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1 Warnings

Injury hazard! Beware of sharp-edged parts (heat-sink, terminal clips) when handling the charger.

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!

Avoid short-circuiting the charge outputs to the car bodywork, as the **isl 6** is not protected against this. In the interests of safety always place the charger on the ground.

The charge leads and/or charge outputs must not be inter-connected or short-circuited in any way, as the result would be damage to the charger and/or the battery. To avoid shorts between the banana plugs on the charge lead please be sure to connect the charge cable to the charger first, and only then to the battery to be charged. Reverse the sequence when disconnecting. We recommend our safety charge lead which features no exposed banana plug contacts, as they are protected by a spring-loaded insulating sleeve.

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

There is always a danger of explosion when handling rapid-charge Ni-Cd batteries. To avoid problems 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.

When charging transmitter batteries it is essential to keep within the maximum charge current permitted for the transmitter circuit board by setting the charge current manually (0.5 - 2 A, see manufacturer's specification).

If you set the charger's automatic charge termination to "sensitive+delayed", note that topping-up full cells makes them very hot.

Never connect the **isl 6** to a car battery which is simultaneously being charged by a car battery charger.

Protect the **isl 6** from damp, water, shock and pressure.

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

Charging fewer than 4 cells at output 1: the special 16-bit A/D converter is outstanding accurate, but we cannot guarantee that the charger will work correctly in this situation. The charge termination may occur too early, too late, not at all, or even perfectly correctly, and the charge current will not approach the maximum rate. The reason for this is that the "kink" in the voltage curve of high-capacity cells is very slight.

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 batteries (dry cells)
- batteries which are not expressly stated by the manufacturer to be suitable for the high charge currents which this charger can supply.
- individual faulty or damaged cells
- batteries which are already fully charged or hot
- batteries fitted with integral charge devices or charge termination circuits
- batteries which are installed in a device, or are also connected electrically to other components.



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 openings in the case must never be covered or sealed.

The unit produces considerable heat in use. Allow excess heat to dissipate, and let the charger cool down after each rapid-charge process.

Check the unit regularly for damage to the case and screen, and poor contact between cables 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. Cable cross-section should be 2.5mm² (even for a receiver battery!).

The charge cable should be fitted with high-quality gold-contact connectors at both ends, and fitted with one of the ferrite tubes (CE tubes) supplied. The tubes are required to satisfy CE requirements (see Chapter 3).

Twist charge leads together to minimise interference radiation.

Take care not to break the ferrite core in the power supply cable, as it prevents the cable acting as an aerial and radiating converter and processor pulse frequency signals.

The information and charging currents stated by the battery manufacturer must be observed at all times. Charge up only such batteries which are expressly stated to be suitable for high charge currents.

Using the charger with a stabilised mains power supply unit (PSU) is possible in theory, but in fact cannot be generally recommended. The high charge power of the unit, inadequate output capacitance, residual voltage and other factors relating to the PSU may cause long-term and even terminal damage to the charger and/or the power supply.

If you insist on using the unit in this way you will have to carry out your own tests and checks to ensure that your combination of charger - power supply works correctly.

In general terms we have to say that none of the laboratory mains PSUs currently available is suitable for use with the **isl 6** without modification.

Many transmitters are fitted with a protective diode which has to be by-passed if the battery is to be rapid-charged. Read your RC system instructions before you attempt to do this.

Make it part of your standard procedure to check that the charge quantity indicated by the charger corresponds to the expected charge quantity when the unit has switched off after detecting the "battery full" condition. This is the only reliable means of recognising when the charger has terminated the charge prematurely. The most likely reason for premature charge termination is a deep-discharged pack and/or a pack with few cells (carry out test charges), or a particular type of cell. Caution: this can result in a crash if you fly a model with a part-charged battery.

The sequence of letters "a", "b"... to indicate the probability of a full battery does not always prove that a pack is fully charged. Often the sequence of letters will appear at the start of the charge if the cells are deep-discharged.

Individual cells to be charged must be soldered together, otherwise the fully automatic programs may not work properly. Do not use battery boxes with spring contacts.

The **isl 6** 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.

Good results are obtained with Ni-MH batteries if you use manual charge current setting and set a current of no more than 1C.

If a pack is completely flat (approx. <1V) the charger may take about 10 minutes to determine the correct number of cells.

If the voltage at output 2 is <0.5V the charger assumes that the pack is connected with reverse polarity.



3 Commonly used terms

Final charge voltage: the voltage at which the battery's charge limit (capacity limit) is reached. The charge process switches from a high current to a low maintenance rate (trickle charge) at this point. From this point on further high current charging would cause overheating and eventual terminal damage to the pack.

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. Individual cells within the pack may become reverse-polarised in this condition, and this can cause permanent damage.

Memory effect: A genuine memory effect has been recorded by Nasa, caused by repeated charge / discharge cycles. Nasa has found that full capacity can be regained by overcharging the cells. In modelling applications different effects are responsible for the reduction in cell capacity. The problem can be cured by balancing the cells (see below), and prevented by the measures described in Chapter 4.1.3.

Balancing: a method of regaining full (nominal) capacity by alternately charging and discharging the pack, sometimes several times. This process is especially useful after a long period of non-usage (e.g. after purchase, or after several weeks without flying), and is also used to disperse the memory effect (see below). The effect of balancing is to break down the coarse crystalline structure (low capacity) inside the cell and convert it into a fine crystalline one (high capacity).

Power-On (- reset): the status of the *isl 6* after it has been connected to the car battery.

Ready message: charger ready to run the program you have just selected (batteries not connected).

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 or discharge current of a 500 mAh battery is 50 mA, we refer to this as a charge or discharge at one tenth C (C/10 or 1/10 C).

A, mA: unit of measurement relating to charge or discharge current. 1000 mA = 1 A (A=Ampere, mA=Milliampere)

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 batteries and maintenance

4.1.1 General information:

Do not store or charge below 0°C, optimum is 10...30°C.

A cold cell is not capable of accepting as much current as a warm one. For this reason you must expect differences in charge characteristics if you use fully automatic charge current calculation (in Winter the charging properties will be worse than in Summer).

The lower the internal resistance of the battery, the higher the charger can increase the charge current for that battery. **For a battery charger which sets the current automatically the resistance of the cable is added to the internal resistance. For this reason: use heavy cable (large cross-section), even for receiver batteries, and keep them short. Do not charge via a switch or switch harness!**

If you wish to measure battery capacity accurately a suitable discharge current is usually 1/10 C.

4.1.2 Reflex charging:

Charging processes which include a brief discharge pulse definitely have the effect that the battery is several degrees cooler at the end of the process. However, from the point of view of the competition operator this is an undesirable effect, as the cell chemistry can only supply high currents if its temperature is raised to a certain extent.

All these effects, whether they actually occur or are simply hear-say, have no practical significance if batteries are correctly handled in the first place. When a battery is full, you can't fill it any fuller!

4.1.3 Memory effect of Ni-Cd and Ni-MH cells:

If cells are repeatedly stored partially discharged, or are recharged from a half-discharged state, what is known as the memory effect sets in. The cells note that their full capacity is not required, and react by refusing to make it available.

One aspect of this is that the crystalline chemical structure inside the cell changes; the cell's resistance rises and its voltage collapses under load, with the result that "full capacity" can no longer be exploited at normal discharge currents.

Even if reflex charging were to eliminate the memory effect, there is no denying the necessity to store your cells in the discharged state; this applies to Ni-Cd cells and also, to some extent, to Ni-MH* cells.

Otherwise, a characteristic feature of these cells is that they self-discharge - and the rate of discharge is different for each individual cell in a battery pack!

If a fully charged pack is left for a considerable time, it will eventually consist of cells of widely varying states of charge.

If at this point you ...

a) ... give the pack a full charge: the cell with the most charge will be overcharged, heat up and be ruined, while the cell with the least charge will still not be full after the same period of charging.

b) ... discharge the pack: the cell with the least charge will be completely flat first, then reverse polarity and often suffer an internal short-circuit. At the point when this happens, the cell with the most charge is still not yet completely discharged.

This is a reliable method of wrecking your most valuable packs - and rest assured that reflex charging will make absolutely no difference. However, there is one method of avoiding the problem: discharge cells after use, and recharge them just before use!

[*] about Ni-MH cells: see Section 4.3



4.2 Nickel-Cadmium batteries (NiCd):

Nominal voltage level: 1.2 V / cells.

Selecting the fast charge current (manual setting):

Charge current = 2 C (C = nominal battery capacity)

Maximum continuous discharge current:

Currents of 10 C to 30 C are possible, depending on cell type.

Maintenance of the Nickel-Cadmium batteries (Ni-Cd):

If a battery is brand-new or used irregularly it is often only possible to balance it completely by carrying out several discharge - charge cycles (use auto-d program).

The automatic current setting circuitry (patent applied for) provides optimum protection to your Ni-Cd batteries during charging. The reduced current towards the end of the charge ensures a completely full pack combined with only a slight temperature rise, as you will easily see in comparison with conventional constant current techniques.

Do not use automatic charge current calculation when charging Ni-MH batteries!

Amongst model car operators it is standard practice to erase any memory effect by completely discharging each cell individually via a resistor (approx. 68 Ohm).

This deliberately "unbalances" the pack, but it can cause the automatic charge termination circuitry to switch off the current prematurely during the charge process.

For receiver batteries special types such as the Sanyo N-350-AAC (the C is the key!) are a good choice.

Warning: The reduced charge current with 1-6 cells makes the voltage peak in the charge curve very slight, especially with batteries of high nominal capacity. In this situation the charger is sometimes unable to detect the "full" condition due to the ill-defined peak.

4.3 Nickel-Metal-Hydrate batteries (NiMH):

Voltage level: 1.2 V / cell.

Selecting the fast charge current (no automatic program!):

Charge current typical $\frac{1}{2}$ C (set a fixed current of, for example, 1 A with 1100 mAh batteries, or 3 A with 3 Ah cells). Some modern high-current Ni-MH cells made by particular manufacturers can safely be charged at a higher rate of up to 1.6 C (This applies to: Panasonic 3000: 3.5...4A, Powers 3000: 3 A, Saft 3000: 3 A (not if battery is charged inside a transmitter!), Sanyo 3000: 4...5A).

Maximum continuous discharge current:

Currents of 5 C to 15 C are possible, depending on cell type.

Typically for Sanyo Twicell and RC3000H cells:

In our experience these cells can be treated in a similar way to Ni-Cd cells, i.e. they can safely be stored in the discharged state (use auto-d program). It is also possible to set the charger's termination sensitivity to the same level as Ni-Cd cells (i.e. normal sensitivity); this eliminates the danger of premature charge termination.

High maximum load capacity and voltage level.

Typically for Panasonic P3000NiMH cells:

These cells should never be stored completely discharged, i.e. use the auto -e program, not a bulb or resistors - even for 2 or 3 days. For storage of more than 1 week: first discharge the pack, then charge about 10% of its capacity back into it. It is important that you take the trouble to give these cells a charge / discharge cycle around every four weeks, otherwise they become tired, and have to be pampered to restore them to full vigour. This involves going through the tiresome business of many repeated charge / discharge cycles. Of course, you should also give the cells one or more charge / discharge cycles before using them "in anger", as this refreshes the cell chemistry.

High capacity and voltage level.

Typical for Powers / GP GT3000R cells:

Extremely high capacity, good voltage level.
Other characteristics not yet determined in detail.

4.3 Lead-acid batteries (Pb):

Nominal voltage level: 2.0 V / cell.

Selecting the fast charge current (pre-set for battery 2):

Charge current = 1 C (C = nominal battery capacity)

Maximum continuous discharge current:

Typically 0,2 C, short time load up to 1 C.

Maintenance: In contrast to Ni-Cd/Ni-MH batteries, lead-acid batteries must be fully recharged after use in order to maintain full capacity.

The nominal capacity can be reduced very quickly by incorrect handling (overloading, repeated 100% discharges, and especially deep-discharges). Please observe the battery manufacturer's recommendations.

Typical: The characteristics of lead-acid batteries are quite different to those of the Ni-Cd sintered cell packs which are used as the power source in model aircraft, cars and hydro-boats.

They can only tolerate relatively low currents relative to their capacity if their full capacity is to be exploited, and/or the voltage is not to collapse too far.

Used as single-cell glowplug energiser batteries and power source in some scale boats.

Very low self-discharge rate.

Hint: When charging lead-acid batteries on Battery 1 output note that the *isl 6* can only detect the *correct number of cells and set the correct current* if the battery is intact and slightly charged.

4.5 Lithium-Manganese-Oxide batteries: (LiMnO):

Nominal voltage level: 3.0 V / cell.

Selecting the fast charge current (pre-set for battery 2):

We recommend currents up to 0.35 C, depending on the cell type.

Maximum continuous discharge current:

We recommend currents up to 1.5 C.

Maintenance: Always store these cells in the charged state.

Typical: These cells are particularly recommended as receiver batteries (2 cells required), although correct charging and storage are very important. However, we do not recommend them as slow-fly flight packs (3 cells), since they have a limited ability to supply high currents, and their useful life varies greatly according to the discharge current and the extent to which they are discharged.

Very good weight : energy ratio.

Tip: Ideally all single cells in a pack should be charged separately; alternatively charge all cells in parallel.

isl 6 uses a modified lead-acid charging program.

The most common form of this cell type is the „Tadiran“ cell.

4.6 Lithium-Ion batteries (Lilon):

Nominal voltage level: 3.7 V / cell.

Selecting the fast charge current (pre-set for battery 2):

Charge current = 1 C or less (C = nominal battery capacity).

Maximum continuous discharge current:

Up to 4 C, depending on cell type.

Maintenance: Always store these cells in the discharged state (use auto-d program), if stored fully charged, the result can be a permanent reduction in capacity.

Typical: They are very popular as power supplies for sail winches (2 cells).

Their limited ability to supply high currents means that they are only suitable as flight packs for slow-fly models (2-3 cells), but they are popular for that application.

Very good weight : energy ratio.

isl 6 uses a modified lead-acid charging program.

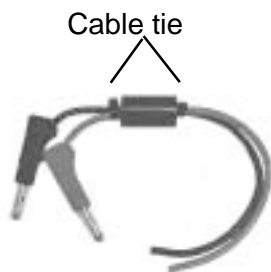


5 Fitting the CE tube

Requirements:

- The charge cable cross-section should be 2.5 mm².
- One wire should be coloured red (positive terminal +), the other black (negative -).
- To meet CE requirements the charge lead should be no longer than 20 cm (minus the length of cable attached to the battery!).

1. Solder a banana plug to each wire. To avoid short-circuits we recommend the use of safety banana plugs fitted with a sliding insulator.
2. Wrap one of the cable ties (supplied) round the two wires about 4 cm from the banana plugs to hold the wires together.
3. Slip the EMF tube onto the free end of the charge lead.
4. Wrap a second cable tie round the two wires immediately adjacent to the tube (see illustration).



5. Twist the wires together and/or fit heat-shrink tubing to keep them tidy.
6. Now solder the battery connector to the free ends of the charge lead. Don't forget to fit the pieces of heat-shrink sleeve required to insulate the soldered joints.

A ready-made charge cable fitted with safety banana plugs and the CE tube is available from us under **CE-kab-i6** (see illustration).

6 Connecting the charger, selecting the program



Please read Chapter 1, "Warnings" and Chapter 2 "How to obtain reliable and trouble-free operation", as they contain important information which you must know before you connect and use the charger.

6.1 Before you connect the charger

Remove the *isl 6* from its carton for charging to ensure adequate air circulation.

Do **not** yet connect the unit to the battery or batteries to be charged.

Ensure that the power supply (12V car battery, mains PSU) is stable and is not producing or suffering from problems.

Ensure that the connections between the power supply and the terminal clamps of the *isl 6* are making perfect contact. This is the reason why we cannot recommend wander plugs and car cigar lighter connectors.

6.2 Switch on the power supply

If you are connecting the unit to a car battery installed in a car:

- Switch off the car engine.

If you are using a suitable mains PSU:

- Switch on the mains PSU first.

6.3 Connect the *isl 6* to the power supply

Connect the terminal clamps to the power supply contacts quickly and confidently, taking care to maintain correct polarity.

Once connected correctly the charger's screen shows the following "ready" message:

- (1) "(c) schulze gmbh" and
- (2) "isl 6-636+ v7.10"

i. e. the manufacturers name is displayed in the first line, the second line shows the device type and version number of the software.

On *isl 6-330d*, which includes a one line display only, the second line is displayed after a short wait time.



If none of these messages appears:

Immediately disconnect the terminal clamps, as damage may result from an undefined machine state. Wait 5 seconds, repeat Step 6.3.

After that, display shows the selected cut off sensitivity for "battery 1" output (Akku 1):

- (1) **"B1 cutoff mode "** and
- (2) **"normal "** or
- (2) **"sensitive "** or
- (2) **"sensitiv+delayed"**

Finally the charger's screen shows the "ready" message, which can be different depending on the chosen program. "13.8" is the car battery voltage in volts.

- (1) **"B1 ready auto. c"** and
- (2) **"B2 4NiCd.3A 0mAh"** (isl 6-330d)
- (2) **"B2 4NiCd.3A 13.8"** other isl-s.

On isl 6-330d, which includes a one line display only, the cursor is located completely left and shows "ready" of battery 2. Pressing both buttons at the same time, the "second line" (2) of the display is showed.

Instead of the car battery voltage (two line display) the charged capacity of battery 2 is displayed - which is 0 mAh after power on.

6.4 Displaying the currently set program at the Akku 1 output

Press the **"+"** or **"-"** button **briefly** (beep):

The screen shows a status message for the currently set program (e.g. **"fullautomatic C"** for fully automatic charging).

After about two seconds the "Ready" message appears as already described.

The current program after connecting the power supply is the one which was either last active (before you disconnected) **or** the fully automatic charge program (**"FAUTO"**), depending on the machine configuration: Chapter 9.

6.5 Selecting your chosen charge or dis-charge program for Akku 1

Selecting a program usually requires that no battery is connected to Output 1.

To avoid selecting unexpected programs change programs only with the battery discon-

nected (exception: charging less than 4 cells)!

Any program can be selected by pressing the + or - button repeatedly or holding it pressed in.

The programs are grouped as described below in section 7.

A changing of battery 2 output programs is only practicable while connecting *isl 6* to the car battery (see section 9.2).

6.6 Connecting the battery after selecting the program

After choosing the program (see program descriptions in Chapter 7 and 8) connect the battery with correct polarity.

A short tone confirms the start of the program.

The display shows alternating in 1 sec. interval:

(charge-)time, battery voltage, carbatt.voltage
"00:01 5.63V 13.8" (isl 6-330d)
resp.

(Lade-)Zeit, Akkuspannung, Autobatt.spannung
"00:01 5.63V 13.8" other isl-s
and

(charge-)quantity, batt.voltage, (charge-)current.
"01mAh 5.63V 0.30A"

Charging battery 2 only on the *isl 6-330d*, the charging data are not displayed as a cursor but in the same way as showing battery 1 data. For differentiation from battery 1 display 1...2 black rectangular fields are shown in the line.

6.7 Displaying the charge/discharge quantities of e. g. combination programs

Hold both buttons (+ and -) pressed for a short time and release it.

dc programs shows all discharge quantities (capacity) in line one. In line two all charge quantities are displayed.

cd programms shows it in reverse order (charge capacity in line 1).

- (1) **"-99mAh68mAh, . . . , "**
- (2) **"+.12Ah, . . . , . . . , "**

The example shows the 3dc program. A fully charged 110 mAh battery was connected and was one time fully discharged (-99mAh) and one time fully charged (0.12Ah=120mAh). Now it is in the third phase - with a currently discharged quantity of 68mAh.



7 Overview Akku/battery 1 and Akku/battery 2 socket programs

7.1 Akku 1/ battery 1 socket programs

	Type of program	Hint	Usage
Group 1 Lead/acid charging programs			
Pb C	Lead/acid charging	high current	Fast charge-/Refresh charge for batteries with few capacity
Pb c	Lead/acid charging	low current	
Group2 Lead/acid discharging programs			
Pb-d	Lead/acid discharging	max. 200mA	precise capacity measurement for batteries with high capacity
Pb-D	Lead/acid discharging	high current	
Group 3 Fixed current discharging programs			
d-50mA	Ni-.. discharging	precise cap. measurement	... for 500mAh Akkus (I=1/10C)
...	or	normal discharge for 50mAh Akkus (I=1C)
d-0,2A	Ni-.. discharging	fast discharge for 50mAh Akkus (I=4C)
...	Ni-.. discharging	measuring the last bits...	e.g. for receiver battery with
d-1,0A	Ni-.. discharging	...of energy (capacity)	real currents
Group 4 Combination programs, Ni-Cd only			
auto -d	Ni-Cd/Li-Io discharging		discharging thoroughly for storage
auto cd	Ni-Cd charge/discharging		battery capacity test
auto3dc	Ni-Cd discharging/charging, 3 times		formatting new batteries, maintenance and...
auto-dc	Ni-Cd discharging/charging		...deleting memory effect
auto c	Ni-Cd charging, <u>standard-programm</u>		optimized charging, 2.5mm ² charging leads essential
Group 5 Fixed current discharging programs			
I=D.1A	Ni-.. charging	I=0,4A pulsed =0,1A averaged	duration charge program, long duration formatting
	no time limit	no cut off	
I=.25A	Ni-.. charging	no time limit...	...but peak voltage cut off active
I=0.3A	Ni-.. charging	current I = 2*C...	...for 110-150 mAh Ni-Cd batt.
I=0.3A	Ni-.. charging	current I = 1*C...	...for 300 mAh Ni-MH batteries
...			
I=3.0A	Ni-.. charging	I = 1 C ... 1,5 C...	...for Ni-MH battery with 3 Ah,
I=3.0A	Ni-.. charging	I = 2 C ... 3 C...	...for Ni-Cd batteries with 1...1,5 Ah
...			common charging of elder batteries, when automatic current calculation does not...
			...calculate normal currents. batteries are used-up.
I=5.5A	Ni-Cd charging		charge current setting for cells which stand highest currents
I=6.0A	isl 6-636+ only		charge current setting for cells which stand highest currents

7.2 Akku 2/ battery 2 socket programs

1) Charging of 1 - 6* Nickel Cadmium batteries	1,2 - 7,2 V	Currents: 100, 200, 332, 500** mA
2) Charging of 1 - 6* Nickel Metallhydrid batteries	1,2 - 7,2 V	Currents: 100, 200, 332, 500** mA
3) Charging of 1 - 4* Lead/Acid or Lead/Gel batt.	2,0 - 8,0 V	Currents: 100, 200, 332, 500** mA
4) Charging of 1 - 3* Lithium Mangan Oxid batt.	3,0 - 9,0 V	Currents: 100, 200, 332, 500** mA
5) Charging of 1 - 3* Lithium Ion batteries	3,7-11,1 V	Currents: 100, 200, 332, 500** mA

[*] maximum cell count with a supply voltage of 13,8 V only, available on soft- & hardware from V 7.03

[**] 500 mA not available on *isl 6-330d*



8.1.1 Battery output 1, Ni-Cd / Ni-MH charge program(s) fixed c with manual charge current selection ($I=x.xx$)

Purpose If you know the permissible charge currents for your batteries, you can use a matching charge program with a fixed defined current. The current can be used for balance-charging, standard and rapid charging (low, medium and high currents) with the charge periods calculated according to the state of charge of the battery.

Manual current selection (no more than 1C) and "sensitive" automatic charge termination are the preferred method if you are using Ni-MH batteries, and also if you have to use thin charge cables and small numbers of cells.

Cell type / No. Ni-Cd, Ni-MH, 1-30 cells (-330d ... -530d), 1-36 cells (-636+ and -636e).

Description The selected program starts charging immediately using the current you have selected. This current is maintained until the charger detects "battery full". The charge rate is only reduced if the selected current threatens to overheat / overload the charger as voltage rises.
Selectable currents: 0.1, 0.25, 0.3, 0.4, 0.5, 0.6, 0.8, 1.0, 1.2, 1.5, ... in 0.5A increments
Maximum currents: -330d = 5.5 A, -430d = 5.0 A, -530d = 6.0 A, -636_ = 6.5 A

Special features - **charging 1-3 Ni-Cd cells:** to suppress low-voltage messages first select the D.1A program and then connect the battery. Now set your chosen program using the + and - buttons. See also the warnings relating to this in Chapters 1 and 2.

- **a charge lasting longer than 3 hours without any "full" detection** halts the charge process without showing the charge period except in the following programs:

- **C.1A** and **0.25A** programs have no time limit

- **C.1A** program (= 0.1A continuous charge): no automatic charge termination

- **C.1A** program uses pulsed current (pulse - pause ratio 1 : 3)

Settings - **Call up** the Power-On reset program you wish to use (see Chapter 9.3.1)

for Power-On

- **Sensitivity** of the automatic charge termination (see Chapter 9.3.2)

Program selection

1. Disconnect any battery from Output 1.

2. Press the "+" or "-" button repeatedly or constantly to select the program you wish to use ($I=x.xA$, $x.x$ = time statement).

- **Display** while button is pressed: "Ch. current $I=x.xA$ "

3. Release the button. The charge program on the screen is now selected.

If you change to a discharge program (without disconnecting the battery - if 1. is ignored), the screen will show the resultant charge quantity from the charge previously fed in and removed, first as a positive and then as a negative value.

Connect battery 4. Now connect the battery to be charged to the Akku 1 output, maintaining correct polarity. The unit beeps to indicate the start of the charging process.

Displays while charging

Line1
alternating with:

- **Current charge time, current charge voltage, current charge current**
- **Current charge quantity, voltage, current/car battery voltage** (on isl 6-330d)
- **Probability of full charge** by series of letters "a" -> "b"... (buttons inactive)
- **!"**: measuring for charge current and automatic charge termination (buttons inactive)
- ******: charge current automatically reduced to guard against overheating
- **Various warnings and error messages** in plain text, with error number
- Pressing +&-buttons simultaneously: **current programm**; after release: **charge capacity** (see chapter 6.7)

Displays after program end

Line1
alternating with:

- **Total charge time, final charge voltage, "full"** e.g. "38:47 31.8V full"
- **Total charged capacity, final charge voltage, "full"** e.g. "2.6Ah 31.8V full"
- "battery full" display by: **brief buzz**, LCD shows **inverted "f"**
- **Inverted "t"**: short pulses of current, widely spaced, to maintain charged state
- **Various warnings and error messages** in plain text, with error number
- Pressing +&-buttons simultaneously: **current program**; after release: **charged capacity**



8.1.2 Battery output 1, Ni-Cd charge program auto c with automatic charge current selection

Purpose	In most cases the "Auto C" fully automatic charge program is the right choice, as it provides optimum rapid-charging of batteries, charging fully but gently. Within the permissible capacity range of 100 mAh to 4 Ah you do not need to have accurate knowledge about the type of Ni-Cd sintered cell you are using. The only pre-conditions are: adequate cross-section of the charge cable (2.5 mm ²), high-quality connectors and a pack consisting of soldered cells.
Cell type / No.	Ni-Cd, 1-30 cells (-330d ... -530d), 1-36 cells (-636+ und -636e).
Description	<p>The <i>isl 6</i> automatically calculates the charge current most appropriate to the battery to be charged. It does this by measuring the battery continuously, and adjusting the charge current repeatedly to match the pack's ability to absorb charge and/or to the maximum capacity of the <i>isl 6</i>. Initially the charge rate is 300 mA for a brief period, then the current rises before falling again towards the end of the charge process. The program continues charging until it detects "battery full". It then switches to a maintenance (trickle) charge.</p> <ul style="list-style-type: none"> - The calculated charge current is reduced if there is any danger of the charger overheating or being overloaded. - Maximum current: -330d = 5.5 A, -430d = 5.0 A, -530d = 6.0 A, -636_ = 8.0 A
Special features	<ul style="list-style-type: none"> - charging 1-3 Ni-Cd cells: to suppress low-voltage messages first select the D.1A program and then connect the battery. Now set your chosen program using the + and - buttons. See also the warnings relating to this in Chapters 1 and 2. - A charge lasting longer than 3 hours without any "full" detection halts the charge process without showing the charge period.
Settings for Power-On	<ul style="list-style-type: none"> - Call up the Power-On reset program you wish to use (see Chapter 9.3.1) - Sensitivity of the automatic charge termination (see Chapter 9.3.2)
Program selection	<ol style="list-style-type: none"> 1. Disconnect any battery from Output 1. 2. Press the "+" or "-" button repeatedly or constantly to select program (auto c). - Display while the button is pressed: "fullautomatic. c". 3. Release the button. The fully automatic charge program on the screen is now selected. If you change to a discharge program (without disconnecting the battery - if 1. is ignored), the screen will show the <u>resultant</u> charge quantity from the charge previously fed in and removed, first as a positive and then as a negative value.
Connect battery	<ol style="list-style-type: none"> 4. Now connect the battery to be charged to the Akku 1 output, maintaining correct polarity. The unit beeps to indicate the start of the charging process.
<u>Displays while charging</u>	
Line1 alternating with:	<ul style="list-style-type: none"> - Current charge time, current charge voltage, current charge current - Current charge quantity, voltage, current/car battery voltage (on isl 6-330d) - Probability of full charge by series of letters "a" -> "b"... (buttons inactive) - "!" : measuring for charge current and automatic charge termination (buttons inactive) - "*" : charge current automatically reduced to guard against overheating - Various warnings and error messages in plain text, with error number - Pressing +&-buttons simultaneously: current programm; after release: charge capacity (see chapter 6.7)
<u>Displays after program end</u>	
Line1 alternating with:	<ul style="list-style-type: none"> - Total charge time, final charge voltage, "full" e.g. "38:47 31.8V full" - Total charged capacity, final charge voltage, "full" e.g. "2.6Ah 31.8V full" - "battery full" display by: brief buzz, LCD shows inverted "f" - Inverted "t": short pulses of current, widely spaced, to maintain charged state - Various warnings and error messages in plain text, with error number - Pressing +&-buttons simultaneously: current program; after release: charged capacity



8.1.3 Battery output 1, Ni-Cd maintenance programs auto-dc and auto3dc (not *isl 6-636e*) with automatic discharge and charge current selection

Purpose	The two battery maintenance programs (1DC, 3DC) balance the state of your batteries in order to erase any existing memory effect. In particular, batteries which are only slightly discharged in use (e.g. transmitter and receiver packs) need to be discharged completely and recharged at regular intervals. Irregularly maintained and brand-new batteries often need this procedure to be carried out three times in a row.
Cell type / No.	Ni-Cd, 1-30 cells (-330d ... -530d), 1-36 cells (-636+).
Description	Using the auto-d program the battery is discharged down to the final discharge voltage and then recharged using the auto-c program (three times if you select the auto3dc program). The program charges until the charger detects "battery full", then switches to a maintenance (trickle) charge. <ul style="list-style-type: none">- The initial value of the discharge current is calculated from the maximum discharge power dissipation and/or the charger's maximum permissible discharge current.- Once the final discharge voltage is reached, the discharge current is reduced in stages to a low value.- Continuous charge current adjustment to suit the battery's ability to absorb charge.- The calculated charge current is reduced if there is a danger of the unit overheating or being overloaded.- Exception: if cells up to the number set for the Akku 2 charge section are connected, the <u>charge</u> current value for Akku 2 is set as the <u>discharge</u> current.- Max. charge current: -330d = 5.5 A, -430d = 5.0 A, -530d = 6.0 A, -636_ = 8.0 A- Max. discharge current: 2,0 A, <i>isl 6-330d</i> = 1,0 A- Max. discharge power: 16 W, <i>isl 6-330d</i> = 10 W
Special features	<ul style="list-style-type: none">- The <i>isl 6</i> hardware is <u>not</u> designed for discharging 1-2 Ni-Cd cells. Reverse polarity guard diodes and the types of transistor used only allow the unit to discharge below 2 Volts at reduced currents; discharging below about 1 Volt is virtually impossible.- a charge period longer than 3 hours without any "full" detection halts the charge process without showing the charge period except in the following programs:
Settings for Power-On	<ul style="list-style-type: none">- Call up the Power-On reset program you wish to use (see Chapter 9.3.1)- Sensitivity of the automatic charge termination (see Chapter 9.3.2).
Program selection	<ol style="list-style-type: none">1. Disconnect any battery from Output 12. Press the "+" or "-" button repeatedly or constantly to select the program you wish to use (auto-dc oder auto3dc)<ul style="list-style-type: none">- Display, button pressed: "fullautomatic-dc" or "fullautomatic3dc"3. Release the button. The combination program on the screen is now selected. If you change from the a discharge to a charge program (without disconnecting the battery - if 1. is ignored), the screen will show the <u>resultant</u> capacity from the previously discharge - at first as a negative and then as a positive value.
Connect battery	<ol style="list-style-type: none">4. Now connect the battery to be charged to the Akku 1 output, maintaining correct polarity. The unit beeps to indicate the start of the charging process.
<u>Displays while discharging/charging</u>	
Line1 alternating with:	<ul style="list-style-type: none">- Current discharge/charge time, current discharge/charge voltage, current discharge/charge current- Current discharge or charge capacity, voltage, current/car battery voltage (on <i>isl 6-330d</i>)- Probability of full charge by series of letters "a" -> "b"... (buttons inactive) - during charge phase- !": measuring for charge current and auto. charge termination (buttons inactive) - while charging- "**": charge current automatically reduced to guard against overheating- Various warnings and error messages in plain text, with error number- Pressing +&-buttons simultaneously: current program; after release: discharge and charge capacity/capacities (see chapter 6.7)
<u>Displays after program end</u>	
Line1 alternating with:	<ul style="list-style-type: none">- Total charge time, final charge voltage, "full" e.g. "33:12 15.9V full"- Total charged quantity, final charge voltage, "full" e.g. "2.6Ah 15.9V full"- "battery full" display by: brief buzz, LCD shows inverted "f"- Inverted "t": short pulses of current, widely spaced, to maintain charged state- Various warnings and error messages in plain text, with error number- Pressing +&-buttons simultaneously: current programm; after release: discharged and charged capacity/capacities (refer to section 6.7)



8.1.4 Battery output 1, Ni-Cd capacity measuring program auto cd (not *isl 6-636e*) with automatic charge / discharge current selection

- Purpose** This program allows you to examine individual battery packs for changes, and helps you draw conclusions about their further usefulness based on variations in measured capacity data.
- Cell type / No.** Ni-Cd, 1-30 cells (-330d ... -530d), 1-36 cells (-636+).
- Description** The battery connected to the charger is charged up using the **auto c** program and then discharged using the **auto -d** program.
- The *isl 6* automatically and repeatedly calculates the charge current to match the battery. The calculated charge current is reduced if there is a danger of the unit overheating or being overloaded. The program charges until it detects "battery full".
 - The battery is then discharged down to the final discharge voltage. The initial value of the discharge current is calculated according to the maximum power dissipation and/or the unit's maximum permissible discharge current.
 - **Exception:** if cells up to the number set for the Akku 2 charge section are connected, the charge current value for Akku 2 is set as the discharge current.
 - **Max. charge current:** -330d = 5.5 A, -430d = 5.0 A, -530d = 6.0 A, -636_ = 8.0 A
 - **Max. discharge current:** 2,0 A, *isl 6-330d* = 1,0 A
 - **Max. discharge power:** 16 W, *isl 6-330d* = 10 W
- Special features**
- The *isl 6* is not designed for discharging 1-2 Ni-Cd cells. Reverse polarity guard diodes and the types of transistor used allow the charger to discharge below 2 Volts only at reduced currents; discharging below about 1 Volt is virtually impossible.
 - **a charge period longer than about 3 hours without any "full" detection** halts the charge progress without showing the charge period.
- Settings for Power-On**
- **Call up** the Power-On reset program you wish to use (see Chapter 9.3.1).
 - **Sensitivity** of the automatic charge termination (see Chapter 9.3.2).
- Program selection**
1. Disconnect any battery from Output 1.
 2. Press the "+" or "-" button repeatedly or constantly to select the program you wish to use (**auto cd**).
 - **Display**, button pressed: `fullautomatic cd`
 3. Release the button. The combination program on the screen is now selected.
- If you change to a discharge program (without disconnecting the battery - if 1. is ignored), the screen will show the resultant charge quantity from the charge previously fed in and removed, first as a positive and then as a negative value.
- Connect battery**
4. Now connect the battery to be charged to the Akku 1 output, maintaining correct polarity. The unit beeps to indicate the start of the charging process.

Displays while charging/discharging

- Line1 alternating with:
- **Current discharge/charge time, current discharge/charge voltage, current discharge/charge current**
 - **Current discharge or charge capacity, voltage, current/car battery voltage** (on *isl 6-330d*)
 - **Probability of full charge** by series of letters "a" -> "b"... (buttons inactive) - during charge phase
 - **!:** measuring for charge current and auto. charge termination (buttons inactive) - while charging
 - ***:** charge current automatically reduced to guard against overheating
 - **Various warnings and error messages** in plain text, with error number
 - Pressing +&-buttons simultaneously: **current program**; after release: **charged and discharged capacity** (chapter 6.7)

Displays after program end

- Line1 alternating with:
- **Total discharge time, final discharge voltage, "empty"** e.g. `"65:09 8.51Vempty"`
 - **Total discharge capacity, final discharge voltage, "empty"** e.g. `"1.9Ah 8.51Vempty"`
 - "battery empty" display by: **brief buzz**, LCD shows **inverted "e"**
 - **Various warnings and error messages** in plain text, with error number
 - Pressing +&-buttons simultaneously: **current program**; after release: **charged and discharged capacity** (chapter 6.7)



8.1.5 Battery output 1, Ni-Cd / Ni-MH discharge program auto -d (not *isl 6-636e*) with automatic discharge current selection

- Purpose** This discharge program discharges the pack as quickly and thoroughly as possible, and is therefore ideal for preparing cells for storage, and also for balancing and refreshing cells.
- Cell type / No.** Ni-Cd, Ni-MH, 1-30 cells (-330d ... -530d), 1-36 cells (-636+ and -636e).
- Description** The battery connected to the unit is discharged down to the final discharge voltage.
- The initial value of the discharge current is calculated from the maximum discharge power dissipation and/or the charger's maximum permissible discharge current.
- **Exception:** if cells up to the number set for the Akku 2 charge section are connected, the charge current value for Akku 2 is set as the discharge current.
- When the final discharge voltage is reached, the discharge current is reduced in stages down to a low value, in order to remove from the pack the last usable residual energy before the program is switched off.
- **Final discharge voltage:** approx. 0.85 V / cell
- **Max. discharge current:** 2,0 A, *isl 6-330d* = 1,0 A
- **Max. discharge power:** 16 W, *isl 6-330d* = 10 W
- Special features** - The *isl 6* hardware is not designed for discharging 1-2 Ni-Cd cells. Reverse polarity guard diodes and the types of transistor used allow the charger to discharge below 2 Volts only at reduced currents; discharging below about 1 Volt is virtually impossible.
- Settings for Power-On** - **Call up** the Power-On reset program you wish to use (see Chapter 9.3.1)
- Program selection** 1. Disconnect any battery from Output 1.
2. Press the "+" or "-" button repeatedly or constantly to select the program you wish to use (auto-d).
- **Display**, button pressed: "fullautomatic -d".
3. Release the button. The discharge program on the screen is now selected.
If you change to a charge program (without disconnecting the battery - if 1. is ignored), the screen will show the resultant capacity from the previously discharge - first as a negative and then as a positive value.
- Connect battery** 4. Now connect the battery to be charged to the Akku 1 output, maintaining correct polarity. The unit beeps to indicate the start of the discharging process.
- Displays while discharging**
- Line1
alternating with: - **Current discharge time, current discharge voltage, current discharge current**
Current discharge capacity, voltage, current/car battery voltage (on *isl 6-330d*)
- "*" alternating with "-": discharge current automatically reduced to guard against overload.
- **Various warnings and error messages** in plain text, with error number
- Pressing +&-buttons simultaneously: **current programm**; after release: **discharge quantity** (see chapter 6.7)
- Displays after program end**
- Line1
alternating with: - **Total discharge time, final discharge voltage, "empty"** e.g. "65:09 8.51Vempty"
Total discharge capacity, final discharge voltage, "empty" "1.9Ah 8.51Vempty"
- "battery empty" display by: **brief buzz**, LCD shows **inverted "e"**
- **Various warnings and error messages** in plain text, with error number
- Pressing +&-buttons simultaneously: **current programm**; after release: **discharged capacity** (see chapter 6.7)



8.1.6 Battery output 1, Ni-Cd / Ni-MH discharge program(s) fixed-d (not *isl 6-636e*) with manual discharge current selection (I-x.xxA)

Purpose	After partially discharging a battery in use it can be interesting to know what an afternoon's flying, a particular driving style or a new power system has cost or saved you in terms of energy. This discharge program supplies that information.
Cell type / No.	Ni-Cd, Ni-MH, 1-30 cells (-330d ... -530d), 1-36 cells (-636+ and -636e).
Description	<p>The selected program starts discharging immediately with the selected constant current. The discharge current is maintained down to the final discharge voltage.</p> <ul style="list-style-type: none"> - The discharge current is automatically reduced if the current you have set threatens to overheat the charger (max. power dissipation 16W). - Selectable currents: 25 mA, 50 mA, 0.1, 0.2, 0.3, 0.5, 0.8, 1.0, 1.2, 1.5, 2.0 A - Exception: if cells up to the number set for the Akku 2 charge section are connected, the <u>charge</u> current value for Akku 2 is set as the <u>discharge</u> current. - The unit is able to detect the number of cells connected with sufficient accuracy. - A useful discharge current for an accurate measurement of battery capacity is usually one tenth of nominal capacity (1/10 C) - Final discharge voltage: approx. 0.85 V / cell - Max. discharge current: 2.0 A - Max. discharge power: 16 W
Special features	- The <i>isl 6</i> hardware is <u>not</u> designed for discharging 1-2 Ni-Cd cells. Reverse polarity guard diodes and the types of transistor used allow the charger to discharge below 2 Volts only at reduced currents; discharging below about 1 Volt is virtually impossible.
Settings for Power-On	- Call up the Power-On reset program you wish to use (see Chapter 8.3.1).
Program selection	<ol style="list-style-type: none"> 1. Disconnect any battery from Output 1. 2. Press the "+" or "-" button repeatedly or constantly to select the program you wish to use (D-x.xA, x.x = No. of cells). - Display, button pressed: "disch.curr.-x.xA" 3. Release the button. The discharge program on the screen is now selected. If you change to a charge program (without disconnecting the battery - if 1. is ignored), the screen will show the <u>resultant</u> capacity from the previously discharge - first as a negative and then as a positive value.
Connect battery	4. Now connect the battery to be charged to the Akku 1 output, maintaining correct polarity. The unit beeps to indicate the start of the discharging process.
<u>Displays while discharging</u>	
Line1 alternating with:	<ul style="list-style-type: none"> - Current discharge time, current discharge voltage, current discharge current - Current discharge capacity, voltage, current/car battery voltage (on <i>isl 6-330d</i>) - "*" alternating with "-": discharge current automatically reduced to guard against overload. - Various warnings and error messages in plain text, with error number - Pressing +&-buttons simultaneously: current programm; after release: discharge capacity (refer to section 6.7)
<u>Displays after program end</u>	
Line1 alternating with:	<ul style="list-style-type: none"> - Total discharge time, final discharge voltage, "empty" e.g. "65:09 8.51Vempty" - Total discharge capacity, final discharge voltage, "empty" "1.9Ah 8.51Vempty" - "battery empty" display by: brief buzz, LCD shows inverted "e" - Various warnings and error messages in plain text, with error number - Pressing +&-buttons simultaneously: current programm; after release: discharge capacity (refer to section 6.7)



7.2.1 Battery output 1, lead/acid discharge programs **Pb-D, Pb-d** (not *isl 6-636e*) with automatic/manual discharge current selection

Purpose The Pb discharge programs are designed either for fast discharging (Pb-D) or for a reasonably accurate capacity measurement (Pb-d).

Cell type / No. Lead-sulphuric acid and lead-gel, 2, 6, 12, 24 V (1, 3, 6, 12 cells)

Description The battery connected is discharged down to the final discharge voltage.
The "**Pb-D**" discharge program discharges at the highest possible current and then reduces in stages down to a relatively low current.
The "**Pb-d**" program discharges at up to 200mA and is designed to allow reasonably accurate measurement of the battery's capacity.
- The initial value of the "**Pb-D**" discharge current is calculated from the maximum discharge power dissipation and/or the unit's maximum permissible discharge current.
- When the final discharge voltage is reached, the discharge current is reduced in stages down to a low value, in order to remove from the pack the last usable residual energy before the program is switched off.
- **Final discharge voltage** approx. 1.73 V / cell
- **Max. discharge current** 2.0 A, *isl 6-330d* = 1,0 A; less with 2V batteries (technical reasons)
- **Max. discharge power** 16 W

Settings for Power-On - **Call up** the Power-On reset program you wish to use (see Chapter 8.3.1)

Program selection 1. Disconnect any battery from Output 1.
If you do not do this it is impossible to change from a **Ni-Cd** to a **Pb** program.
2. Press the "+" or "-" button repeatedly or constantly to select the program you wish to use (**PB-D** or **PB-d**).
- **Display**, button pressed: "lead accu **PB-D**" or "lead accu **PB-d**"
3. Release the button. The discharge program on the screen is now selected.
If you change to a charge program (without disconnecting the battery - if point 1 is ignored), the screen will show the resultant charge quantity from the energy previously removed and then charged-in, first as a negative and then as a positive value.
Connect battery 4. Now connect the battery to be discharged to the Akku 1 output with correct polarity.
- The unit beeps to indicate the start of the discharge process.

Displays while discharging

Line1 alternating with:
- **Current discharge time, current discharge voltage, current discharge current**
Current discharge quantity, voltage, current/car battery voltage (on *isl 6-330d*)
- **Discharge time** "mm:ss" changes after 99 minutes discharge time to "HHhmm"
(mm = minutes, ss = seconds, HH = hours, : = minutes display, h = hour)
- "*" alternating with "-": discharge current automatically reduced to guard against overload.
- **Various warnings and error messages** in plain text, with error number
- Pressing +&-buttons simultaneously: **current programm**; after release: **charge capacity** (refer to section 6.7)

Displays after program end

Line1 alternating with:
- **Total discharge time, final discharge voltage, "empty"** e.g. "05h54 6.69Vempty"
Total discharge capacity, final discharge voltage, "empty" "4.3Ah 6.69Vempty"
- "battery empty" display by: **brief buzz**, LCD shows inverted "e"
- **Various warnings and error messages** in plain text, with error number
- Pressing +&-buttons simultaneously: **current programm**; after release: **charge capacity** (refer to section 6.7)



7.2.2 Battery output 1, lead-acid charge programs **Pb C**, **Pb c** with automatic charge current selection

- Purpose** The Pb charge programs charge lead-acid batteries virtually full within a few hours.
- Cell type / No.** Lead-sulphuric acid, lead-gel, 2, 6, 12, 24 V (1, 3, 6, 12 cells)
- Description** The Pb charge programs start charging at zero current when the battery is connected, then gradually increase the charge rate (at around one minute per Amp-hour capacity). When the battery's maximum voltage is reached the current is gradually reduced again.
- The "**Pb c**" program charges at low currents (better filling, good for low-capacity batteries); while the "**Pb C**" charges at higher currents for high-capacity batteries.
 - When the battery first reaches the voltage limit for cyclic charging (approx. 2.45V/cell) the screen shows a letter "a". The battery is then about 75% fully charged, and further charging takes place much more slowly. Further rises in capacity are indicated in 5% increments with the letters "b", "c" ...; note that the period required to reach the "battery full" indication may take about as long as the appearance of "a" after initial connection. Note: these are not specific figures; they are just intended to give you a rough idea of how the lead-acid charge process is progressing.
 - The maintenance charge voltage and current are reduced to the permissible continuous limit values once "battery full" has been detected, but to ensure the battery is completely full and kept that way they are not switched off. The charged-in Amp-hours are added together and stated together with the current charge voltage.
 - Don't be surprised if the *isl 6* shows "battery full" at around 70% of nominal capacity, especially with low-capacity batteries (up to about 3Ah).
- Settings** for Power-On
- **Call up** the Power-On reset program you wish to use (Chapter 9.3.1)
- Program selection**
1. Disconnect any battery from Output 1.
- If you do not do this it is not possible to switch from a **Ni-Cd** to a **Pb** program.
2. Press the "+" or "-" button repeatedly or constantly to select the program you wish to use (**Pb C** or **Pb c**).
 - **Display**, button pressed: "lead accu Pb C" or "lead accu Pb c"
 3. Release the button. The charge program on the screen is now selected.
- If you change to a discharge program (without disconnecting the battery - if point 1 is ignored), the screen will show the resultant charge quantity from the energy previously charged-in and then removed, first as positive and then as negative value.
- Connect battery**
4. Now connect the battery to be charged to the Akku 1 output with correct polarity.
- The unit beeps to indicate the start of the charging process.

Displays while charging

- Line1 alternating with:
- **Current charge time, current charge voltage, current charge current** "19:16 6.13V 3.2A"
 - **Current charge quantity, voltage, current charge current** or e.g. ".11Ah 6.13V 3.2A"
 - **Current charge quantity, voltage, car battery voltage (isl 6-330d)** ".11Ah 6.13V 13.8"
 - "+": automatic charge current adjustment in progress; current slowly rising
 - Probability of full charge by series of letters "a" -> "b"... (buttons inactive)
 - "*": charge current automatically reduced to guard against overheating
 - Charge period "mm:ss" changes after 99 minutes charge period to "HH:mm"
 - (mm = minutes, ss = seconds, HH = hours, : = minutes display, h = hour display)
 - **Various warnings and error messages** in plain text, with error number
 - Pressing +&-buttons simultaneously: **current programm**; after release: **charge capacity** (refer to section 6.7)

Displays after program end

- Line1 alternating with:
- **Charge time, current battery voltage, "full"** e.g. "18h12 6.90V full"
 - **Charged capacity, current battery voltage, "full"** e.g. "4.6Ah 6.90V full"
 - "battery full" display by: **brief buzz**, LCD shows inverted "f"
 - **Various warnings and error messages** in plain text, with error number
 - Pressing +&-buttons simultaneously: **current programm**; after release: **charge capacity** (refer to section 6.7)



8.3.1 Battery output 2, charge program for 1 to 6*- cell Ni-Cd batteries

- Purpose** e.g. for charging receiver batteries down to 50 mAh or e.g. 6 cell transmitter batteries of high capacity.
- Cell type** Set the cell type to NiCd batteries as explained in Section 9.2.
- Cell count** Set the number of cells as explained in Section 9.2.
- Charge current** Set the charge current as explained in Section 9.2 (Current value: see Section 4.2).
- Description** The charge program starts charging with the pre-selected current and the set number of cells. At fixed intervals and after reaching the prescribed charge voltage limit the **isl 6** switches to a pulsed charge process. The better the battery maintains its voltage in the pauses, the longer the pauses become and the shorter the charge pulses become.
- The current and the number of cells are determined by a special initialisation process which runs when the charger is first connected to the car battery (Section 9.2)
- Please note** If the voltage at the battery output is excessive, the charger may fail to detect the presence of a battery.
- Settings at Power-On**
- cell type to be connected (see Section 9.2)
- number of cells to be connected (see Section 9.2)
- charge current (see Section 9.2 and 4.2)
- Connect battery** Connect the battery to be charged to the battery 2 output, taking care to maintain correct polarity.
- The charger beeps once to indicate the start of the charge process.

Displays if output 2 is "ready"

- Line 2 - **setting of battery output 2, car battery voltage**, e.g. "b2 4NiCd.1A 13.6"
- press both buttons simultaneously to display **charged-in capacity** (charge quantity) during the last charge process e.g. "49mAh4NiCd.1A b2"
- dto. **isl 6-330d** If the cursor (under the battery 1 data) is at "ready" (i.e. at the far left of the screen) and if you press both buttons simultaneously, the screen shows:
- **last capacity** and **setting of battery output 2**, e.g. "49mAh4NiCd.1A b2"

Displays while output 2 is charging

- Line 2 - **current charge time, current charge voltage, car battery voltage** "07:23 5.63V 13.6"
alternating on line 2, with alternating with
- **current charge quantity, current voltage, current current** e.g. "12mAh 5.63V0.10A"
When both buttons are pressed simultaneously:
- **current charge quantity** and **setting of battery output 2** e.g. "12mAh4NiCd.1A b2".
- dto. **isl 6-330d**
- if battery 1 is not in use, the screen display is as above
- if battery 1 is in use, the cursor under the battery 1 data indicates the approximate state of charge.
If you press both buttons simultaneously, the screen shows
- **current capacity, cell count, cell type, charge current, "b2"** e.g. "12mAh4NiCd.1A b2"

Displays after output 2 program end

- Line 2 - **time of "full" termination, cut off voltage,, car battery voltage** "29:12 5.79V 13.6"
alternating on line 2, with alternating with
- **charged capacity, cut off voltage, "full"** e.g. "53mAh 5.79V full"
- "full" indication: **brief buzz** and inverted "f" on LCD screen
- dto. **isl 6-330d**
- if battery 1 is not in use, the screen display is as shown above
- if battery 1 is in use, the cursor under the battery 1 data indicates "full", i.e. the cursor is at the far right of the screen.
If you press both buttons simultaneously, the screen shows
- **charged capacity** and **setting of battery output 2** e.g. "53mAh4NiCd.1A b2"

[*] Maximum cell count only at supply voltage of 13,8 V; available from software & hardware V 7.03



8.3.2 Battery output 2, charge program for 1 to 6*- cell Ni-MH batteries

- Purpose** For charging receiver batteries down to 100 mAh and 6 cell transmitter batteries.
- Cell type** Set the cell type to NiMH batteries as explained in Section 9.2.
- Cell count** Set the number of cells as explained in Section 9.2.
- Charge current** Set the charge current as explained in Section 9.2 (Current value: see Section 4.3).
- Description** The charge program starts charging with the pre-selected current and the set number of cells. At fixed intervals and after reaching the prescribed charge voltage limit the **isl 6** switches to a pulsed charge process. The better the battery maintains its voltage in the pauses, the longer the pauses become and the shorter the charge pulses become.
- The current and the number of cells are determined by a special initialisation process which runs when the charger is first connected to the car battery (Section 9.2)
- Please note** If the voltage at the battery output is excessive, the charger may fail to detect the presence of a battery.
- Settings at Power-On**
- cell type to be connected (see Section 9.2)
- number of cells to be connected (see Section 9.2)
- maximum charge current (see Section 9.2 and 4.3)
- Connect battery** Connect the battery to be charged to the battery 2 output, taking care to maintain correct polarity.
- The charger beeps once to indicate the start of the charge process.

Displays if output 2 is "ready"

- Line 2 - **setting of battery output 2, car battery voltage**, e.g. "b2 4NiMH.3A 13.6"
- press both buttons simultaneously to display **charged-in capacity** (charge quantity) during the last charge process e.g. ".73Ah4NiMH.3A b2"
- dto. **isl 6-330d** If the cursor (under the battery 1 data) is at "ready" (i.e. at the far left of the screen) and if you press both buttons simultaneously, the screen shows:
- **last capacity** and **setting of battery output 2** e.g. ".73Ah4NiMH.3A b2"

Displays while output 2 is charging

- Line 2 - **current charge time, current charge voltage, car battery voltage** "27:12 5.63V 13.6"
alternating on line 2, with alternating with
- **current charge quantity, current voltage, current current** e.g. "89mAh 5.63V0.33A"
When both buttons are pressed simultaneously:
- **current charge quantity** and **setting of battery output 2** e.g. "89mAh4NiMH.3A b2".
- dto. **isl 6-330d** - if battery 1 is not in use, the screen display is as above
- if battery 1 is in use, the cursor under the battery 1 data indicates the approximate state of charge.
If you press both buttons simultaneously, the screen shows
- **current capacity, cell count, cell type, charge current, "b2"** e.g. "89mAh4NiMH.3A b2"

Displays after output 2 program end

- Line 2 - **time of "full" termination, cut off voltage, car battery voltage** "27:12 5.72V 13.6"
alternating on line 2, with alternating with
- **charged capacity, cut off voltage, "full"** e.g. ".74Ah 5.72V full"
- "full" indication: **brief buzz** and inverted "f" on LCD screen
- dto. **isl 6-330d** - if battery 1 is not in use, the screen display is as shown above
- if battery 1 is in use, the cursor under the battery 1 data indicates "full", i.e. the cursor is at the far right of the screen.
If you press both buttons simultaneously, the screen shows
- **charged capacity** and **setting of battery output 2** e.g. ".74Ah4NiMH.3A b2"

[*] Maximum cell count only at supply voltage of 13,8 V; available from software & hardware V 7.03



8.3.3 Battery output 2, charge program for 1 to 4*- cell Lead-Acid batteries

Purpose	Typically to charge single-cell glowplug energiser batteries and 2-cell lead-gel and lead-acid batteries, which cannot be charged at the battery 1 output.
Cell type	Set the cell type to Lead batteries as explained in Section 9.2.
Cell count	Set the number of cells as explained in Section 9.2.
Charge current	Set the charge current as explained in Section 9.2 (Current value: see Section 4.4).
Description	The charge program initially charges at a very low current, and slowly increases the rate until the pre-selected value is reached - unless the maximum voltage typical of these cells is reached before this. Towards the end of the process the charge current is again reduced significantly, and under certain circumstances it may even fall to zero. - The current and the number of cells are determined by a special initialisation process which runs when the charger is first connected to the car battery (Section 9.2)
Please note	If the voltage at the battery output is excessive, the charger may fail to detect the presence of a battery.
Settings at Power-On	- cell type to be connected (see Section 9.2) - number of cells to be connected (see Section 9.2) - maximum charge current (see Section 9.2 and 4.4)
Connect battery	Connect the battery to be charged to the battery 2 output, taking care to maintain correct polarity. - The charger beeps once to indicate the start of the charge process.

Displays if output 2 is "ready"

Line 2	- setting of battery output 2, car battery voltage , e.g. "b2 1Lead.5A 13.8" - press both buttons simultaneously to display charged-in capacity (charge quantity) during the last charge process (zero after "power-on") e.g. "00mAh1Lead.5A b2"
dto. <i>isl 6-330d</i>	If <u>the cursor</u> (under the battery 1 data) is at "ready" (i.e. at the far left of the screen) and if you press both buttons simultaneously, the screen shows (332 mA max. with <i>i6-330d</i>): - last capacity and setting of battery output 2 , e.g. "00mAh1Lead.3A b2"

Displays while output 2 is charging

Line 2	- current charge time, current charge voltage, car battery voltage "19:12 2.13V 13.8" <u>alternating on line 2, with</u> alternating with - current charge quantity, current voltage, current current e.g. ".11Ah 2.13V 0.50A" When both buttons are pressed simultaneously: - current charge quantity and setting of battery output 2 e.g. ".11Ah1Lead.5A b2".
dto. <i>isl 6-330d</i>	- if battery 1 is not in use, the screen display is <u>as above</u> - if battery 1 is in use, <u>the cursor</u> under the battery 1 data indicates the approximate state of charge. If you press both buttons simultaneously, the screen shows (332 mA max. with <i>i6-330d</i>): - current capacity, cell count, cell type, charge current, "b2" e.g. ".11Ah1Lead.3A b2"

Displays after output 2 program end

Line 2	- time of "full" termination, current voltage, car battery voltage "18h12 2.27V 13.8" (18 hours, 12 minutes) <u>alternating on line 2, with</u> alternating with - current charged capacity, current battery voltage, "full" e.g. "4.5Ah 2.27V full" - "full" indication: brief buzz and inverted "f" on LCD screen
dto. <i>isl 6-330d</i>	- if battery 1 is not in use, the screen display is <u>as shown above</u> - if battery 1 is in use, <u>the cursor</u> under the battery 1 data indicates "full", i.e. the cursor is at the far right of the screen. If you press both buttons simultaneously, the screen shows (332 mA max. with <i>i6-330d</i>): - current capacity and setting of battery output 2 e.g. "4.5Ah1Lead.3A b2"

[*] Maximum cell count only at supply voltage of 13,8 V; available from software & hardware V 7.03



8.3.4 Battery output 2, charge program for 1 to 3*- cell Lithium-Manganese-Oxide batteries (Tadiran)

Purpose	Typically to charge 2-cell lightweight high-capacity receiver batteries
Cell type	Set the cell type to LiMn batteries as explained in Section 9.2.
Cell count	Set the number of cells as explained in Section 9.2.
Charge current	Set the charge current as explained in Section 9.2 (Current value: see Section 4.5).
Description	The charge program initially charges at a very low current, and slowly increases the rate until the pre-selected value is reached - unless the maximum voltage typical of these cells is reached before this. Towards the end of the process the charge current is again reduced significantly, and under certain circumstances it may even fall to zero. - The current and the number of cells are determined by a special initialisation process which runs when the charger is first connected to the car battery (Section 9.2)
Please note	If the voltage at the battery output is excessive, the charger may fail to detect the presence of a battery.
Settings at Power-On	- cell type to be connected (see Section 9.2) - number of cells to be connected (see Section 9.2) - maximum charge current (see Section 9.2 and 4.5)
Connect battery	Connect the battery to be charged to the battery 2 output, taking care to maintain correct polarity. - The charger beeps once to indicate the start of the charge process.

Displays if output 2 is "ready"

Line 2	- setting of battery output 2, car battery voltage , e.g. "b2 2LiMn.2A 13.7" - press both buttons simultaneously to display charged-in capacity (charge quantity) during the last charge process (zero after "power-on") e.g. "00mAh2LiMn.2A b2"
dto. <i>isl 6-330d</i>	If <u>the cursor</u> (under the battery 1 data) is at "ready" (i.e. at the far left of the screen) and if you press both buttons simultaneously, the screen shows: - last capacity and setting of battery output 2 , e.g. "00mAh2LiMn.2A b2"

Displays while output 2 is charging

Line 2	- current charge time, current charge voltage, car battery voltage "19.13 5.43V 13.7" <u>alternating on line 2, with</u> alternating with - current charge quantity, current voltage, current current e.g. ".11Ah 5.43V0.20A" When both buttons are pressed simultaneously: - current charge quantity and setting of battery output 2 e.g. ".11Ah2LiMn.2A b2".
dto. <i>isl 6-330d</i>	- if battery 1 is not in use, the screen display is <u>as above</u> - if battery 1 is in use, <u>the cursor</u> under the battery 1 data indicates the approximate state of charge. If you press both buttons simultaneously, the screen shows: - current capacity, cell count, cell type, charge current, "b2" e.g. ".11Ah2LiMn.2A b2"

Displays after output 2 program end

Line 2	- time of "full" termination, current voltage, car battery voltage "03h38 6.70V 13.7" (3 hours, 38 minutes) <u>alternating on line 2, with</u> alternating with - current charged capacity, current battery voltage, "full" e.g. ".61Ah 6.70V full" - "full" indication: brief buzz and inverted "f" on LCD screen
dto. <i>isl 6-330d</i>	- if battery 1 is not in use, the screen display is <u>as shown above</u> - if battery 1 is in use, <u>the cursor</u> under the battery 1 data indicates "full", i.e. the cursor is at the far right of the screen. If you press both buttons simultaneously, the screen shows: - current capacity and setting of battery output 2 e.g. ".61Ah2LiMn.2A b2"

[*] Maximum cell count only at supply voltage of 13,8 V; available from software & hardware V 7.03



8.3.4 Battery output 2, charge program for 1 to 3*- cell Lithium-Ion batteries

Purpose	Typically to charge 2 or 3-cell lightweight high-capacity power batteries for slowflyer.
Cell type	Set the cell type to Lilo batteries as explained in Section 9.2.
Cell count	Set the number of cells as explained in Section 9.2.
Charge current	Set the charge current as explained in Section 9.2 (Current value: see Section 4.6).
Description	The charge program initially charges at a very low current, and slowly increases the rate until the pre-selected value is reached - unless the maximum voltage typical of these cells is reached before this. Towards the end of the process the charge current is again reduced significantly, and under certain circumstances it may even fall to zero. - The current and the number of cells are determined by a special initialisation process which runs when the charger is first connected to the car battery (Section 9.2)
Please note	If the voltage at the battery output is excessive, the charger may fail to detect the presence of a battery.
Settings at Power-On	- cell type to be connected (see Section 9.2) - number of cells to be connected (see Section 9.2) - maximum charge current (see Section 9.2 and 4.6)
Connect battery	Connect the battery to be charged to the battery 2 output, taking care to maintain correct polarity. - The charger beeps once to indicate the start of the charge process.

Displays if output 2 is "ready"

Line 2	- setting of battery output 2, car battery voltage , e.g. "b2 3LiIo.5A 13.8" - press both buttons simultaneously to display charged-in capacity (charge quantity) during the last charge process (zero after "power-on") e.g. "00mAh3LiIo.5A b2"
dto. <i>isl 6-330d</i>	If <u>the cursor</u> (under the battery 1 data) is at "ready" (i.e. at the far left of the screen) and if you press both buttons simultaneously, the screen shows (332 mA max. with <i>i6-330d</i>): - last capacity and setting of battery output 2 , e.g. "00mAh3LiIo.3A b2"

Displays while output 2 is charging

Line 2	- current charge time, current charge voltage, car battery voltage "17:12 10.3V 13.8" <u>alternating on line 2, with</u> alternating with - current charge quantity, current voltage, current current e.g. ".11Ah 10.3V0.50A" When both buttons are pressed simultaneously: - current charge quantity and setting of battery output 2 e.g. ".11Ah3LiIo.5A b2".
dto. <i>isl 6-330d</i>	- if battery 1 is not in use, the screen display is <u>as above</u> - if battery 1 is in use, <u>the cursor</u> under the battery 1 data indicates the approximate state of charge. If you press both buttons simultaneously, the screen shows (332 mA max. with <i>i6-330d</i>): - current capacity, cell count, cell type, charge current, "b2" e.g. ".11Ah3LiIo.3A b2"

Displays after output 2 program end

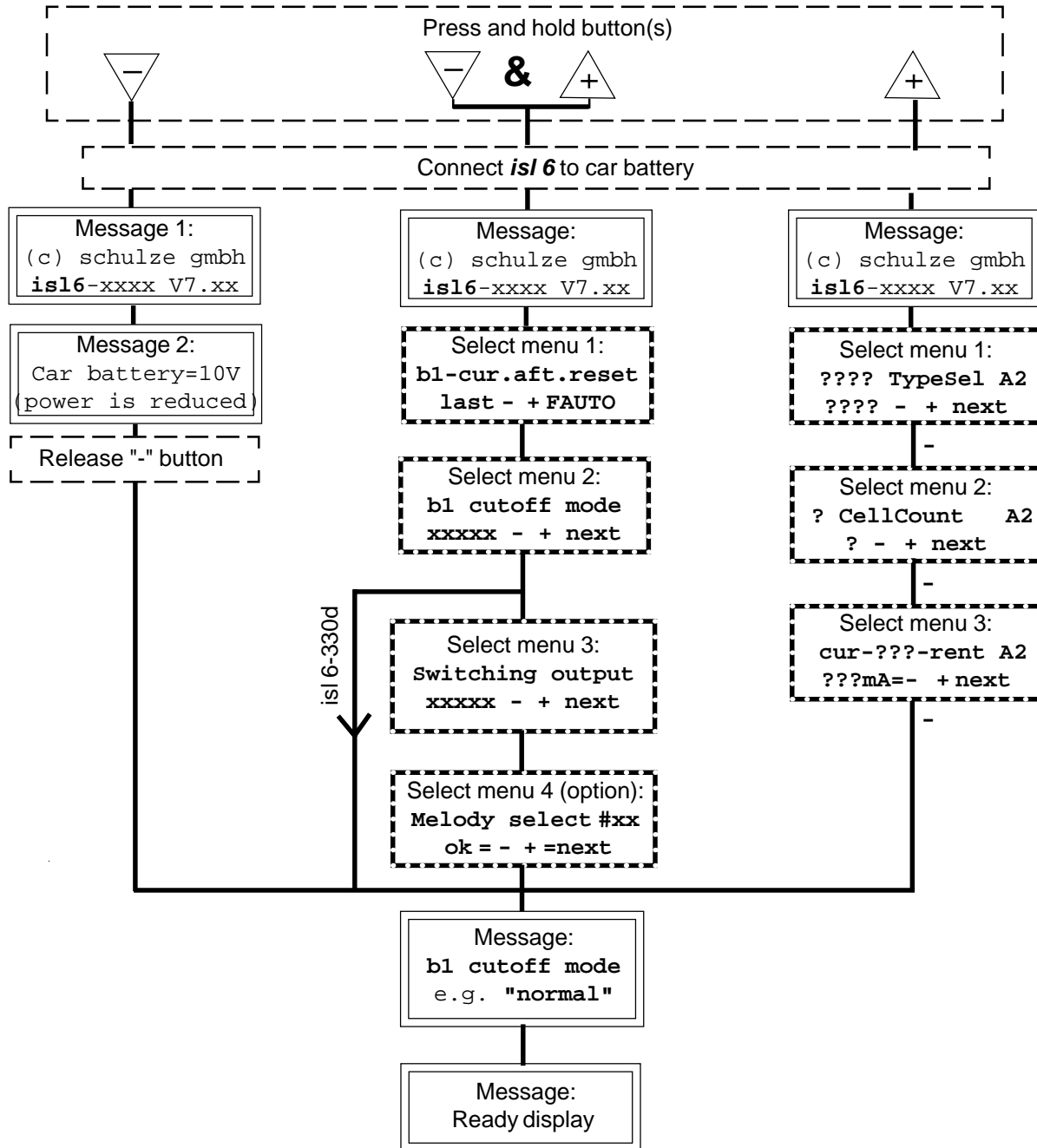
Line 2	- time of "full" termination, current voltage, car battery voltage "03h07 12.4V 13.8" (3 hours, 7 minutes) <u>alternating on line 2, with</u> alternating with - current charged capacity, current battery voltage, "full" e.g. "1.3Ah 12.4V full" - "full" indication: brief buzz and inverted "f" on LCD screen
dto. <i>isl 6-330d</i>	- if battery 1 is not in use, the screen display is <u>as shown above</u> - if battery 1 is in use, <u>the cursor</u> under the battery 1 data indicates "full", i.e. the cursor is at the far right of the screen. If you press both buttons simultaneously, the screen shows (332 mA max. with <i>i6-330d</i>): - current capacity and setting of battery output 2 e.g. "1.3Ah3LiIo.3A b2"

[*] Maximum cell count only at supply voltage of 13,8 V; available from software & hardware V 7.03

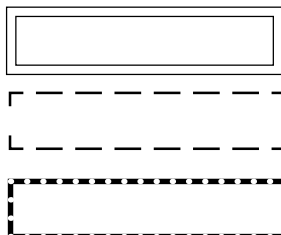


9 Modifying charger characteristics

9.1 Tabular summary



Key:



Message for "ready" state or settings

Action to display or select a charger characteristic

Display of selectable charger characteristics



9.1.1 Use with an external 12V car battery

An external 12V battery can safely be discharged to a lower level with the *isl 6* than a car battery which is required to start a car engine. The option of deeper discharge can be selected when you connect the *isl 6* to the battery. At the same time you can limit the maximum charge power (see 9.1.2.2 "Use with a 22/25A mains PSU").

If you wish to do this, hold the "-" button on the *isl 6* pressed in while you connect it, until the charger's screen shows the message "**car battery =10V**" in the first line.

The low-voltage warning message range (# 5) then lies approximately between 9.75 und 10.5V, and below 9.75V the unit switches itself off (error # 72).



The charger does **not** store the "-" button press during initial connection, so the setting has to be repeated at the start of every session with the charger.

The best way to exploit the full charge power of the unit is to delay making the change until the first message

"**car battery=MIN**" or

"**car battery<MIN**" appears.

However, please note that you lose the current data relating to the charge program running (charge period, capacity) when you disconnect the charger from the car battery to effect this change.

Unfortunately, reducing the charge current when the above messages appear is not without its problems, as the automatic charge termination circuit can then get "out of step", because a reduction in the load current also causes a reduction in the voltage of the battery pack.

9.1.2 Use with the 230V mains supply

9.1.2.1 Use with a car battery charger



Never connect the *isl 6* to a car battery charger. These units produce a pulsed D.C. current which damages the *isl 6*.

Using the unit with a car battery wired in parallel and acting as a buffer can also cause problems, as this arrangement tends to produce senseless error messages.

9.1.2.2 Use with a 22/25A mains PSU



In theory the charger can be used with a stabilised mains power supply unit, but the charger's high power and the PSU's inadequate output capacity present problems, and the arrangement cannot be recommended. The result may be long-term damage, and even terminal damage to the mains PSU and the charger.

For charging batteries (minimum 8 cells) in conjunction with a 22 A (25 A peak) mains PSU it is possible to limit the maximum charge power of the unit (*isl 6-530d* upwards) at the Akku 1 output to about 190 W, so that the current drain from the PSU stays below 22 A.

This setting is made by pressing the "-" button while you connect the unit to the car battery (see description in Section 9.1.1).

The unit displays the message "**power reduced**" in der second line of the screen.

As reliable operation of the *isl 6* with a mains PSU depends on other factors, including spurious voltage levels, questionable reliability when run continuously, sensitivity to converter clock frequencies and adequate reserves of output capacity (one area in which laboratory mains PSUs are often lacking) etc., it is up to you to carry out tests to establish whether your particular combination of PSU and charger works properly. We accept no liability for problems or damage to the *isl 6* or other parts of the combination arising from this mode of usage.

Please note that "repairs" to chargers which produce error messages when used with mains PSUs will be charged for accordingly.



9.2 Setting the number of cells and charge current for battery Output 2

The Akku 2 (battery 2) output must be set to the type of cell, number of cells and charge current you wish to use.

You can choose within 5 types of batteries and choose up to 4 (isl 6-330d 3) different charge currents.

The values you select are stored permanently in the charger.

1. Hold the "+" button pressed in while you connect the charger to the car battery and wait until the selection menu appears (about 2-3 seconds).

2. Release the button again.

```
" ???? TypeSel B2"
```

```
"4NiCd.3A- +next" (example)
```

In the *isl 6-330d* both lines follow in succession. The value to select is marked by a question mark, in the *isl 6-330d* the cursor marks the position to select.

You can choose following types of batteries:

Nickel Cadmium (NiCd),
 Nickel Metallhydrid (NiMH),
 Lead/acid and Lead/gel (Lead),
 Lithium Manganoxid (LiMn),
 better known as Tadiran cell,
 Lithium Ionen (LiIo).

3. Press the "+" button (+next) repeatedly to display the different battery types until the desired type appears.

4. Select the shown type of cell by pressing the "-" button (e. g. .LiMn...-).

5. After that, the cell count menu appears.

```
"? CellCount A2"
```

```
"1LiMn.3A- +next" (example)
```

Depending of the selected type of battery you can choose following cell counts:

NiCd:	1 - 6* cells	= 1,2 ... 7,2 V
NiMH:	1 - 6* cells	= 1,2 ... 7,2 V
Lead:	1 - 4* cells	= 2, 4, 6, 8 V
LiMn:	1 - 3* cells	= 3,0 ... 9,0 V
Lilo:	1 - 3* cells	= 3,7 ... 11,1 V

[*] maximum cell count with a supply voltage of 13,8 V only, available on soft- & hardware from V 7.03

6. Press the "+" button (+next) repeatedly until the desired cell count appears.

7. Select the shown cell count by pressing the "-" button (e. g. 2LiMn...-).

8. After that, the charge current menu appears:

```
" cur-???-rent B2"
```

```
"1LiMn.3A- +next" (example)
```

You can choose between following currents

(*isl 6-330d* in ()):

100 mA	= ".1A",	(100 mA = ".1A")
200 mA	= ".2A",	(200 mA = ".2A")
332 mA	= ".3A",	(332 mA = ".3A")
500 mA	= ".5A",	(332 mA = "<.5")
500 mA	= "<1A",	(332 mA = "<1A")
500 mA	= "<2A",	(332 mA = "<2A")

Hint: Effects on the Akku 1 output:



All currents selected for Akku 2 output are used for Akku 1 output under following conditions: The currents are only used at Akku 1 fullautomatic-discharging programs, if Akku 2 output is selected to a Nickel-Cadmium or a Nickel-Metal-Hydrid battery and the cell count of the battery connected to Akku 1 output is equal or less of the cell count selected for Akku 2 output. Example:

```
"1LiMn.3A":
```

Effect: none, because neither NiCd nor Ni-MH is selected.

```
"4NiCd.3A":
```

Effect: none, if Akku 1 discharges 5 or more cells. At 1, 2, 3, or 4 cells the starting current is the selected 332 mA (0.3 A).

If a fixed discharge program is selected on Akku 1 output, the battery always will be discharged (if possible) with the selected fixed current on Akku 1 output.

```
"4NiCd<1A":
```

The auto-d programm discharges 1 A from 1-4 cells at Akku 1 output. The Akku 2 output always supplies at the same selection no more than its maximum current of e.g. 500 mA (isl 6-430d) having selected currents with leading "<" sign.

9. Press the "+" button (+next) repeatedly to display the different current values,

10. Select the visible current value by pressing the "-" button (e. g. 2LiMn.3A-).

11. After that the screen will show the set charge termination sensitivity before the "ready" message appears, exactly as if you had just connected the charger to the car battery.



- 9.3 Program type after reset for A1 (9.3.1)
- Charge termination for A1 (9.3.2)
- Switch output (9.3.3)
- Melody select module (9.3.4)

These 4 parameters can be adjusted in a single process.

To do this hold the "+" and "-" buttons pressed in while you connect the **isl 6** to the car battery, and wait until the menu

"B1-cur.aft.reset" appears.

9.3.1 Setting the program type after reset

Here you select the program which is to appear as standard when you connect the **isl 6** to the car battery.

The program which appears after initial connection can be the:

- last used program

(more accurately: the program setting which applied when the battery was last connected; (Select "last" with the "-" button)

or

- the fully automatic charge program

(Select "FAUTO" with the "+" Taste).

When you have made your selection the menu "p1 cutoff mode" appears (description below).

9.3.2 Setting charge termination sensitivity:

Press the + button repeatedly to display the charge termination sensitivity.

Press the - button to select the value on the screen. After you have made your selection your selected value is repeated again:

```
"B1 cutoff mode"  
"--> xxxx      "
```

(xxxx = normal, sensitive [sensit.], sensitive + delay [sens+d])

After this selection the screen shows the menu for setting the light indicator at the switched output - even if the switched output is not installed (9.3.3).

9.3.2.1 Possible selections

Explanation: You can now adjust the method of working of the automatic Delta-Peak charge termination circuit. Three stages of sensitivity are available:

1. normal

Delta-peak termination using proven termination criteria. This setting is the most straightforward for most applications.

2. sensitive (sensit.)

3. sensitive with delay (sens+d)

Re. 2.+3.: Delta-peak termination with sensitive trip characteristics. This setting switches off the charge voltage as soon as the voltage curve flattens out. This often applies to hybrid cells and similar, such as 1700SCE, RED AMP and many transmitter batteries.

Note re. **sens+d**:

With the sensitive settings you may find that deep-discharged cells are switched off right at the start of the charge process. The "sens+v" mode prevents this happening, because it incorporates a delay time after the pack is connected, and the automatic charge termination circuit is only activated after 8 minutes.



This means: the charge voltage is **not** monitored during the first 8 minutes, so the cells are charged for at least about 10 minutes.

Warning: for the same reason, if you connect a large number of cells for a final "top-up", they are likely to get very hot if the charge is set to "sens+d".

9.3.2.2 Ni-MH batteries

Tests with charging Ni-MH batteries have produced good results using the two "sensitive" termination settings, provided that manual charge current setting is used, and charge currents of no more than 1 C are set (i.e. 1000 mA charge rate for 1100 batteries).



In our experience, batteries which fail to reach anything like their stated nominal capacity when charged also present the most problems in detecting the "battery full" state, i.e. the charger fails to switch off.

Tests with modern high current Ni-MH batteries can be charged (depending on type) up to 1.6 C.



9.3.3 Switched output setting

(not for isl 6-330d)

" switch output "

"12V perma- +next" re. a)

You can chose among 3 different settings:

a) 12V permanent

The switched output provides 12 V continuously, ideal to to drive a battery cooling fan or similar.

b) FullBlinking

The switched output provides 12 V on / off to drive a car flasher bulb when battery is fully charged or discharged.

c) FullContinuous

The switched output provides 12 V continuously to drive a car flasher bulb when battery is fully charged or discharged.

Press the "+" button (+next) repeatedly to display the switch output features.

Press the "-" button to select desired feature (e.g. FullBlink).

The selected setting is repeated once more.

Note re. switched output:

The charger features a Cinch (phono) socket as widely used in audio equipment, and it is protected by an internal T 2.5 A fuse. It is designed for connection to a car flasher bulb (12V / 25W) so that you have a visual indicator of the "battery full" and "battery empty" states.

As an alternative to the flashing light output the Cinch socket can be set up at the factory to provide a fixed 12 V to drive a battery cooling fan or similar.

Note: the cables connected to this socket must be fitted with a ferrite core in order to keep within the CE limits for interference radiation. Use the "CE-Ring-i8" for this, and wind at least 9 turns of the cable through it at a point no more than 5 cm from the Cinch plug. The cable must not be more than 2 m long.

9.3.4 Melody selection setting

Note: this option is only fitted to older chargers built before the end of 1995.

If the module is present, you can press the "+" button to listen to all 12 melodies in turn.

You select the melody you wish to hear when your batteries are "full" or "empty" by pressing the "-" button (melody 0 = buzzer).

The selected melody (except melody 0) not only sounds when the program terminates, but also when you press the "+" and "-" buttons simultaneously to display the charged-in / discharged capacity of the active program.

Note: you can cut short the melody or the buzzer at any time by pressing the "+" or "-" button.

When you finish the setting-up procedure the screen will show the set charge termination sensitivity before the "ready" message appears, exactly as if you had just connected the charger to the car battery.



10 Legal matters

10.1 Warranty

All **isl/ 6** 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 **isl/ 6** 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.

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 outside 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.

10.2 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 quantity 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.

10.3 CE approval

All **isl/ 6** units built after January 1996 satisfy all relevant and mandatory EC directives: these are the EMF directives

- **89/336/EWG,**
- **91/263/EWG and**
- **92/31/EWG.**

The product has been tested to meet 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 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 or with only 7 cells, in which mode the voltage converter would not be active. In such cases the charger would not produce its maximum interference level.

The procedure also includes a test of interference 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.

Note:

If you encounter problems in using this device, please carry out the measures described in Chapter 13 and 14 before you decide that it is defective.



11 Specifications, technical features

<i>isl 6</i> Dims. approx. [kg][linexchar]	Display [vis. area]	Display [vis. area]	No. of cells [No. Ni-Cd]	Capacity [Ah]	Charge currents [mA - A]	Disch. currents [mA - A]
-330d 0,71	1 x 16	63x12mm	1 - 30	0.1 - 5	250 - 5,5	25 - 1
-430d 1.1	2 x 16	61x15mm	1 - 30	0.1 - 4	250 - 5	25 - 2
-530d 1.1	2 x 16	61x15mm	1 - 30	0.1 - 5	250 - 6	25 - 2
-636+ 1.3	2 x 16	98x22mm	1 - 36	0.1 - 6	250 - 6.5 (8)	25 - 2
-636e 1.3	2 x 16	61x15mm	1 - 36	0.1 - 6	250 - 6.5 (8)	N.A.

<i>isl 6</i> ... Model	Lead-acid batteries	No. of cells [No. Pb]	Min. capacity [Ah]	Charge currents [ca. A]	Disch. currents [A]
-330d		1, 3, 6, 12	1.0	0,25 - 4	0,1-1
-430d		1, 3, 6, 12	1.0	0.25 - 4	0.1-2
-530d		1, 3, 6, 12	1.0	0.25 - 4.5	0.1-2
-636+		1, 3, 6, 12	1.0	0.25 - 5	0.1-2
-636e		1, 3, 6, 12	1.0	0.25 - 5	N.A.

Summary of charge currents related to number of cells connected to Akku 1 output							
Voltage	6V	9V	11- 26V	34V	40V	45V	50V
No. of cells	~4c	~6c	~8-16c	~20c	~24c	~27c	~30c
-330d	2,1 A	4,0 A	5,5 A	3,7 A	2,9 A	2,4 A	2,0 A
-430d	2.7 A	5.0 A	5.0 A	4.5 A	3.5 A	2.9 A	2.5 A
-530d	2.7 A	5.3 A	6.0 A	6.0 A	4.8 A	4.0 A	3.5 A
-636+,e	2.7 A	5.3 A	8.0 A	8.0 A	6.5 A	5.6 A	4.8 A

Akku 2 output:

Cell count: 1-6 Ni-Cd, 1-6 Ni-MH, 1-4 PB, 1-3 Li-Ion, 1-3 Li-MnO (Tadiran); 13,8V supply voltage...
Charge current 100, 200, 330 mA or 500 mA (500 mA not for *isl 6-330d*), ...for max. cell count!

Other features:

- fully automatic charge current calculation for Akku 1 (patent application submitted)
- Akku 1 und Akku 2 outputs can be used simultaneously
- Akku 1 output suitable for use with Ni-Cd and Ni-MH batteries
- Akku 1 output also suitable for lead-acid and lead-gel batteries (min. capacity 1Ah)
- Safety charge termination after 3 hrs charge period at Akku 1 output
(4h for 3dc program, 1st charge phase)
- Tolerances at Akku 1, current: typically 5%; max. approx. 15% or 250 mA (higher value applies)
- Tolerances at Akku 2, current: typically 5%; max. approx. 10% or 100 mA (higher value applies)
- No-load current drain: approx. 200 mA
- Continuous charge output at 100mA (mean value, pulsed 400mA supply)
- Maximum discharge power dissipation 16 Watts (10 Watts *isl 6-330d*)
- Power supply voltage: 11 - 15.2 V
- Low voltage warning threshold: 11.25 V (10.5 V at reduced setting)
- Low voltage power cut-off: 10.75 V (9.75V at reduced setting)
- Cartridge fuse at Akku 1 output: 5 x 20 mm, rating M 16 A
- All data refer to a car battery voltage of 12.5V DC
- Recommended car battery: 12 V / greater than 63 Ah; minimum capacity: 12 V / 42 Ah

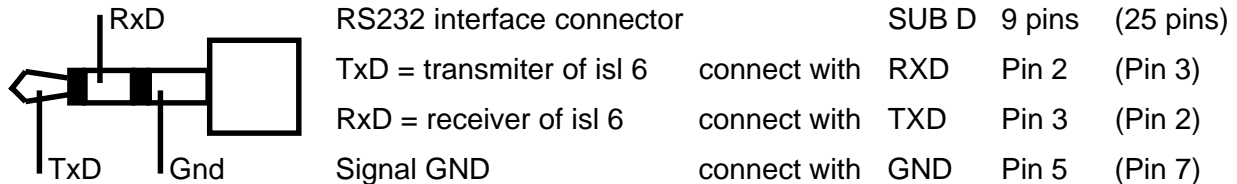
Applicable to *isl 6-636e* only:

- Small display; no discharge stage; melody module and switched output not available



12 RS232 interface pinout and data convention

12.1 Pinout of the jack connector of the the connecting cable



In the charger and in the sub d socket of our **i6-RS-kab** we mounted some resistors for safety reasons, which shall protect the interface against damage by short circuit during the connection of the plug into the socket.

12.2 Data convention PC-connection

Data transfer rate: 9600 Baud

Datablock: **A:sssss:uuuuu:iiiiVSttt## (ASCII)**

Legend:	<p>A</p> <p>:</p> <p>sssss</p> <p>:</p> <p>uuuuu</p> <p>:</p> <p>iiii</p> <p>V[: , -]</p> <p>S[L , L , E , P , v . . .]</p> <p>ttt[. . .]</p> <p>##[. . .]</p>	<p>Output/Pack No.</p> <p>Separation sign</p> <p>time in seconds</p> <p>Separation sign</p> <p>Battery voltage in millivolts</p> <p>Separation sign</p> <p>Current in milliamperes</p> <p>Charge/Discharge indicator</p> <p>Charge-/Discharge-Status</p> <p>Battery temperature</p> <p>Device number</p>
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Hint: Battery temperature and device number are transferred as "....." (points)



13 Error messages and their causes

When certain limit values (car battery voltage, charger temperature, maximum charge power) are exceeded, the result may be to cut off the charge process (e.g. excess car battery voltage), or the screen may show an error message while the buzzer sounds; the buzzer is switched off automatically after a certain time.

- **If an error message appears**, the screen only shows the charged quantity from then on; the charge period and charge voltage can no longer be read off.

- **At the Akku 2 output** a battery voltage of less than about 0.5 V will cause the charger to assume incorrect polarity.

- **During charging at Akku 2 output** with the maximum rated cell count (especially with 3 Li-Io cells) the warning/error "Vcar-Vbatt2 <min" appears, when supply voltage of the isl 6 is too low (lower 13.8 Volts). Please be sure that supply voltage is 13.8 volt and/or unplug battery from battery 1 output.

Error No.		Cause of error
Akku1	Akku2	The cause of the error is explained in plain text together with the error number
41	42	Charge period > maximum ¹
82	-	Battery voltage > maximum ²
51	-	Converter voltage > maximum
52	-	Charge current > maximum
62	-	Power dissipation of charge source > maximum
-	-	Power dissipation of discharge current sink > maximum
61	-	Charger converter power > maximum ²
General errors		
74		Charger current drain > maximum
73		Charger temperature > maximum
5		Car battery voltage low
72		Car battery voltage < minimum
75		Fuse blow ³ (after 94 series)

[¹] **Cause:** the battery, usually a receiver pack, is not being charged at high current (< 1C). Time > 3 hours or > 4 hours, 1st phase, 3DC program.

Remedy: use 2.5mm² charge cable with short adaptor cable (max. length 5 cm) to receiver battery. Never charge through a switch harness with integral charge socket.

[²] The charger may report "disconnect Akku1" and other inexplicable errors if ...

... the unit is run from a car battery which is itself being charged by a car battery charger.

... the unit is run from an unsuitable mains PSU as power source.

[³]**Cause:** Short-circuit between positive terminal of Akku 1 socket and car battery negative terminal.

Remedy: Open case and replace internal fuse (5 x 20mm cartridge, rating M 16 A). Disconnect unit from power supply before opening (remove 3 exposed screws).

Note: This message may also appear if a conductor burns through in an early model of charger. Send the charger to our Service department, as it is not usually just the conductor that is faulty.

Error: EMPTY message in a Ni-Cd charge program after approx. 30 seconds:

Cause: a) 1-3 cell battery connected for charging, not started with the D.1 program. **b)** At the start of the charge with a completely flat battery (0V) a warning appears until minimum voltage is reached.

Note: this message may also indicate incorrect polarity. Check this, otherwise you could accidentally "charge" the pack the wrong way round.

Error: disconnect battery 1/2 and/or Power-On Reset:

Cause: a) One or more batteries was connected to the charger before it was connected to the car battery.

b) The "watchdog" has tripped in mid-charge or mid-discharge. It responds when the micro-processor is in a state which the software does not recognise, perhaps due to outside interference.

Note: Not an error! The charger is incapable of deciding whether a lead-acid or Ni-Cd program has to be selected, or whether a charge or discharge program is to be used.

Error: The *isl 6* does not respond to the buttons.

Note: Not an error! During the measurement phases ("I") and towards the end of the charge process the programs must not be altered, as the *isl 6* must be allowed to detect the imminent "full" state (screen: a, b, c ...) without outside interference.



14 Trouble-shooting

Dear customer,

If your charger appears not to work as you expect it to, please run through the measures outlined below step by step before assuming that it is faulty.

Only if you have completed all these checks, and the problem is still present, ring on our hotline for technical advice. Even better, fill in the service questionnaire (next page) and send or fax it to us. We will then ring you back with advice.

From long years of experience with our battery chargers we know that most problems do not arise if the points listed below are followed to the letter.

If we receive your charger but can find no fault with it ("no fault found") - which usually means that the measures described below have been ignored - please note once again that we incur costs in checking the unit, and that those costs are payable by you even if the charger is within the warranty period.

1. Connect the charger to a fully charged car battery with a capacity of at least 60 Ah. Do not use a mains-powered Power Supply Unit!
2. For the power supply to the charger use only the original cables and terminal clips. Connectors such as wander plugs, car cigar lighter plugs etc. are not suitable! If you have made changes, kindly restore the original cables and clips. Take care to produce sound soldered joints - no "solder blobs" or dry joints, please!
3. Charge cables for all batteries should have a conductor cross-section of 2.5 sq mm. The charger's automatic current setting circuitry is only capable of setting a suitable (i.e. high) charge current for your battery if the cable is of this cross-section. Give the automatic circuit a fair chance!
4. Just as important as the charge cables are the connectors attached to them. Use the proven 4 mm gold-contact connectors at the charger end (don't use expensive wander plugs). Your flight packs should already be fitted with gold-contact connectors. Tin-plated connectors are completely unsuitable as their transfer resistance is high and they are prone to intermittent contact. Be sure that your cables are well soldered to the plugs and sockets. Do not fasten with screws.
5. If you observe Points 3) and 4) and connect a discharged battery to the charger, the fully automatic charge mode should set a current of at least 1C, usually as much as 2C, after about 5 - 10 min-utes. If this is not the case, then the internal resistance of the battery is probably excessive. In short, your battery has "had it", or is not suitable for rapid-charging.
6. Ensure that there are no defective cells in the battery pack. Bad cells usually heat up early in the charge, and then cause the charger to switch off prematurely, and/or to set too low a charge current in automatic mode.
7. If the 3-hour limit is exceeded when you are charging from the Akku 1 or Akku 2 output in automatic mode, then something is wrong with your charge cable, your connectors or your battery. Perhaps too small a cross-section in the charge cable? Connectors not good-quality gold-contact types? Dry solder joints? Battery ready for the bin, or not designed for rapid-charging? Establish the reason! Attempting to alter the 3-hour time limit is not the way forward, as in most cases a charge period of one hour already indicates that something is amiss. After 5 - 10 minutes the automatic circuitry should have set a charge current of at least 1C!
8. Have you read the information in Chapter 1 (Warnings) and 2 (How to obtain reliable, trouble-free operation) and observed the recommendations?

**15 Service questionnaire**

Your address:

To: schulze elektronik gmbh

and

Fax-No. +49 / 6150 / 1306-99

Telephone No.:

Please complete every section.

If a fault arises please return this form with the unit!

Battery:	Your information:	Example:
Purpose (Transmitter, receiver, flight pack)		Transmitter
Manufacturer		Sanyo
No. of cells / voltage		8-cell / 9,6 V
Capacity		1700 mAh
Type		1700SCE
Cells soldered or clipped		soldered
Charge cable connector		Barrel
Charge cable:		Original <xyz>
Length		1.5 m
Cross-section		0.14 sq mm
Charger connector		Wander plug
Power supply:		
Fault with mains PSU power:		yes
PSU type		Power 150
Output voltage		13 V
Maximum output current		11 A
Fault with car battery power:		no
Nominal capacity, car battery		45 Ah
Charger:		
Type		isl 6-430d
Charge output used		Akku 1
Charge program selected		Auto C
(Automatic mode:) max. charge current		0.83A
(Automatic mode:) charge current at fault		0.25A
Duration of charge		133 min
Battery temperature at termination		30°C
Error message		# 52
Description of fault:		



isl 6 chameleon: rapid charger series

operating instructions for software from V7.03, date of issue 17 DEC 2001



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