Spectra+ K-LED Battery & Charger

Service Manual

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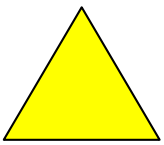

ALWAYS READ THE INSTRUCTIONS

A HALMA GROUP COMPANY

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Part No 2415-P-7017

CONTENTS

Introduction

The instructions in this manual cover the Batteries and Chargers used with both the Spectra Indirect Ophthalmoscope and the K-LED Headlight.

The 12 volt Switched Mode Power Supply (EP39-32777) is a non-repairable unit. Any fault with this will require it to be replaced.

Tools Required

Most of the tools required will be in a standard electro-mechanical toolkit.

Spare Parts

Parts lists are shown at the end of each section.

Parts not listed are generally not available as spares.

There are a number of parts which are common to both the Single and Double Chargers.

There are a number of parts which are common to both the Battery with Switch and Battery with Control.

Parts marked * are only available as part of a kit shown at the bottom of the relevant Parts List.

Current prices for spare parts are available from Technical Service.

Technical Service
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Clewer Hill Road
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Phone +44 (0)1753 827110

Fax +44 (0)1753 827114

Precautions

Care should be taken to carry out any repair work on a clean soft surface to minimise damage to the outside of the unit.

Great care should be taken to avoid short circuiting the Lithium Ion Batteries as this could cause damage.

Do not heat or incinerate the batteries.

Do not dismantle the battery assemblies.

Solvents should **not** be used for cleaning.

Lithium Battery with Switch

Disassembly

1. Remove 2 off M1.7 x 5 CSK PT Screws (14) from the bottom of the Battery Box front (9).
2. Remove 2 off M2.5 x 25 CSK PT Screw (1) from the Battery Box Rear (10)
3. The Front and Rear halves of the Box can now be parted allowing access to the remaining assembly.

Replacements

Battery

1. Remove the old Battery (4) by carefully lifting the tongue on the white plug mounted on the PCB (16) releasing the connector on the lead from the Battery.
2. Move the self adhesive foam strips from the old battery to the new battery.
3. Connect the new Battery (4) by fitting the connector on the battery lead to the white plug on the PCB (16).

PCB

1. Carefully un-solder 4 wires (Black, Yellow, Red, White) from the PCB.
2. On the new PCB. solder a link between P6 and P7 (marked on the front of the PCB)
3. Ensure that all 4 wires pass through the Ferrite Bead (12)
4. Carefully re-solder the 4 wires to the new PCB.

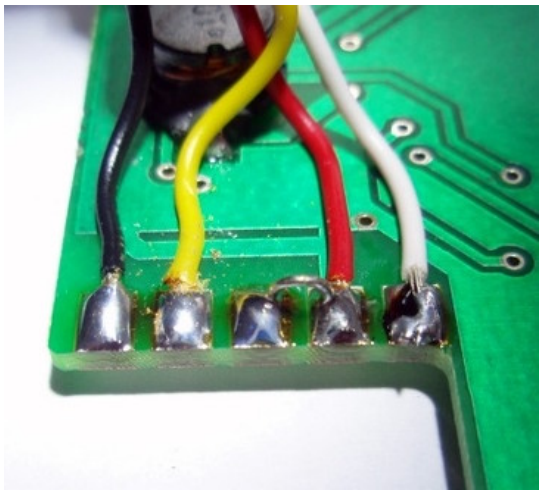
P4 – Black

P5 – Yellow

P6 – Left Blank with link only

P7 – Red with link to P6

P8 – White



Switch

1. Carefully un-solder 1 off Brown wire and 1 off White wire from the Switch (3) terminals
2. Whilst squeezing the fixing lugs against the body of the Switch(3) push the switch through the Top Plate (2).
3. Fit the replacement Switch (3) by squeezing the fixing lugs and pushing it through the cut-out in the Top Plate (2) noting that the '0' on the switch rocker is nearest to the end of the Top Plate (2).
4. Carefully re-solder 2 wires to the switch terminals.

Brown	Terminal in the centre of the switch
White	Outer terminal

Note that the White wire passes through the Ferrite Bead (12) but the Brown wire does not.

Lemo Plug

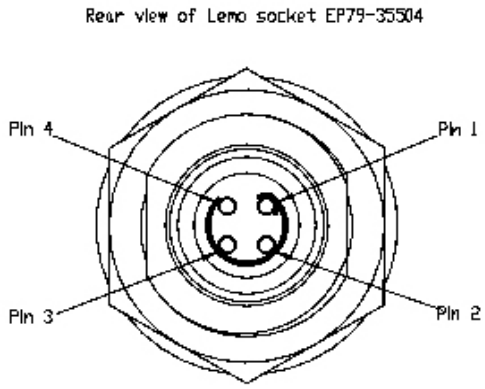
1. Carefully un-solder 4 wires (Yellow, Brown, Red, Black) from the old Lemo Plug (7)
2. Unscrew the nut on the back of the Lemo Plug (7)
3. Remove the old Lemo Plug.
4. Place the new Lemo Plug (7) through the Top Plate(2)
5. Ensure that the front threaded ring is flush with the plug body.
6. Fit the nut onto the rear of the Lemo Plug (7) and tighten it.
7. Ensure that the Yellow, Red and White wires pass through the Ferrite Bead (12) and the Brown wire does not.
8. Carefully re-solder 4 wires to the Lemo Plug terminals. Refer to the diagram for pin numbers. Note the marking around the pins.

Pin 1 – Yellow

Pin 2 – Brown

Pin 3 – Red

Pin 4 – Black



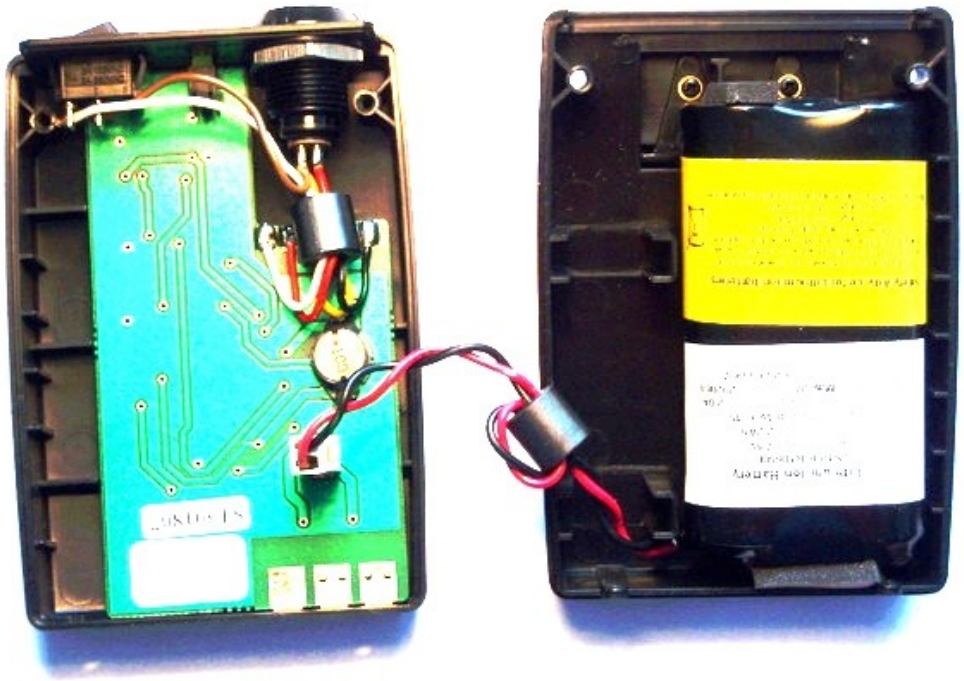
Belt Clip

1. Remove the Battery (4) from the Battery Box Rear (10)
2. Remove 2 off M1.6 x 5 Pan Head Screws (13) and 2 off M1.6 Washers (15) from the inside of the Battery Box Rear
3. Remove the old Clip (11)

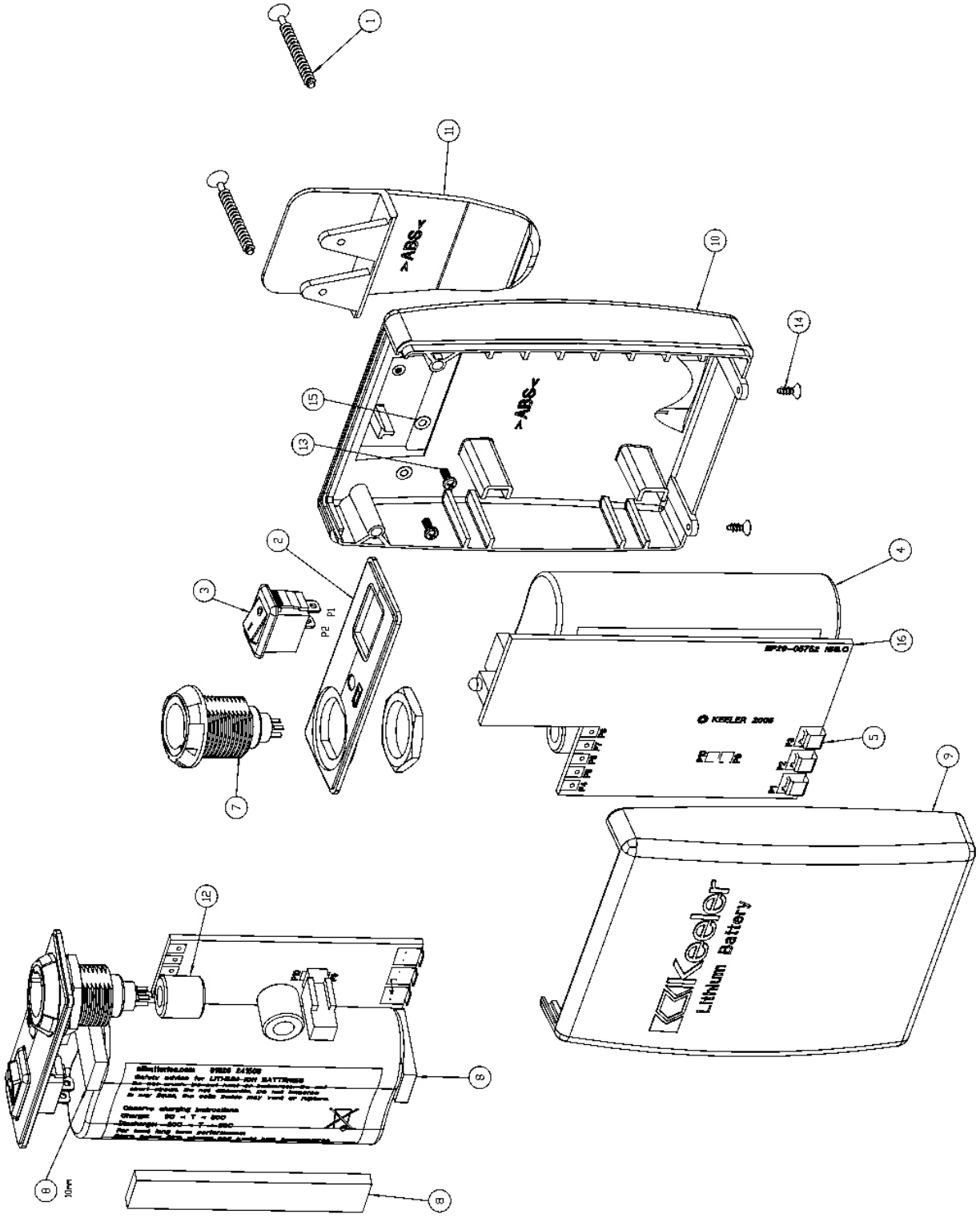
4. Fit the new Clip (11) through the slot in the Battery Box Rear (10)
5. Secure using 2 off M1.6 x 5 pan head Screws (13) and 2 off M1.6 Washers (15)

Reassembly

1. Ensure that the Battery (4) is connected to the PCB (16)
2. Lay the Battery (4) in the Battery Box Rear as shown ensuring that the Foam Strips (8) all in place.
3. Carefully fit the Top Panel (2) into the Front (9) along with the PCB (16) ensuring that the PCB (16) fits between the webs in the Front (9) and the LED on the PCB (16) fits into the hole in the Top Panel (2)
4. Carefully put the Battery Box front (9) and Rear (10) together ensuring that the Top Plate (2) fits into the grooves on both parts and that no wires are trapped.
5. Secure the two halves together using 2 off M2.5 x 25 CSK PT Screws (1) in the back of the Rear (10) and 2 off M1.7 x 5 CSK PT Screws (14) in the bottom of the Front.



Exploded Parts Diagram - Lithium Battery with Switch



Spare Parts - Lithium Battery with Switch

Item	Part No	Description	
1	SP72-50003	M2.5 x 25 CSK PT Screw	*
2	EP39-23100	Top Plate	
3	EP79-35512	On/Off Switch	
4	EP39-33907	LED Battery Pack	
7	EP79-35504	Lemo Socket	
8	RP99-99253	Foam Tape	*
9	EP19-02576	Battery Box Front	
10	EP19-02584	Battery Box Rear	
11	EP39-23063	Battery box Clip	
12	EP79-10374	Ferrite Bead	*
13	SP11-65001	M1.6 x 4 Pan Head PT Screw	*
14	SP71-82024	M1.7 x 5 CSK PT Screw	*
15	WP11-61009	M1.6 Washer	*
16	1919-P-7122	PCB Assembly	
	1919-P-7114	Lithium Battery Fixing Kit	

* - only available as part of the Fixing Kit

Lithium Battery with Control

Disassembly

1. Remove 2 off M1.7 x 5 CSK PT Screws (7) from the bottom of the Battery Box front (10).
2. Remove 2 off M2.5 x 25 CSK PT Screw (1) from the Battery Box Rear (9)
3. The Front and Rear halves of the Box can now be parted allowing access to the remaining assembly.

Replacements

Battery

1. Remove the old Battery (15) by carefully lifting the tongue on the white plug mounted on the PCB (3) releasing the connector on the lead from the Battery.
2. Move the self adhesive foam strips from the old battery to the new battery.
3. Connect the new Battery (15) by fitting the connector on the battery lead to the white plug on the PCB (3).

PCB

1. Carefully un-solder 5 wires (Black, Yellow, White, Blue, Red) from the PCB.
2. Ensure that all 5 wires pass through the Ferrite Bead (12)
3. Carefully re-solder the 4 wires to the new PCB.

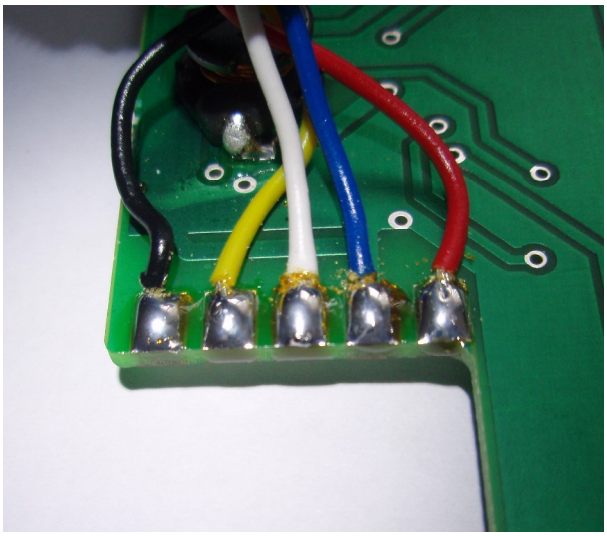
P4 – Black

P5 – Yellow

P6 – White

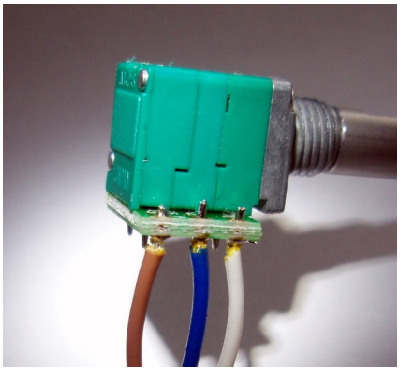
P7 – Blue

P8 – Red



Brightness Control

1. Slide the Indicator Pin (2) out of the Control Knob (5) to reveal an Allen Screw.
2. Slacken the Allen Screw using a 1.5mm Allen Key.
3. Remove the Knob (5)
4. Undo the Nut retaining the Control PCB Assy (16) allowing it to be removed. Save the Washer.
5. Carefully un-solder 3 wires (Brown, Blue, White) from the Control PCB.
6. Carefully re-solder 3 wires (Brown, Blue, White) to the new PCB.
7. Fit the new PCB Assy (16) to the Top Plate (6) ensuring that the pip on the potentiometer fits into the recess in the Top Plate (6).
8. Fit the Washer and Nut to retain the assembly and carefully tighten it.
9. Fit the Knob (5) ensuring that the Allen Screw is lined up with the flat on the potentiometer shaft and tighten with a 1.5mm Allen Key.
10. Fit the Indicator Pin (2).



Lemo Plug

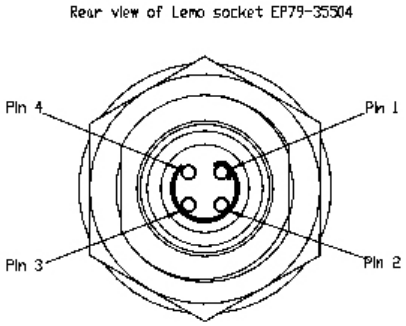
1. Carefully un-solder 4 wires (Yellow, Brown, Red, Black) from the old Lemo Plug (7)
2. Unscrew the nut on the back of the Lemo Plug (13)
3. Remove the old Lemo Plug.
4. Place the new Lemo Plug (13) through the Top Plate(6)
5. Ensure that the front threaded ring is flush with the plug body.
6. Fit the nut onto the rear of the Lemo Plug (13) and tighten it.
7. Ensure that the Yellow, Red and White wires pass through the Ferrite Bead (12) and the Brown wire does not.
8. Carefully re-solder 4 wires to the Lemo Plug terminals. Refer to the diagram for pin numbers. Note the marking around the pins.

Pin 1 – Yellow

Pin 2 – Brown

Pin 3 – Red

Pin 4 – Black

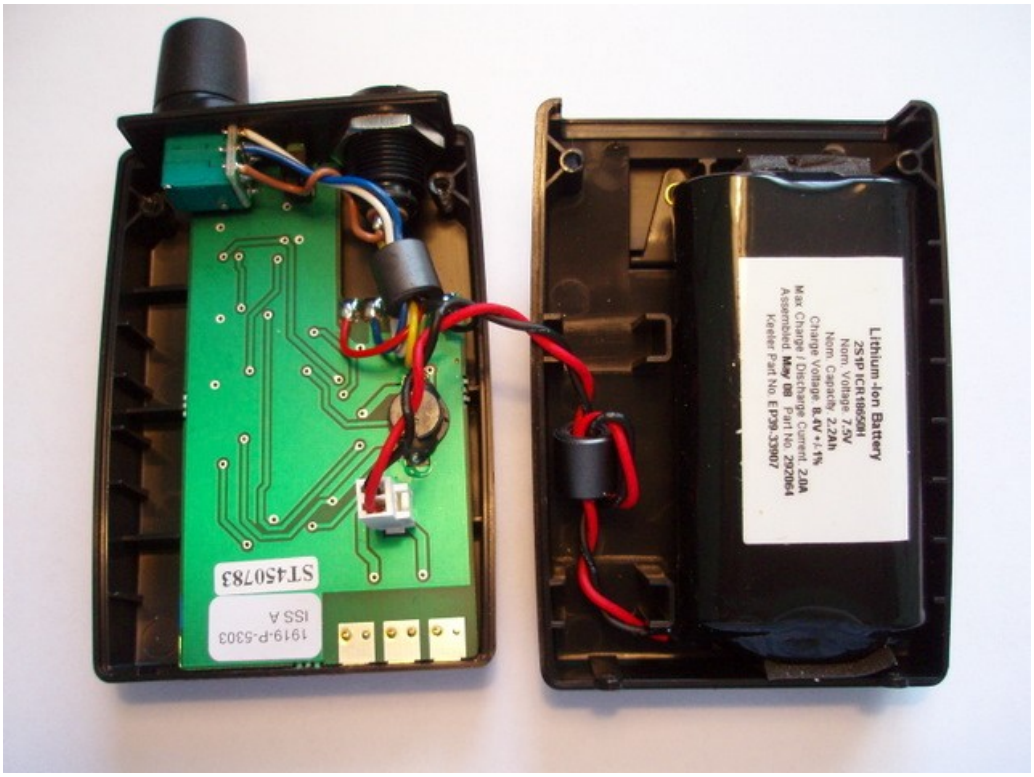


Belt Clip

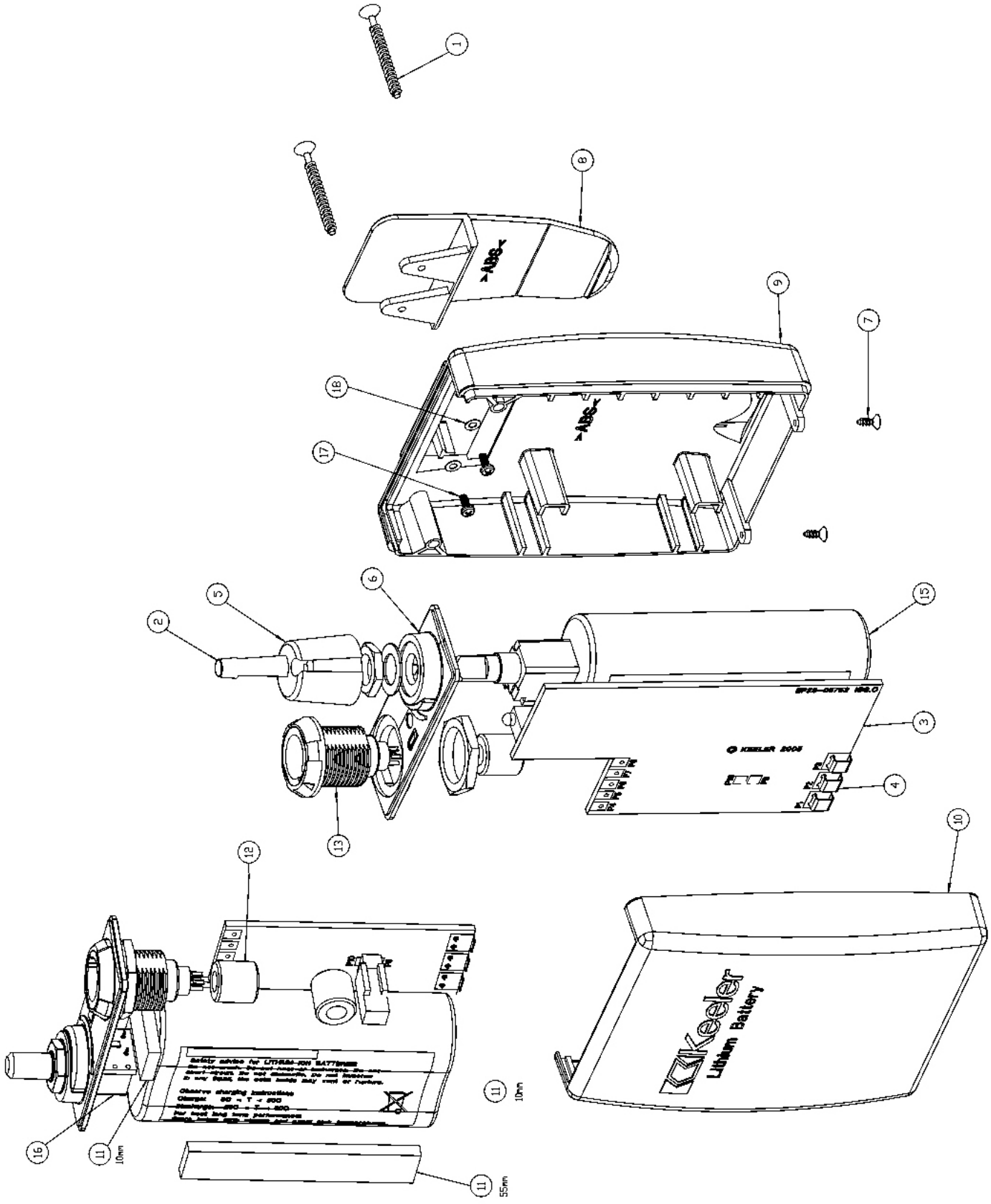
1. Remove the Battery (8) from the Battery Box Rear (9)
2. Remove 2 off M1.6 x 5 Pan Head Screws (17) and 2 off M1.6 Washers (18) from the inside of the Battery Box Rear
3. Remove the old Clip (8)
4. Fit the new Clip (8) through the slot in the Battery Box Rear (9)
5. Secure using 2 off M1.7 x 5 pan head Screws (17) and 2 off M1.6 Washers (18)

Reassembly

1. Ensure that the Battery (15) is connected to the PCB (3)
2. Lay the Battery (15) in the Battery Box Rear as shown ensuring that the Foam Strips (11) all in place.
3. Carefully fit the Top Panel (6) into the Front (10) along with the PCB (3) ensuring that the PCB (3) fits between the webs in the Front (10) and the LED on the PCB (3) fits into the hole in the Top Panel (6)
4. Carefully put the Battery Box front (10) and Rear (9) together ensuring that the Top Plate (6) fits into the grooves on both parts and that no wires are trapped.
5. Secure the two halves together using 2 off M2.5 x 25 CSK PT Screws (1) in the back of the Rear (9) and 2 off M1.7 x 5 CSK PT Screws (7) in the bottom of the Front.



Exploded Parts Diagram - Lithium Battery with Control



Spare Parts - Lithium Battery with Control

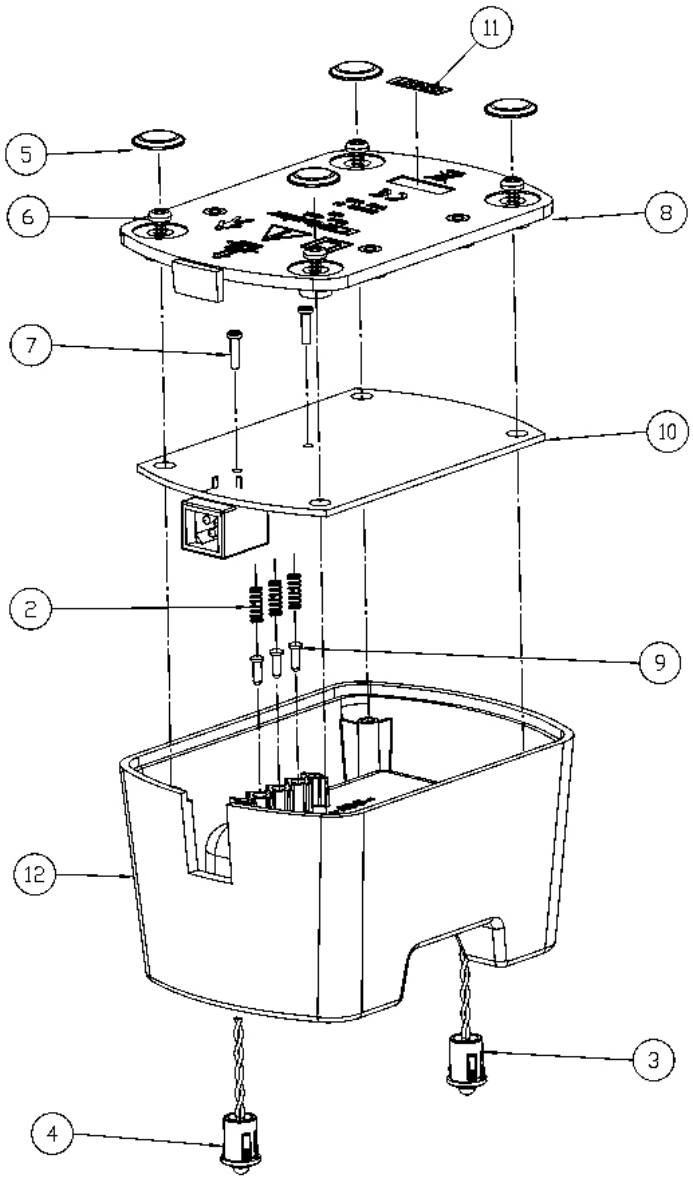
Item	Part No	Description	
1	SP72-50003	M2.5 x 25 CSK PT Screw	*
2	EP79-09808	Indicator Pin	*
3	1919-P-5303	Battery PCB	
5	EP79-09795	Knob	*
6	EP39-23071	Top Plate	
7	SP71-82024	M1.7 x 5 CSK PT Screw	*
8	EP39-23063	Battery Box Clip	
9	EP19-02584	Battery Box Rear	
10	EP19-02576	Battery Box Front	
11	RP99-99253	Foam Tape	*
12	EP79-10374	Ferrite Bead	*
13	EP79-35504	Lemo Socket	
15	EP39-33907	LED Battery Pack	
16	1919-P-5223	Pot PCB Assy	
17	SP11-65001	M1.6 x 4 Pan head PT Screw	*
18	WP11-61009	M1.6 Washer	*
		Lithium Battery Fixing Kit	

* - only available as part of the Fixing Kit

Single Charger

Disassembly

1. Carefully remove 4 off Adhesive Foot (5) from the base of the unit. This may be done by carefully inserting the point of a sharp blade under the foot ensuring that there is no danger of causing injury.
2. Remove 4 off M3 x 8 Pan Head Screws(6) holding the Base Moulding Assy (8) to the Top Moulding (12)
3. Remove 2 M2 x 8 Pan Head Screw (7) holding the PCB (10) to the Top moulding (12)
4. The PCB (10) may now be lifted out. Note the Contacts (9) and Contact Springs (2) are no longer retained and the PCB (10) is still attached to the Top Moulding (12) by the LED wires.
5. Remove 3 off Contact Springs (2) and 3 off Contacts (9)



Replacements

LEDs

1. Carefully push the LED (3,4) on the rim of its mount as shown from the inside of the Top Moulding (12) so that the LED (3,4) comes out of the front of the Top moulding (12).

2. The LED (3,4) may now be withdrawn from its mount by gently pulling on the wires.
3. The LED (3,4) may now be carefully unsoldered and replaced.
4. Note that the Red wire is soldered into the hole closest to the legend for LED1 and LED2 as appropriate. Note also that LED1 is Yellow and LED2 is Green.
5. Feed the LED (3,4) through its hole in the Top Moulding (12)
6. Insert the LED (3,4) fully into its mount and gently push the LED in its mount back into its hole whilst gently squeezing the lugs on the mount so that the mount fits tight against the Top Moulding (12)

PCB

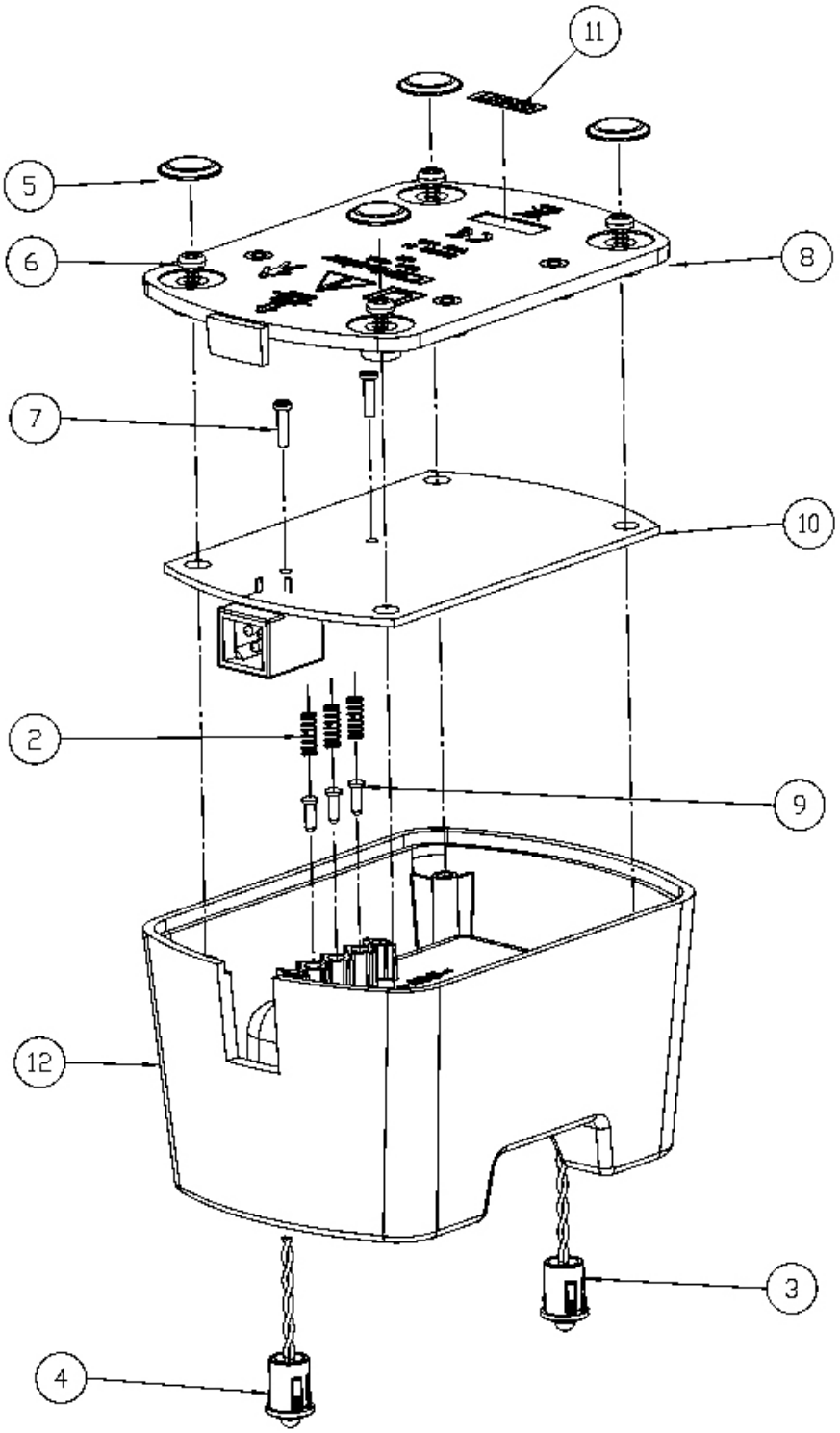
1. Disconnect both LEDs (3,4) as described above.
2. Solder the LEDs(3,4) to the replacement PCB
3. Refit the LEDs (3,4) to the Top Moulding (12) ensuring that they go in the correct positions.

Reassembly

1. Fit 3 off Charging Pins (7) by dropping them into the Top Moulding (12) with the flat base uppermost.
2. Fit 3 off Springs (2)
3. Fit the PCB (10) ensuring that the LED wires are not trapped under the PCB (10) in the contact area or under the 4 fixing bosses.
4. Check that the 3 contacts move freely.

5. Fit 2 off M2 x 8 Pan Head Screws (7) to retain the PCB (10)
6. Fit the Base Moulding (8) ensuring that the PCB (10) remains in place so that the Base Moulding (8) fits flush with the sides of the Top Moulding (12).
7. Fit 4 off M3 x 8 Pan Head Screws (6) to retain the Base Moulding (8)
8. Fit 4 off Adhesive Feet (5) over the screws.

Exploded Parts Diagram – Single Charger



Spare Parts - Single Charger

Item	Part No	Description	
2	EP59-35578	Spring	*
3	EP79-08629	Yellow LED	
4	EP79-08610	Green LED	
5	EP79-09496	Adhesive Pad Foot	*
6	SP73-00002	M3 x 8 Pozi Pan head Screw	*
7	SP72-00004	M2 x 8 Screw	*
8	EP29-30675	Base Moulding	
9	EP39-00849	Plunger Contact	*
10	1941-P-5377	Single Charger PCB	
12	EP29-30683	Top Moulding Assy	
	1941-P-7137	Single Charger Fixing Kit	

* - only available as part of the Fixing Kit

Double Charger

Disassembly

1. Remove 6 off M3 x 8 Pan Head Screws (17) holding the Charger Base (3) to the Charger Top (2)

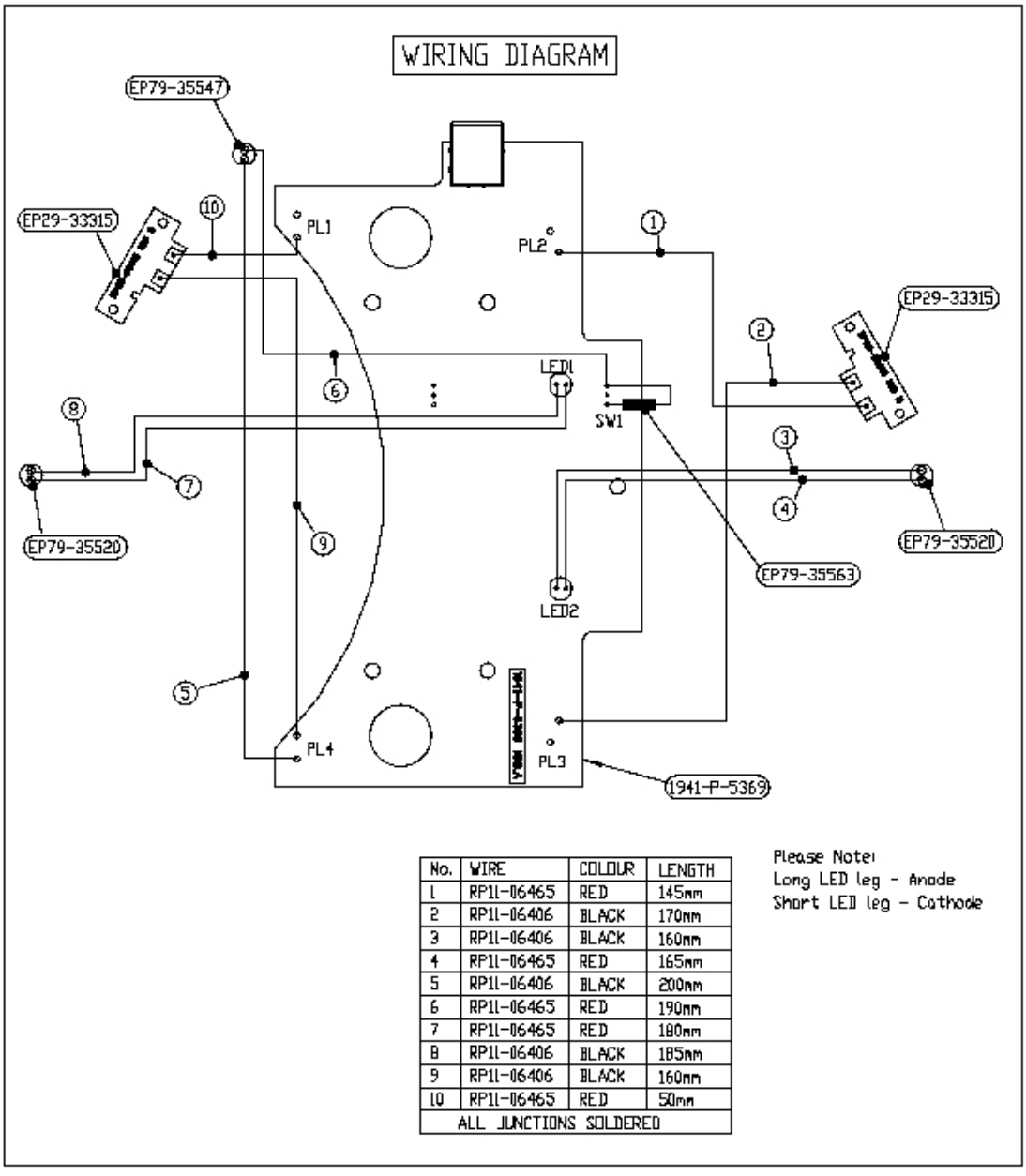
Replacements

Contact Assembly

1. If the Charging Contact PCB is to be replaced – carefully un-solder 2 wires (1 Black 1 Red) from the Charging Contact PCB (4).
2. Remove 2 off M2 x 8 Pan head Screws (16) holding the Charging Contact PCB (4) to the Charger Top (2)
3. Remove 3 off Springs (14) revealing 3 off Charging Pins (5)
4. Remove the Charging Pins (5) by turning the Charger Top (2) over taking care not to lose the pins.
5. Change any faulty parts – the Springs(14) and Pins (5) are silver plated and it is essential that both the Springs (14) and Pins (5) are clean to ensure proper charging of the batteries.
6. Fit 3 off Charging Pins (5) by dropping them into the Charger Top (2) with the flat base uppermost.
7. Fit 3 off Springs (14)
8. Fit the Charging Contact PCB (4) taking care not to distort the Springs(14)
9. Fix the Charging Contact PCB (4) using 2 off M2 x 8 Pan head Screws (17)
10. Carefully re-solder 2 off wires (1 Black 1 Red) noting the correct polarity with the Black wire going to the contact in the centre of the Charging Contact PCB (4)
11. Check that the 3 contacts move freely.

Main PCB

1. Carefully un-solder 10 off connections to the Charger PCB (1)
2. Remove 4 off M3 x 8 Pan head Screws (17) holding the Charger PCB (1) to the Charger Top (2)
3. Remove the old Charger PCB (1).
4. Fit the replacement Charger PCB (1).
5. Ensure that the Resistor (EP79-35563 – 820Ω) is fitted across SW1 position on the PCB as shown on the wiring diagram.
6. Fit 4 off M3 x 8 Pan head Screws (17).
7. Carefully re-solder 10 off connections to the Charger PCB (1). Refer to the wiring diagram to ensure that all the connections are made to the correct points.

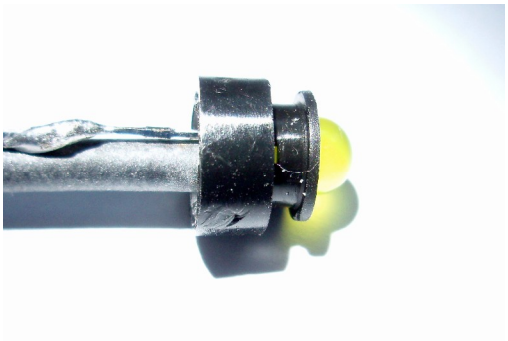


No.	WIRE	COLOUR	LENGTH
1	RP11-06465	RED	145mm
2	RP11-06406	BLACK	170mm
3	RP11-06406	BLACK	160mm
4	RP11-06465	RED	165mm
5	RP11-06406	BLACK	200mm
6	RP11-06465	RED	190mm
7	RP11-06465	RED	180mm
8	RP11-06406	BLACK	185mm
9	RP11-06406	BLACK	160mm
10	RP11-06465	RED	50mm
ALL JUNCTIONS SOLDERED			

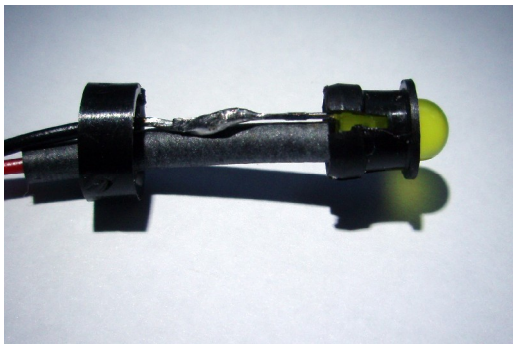
Please Note:
Long LED leg - Anode
Short LED leg - Cathode

LED

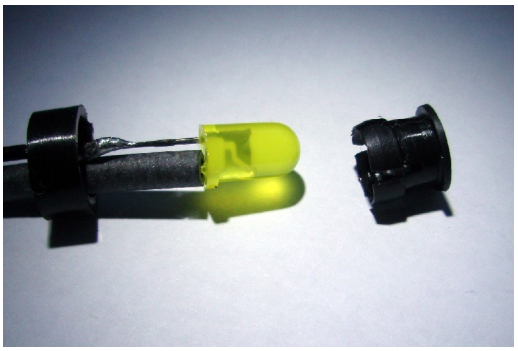
LEDs are held in place by a Locator Sleeve (12) and Ring (11) with the flange on the LED body resting in a groove inside the Locator Sleeve (11).



1. Carefully withdraw the Ring (11) from the Locator Sleeve (12). This may be achieved by gently levering the Ring (12) up with a screwdriver blade between the underside of the Ring (12) and the inside of the Charger Top (2) and when enough is free of the Locator Sleeve (12), pulling the Ring (11) with pliers or tweezers.



2. Spread the sides of the Locator Sleeve (12) so that the flange on the LED is released and the LED can be pushed through to the inside of the Charger Top (2).
3. Slide back the Rubber Sleeve on the Red wire and carefully un-solder the Black and red wires.
4. On the replacement LED note that the longer lead is the positive connected to the Red wire.

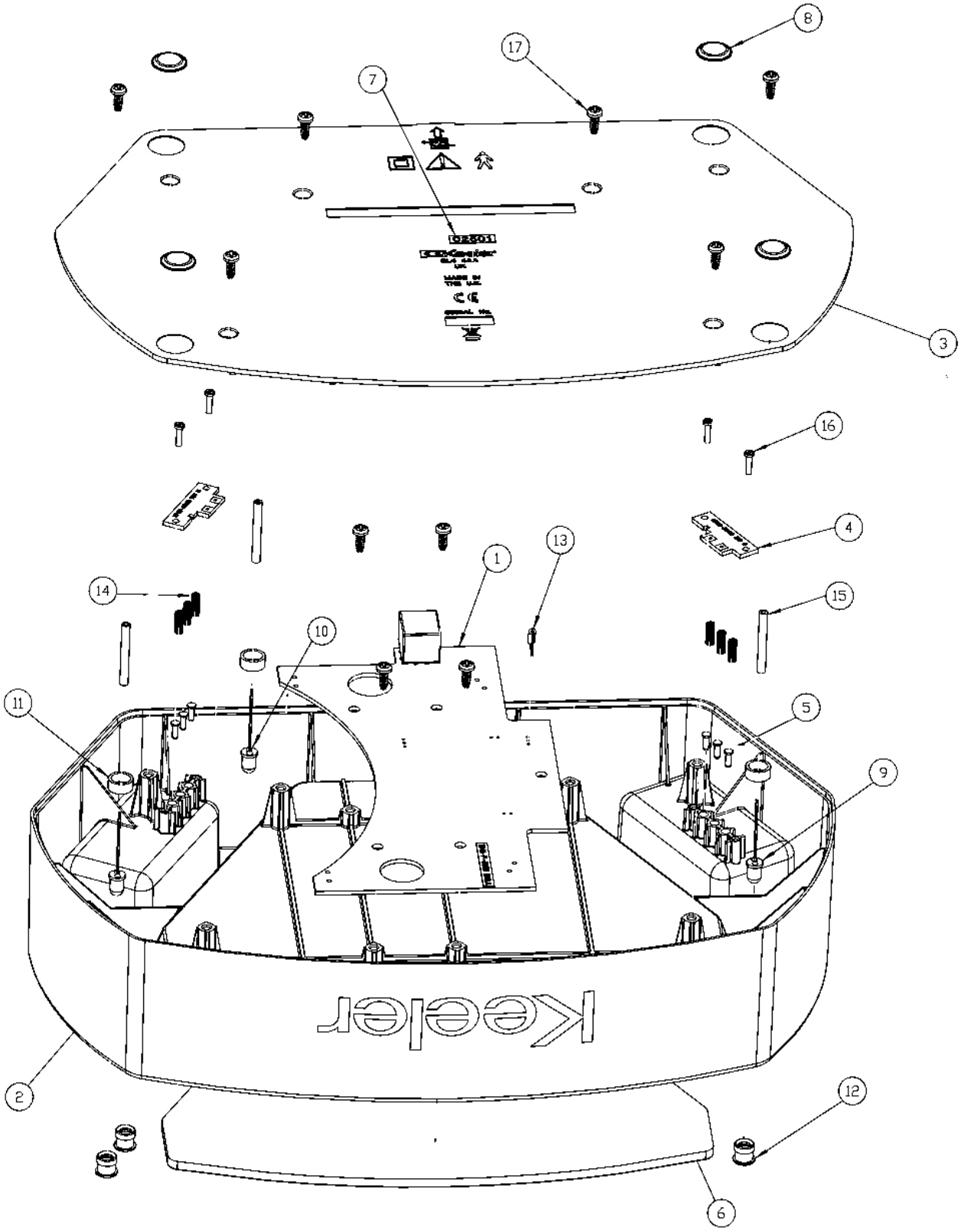


5. Cut approximately 15mm off of each ensuring that the longer lead remains the longer to identify it as the longer.
6. Ensure that the Rubber Sleeve (15) is still on the Red wire.
7. Carefully re-solder the Red wire to longer LED lead and the Black wire to the shorter lead identified by a flat on the LED Flange.
8. Slide the Rubber Sleeve (15) over the connection on the Red wire.
9. Ensure that the Locator Sleeve (12) is inserted into the hole on the Charger Top (2) from the front and lies flush with the face of the Charger Top (2).
10. Ensure that the LED is pushed through the Ring (11) onto the LED wiring with the chamfer on the inside of the Ring (11) towards the LED.
11. Holding the Locator Sleeve (12) against the face of the Charger Top (2) push the LED into the Locator Sleeve (12) until the flange on the LED locates in the groove of the Locator Sleeve.
12. Holding the LED and Locator (11) against the Charger Top (2), push the Ring (12) along the wiring and over the Locator Sleeve(11).

Reassembly

1. Check that all wiring within the unit is correctly connected and clear of the 6 bosses that the Charger Base fixing screws use.
2. Place the Charger Base (3) on the Charger Top (2) ensuring that is the correct way up with the recesses for the fixing screws on top.
3. Fix the Charger Base (3) to the Charger Top (2) using 6 off M3 x 8 Pan Head Screws (17)

Exploded Parts Diagram – Double Charger



Spare Parts - Double Charger

Item	Part No	Description	
1	1941-P-5369	Charger PCB	
2	EP19-02728	Charger Housing Top	
3	EP19-02736	Charger Housing Base	
4	EP29-33315	Charging Contact PCB	
5	EP39-00849	Charging Pin	*
6	EP39-15805	Charger Tray Lining	
8	EP79-09496	Padded Foot	*
9	EP79-35520	Yellow LED	*
10	EP79-35547	Green LED	*
11	EP79-35555	LED Locator Ring	*
12	EP79-35555	LED Locator Sleeve	*
13	EP79-35563	Resistor 820R	*
14	EP79-35627	Spring	*
15	EP79-40637	Insulating Sleeve	*
16	SP72-00004	M2 x 8 Pozi Pan Head Screw	*
17	SP73-00002	M3 x 8 Pozi Pan Head Screw	*
	1941-P-7145	Fixing Kit – K-LED Duo Charger	

* - only available as part of the Fixing Kit