

Assembly Instructions for the Solar Lantern System

SOLUX-LED-100

Important notice for the use of the conversion kit:

When converting a SOLUX-I or SOLUX-IP to a SOLUX-LED-100 while still using the current solar module, notice that the polarity of the contacts inside the charging socket of the SOLUX-LED-100 has been changed:

Charging socket of SOLUX-I or SOLUX-IP: center contact: MINUS
outside contact: PLUS

Charging socket of SOLUX-LED-100: center contact: **PLUS**
outside contact: **MINUS**

Measure:

- > **Cross over the leads of the presently used solar module!**
- > **Mark the module with "LED-100" to prevent mixing up with SOLUX-I oder SOLUX-IP!**

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History

Date	Issue	Modifications
02.07.2009	1.01	The current issue is based on the previous issue 1.00/07.08.2008 with modifications caused by implementation of a current regulator for the white LED.

A) Preparation work

1) Top cup

Only when using the conversion kit:

- Enlarge the hole for the charging plug to 10,5 mm diameter.
- Drill a hole of 3 mm diameter for the yellow light-emitting diode (LED).



New lamp only:

Deburr the pin for the carrying belt, using a file or grinding stone.

Insert the pin, using a pair of pliers or a small hammer.

2) Shrinkdown plastic tubing (two for each lantern)

Cut to length: 8 mm.

3) Threaded rod (two for each lantern)

Clamp the threaded rod in a vice, making sure the thread does not get damaged (use intermediate layers of wood or plastic).

Slide a black neopren rubber washer over the rod.

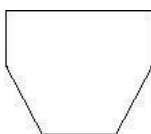
Screw the cap nut to the rod and fasten tight.



4) Preparing the foam rubber parts for coating and fixing the batteries

Cut foam rubber (2 mm thick):

- 1 strip 160...165 x 20 mm for the bandage
- 1 strip 38 x 15 mm for abrasion protection for the batteries
- 2 triangular shaped parts (see sketch) as buffer for the batteries in the bottom cup:
 - cut a square 40 x 40 mm
 - cut off the lower corners



5) Coating the batteries, fastening the buffer rubber and the abrasion protection

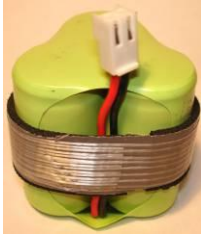
Wrap the foam rubber strip (bandage) around the battery pack.

→ The cable **has to** be wrapped in!

→ Take care that the ends of the foam rubber band **do not overlap** to keep the package slim to fit easily into the bottom cup.

Wrap the fabric tape around the bandage.

→ Allow generous overlapping to prevent the glued joint becoming loose.



Glue the two triangular shaped parts into the bottom cup (UHU).

Glue the strip for abrasion protection onto outer side of this front side of the cooling plate, which has a distance of 30 mm to the screw hole.

→ Roughen the gluing area with the abrasive paper.

(If available: clean the gluing area free of grease with spiritus).

6) Preparing the transparent foil for the glass cylinder

Hint:

Wash your hands - the foil is sensitive to grease spots!

Cut band to 105 x 195 mm.

→ First test one prototype to make sure the foil is not taller than the glass cylinder, which would deform the foil during final assembly. The foil should overlap about 5 mm when wrapped around.

7) Mounting the transparent foil and the type label into the glass tube

Hint:

Wash your hands - the foil is sensitive to grease spots!

Insert the foil into the glass tube.

Cover the joint (overlapping of approx. 5 mm) at both sides with approx. 30 mm clear glue strips.

→ Take care that the foil lies completely flat in the glass tube.

Insert the type label between foil and glass tube in such a way, that the label completely covers the joint line.

→ Take care of an upright alignment.

8) Preparing the wires

Cut the wires in length accordingly to the following wiretable.

Remove insulation on both ends of all wires for approx. 3 mm and tin all ends.

Wiretable:

No.	Colour	Length [mm]
01	red	90
02	red	80
03	red	80
-	-	-
05	blue	60
-	-	-
07	blue	65
08	blue	90
09	blue	30
10	yellow	90
11	yellow	110
12	brown	120
13	red	45
a	black	40 *)
b	white	40 *)
c	black	Original length *)
d	white	Original length *)

*) The wires a, b, c, d are already soldered to the current regulator (state of delivery).

- a / black: connector 'LED -'
- b / white: connector 'LED +'
- c / black: connector 'V -'
- d / white: connector 'V +'

9) Gluing the white light-emitting diode (LED) and the current regulator onto the cooling plate and wiring with each other

Richly tin the soldering connectors of the LED!

Carefully tin the connecting wires of the current regulator (shortened to 40 mm)

- a / black (connector 'LED -') and
- b / white (connector 'LED +')

Roughen the provided gluing areas with the abrasive paper.
(If available: clean the gluing area free of grease with spiritus).

Provided gluing areas:

- for the current regulator:
 - adjacent to that front side of the cooling plate, which carries the foam rubber strip for abrasion protection
- for the LED: center of the cooling plate

Glue the LED and the current regulator with the heat-conducting glue onto the the cooling plate (see the following picture):
apply a small amount of glue onto the gluing areas and fasten the components by easily "rubbing" it.

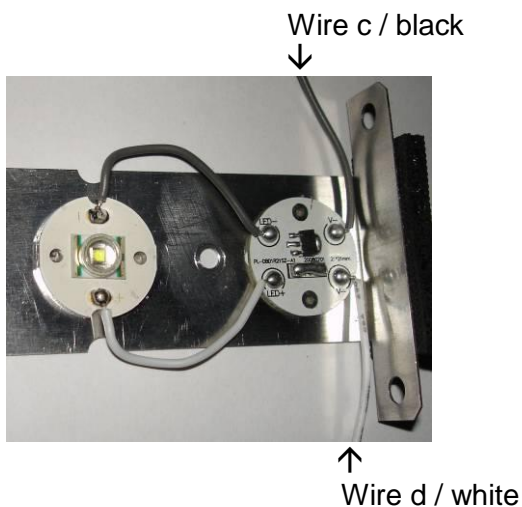
Hint:

The used heat-conducting glue hardens very fast (within 10 minutes).

Therefore it is recommended to prepare only small portions and process it quickly. For this purpose take a thred of **approx. 1 cm length** out of each of the two glue tubes and mix it thoroughly on an appropriate base (e.g. piece of foil).

Solder wire **a / black** of the current regulator connector '**LED -**' to the LED connector '**-**'.

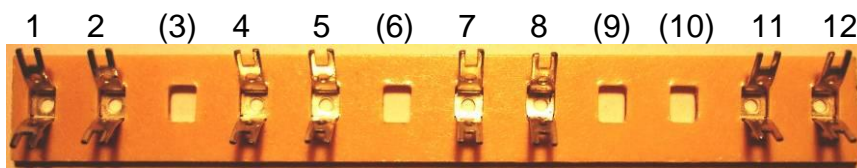
Solder wire **b / white** of the current regulator connector '**LED +**' to the LED connector '**+**'.



10) Preparing the soldering strip

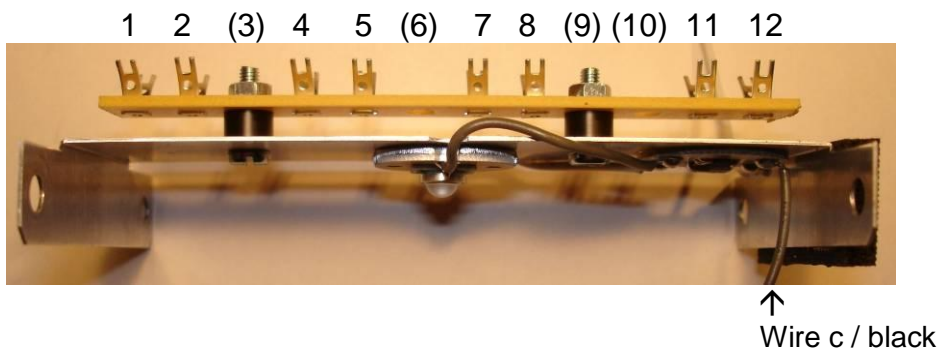
Cut the soldering strip into parts of 12 soldering tags using a fine saw.
→ **Caution:** crisp material!

Remove the soldering tags at the positions 3, 6, 9 and 10.



11) Mounting the soldering strip

Mount the soldering strip onto the cooling plate using the black distance sleeves (length: 5 mm) and the M3-screws.



B) Mounting the top cup

1) Mounting the yellow light-emitting diode (LED)

Short the shorter lead of the LED by 10 mm.

→ This offers a better distinction for the built-in situation, where both leads will be bent then.

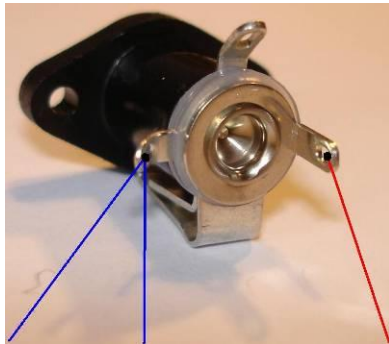
Glue the yellow LED into the top cup using UHU(-PLUS). This has to be done in such a way that the shorter lead points in direction to the charging socket.

→ Allow to dry completely!

After drying bend the leads sideways!

2) Wiring the charging socket (before gluing!)

Solder the appropriate wires to the charging socket according to the picture below.



*) Twist together before soldering!

↑ ↑ ↑
| | |
| No. 08 / blue No. 02 / red
| *) *)
| | |
| No. 09 / blue

3) Mounting the charging socket

Glue the charging socket into the top cup using UHU(-PLUS).

→ The unwired middle solder tag has to point upwards (i.e. in the direction to the opening of the top cup). Thus the solder tag with wire no. 03 / red becomes located directly beside the opening for the switch.

→ Allow to dry completely!

4) Rivetting the carrying belt

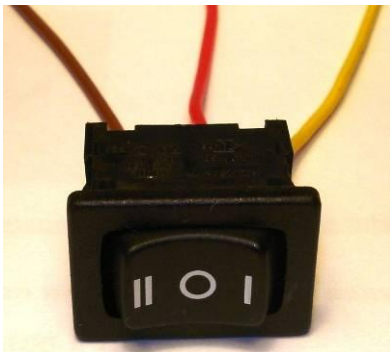
→ Notice that if the carrying belt covers the switch, the topside of the rivet has to be seen.



5) Wiring the switch

Solder the appropriate wires to the switch according to the picture below.

No. 12 / brown
↓
No. 03 / red
No. 11 / yellow
↓

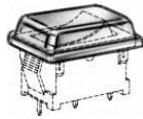


Hint:

- The soldering tag for the switch position **I** is located at side **II** of the switch rocket!
- The soldering tag for the switch position **II** is located at side **I** of the switch rocket!

6) Mounting the switch

Put the protective cap over the switch.



Insert the switch into the top cup and notice the complete snapping in.



C) Wiring

1) Colour code of the resistors

	Value [Ohm]	1. ring	2. ring	3. ring	4. ring	5. ring
R1	4,7	yellow	violet	black	silver	brown
R3	470	yellow	violet	black	black	brown

2) Preparing the accumulator plug

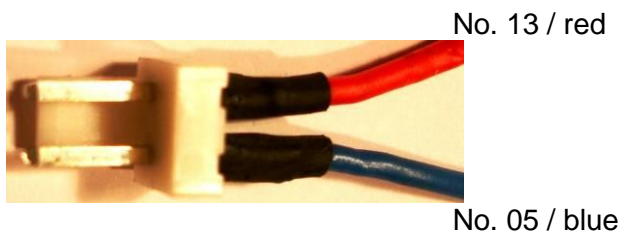
Solder the wires No. 13 / red and No. 05 / blue to the accumulator plug according to the picture below.

Hint:

To stabilize the accumulator plug for the soldering process it is recommended to plug it into the accumulator pack before soldering.

Pull shrinkdown plastic tubings over the soldered joints.

Let the shrinkdown plastic tubings shrink by touching them gently with the shaft of the soldering iron.



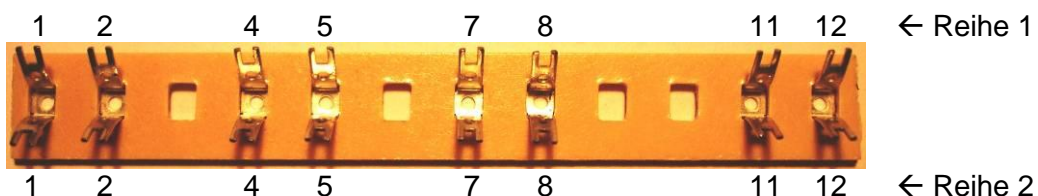
3) Wiring the yellow light-emitting diode (LED)

Solder wire no. 09 / blue (short) coming from the charging socket to the short lead of the yellow LED.

Solder wire no. 10 / yellow onesided to the long lead of the yellow LED.

4) Mounting the components to the soldering strip

→ See appendix 2: Wiring Diagram



Row 1:

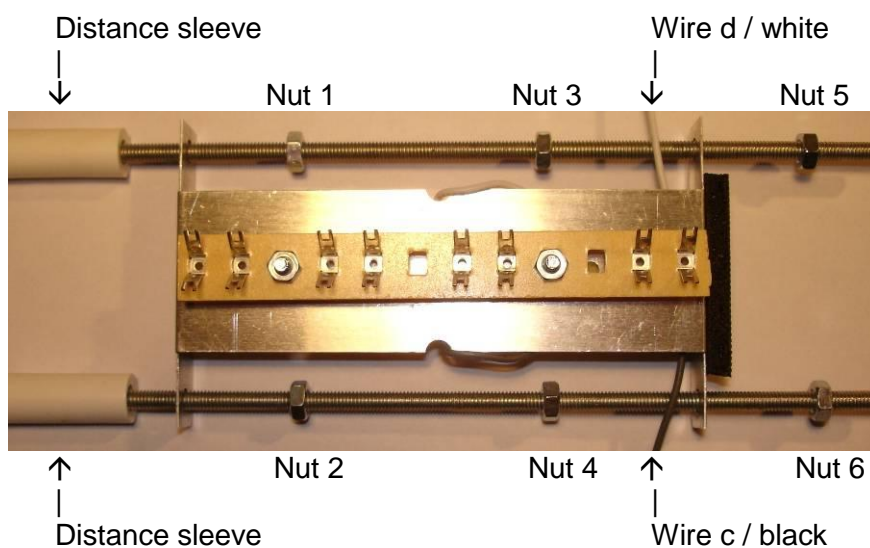
- Solder resistor R3 onesided to soldering tag 4.
- Solder resistor R1 between soldering tags 5 and 7.
- Solder the Schottky-diode (**bright marking ring left-sided**) between soldering tags 8 and 11.
- Solder wire no. 13 / red of the accumulator plug to soldering tag 12.

Row 2:

- Solder wire no. 07 / blue between soldering tags 1 and 8.
- Solder wire no. 01 / red onesided to soldering tag 12.
- Solder wire c / black (V-) of the current regulator together with wire no. 05 / blue of the accumulator plug to soldering tag 11.

5) Building-in the soldering strip

→ The picture below shows the soldering strip without components for better clarity.



Insert both threaded rods together with their related sealing washers (see point A3) into the top cup.

Slide the white distance sleeves on the threaded rods.

Attention!

→ For the following action the cooling plate has to be positioned in such a way, that the soldering strip is located at the same side as the switch and the charging socket.
Thus the white LED points to the same side as the yellow LED.

Slide the cooling plate, aligned as described above, with the first side panel on the threaded rods in such a way, that the nuts 1, 2, 3 and 4 can be screwed on the threaded rods.

After this slide the cooling plate completely on the threaded rods and screw the nuts 5 and 6 on the threaded rods.

Fasten the nuts 1 and 2 to end stop.

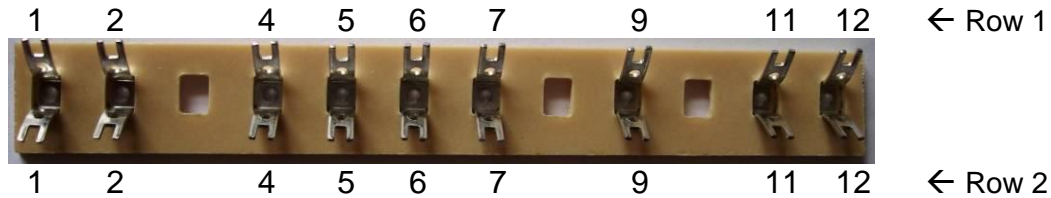
Screw nuts 3 and 5 and the nuts 4 and 6 respectively to each other to end stop, without bending deformation of the side panel of the cooling plate.

Check:

→ the distance between the nuts 5 and 6 respectively and the ends of the threaded rods has to be 60 mm at least.

6) Completing the wiring

→ See appendix 2: Wiring diagram

**ATTENTION!**

→ There must not to be seen any wire at the side of the white LED except the wires a, b, c, d!

Row 1:

From charging socket:

- solder the still free end of wire no. 08 / blue (long) to soldering tag 1.

From switch:

- solder the still free end of wire no. 03 / red together with the still free end of resistor R3 to soldering tag 2.

Row 2:

From yellow LED:

- solder the still free end of wire no. 10 / yellow to soldering tag 4.

From switch:

- solder the still free end of wire no. 11 / yellow together with wire d / white (V+) of the current regulator to soldering tag 5.
- solder the still free end of wire no. 12 / brown to soldering tag 7.

Solder the following two wires together to soldering tag 2:

- from soldering tag 12: the still free end of wire no. 01 / red
- from charging socket: the still free end of wire no. 02 / red

7) First functional test without accumulator

Connect a voltage source (**4,5 V / max. 350 mA**) to the charging socket:

- the delivered wall plug transformer, adjusted to 4,5 V or
 - the solar module (if there is sufficient sunlight) or
 - another voltage source
- check voltage and polarity with the digital multimeter:
center contact: PLUS, outside contact: MINUS

The yellow LED illuminates permanently.

The white LED illuminates according to the switch position:

- **0**: not
- **I**: poor
- **II**: bright

Check the polarity of the open accumulator plug:
→ red: PLUS, blue: MINUS.

If the measuring lines are connected appropriately (red to red, black to blue), the digital multimeter indicates a positive voltage value.

D) Finally mounting

1) Join top cup and glass tube

Insert the large sealing ring into the top cup.

Slide the glass tube over the components.

Notice the correct position of the type label:

- the type label is in line with the switch and thus on the side of the soldering strip,
- in normal-use position of the lantern the type label is situated in normal reading direction.

2) Mounting the bottom cup

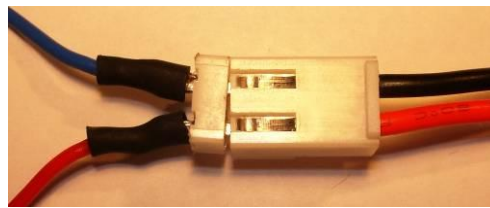
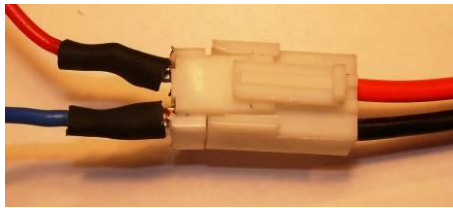
Insert the accumulator pack into the bottom cup in such a way, that the accumulator cable runs from bottom to top and is aligned with that little hole between the two large holes for the threaded rods. If the accumulator pack is in its correct position, the two large holes can be seen when looking into the bottom cup.

Insert the large sealing ring into the bottom cup.

Join the top cup (with glass tube) and the bottom cup.

Connect both parts of the accumulator plug with each other.

Notice the correct 'snapping-in' of the plug parts!



Insert the threaded rods into their appropriate holes and screw together the entire lantern using the M4-nuts.

3) Finally mounting the carrying belt

Attach the end of the carrying belt with the sheet-metal screw and the related washer to the bottom cup, whereby the washer is located between screw head and carrying belt.

E) Final test

- 1) Set the **switch to '0'** and charge the lantern for approx. **10 minutes** by inserting the charging plug into the charging socket:
 - with the delivered wall plug transformer, adjusted to 4,5 V or
 - with the solar module (if there is sufficient sunlight)

The yellow LED illuminates permanently.
The white LED doesn't illuminate.

The charging current can be measured with the delivered measuring cable and the digital multimeter:

- typ. 100-250 mA (max. 400 mA)

- 2) At the end of the charging time remove the charging plug:

The yellow LED becomes dark.

- 3) Functional test with switch position 'I' and 'II':

→ Quote out of the "Operation Manual":

"(...) Position I will provide 50%, position II provides 100 % brightness (...)"

Appendix 1: Circuit Diagram

