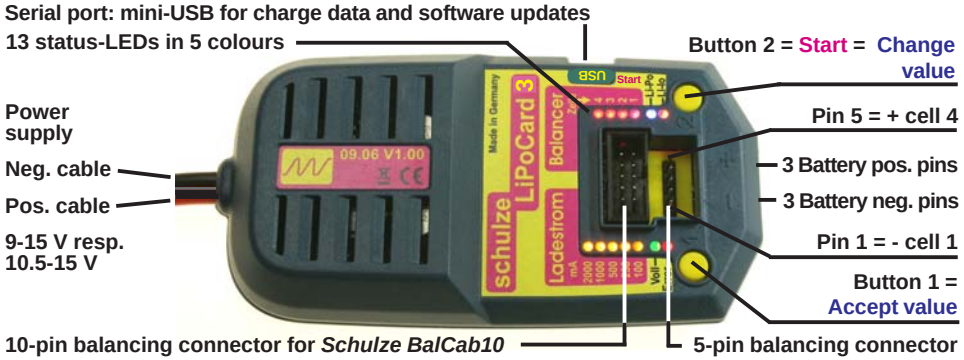


The principle of connection (5-pin universal-plug): cell arrangement as the storeys in a high rise building!
Pin 1= - cell1 (ground floor), **Pin 2=** + cell1 (= - cell2), **Pin 3=** + cell2 (= - cell3), **Pin 4=** + cell3 (= - cell4), **5=** + cell4

Contents

Dear Customer,

In principle you can charge any Lithium-Ion, Lithium-Polymer and Lithium-Iron-Ferrite battery with up to four cells using the ***Schulze LiPoCard3*** without the balancer socket. Lithium batteries with a conventional balancer socket can also be connected to the ***Schulze LiPoCard3***, if necessary using a balancer adaptor. However, if you use either of these methods it is essential to set the ***Schulze LiPoCard3*** 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 LiPoCard3*** separately for each battery, the ***Schulze LiPoCard3*** features a quasi-automatic function: a special Schulze LiPoCard3 Balancing Cable (***BalCab10***) is used to inform the ***Schulze LiPoCard3*** of the battery-specific data.

The cable can easily be assembled using the parts contained in the ***BalCab10-set*** (10-way balancing cable set **- 16.2 -**). This cable features three more leads than usual. The electronic circuitry of the ***Schulze LiPoCard3*** 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 leads have to be wired.

The balancer included in the ***Schulze LiPoCard3*** 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

Hint: The LiPoCard3 is delivered with an integrated charging socket. Apply a polarized socket system as shown in picture - **16.1** - . Only with these polarized connectors you can secure that you connect the batteries without wrong polarity. Otherwise it is absolutely essential to start by connecting the battery to the ***Schulze LiPoCard3*** 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 fuses resp. the conductor tracks on the circuit board between the battery connections and the balancer plug are not overloaded ... because 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 e.t.c (chapter 5.3)!
To meet the CE Issueards 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 LiPoCard3*** 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 LiPoCard3*** 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 LiPoCard3*** operates correctly.

The ***Schulze LiPoCard3*** 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 LiPoCard3*** 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 LiPoCard3*** 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.

Charge Quantity, Capacity: see C and Ah resp. 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 and their maintenance

4.1.1 **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.

4.1.2 **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 supplement. 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 provide a high performance at room temp., although they still have slightly more to offer at 60 ºC. The uniform nominal voltage of these cells is stated as 3.7 V, the maximum charge voltage as 4.2 V.

4.1.3 **Li-Fe** (LiFePO4=Lithium-Iron-Phosphate „Saphion", „A123") cells have a voltage range which makes this cell ideal for a replacement of a 5 cell Ni-Cd receiver battery. By means of its high current carrying capacity (15...30C) it is also suited for motor loads. A 3s Li-Fe pack replaced 8 Nickel cells.

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

4.2.1 **Nominal voltage**

LiIo:	**3,6 V** / cell (SAFT)
LiIo/LiPo:	**3,7 V** / cell (SANYO, KOKAM)
LiFe:	**3,2 V** / cell (A123, SAPHION)

4.2.2 **Max. charge voltage**

LiIo:	**4,1 V** +-40mV / cell (SAFT)
LiPo:	**4,2 V** +-50mV / cell (MoliCel); absolute limit 4,3 V / cell
LiFe:	**3,65 V*** (A123, SAPHION)

(*) This limit is applied variable for a short time to optimize the charge characteristics.

4.2.3 **Min. discharge voltage**

LiIo:	**2,5 V** / cell (MoliCel), **2,7V** / Zelle(SANYO)
LiPo:	**3,0 V** / cell (KOKAM) - absolute limit 2,3 V / cell
LiFe:	**2,0 V** / cell (A123, SAPHION)

4.3 **Number of cells** to be selected on the ***Schulze LiPoCard3*****:**
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 LiPoCard3*** 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.

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

4.5 **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), (up to 2 C SAPHION).

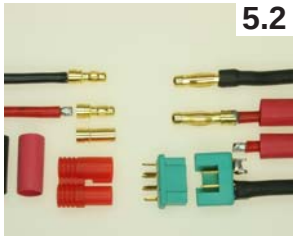
4.6 **Maximum continous discharge current when used as a drive battery:**
Depending on the cell type: 1 ... 20 C continous current.

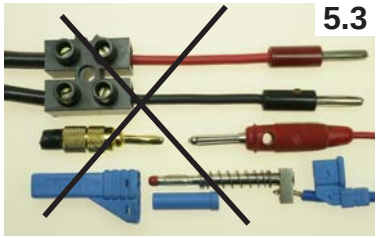
4.7 **Long time storage**: **Empty,** i.e. discharged to the discharge voltage cut off level (see maintenance), at low temperature (-20°C bis +10°C); Li-Fe**:** Up to 6 months between 30 % ... 50 % full at 23°C.

4.8 **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.
Li-Fe: Discharge after 6 month and charge in 50% of the capacity.

5 Using the charger for the first time


5.1


5.2


5.3

Take the ***Schulze LiPoCard3*** 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.
-5.3- **Never** use segmented or metal sheet connectors, as they represent a high risk of intermittent contact.
-16.1- Solder polarized connectors to the integrated charging cables. Make additional adaptor cables if necessary.
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).
Attention: Do not connect it to a charger - The LiPoCard3 may be damaged!
First switch on the mains PSU. Connect the ***LiPoCard3*** 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 Connection to a 9-15 V mains PSU or a car battery

5.4

-5.4- LED test (all LEDs are on for 1 second).

-5.41- Then the unit displays the configuration which is stored in the ***Schulze LiPoCard3***. In this example it is: Current= 750 mA, Cell count= 3, Type= Li-Po.

5.41

5.5 Connecting theLiPoCard3 to a 9-15 V battery

5.51

5.52

5.53

-5.5- To select this operating mode ("lower undervoltage limit"): Hold the **button 1** pressed in while you connect the 9-15 V battery power source, and hold it pressed in until the end of the LED test (**-5.4-**). The LED test ends in this mode when the LEDs go out in sequence from red to yellow (**-5.51-**,**-5.52-**). The unit then displays the configuration which is stored in the ***Schulze LiPoCard3*** (**-5.53-**). This lower undervoltage limit is valid until the power supply is disconnected.

6 Configuration (setting the operating parameters)

If you connect a battery using a ***Schulze BalancerCable*** (special balancer lead for the ***Schulze LiPoCard3***), you could skip this section (Chapter 6). The ***Schulze BalancerCable*** passes on the essential configuration information to the ***Schulze LiPoCard3***, 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 (button 1)** and **Change value (button 2)** simultaneously. The **"Voll"** LED ("full", green) lights up at the same time as one (Li-Fe: none) 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 1)** repeatedly (at least three times).

6.1

-6.1- Enter the configuration mode of the ***Schulze LiPoCard3***: press **button 1** and **button2** simultaneously. **„Voll"** is ON.
-6.2- The card is now ready for entering the battery type...


6.21


6.22

-6.21- Li-Poly (blue) or **-6.22- Li-Ion (orange)** glows in addition to **"Voll"** (green). Every time you press **button 2** the cell type changes. If the blue and orange LEDs are out, the **Li-Fe** battery type is selected.

6.31


6.32


6.33


6.34

6.4

Press **button 1** to store the indicated cell type from 6.2x into the charger's memory.

-6.3- The ***Schulze LiPoCard3*** now waits for you to enter the cell count (one (6.31) or more (6.32-6.34) red LEDs light up).
One to four LEDs now glow. Every time you press **button 2** 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.

Press **button 1** to store the indicated cell count from 6.3x into the charger's memory.

-6.4- The ***Schulze LiPoCard3*** now waits for you to enter the maximum charge current (one or more yellow LEDs light up).

6.41

The charge current "Ladestrom" 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. Examples:
-6.41-: 500 + 250 = 750 mA
-6.42-: 1000 + 100 = 1100 mA

6.42

-6.43- If the LEDs display 100 + 250 + 500 = 850 mA, pressing **button 2** once increases the charge current to 1000 mA (**-6.44-** only one yellow LED glows). Pressing the **button 2** continously leads to a fast change.

Pressing **button 1** stores the indicated charge current (of picture 6.4x) in the charger's memory.

-6.5- This completes the configuration process for the ***Schulze LiPoCard3***, and the unit displays the overall configuration:
Current = 1A (1000 mA), Cell count = 2, Battery type = LiPo.
The charger is now ready to use, and waits for you to connect the battery you wish to charge, or the ***Schulze BalancerCable.***

7 Charging without the Balancers

-7.1- Connect the battery to the integrated charging socket, 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. This implies "ready".
(*) Li-Fe: both LEDs are flashing.

-7.2- Press **Start (button 2)** to initiate the charge process. The battery type LED now lights up continuously (Li-Fe: both out), and the yellow current LEDs are flashing. This means that the ***Schulze LiPoCard3*** is 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 and the **"Voll"** LED ("full", green) now glows constantly. The charge quantity is displayed (see also -10.13-).

8 Charging with a conventional Balancer connection

-8.1- Connect the battery via the integrated charging socket taking care to maintain correct polarity! The use of the charging socket is obvious, because you can not charge via the conventional balancer cable.

If everything is in order as you see in the picture (8.1, left), the battery type LED(*) flashes "ready to charge" (even if the cell balancing 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 and Error messages).

If a reverse-polarity connection is present, this MUST be corrected **before** you connect the balancer cable! Neglecting to do this could result in damage to the ***Schulze LiPoCard3*** and the pack can not be charged too.

In contrast, if the cell count is false, the error is corrected immediately when the Balancer plug is connected (8.2).

(*) Li-Fe: both LEDs are flashing.

-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 LiPoCard3***.

The battery type LED (Li-Fe: LEDs) flashes to indicate "Ready".

Check the battery type configuration: This parameter cannot be detected automatically by the ***Schulze LiPoCard3***!

Note: Before you connect one of the non-standard Balancer sockets to the 5-pin socket of the ***Schulze LiPoCard3***, please ensure that it fits physically, i.e. in terms of dimensions (2.54 mm pitch), and that the pin sequence is correct (see Page 1 - cover sheet), 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- LiPoCard is configurated to LiPo, 2s, 350 mA.

-9.12- If you have set a charge current above 1 Ampere connect the battery now to the integrated charging socket (MPX high current plug) on the ***Schulze LiPoCard3***. Maintain correct polarity! For charge currents up to 1 A* this charging socket does not need to be used (i.e. go to section 9.2).

If everything is in order, the battery type LED/LEDs flashes.

If the pack is connected with reversed polarity, the Error LED glows; it also lights up if the cell count is incorrect.
Error in the example above: The LiPoCard3 is configurated to two cells (pic. 9.11) but has detected caused by the voltage of the connected battery pack three cells (pic. 9.12). The red LED #3 flashes and shows the discrepancy of the setting.
See also Chapter 10: Display and error messages.

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

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

However, the connection between the Balancer plug contacts and the charging socket is the reason why the ***Schulze LiPoCard3*** could be damaged 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 now.

The ***Schulze LiPoCard3*** displays the battery type, the cell count and the maximum charge current as configured by the cable (here: LiPo, 3 cells, Max. current).

The **"Li-Po"** LED flashes to indicate that the charger is **"Ready"**.

(*) Since the contacts of the integrated charging socket are connected directly to the outer pins of the ***Schulze BalancerCable***, the battery can be charged directly via the Balancer connector provided that the charge current is not higher than 1 A.

-8.3/9.3- Press **Start (button 2)** 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 (i.e.: The LED(s) are switched off for a short period every second).

-8.41/9.41- The current fed to the battery declines towards the end of the charge process. Picture 9.41 shows that cell no. one is just in balancing process (LED 1 out).

-8.42/9.42- When the battery is full, the charge current is switched off and the **"Voll"** LED („full", green) glows constantly. The yellow LEDs then show by short blinking the capacity charged in.
Example: A charge current display of 1500 mA means 1500 mAh capacity charged in. **Hint:** The exact amount of the charged capacity is transmitted on the 5V-SIO.

10.1 LED display - Status messages

-10.11- „Ready"
Li-Poly / Li-Io or both (LiFe) are flashing when the battery is connected.

The charge current LEDs (yellow) glow continuously.

Press **Start (button 2)**.

-10.12- „Charging"

The ***LiPoCard3*** charges.
The battery type LED (in this example: blue) is on continuously.
The charge current LEDs (yellow) are flashing. There is no intervention required until "full".

-10.13- „Full"

The **"Voll"** LED ("full", green) glows continuously.

The yellow current LEDs are flashing the charged amount in mAh.

10.2 LED display - Balancer function

-10.21- Four cells are being charged.

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).

-10.22-

Cells 2 and 4 are being balanced (LED is off).

10.3 LED display - Charge current display

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.
If a 740 mAh battery is charging then the battery is between about 0 ... 80% full.

-10.32- 250 + 100 = 350 mA
If a 740 mAh battery is charging then the battery is more than 80% full.

-10.33- 100 = 100 mA
If a 740 mAh battery is charging then the battery is nearly full.
Remark: **„Voll"** LED is still off.

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- 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.

-10.44- 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 (LiPo= 3,0 ... 4,2 V). If defective: replace the cell.

-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 resistor value not acceptable.

All five current LEDs (yellow) flash when the Balancer plug is connected.

Current resistor in the BalCab defective / cold solder point. Replace resistor or pot.

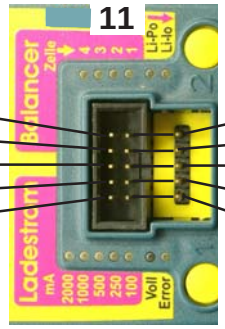
-10.47- The configurated charge current is too high for the Balancer cable.

The „Error“ LED is flashing, the charge current was automatically reduced to the max. safe charge current via the Balancer cable which is 1 ampere.

Use additionally the normal charge cable, i.e. the battery has to be charged via the integrated MPX high current plug.

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

- 11- Table: Pin assignment of the 10-pin Balancer plug of the *LiPoCard3*



Cable colour	Assignment	Pin	Pin	Assignment	Cable colour
brown	battery +	10	9	‘+’ batt. (‘+’ last cell: 1,2,3 or 4)	red
orange	cell type	8	7	‘+’ cell 3 (no connect at 2s pack)	yellow
green	charge curr.(2)	6	5	‘+’ cell 2 (no connect at 1s pack)	blue
lilac	charge curr.(1)	4	3	‘+’ cell 1	grey
white	battery -	2	1	‘-’ cell 1 (battery -)	black

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.

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: The ***LiPoCard3*** detects 3 types. Prepare the ends cable as shown in Figs. **6-17**.
a) With **Li-Ion** batteries the pin 8 (orange) has to be connected with pin 4 (lilac).
b) With **Li-Poly** batteries the pin 8 (orange) has to be connected with pin 6 (green).
c) With **Li-Fe** batteries (Li-Iron-Phosphate „SAPHION“), leave the pin 8 (orange) open (No connection).

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 LiPoCard3*** features a mini-USB interface, which can be connected to the USB port of a PC using the ***Schulze mini-USB-Kabel*** (mini-USB-cable).
Do not forget to install the ***schulze-LiPoCard3.inf*** file on your PC to enable the data transfer from the ***LiPoCard3*** to the PC. You can download it from the Schulze-Homepage section C4.
The ***Schulze LiPoCard3*** transfers data which are compatible to the ***Akkusoft*** or ***Schulze-Soft*** (C2). With these data the charge voltage curve can be displayed in graphic form: the data consists of charge time, charge current, individual cell voltages (only if the Balancer is connected) and total battery voltage.
When the charger detects “Battery full”, it also transfers the data for charged-in capacity and discharged capacity 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.	117*62*24	mm
Weight approx.	101	g
Cell count range	1 - 4	Li-Poly, Li-Ion, Li-Fe (Lithium-Iron-Phosphate)
Converter efficiency approx.	80 - 96	%
Max. charge power	65	W
Charge current range	25 - 3850	mA @ 12 V power supply voltage and 16,8 V charge voltage
Balancing precision better	+ - 10	mV
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 (mini-USB), protection circuits, very stylish plastic case.	

14 THE LiPoPerfect System

Schulze LiPoCard3 connected with the ***Schulze LiPoPerfekt*** battery pack via the ***Schulze BalCab 10-Verl*** (extension cable)**.**

15 Legal matters

15.1 Warranty

All **Schulze devices** 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!

For all supply of warranty services our Terms of Sale and Supply are applicable (see Schulze Homepage).

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

Changes or extensions of the device can lead to additional costs if these impede or prevent services.
Non-suitable components will be replaced or build back to the delivered condition at the owners expense without any consultation.

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. 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 circumstances we are then obliged to decline to repair it altogether.

15.2 CE approval

All **Schulze devices** satisfy all relevant and mandatory EC directives:

These are the

EMF directive	**89/336/EWG: 3.May 1989** plus
additional changes	**up to 3. January 1994**

The product has been tested to meet the following basic technical standards:

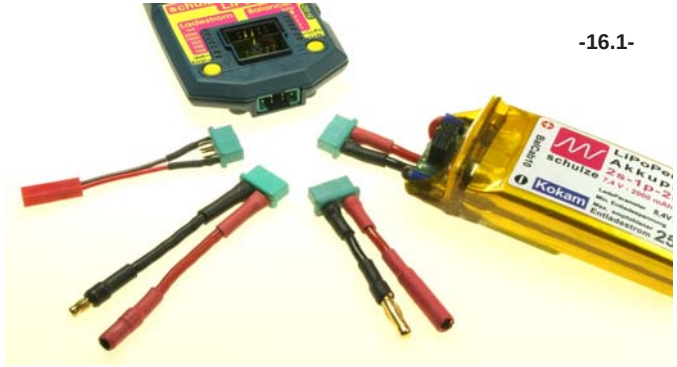
Interference radiation: DIN EN 55014-1: 2003-09
Interfer. susceptibility: DIN EN 55014-2: 2002-08

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 approval procedure includes a test of **interference radiation**, i.e. of interference generated by the charger. This charger has been tested under practical conditions at maximum load current and with a large number of cells, and remains within the interference limits.
A less stringent test would be, for example, to measure interference levels at a low charge current. In such cases the charger would not produce its maximum interference level.

The procedure also includes also a test of **interference susceptibility**, i.e. the extent to which the device 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.

16 Connecting-recommendations and accessories



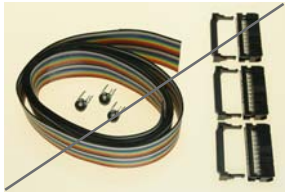
-16.1-

16.1
Adaptors fitting on different high current connectors

If you do not charge exclusively via the balancer cable and you use more than one type of power connector then you should make yourself the connector system shown on the left side.

16.2 *Schulze BalCab10-Set*
Balancer cable kit to retrofit your existing battery packs.
10-pins for 2 - 4 cells in series.

***BalCab20-Set* 16.3**
as above, but not for ***LiPoCard3***
because of 20 pins for 2-14 cells in series.



16.4 *Schulze BalCab10-Verl*
Ready made balancer cable to connect the ***Schulze LiPoPerfekt*** battery packs.
10-pins for 2 - 4 cells in series.

***BalCab20-Verl* 16.5**
as above, but not for ***LiPoCard3***
because of 20 pins for 2-14 cells in series.

16.6 *mini-USB-kabel*
To connect the ***USB-adapt-uni*** with a PC or Laptop

Schulze Elektronik GmbH • Prenzlauer Weg 6 • 64331 Weiterstadt • Fon: 06150/1306-5, Fax: 1306-99
www.schulze-elektronik-gmbh.com • Germany • hotline@schulze-elektronik-gmbh.com