal of the charge lead.



- battery (‘-’ cell 1)

4 mm charge connector (female):

+ battery (‘+’ of last cell: 1,2,3 or 4)

Pin	Assignment	Cable colour
9	‘+’ batt. (‘+’ last cell: 1,2,3 or 4)	red
7	‘+’ cell 3 (no connect at 2s pack)	yellow
5	‘+’ cell 2 (no connect at 1s pack)	blue
3	‘+’ cell 1	grey
1	‘-’ cell 1 (battery -)	black

This makes it possible to charge small batteries at low charge currents (max. 1 A) using the ***Schulze Balancer Cable*** directly, i.e. without using a charge lead.

Cell type detect: if the battery is a Li-Ion type, pin 8 (orange) must be connected to pin 4 (lilac); if it is a Li-Poly type, pin 8 (orange) must be connected to pin 6 (green). Prepare the ends of the ribbon cable wires as shown in Figs. **6 - 17**.

Charge current detect: the charge current for the battery pack is determined by a resistor between pin 4 (lilac) and pin 6 (green). The value of the resistor is 1 Ohm per milli-Amp (mA) of charge current, i.e. 360 mA = 360 Ohm; 1250 mA = 1250 Ohm, 3200 mA = 3.2 kOhm. Any value above 3.9 kOhm is possible (e.g. for a 6000mAh pack = about 6 kOhm); the LiPo Card then charges at the maximum possible current of 3850 mA. Permissible resistor values are from 25 Ohm to 15 kOhm.

12 Serial interface

The ***Schulze LiPoCard*** features a TTL-level serial interface, which can be connected to the RS232 port of a PC using the ***Schulze prog-adapt-uni*** cable.

Using this cable, the ***Schulze LiPoCard*** transfers ***Schulze winsoft***-compatible data to the PC, where the charge voltage curve can be displayed in graphic form: the data consists of charge time, charge current, individual cell voltages (only if a Balancer is connected) and total battery voltage. If the balancer vcable is connected select „4 Cells Voltage“ to show the voltage of the single cells.

When the charger detects “Battery full”, it also transfers the data for charged-in energy and discharged energy from the Balancer to the interface. This data can be analysed to glean valuable information about the condition of your battery packs.

Software-Updates can also be done by yourself via this interface.

13 Specifications

Dimensions approx.	96*53*12	mm
Weight approx.	52	g
Cell count range	1 - 4	Li-Poly, Li-Ion
Converter efficiency	80 - 96	%
Max. charge power	65	W
Charge current range	25 - 3850	mA 12 V power supply voltage and 16,8 V charge voltage
Balancer socket	10-pin	with current and battery type coding
Power supply voltage	10.5 - 15	V DC
Power supply, reduced	9 - 15	V DC
Max. power supply current	7	A
Power supply types	12 V - 13.8 V mains PSU, 12 V lead-acid battery, 3-cell Lithium battery, 10 - 11 cell Nickel (Ni-Cd, NiMH) battery	
Operational mode display	via 13 LEDs	
Operation	via 2 push-buttons	
Miscellaneous	Serial interface, heat-shrink sleeve “case”.	

14 Legal matters

14.1 Warranty

All ***Schulze LiPoCard*** chargers are carefully checked and tested before dispatch.

If you have a complaint, send the unit back to us with a clear description of the fault.

A message such as "doesn't work properly" or "software error" doesn't help us much!

Before you send your ***Schulze LiPoCard*** back to us, please test the unit **carefully,** as it costs us money to test a charger, and if it turns out to be in working order we have to recover those costs from you. In this case it makes no difference whether the **fully functional charger** is returned within the warranty period or not. Approved warranty claims are processed in accordance with our currently valid General Conditions of Business, which are printed in our catalogue resp. on our homepage.

One further note: if a problem arises with any schulze product, send it directly to us without interfering with it in any way.

This ensures that we can repair the unit quickly, pick up warranty faults without any dispute, and keep costs to a minimum.

You can also be sure that we will fit genuine replacement parts which will work properly in your unit. Unfortunately we have had bad experience with third-party Service Centres which claim technical competence. Note also that any out-side interference with our products invalidates the warranty (e.g. the original pole clamps omitted or replaced). Incompetent attempts at repair can cause further damage. We often find it impossible to estimate the repair cost of devices in such condition, and in certain circum-stances we are then obliged to decline to repair it altogether.

14.2 Limited liability / compensation

We at Schulze Elektronik GmbH are unable to monitor the observance of our assembly and operation instructions, our prescribed conditions and methods for installation, connection, usage and maintenance of our battery chargers. For this reason we cannot accept liability for loss, damage or costs which arise through the inappropriate use of our products, or are connected in any way with such use.

Within the normal legal limits, our obligation to provide compensation, for whatever legal reason, is limited to the invoice value of that quan-tity of product immediately involved in the event which caused the damage. This does not apply if we are obliged to accept unlimited liability in accordance with mandatory law due to our deliberate or serious negligence.

14.3 CE approval

All ***Schulze LiPoCard*** units built after January 1996 satisfy all relevant and mandatory EC directives: these are the EMF directives

- 89/336/EWG, 91/263/EWG und 92/31/EWG.

The product meets the following basic technical standards:

Interference radiation: EN 50 081-1:1992, Interference susceptibility: EN 50 082-1:1992 and/or EN 50 082-2:1995.

You are the owner of a product whose design and construction fulfil the safety aims of the EC for the safe operation of devices.

The procedure also includes a test of interfer-ence susceptibility, i.e. the extent to which the charger is vulnerable to interference from other devices. The test involves subjecting the charger to RF signals similar to those produced by an RC transmitter or a radio telephone.

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