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 charching 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 (s. Appendix 3)**
- ➔ **Mark the module with "LED-100" to prevent mixing up with SOLUX-I or SOLUX-IP!**

SOLUX e.V.

Wallbergstr. 3

D-82024 Taufkirchen

Germany

Tel: +49 (0) 89 61209431

Fax: +49 (0) 721 151281216

Email: info@solux.org

Homepage: www.solux.org

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.
25.05.2011	**1.08**	**Translation of the current German version 1.08**

Authors

Manfred Saupe	Präzis Werkzeugbau Dresden Ltd.	info@praezis-dresden.de
Freimut Wätzig	SOLUX e.V. / Dresden	waetzig@solux.org
Friedrich Rehak	SOLUX e.V. / Munich	rehak@solux.org

A) Preparation work

1) Former top cup

Only when using the conversion kit:

- Drill a hole of 3 mm diameter for the yellow light-emitting diode (LED).

Current top cup:

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

Insert the pin, driving it in carefully using a small hammer (s. Fig. 1).

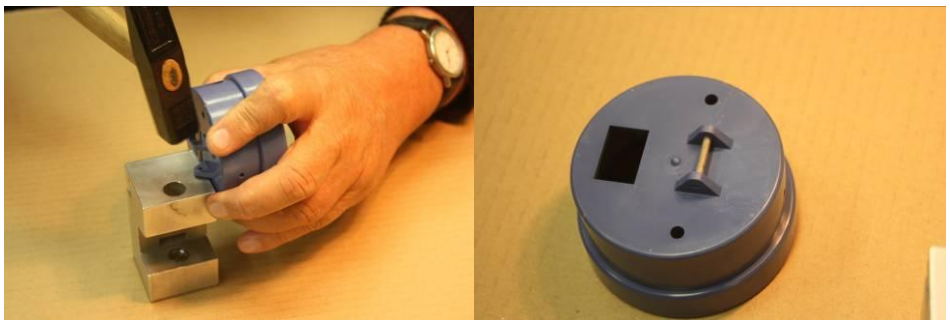


Fig. 1

2) Shrinkdown plastic tubing (three for each lantern)

Cut to length: 8 mm.

3) Threaded rod (two for each lantern) (s. Fig. 2)

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

Screw the cap nut to the rod with UHU glue and **fasten tight**.

Slide a black neopren rubber washer over the rod.

Fig. 2

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

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 accumulators
- 2 triangular shaped parts as buffer for the accumulators in the bottom cup (s. Fig. 2a):

  -- cut a square 40 x 40 mm
  -- cut off the lower corners

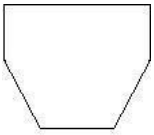


Fig. 2a

5) Rivetting the carrying belt

→ Notice:
if the carrying belt covers the switch, the topside of the rivet has to be seen
(s. Figs. 3, 4, 5)

Fig. 3

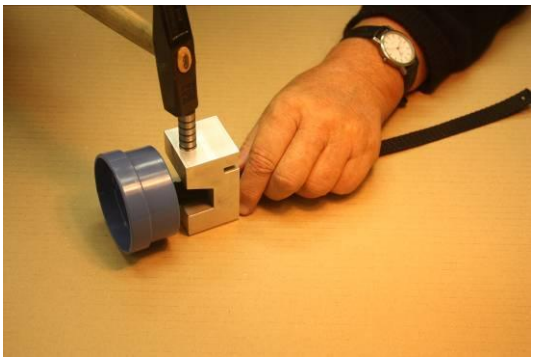


Fig. 4

Fig. 5

6) Coating the accumulators

Put the foam rubber strip to the fabric tape approx. 30 mm shifted from the end (s. Fig. 6), press on and wrap both around the accumulator pack (beginning of the foam rubber strip positioned at the accumulator cable).

→ The accumulator cable has to be wrapped in!
→ Take care that the ends of the foam rubber band **do not overlap!**
→ Allow generous overlapping of the fabric tabe to prevent the glued joint becoming loose.

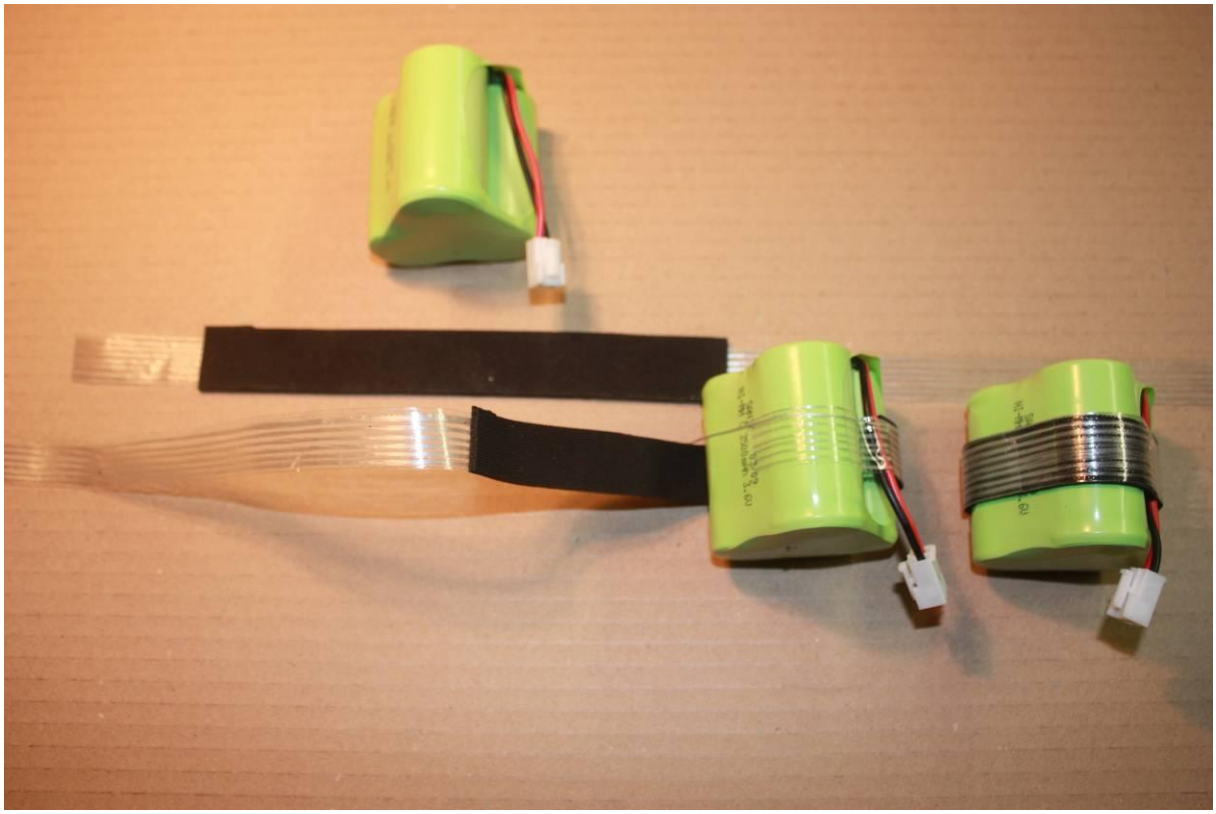


Fig. 6

7) Glueing the foam rubber parts

Glue the two triangular shaped parts (each 2 mm thick) into the bottom cup (UHU).

Glue the strip 38 x 15 mm (2 mm thick) centrically to the plastic bracket (UHU).

8) Preparing the glass cylinder

For aligning the type label place marks on the glass cylinder with approx. 30 mm and 10 mm distance from the edge respectively using a felt pen (s. Fig. 7).

Stick glueing tape approx 3 to 5 mm onto the type label, insert the type label into the glass cylinder, press down slightly, align and finally press down strongly.

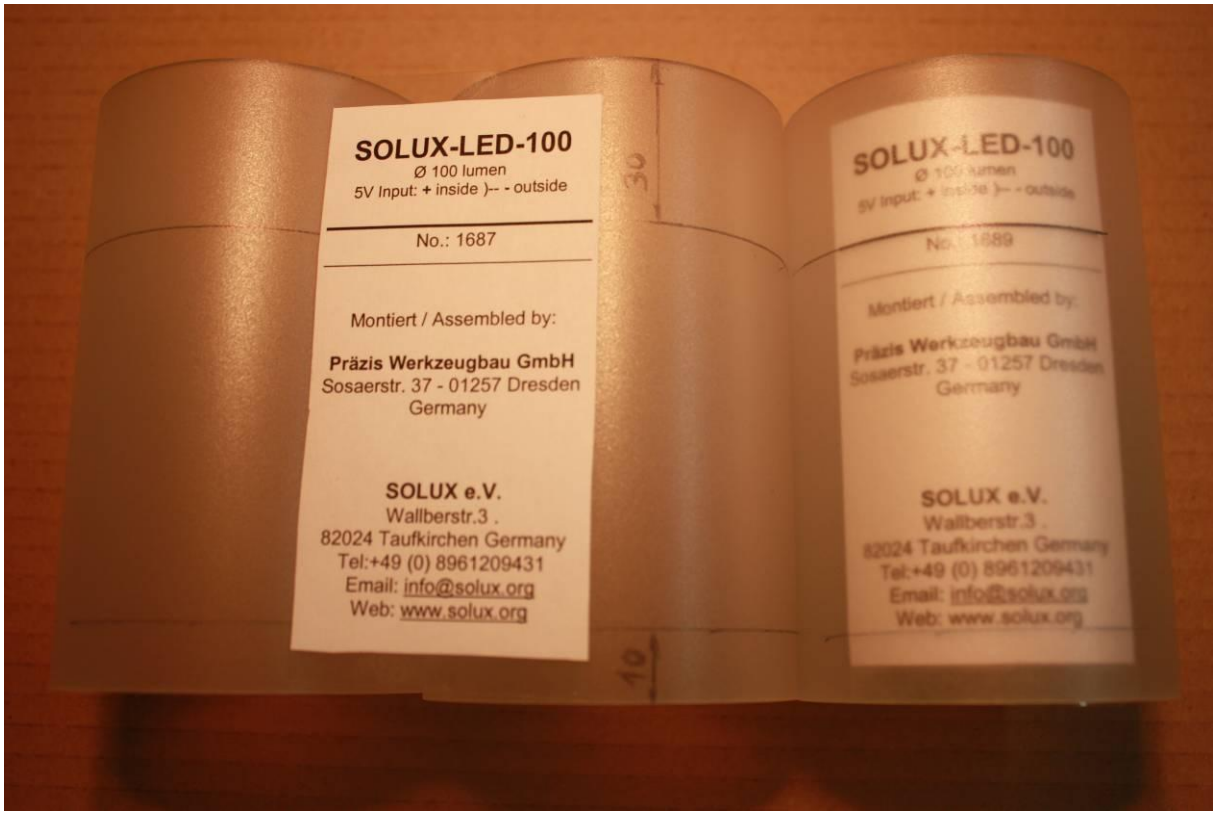


Fig. 7

9) 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	35	
10	yellow	90	
11	yellow	110	
12	brown	120	
13	red	45	
a	black	60	**1)**
b	white or red	60	**1) 2)**
c	black	Original length	**1) 3)**
d	white or red	Original length	**1) 2)**

1) The wires a, b, c, d are already soldered to the current regulator (state of delivery), all free ends have to be tinned.
- a / black: connector 'LED -'
- b / white: connector 'LED +'
- c / black: connector 'V -'
- d / white: connector 'V +'

2) White or red depending on condition of delivery

3) Original length is 100 mm. If shorter → replace!

10) Preparing the soldering strip

Cut the soldering strip into parts of 12 soldering tags using a fine saw.

→ **Caution**: brittle material!

Remove the soldering tags at the positions 3, 6, 9 and 10 (s. Fig. 8).

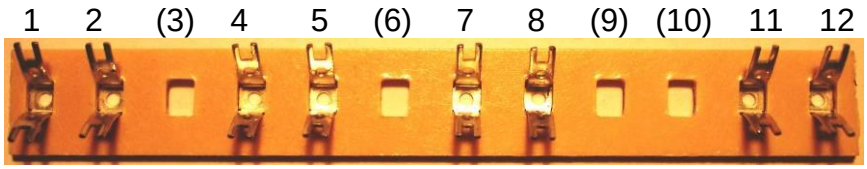


Fig. 8

B) Pre-assembly

1) Mounting cooling plate and soldering strip

Fasten cooling plate and soldering strip (s. Fig. 9) onto the plastic bracket using distance tubes (length 5mm) with sheet-metal screws (s. Fig. 10).

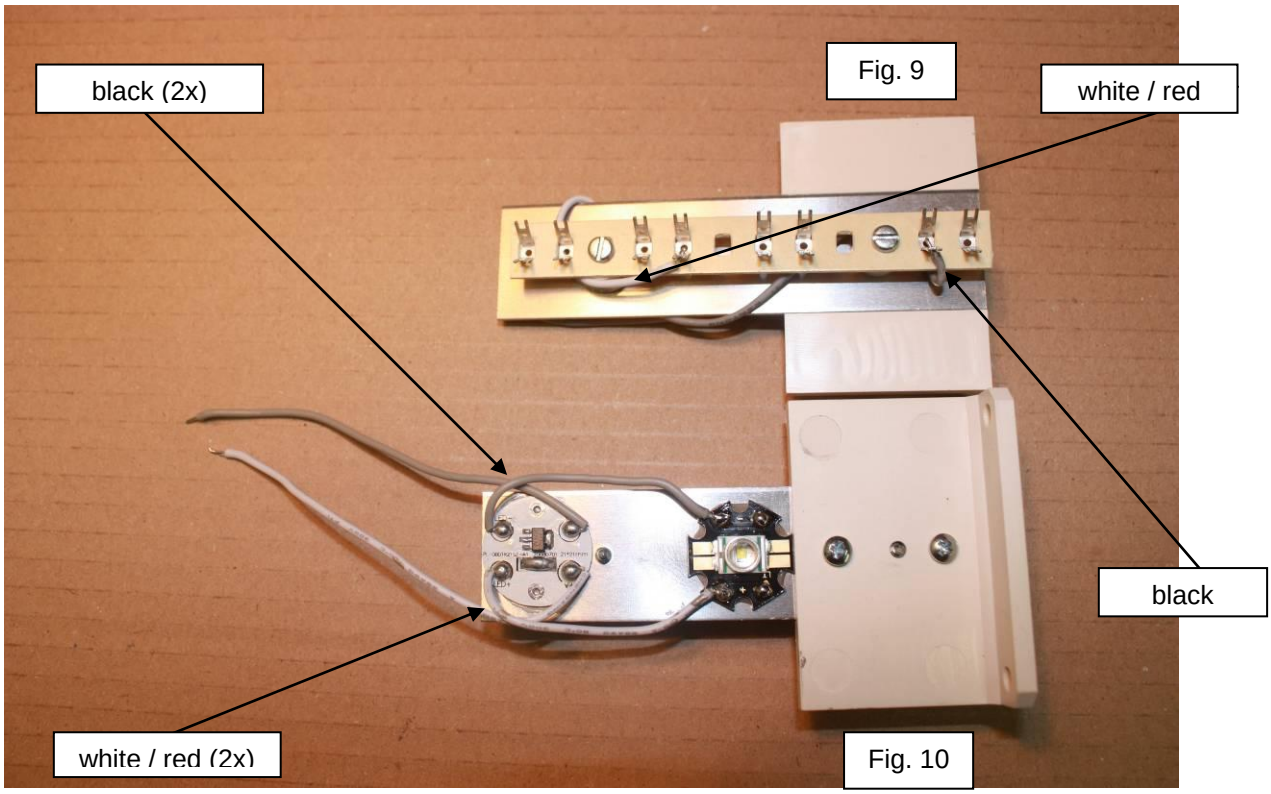


Fig. 9 Fig. 10

2) Mounting the white light-emitting diode (LED) and the current regulator chip

Roughen the glueing areas of the current regulator chip and the cooling plate with abrasive paper.

Glue current regulator chip onto the cooling plate using UHU-power adhesive (postion according to Fig. 10!):
LED circuit points **+ -** above
V circuit points **+ -** below

Richly tin the soldering connectors of the LED!

Brush LED bearing side with heat-conducting paste

Fasten LED onto the cooling plate using sheet-metal screws and plastic washers (postion according to Fig. 10!):
+ - above, **+** left, **-** right

Hint:
first precut the thread using the sheet-metal screw without LED and plastic washer, then mount LED and plastic washer.

Carefully tin the connecting wires of the current regulator (shortened to 60 mm)
a / black (connector 'LED **-**')
b / white (connector 'LED **+**')

C) Mounting the top cup

1) Wiring the charging socket (before screwing in!) (s. Fig. 11)

Solder the related wires onto the charging socket accordingly:
- wire no. 02 / red onto the short soldering tag – positive pole
- twisted wires no.08 / blue and no. 09 / blue onto the other soldering tag

Cover positive pole (red) with shrinkdown plastic tubing.

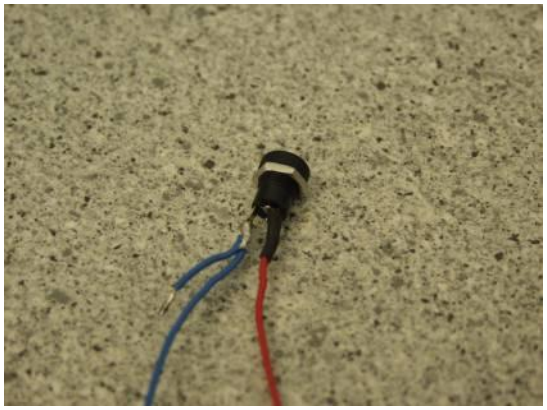


Fig. 11

2) Mounting the charging socket (s. Figs. 12 and 13)

Demount the nut from the charging socket, bewet the thread of the charging socket with a small amount of UHU adhesive, insert the charging socket into the top cup and mount the nut. When fixing the nut direct the blue-wired side to the hole for the yellow LED.

→ Allow the glue to dry completely (4 to 6 hours).

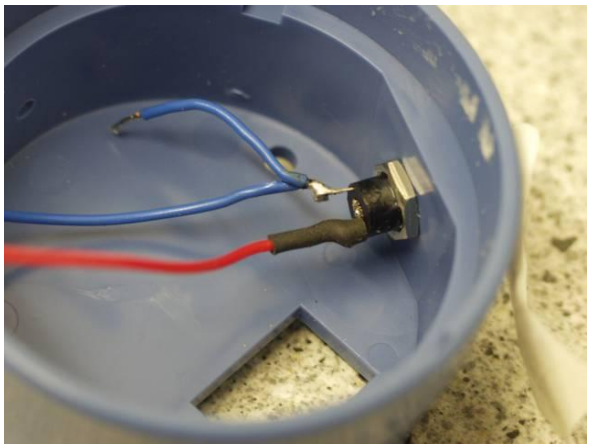


Fig. 12

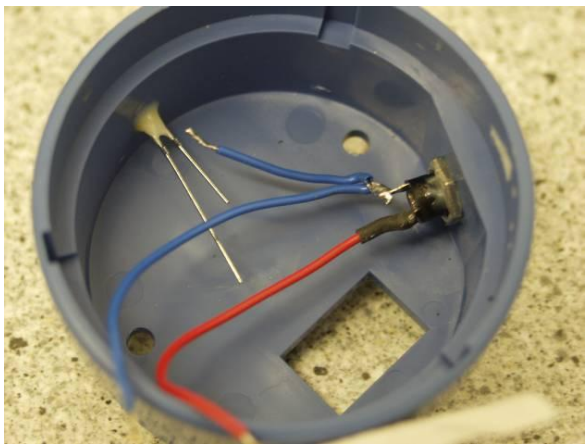


Fig. 13

Test:

Solar-Modul in die Sonne oder unter eine Lampe legen und die Ladespannung an den Drähten rot und blau mit dem Voltmeter messen (s. Bild 14).

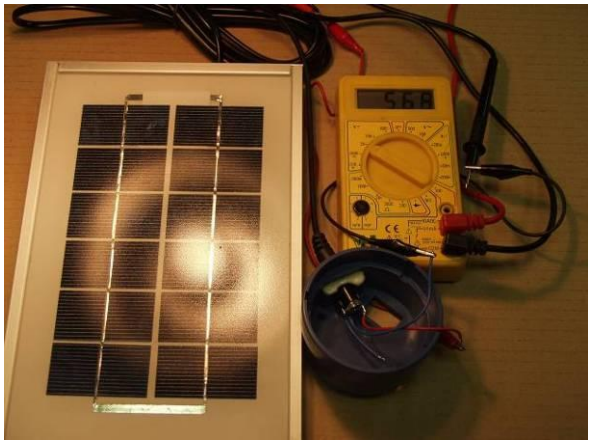


Bild 14

3) 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.

Wet the yellow LED with UHU adhesive and insert it into the hole. This has to be done in such a way that the shorter lead points in direction to the charging socket → s. Fig. 13

For locking purpose finally apply a drop of adhesive to the LED.
→ Allow to dry completely!

After drying bend the leads sidewards!

4) Wiring the switch

Solder the appropriate wires to the switch according to Fig. 15.

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

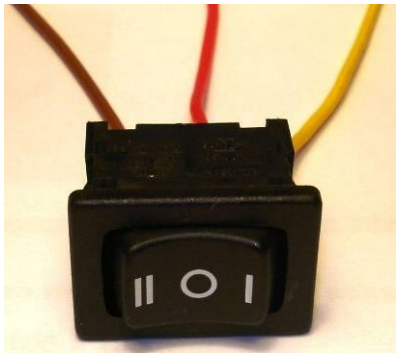


Fig. 15

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!

D) Wiring

1) Preparing the accumulator plug

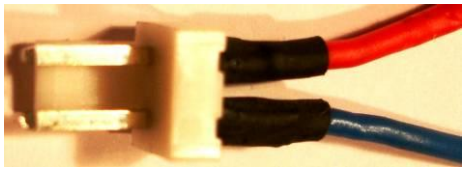
Solder the wires no. 13 / red and no. 05 / blue to the accumulator plug according to Fig. 16.

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.

No. 13 / red



No. 05 / blue

Fig. 16

2) Wiring the yellow light-emitting diode (LED) (s. Fig. 17)

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.

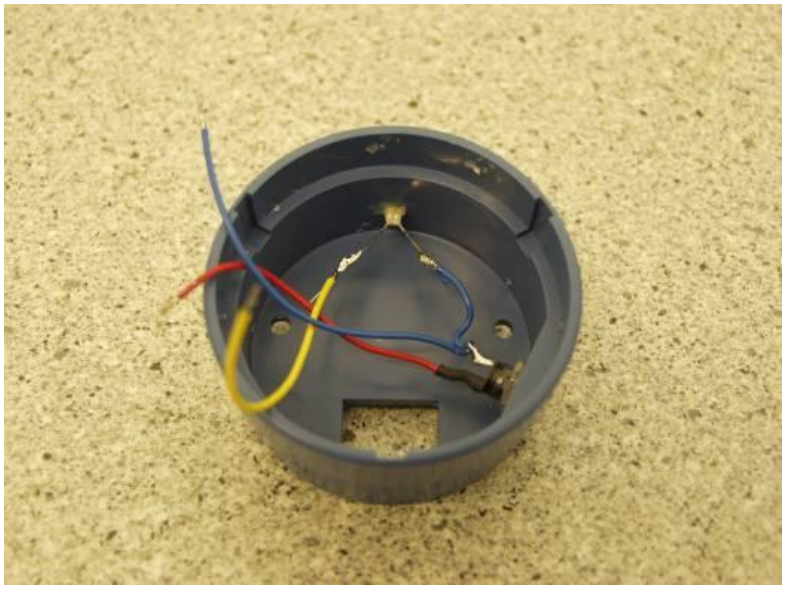


Fig. 17

3) Mounting the components to the soldering strip (s. Fig. 18 and 19)

→ See appendix 2: Wiring Diagram

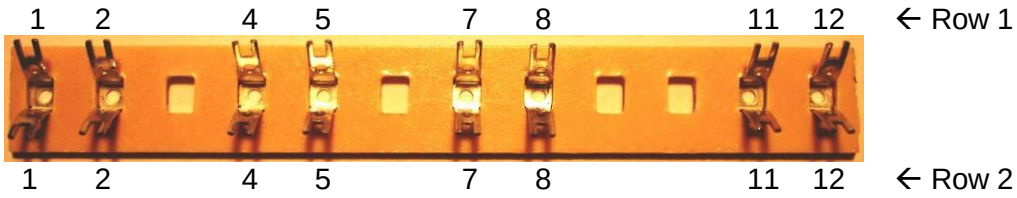


Fig. 18

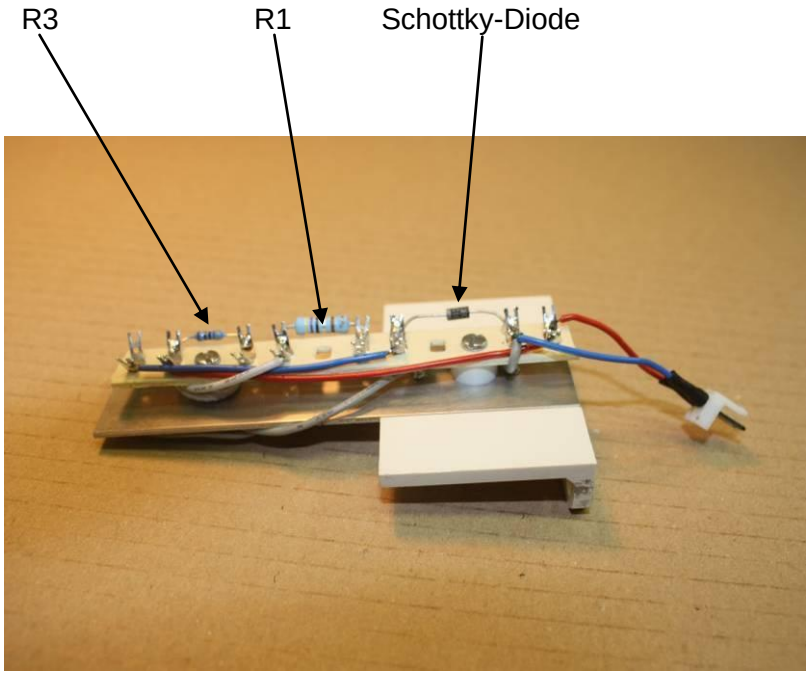


Fig. 19

Row 1:

- Solder resistor R3 between soldering tags 2 and 4.
- Solder resistor R1 between soldering tags 5 and 7.
- Solder the Schottky-diode between soldering tags 8 and 11 (**bright marking ring left-sided**)

Row 2:

- Solder wire no. 07 / blue between soldering tags 1 and 8.
- Solder wire no. 01 / red between soldering tags 2 and 12.
- Solder wire c / black (V-) of the current regulator onto soldering tag 11
- Solder wire d / white (V+) of the current regulator onto soldering tag 5

- Solder wire no. 13 / red of the accumulator plug onto soldering tag 12 / row 1.
- Solder wire no. 05 / blue of the accumulator plug onto soldering tag 11 / row 2.

4) Mounting the top cup with plastic bracket and cooling plate (Figs. 20, 21, 22)

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

Slide the white distance tubes onto the threaded rods and srew them firmly with washers and nuts.

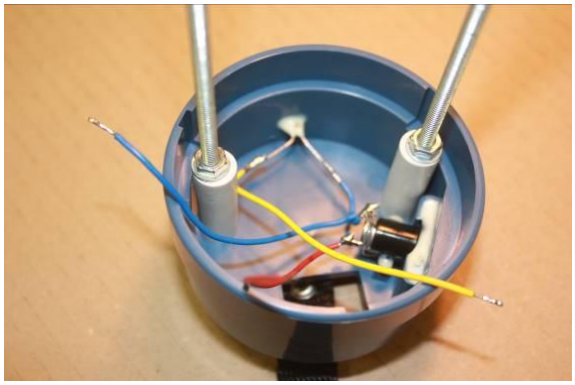


Fig. 20

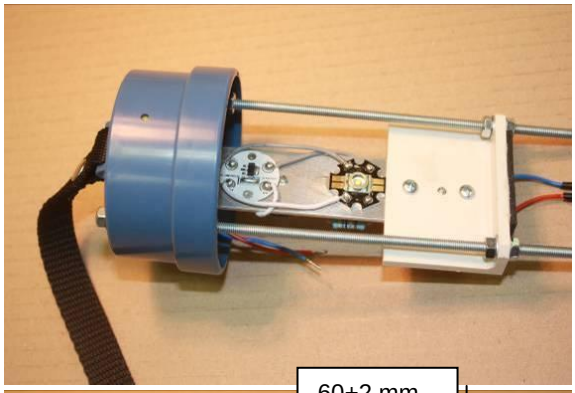


Fig. 21

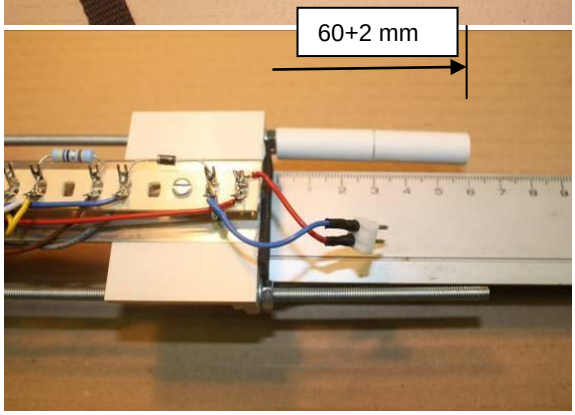


Fig. 22

Add another nut and washer to each threaded rod

Slide plastic bracket and cooling plate onto the threaded rods 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.

Add another nut and washer to each threaded rod and adjust by means of two distance tubes (length 30 mm each) so that the distance between the nut above and the end of the threaded rod is 60 mm.

Fasten the nuts firmly and lock with UHU power adhesive.

5) Mounting the switch

Put the protective cap over the switch (s. Fig. 23).

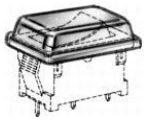


Fig. 23

Insert the switch according to Fig. 23a into the top cup and notice the complete snapping in.

Fig. 23a

6) Completing the wiring

→ See appendix 2: Wiring diagram

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

Soldering step 1 + 2 (s. Fig. 24 and 25)

- Solder wire no. 10 / yellow from the yellow LED onto soldering tag 4 / row 2
- Solder wire no. 02 / red from the charging socket onto soldering tag 2 / row 2
- Solder wire no. 08 / blue from the charging socket onto soldering tag 1 / row 1

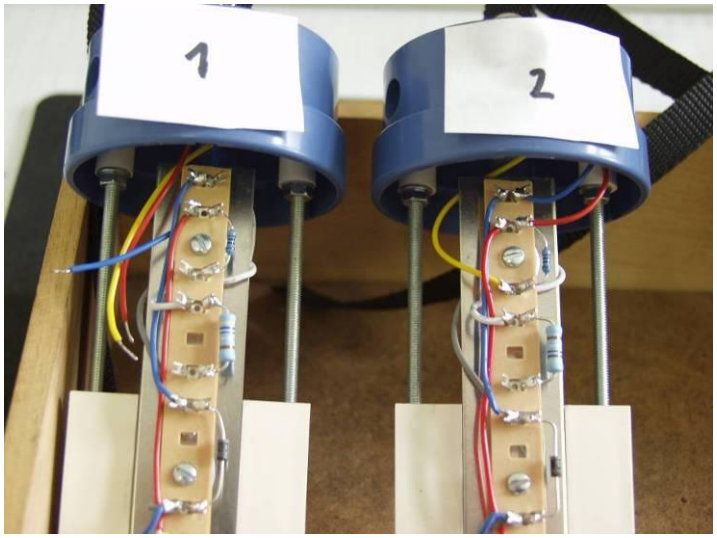


Fig. 24 Fig. 25

Soldering step 3 + 4 (s. Fig. 26 and 27)

Wiring of the switch:

- Solder wire no. 12 / brown onto soldering tag 7 / row 2
- Solder wire no. 11 / yellow onto soldering tag 5 / row 2
- Solder wire no. 03 / red onto soldering tag 2 / row 1

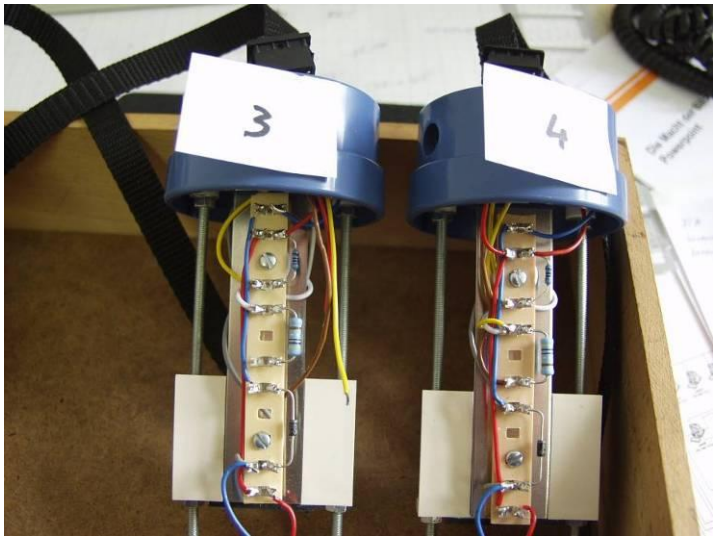


Fig. 26 Fig. 27

D) Functional Check

1) Before complete assembling

Connect the accumulator

→ The white LED illuminates differently according to the switch position I or II
(**I**: poor / **II**: bright)

Remove the accumulator and connect a voltage source (**4,5 V / max. 350 mA**) or the solar module (if there is sufficient sunlight) to the charging socket:
→ The yellow LED illuminates permanentely.
→ Check voltage and polarity with the digital multimeter:
center contact: PLUS, outside contact: MINUS
- red = **+**
- blue = **-**
If the measuring lines are connected appropriately (red to red, black to blue), the digital multimeter indicates a positive voltage value.

If the white LED does not illuminate check voltage and correct polarity (**+**, **-**) beginning from the accumulator plug to the current regulator chip (V+ / V-) according to the wiring diagram.

At current loss between V+ und LED+ at the current regulator chip, the current regulator chip might be defect and has to be replaced.

If the yellow LED does not illuminate when using a voltage source or the solar module, check the voltage beginning at the charging socket following the wiring diagram.

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.

Connect both parts of the accumulator plug with each other (s. Figs. 28 and 29)
Notice the correct 'snapping-in' of the plug parts!

Position the accumulator pack between the threaded rods (s. Fig. 30).

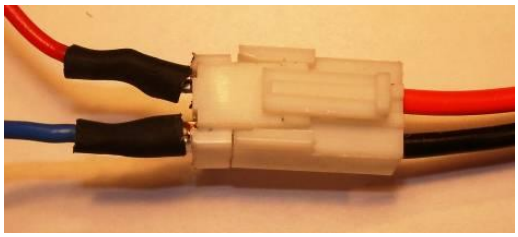


Fig. 28

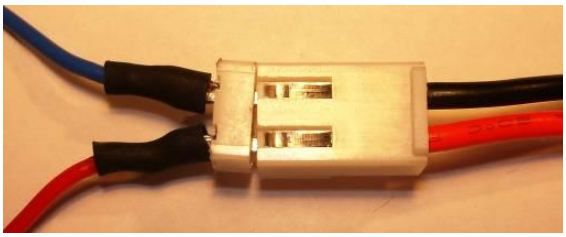


Fig. 29

Fig. 30

2) Mounting the bottom cup

Insert the large sealing ring into the bottom cup.

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

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

The washer is located between screw head and carrying belt.

G) 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 permanentely.
   → The white LED doesn't illuminate.

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

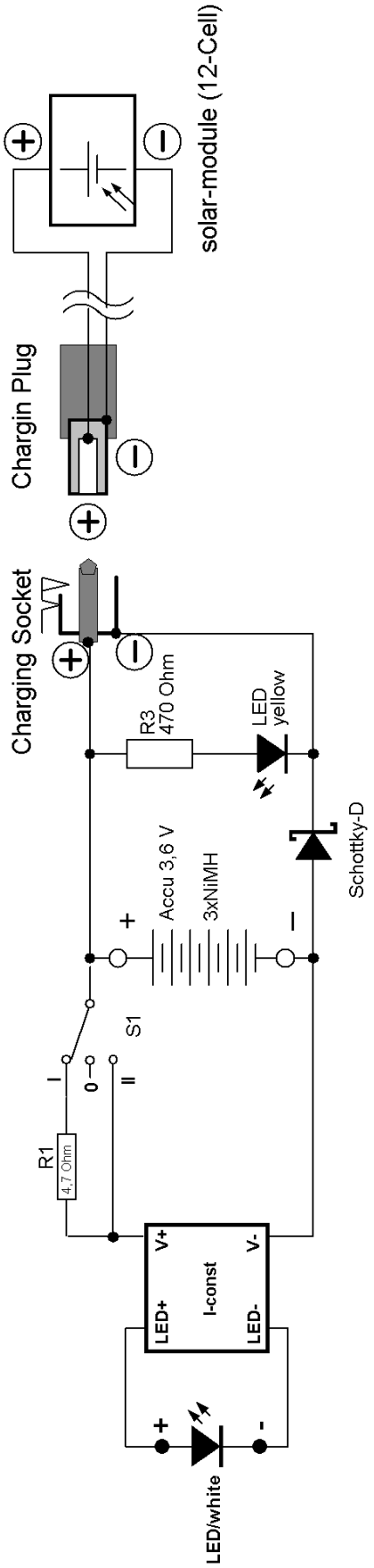
   → The yellow LED goes off.

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

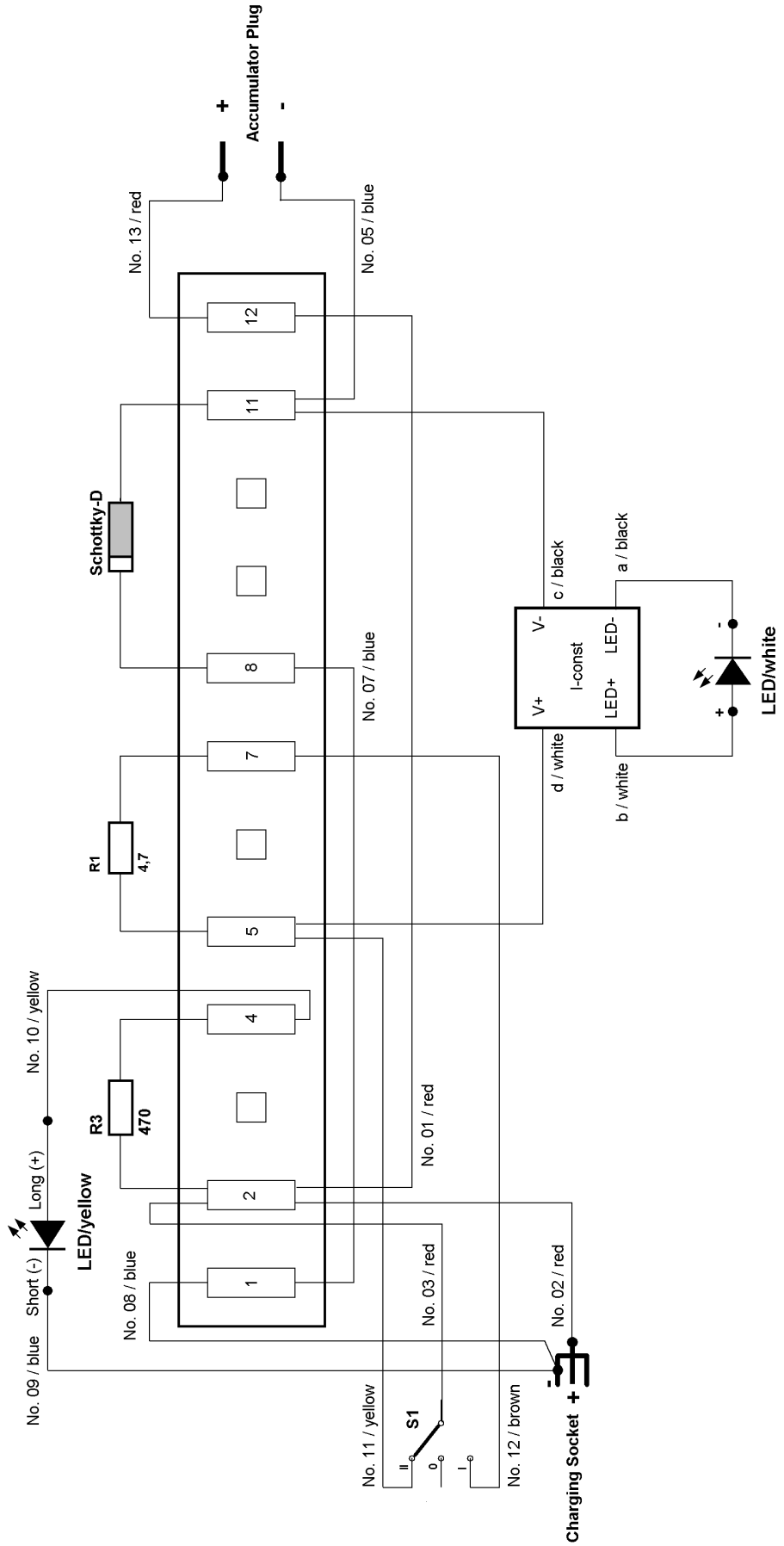
   → Quote out of the "Operation Manual" / page 2:

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

Appendix 1: <u>Circuit Diagram</u>

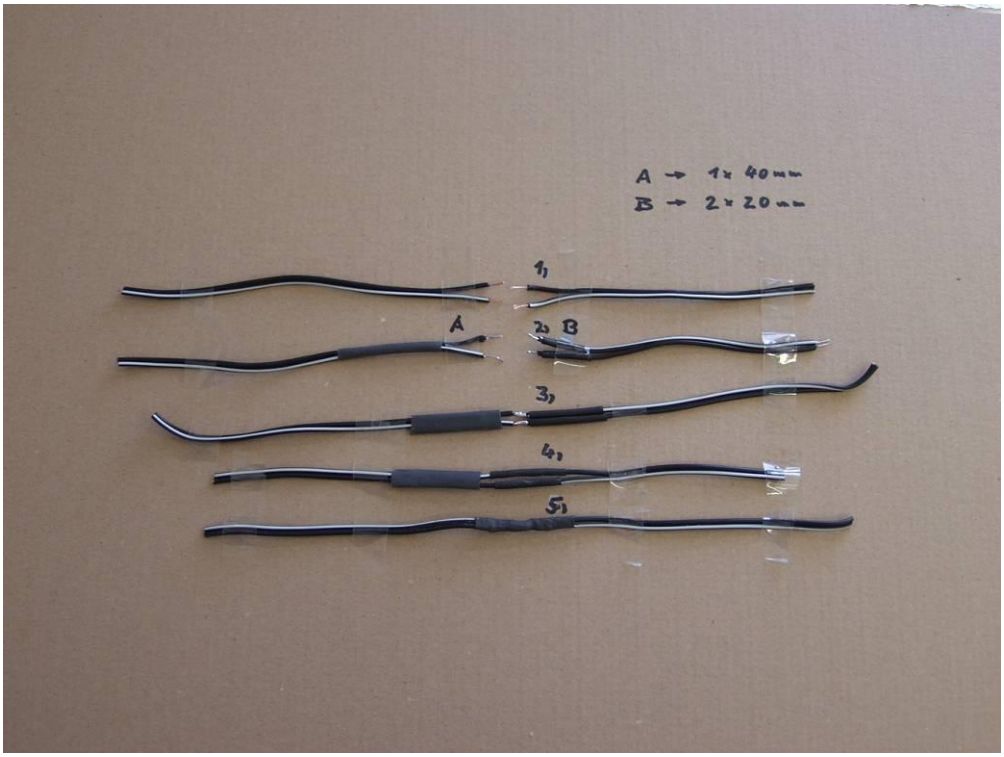


Appendix 2: Wiring Diagram



Appendix 3: Reworking of Solar Module

Reworking of a solar module Solux I or IP to a module for Solux LED 100 by crossing over the leads.



1. Cut the cable and remove the insulation

2. Slide on the shrinkdown plastic tubings

   A: 1 x 40 mm
   B: 2 x 20 mm

3. Cross and solder together the wires: **+** to **-** / white to black

4. Slide on both shrinkdown plastic tubings B and shrink

5. Slide on the shrinkdown plastic tubing A and shrink

6. Mark the module with **"LED-100"** to prevent mixing up with SOLUX-I or SOLUX-IP!

Result:

Charging plug for Solux-LED-100:
   center contakt **Plus**
   outside contact **Minus**