

Model 2440 LI

4 A max out • 90-264 VAC input

- 3-step charge control with current detection as charge termination
- Universal input voltage (90-264 VAC)
- Charging 1-16 battery cells
- Waterproof (IP67) version available
- Approvals:
 - Medically certified
 - Safety: EN 60601-1 ed. 3.1
 - Home healthcare EN 60601-1-11
 - EMC: EN 60601-1-2 ed. 4
 - UL approved
- Custom specifications on request:

Charging parameters, connectors, cords, logo print, housing/open frame/IP rating and certificates. For more information: [custom design info sheet](#)

Notes:

Desktop unit
2-pin IEC 60320
Exchangeable DC plugs available
Standard DC output cord (exch. DC plugs):
Female connector L 1.8m, AWG 18, OD: 2.7 X 5.4 Black w. white line, UL 2468
Mounting bracket available
Order plugs and mains cord separately



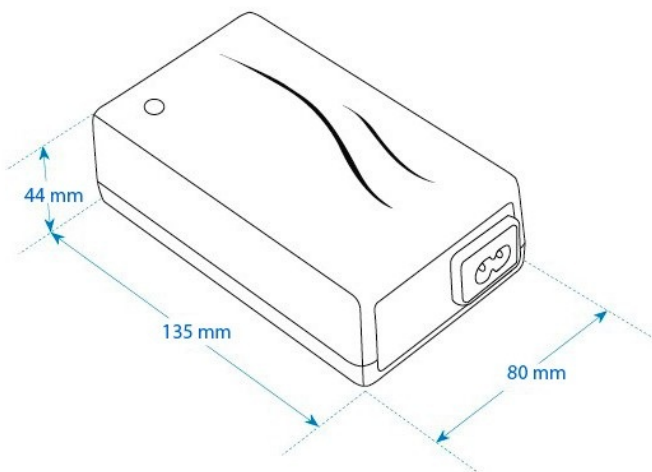
Available versions

1 cell / 4A	2 cells / 4A
3 cells / 4A	4 cells / 3,5A
5 cells / 3,3A	6 cells / 2,8A
7 cells / 2,5A	8 cells / 2,1A
9 cells / 1,9A	10 cells / 1,8A
11 cells / 1,6A	12 cells / 1,45A
13 cells / 1,35A	14 cells / 1,3A
15 cells / 1,15A	16 cells / 1,0A

Specifications for MASCOT type 2440	Li-Ion versions							
	1-Cell	2-Cell	3-Cell	4-Cell	5-Cell	6-Cell	7-Cell	8-Cell
Input voltage:	90 - 264VAC	90 - 264VAC	90 - 264VAC	90 - 264VAC	90 - 264VAC	90 - 264VAC	90 - 264VAC	90 - 264VAC
Line frequency:	47 - 63Hz	47 - 63Hz	47 - 63Hz	47 - 63Hz	47 - 63Hz	47 - 63Hz	47 - 63Hz	47 - 63Hz
Max output power:	17W	34W	51W	59W	70W	71W	74W	71W
Ripple (measured on PCB):	<100mV p-p	<100mV p-p	<100mV p-p	<100mV p-p	<100mV p-p	<100mV p-p	<100mV p-p	<100mV p-p
Efficiency (at 100% load, 230V) typical:	>60%	>80%	>81%	>85%	>85%	>86%	>85%	>85%
Leakage current from battery with mains switched off:	<0.4mA @ 3.7V	<0.4mA @ 7.4V	<0.7mA @11.1V	<0.7mA @14.8V	<0.6mA @18.5V	<0.7mA @22.2V	<0.9mA@25.9V	<1.6mA @29.6V
Charge control:	Charge indication:							
Step 1 Charge current:	4.0A ±0.2A	4.0A ±0.2A	4.0A ±0.2A	3.5A ±0.2A	3.3A ±0.2A	2.8A ±0.2A	2.5A ±0.2A	2.1A ±0.2A
Step 2 Charge voltage:	4.2V ±0.05V	8.4V ±0.1V	12.6V ±0.1V	16.8V ±0.1V	21.0V ±0.1V	25.2V ±0.2V	29.4V ±0.2V	33.6V ±0.2V
- Charge current >:	1.8A ±0.2A	1.8A ±0.1A	1.8A ±0.1A	1.6A ±0.1A	1.6A ±0.1A	1.6A ±0.1A	0.8A ±0.1A	0.8A ±0.1A
- Charge current <:	300mA ±25%	300mA ±25%	300mA ±25%	300mA ±25%	300mA ±25%	300mA ±25%	300mA ±25%	300mA ±25%
Step 3 Charge termination <:	4.1V ±0.1V	8.0V ±0.1V	12.3V ±0.1V	16.4V ±0.1V	20.5V ±0.1V	24.6V ±0.2V	28.7V ±0.2V	32.8V ±0.2V
Charge start Vbat <:	or mains turn-on	or mains turn-on	or mains turn-on	or mains turn-on	or mains turn-on	or mains turn-on	or mains turn-on	or mains turn-on
NTC input on request (10K):	0-45°C normal charge <0 or >45°C reduced charge (LED indication is yellow)							
Switch frequency approx.:	40kHz							
Protection:	Protected against reversed polarity and short circuit proof							
Temperature range:	Operating: +25 to +40°C / Storage: +25 to +85°C							
Safety:	Medical EN 60601-1 / Home Healthcare EN 60601-1-11 / Battery Charger EN 60335-2-29							
Insulation class :	Class II. (Class I on request)							
Insulation voltage: Primary – secondary:	4000VAC / 5700VDC							
EMC standards:	Medical EN 60601-1-2 / Emission EN 61000-6-3 / Immunity EN 61000-6-1							
Mains connection:	2-pins IEC 60320/C8 connector. (3-pins IEC 60320/C14 connector or non-detachable mains cord on request)							
Output terminals:	Battery clips or DC connector.							
IP-Grade:	IP4X (IP67 on request).							
Dimensions:	135 x 80 x 44mm							
Weight:	390g (890g IP67 version)							

Specifications for MASCOT type 2440	Li-Ion versions							
	9-Cell	10-Cell	11-Cell	12-Cell	13-Cell	14-Cell	15-Cell	16-Cell
Input voltage:	90 - 264VAC	90 - 264VAC	90 - 264VAC	90 - 264VAC	90 - 264VAC	90 - 264VAC	90 - 264VAC	90 - 264VAC
Line frequency:	47 - 63Hz	47 - 63Hz	47 - 63Hz	47 - 63Hz	47 - 63Hz	47 - 63Hz	47 - 63Hz	47 - 63Hz
Max output power:	72W	76W	74W	73W	74W	76W	72W	67W
Ripple (measured on PCB):	<100mV p-p	<100mV p-p	<100mV p-p	<100mV p-p	<100mV p-p	<100mV p-p	<100mV p-p	<100mV p-p
Efficiency (at 100% load, 230V) typical:	85%	88%	87%	87%	87%	88%	87%	87%
Leakage current from battery with mains switched off:	<1.6mA @33.3V	<0.9mA @37.0V	<1.6mA @40.7V	<1.6mA @44.4V	<1.6mA @48.1V	<0.5mA @51.8V	<1.6mA @55.5V	<0.6mA @59.2V
Charge control:	Charge indication:							
Step 1 Charge current:	1.9A ±0.2A	1.8A ±0.1A	1.6A ±0.1A	1.45A ±0.1A	1.35A ±0.1A	1.3A ±0.1A	1.15A ±0.1A	1.0A ±0.1A
Step 2 Charge voltage:	37.8V ±0.2V	42.0V ±0.2V	46.2V ±0.2V	50.4V ±0.3V	54.6V ±0.3V	58.8V ±0.3V	63.0V ±0.3V	67.2V ±0.3V
- Charge current >:	Orange	Orange	Orange	Orange	Orange	Orange	Orange	Orange
- Charge current <:	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Step 3 Charge termination <:	Green	Green	Green	Green	Green	Green	Green	Green
Charge start Vbat <:	36.9V ±0.2V	41.0V ±0.2V	45.1V ±0.2V	49.2V ±0.3V	53.3V ±0.3V	57.4V ±0.3V	61.5V ±0.3V	65.6V ±0.3V
NTC input on request (10K):	0-45°C normal charge <0 or >45°C reduced charge (LED indication is yellow)							
Switch frequency approx.:	40kHz							
Protection:	Protected against reversed polarity and short circuit proof							
Temperature range:	Operating: +25 to +40°C / Storage: +25 to +85°C							
Safety:	Medical EN 60601-1 / Home Healthcare EN 60601-1-11 / Battery Charger EN 60335-2-29							
Insulation class :	Class II. (Class I on request)							
Insulation voltage: Primary – secondary:	4000VAC / 5700VDC							
EMC standards:	Medical EN 60601-1-2 / Emission EN 61000-6-3 / Immunity EN 61000-6-1							
Mains connection:	2-pins IEC 60320/C8 connector. (3-pins IEC 60320/C14 connector or non-detachable mains cord on request)							
Output terminals:	Battery clips or DC connector.							
IP-Grade:	IP4X (IP67 on request).							
Dimensions:	135 x 80 x 44mm							
Weight:	390g (890g IP67 version)							

Technical drawing



Charging method A

STEP 1 – CONSTANT CURRENT CHARGE

To start a charge cycle, connect the charger to the mains.

The charger is in constant current mode, charging with the maximum current indicated on the charger, the LED-indication on the charger is ORANGE. This step allows rapid charging of your battery until the battery reaches typically 80 - 95% of its capacity.



STEP 2 – CONSTANT VOLTAGE CHARGE

The charger is in constant voltage mode, charging with a decreasing current until the current is below the charger's charge termination level (indicated on the charger). The LED-indication on the charger is ORANGE. The battery is charged to its full capacity at the end of this step.

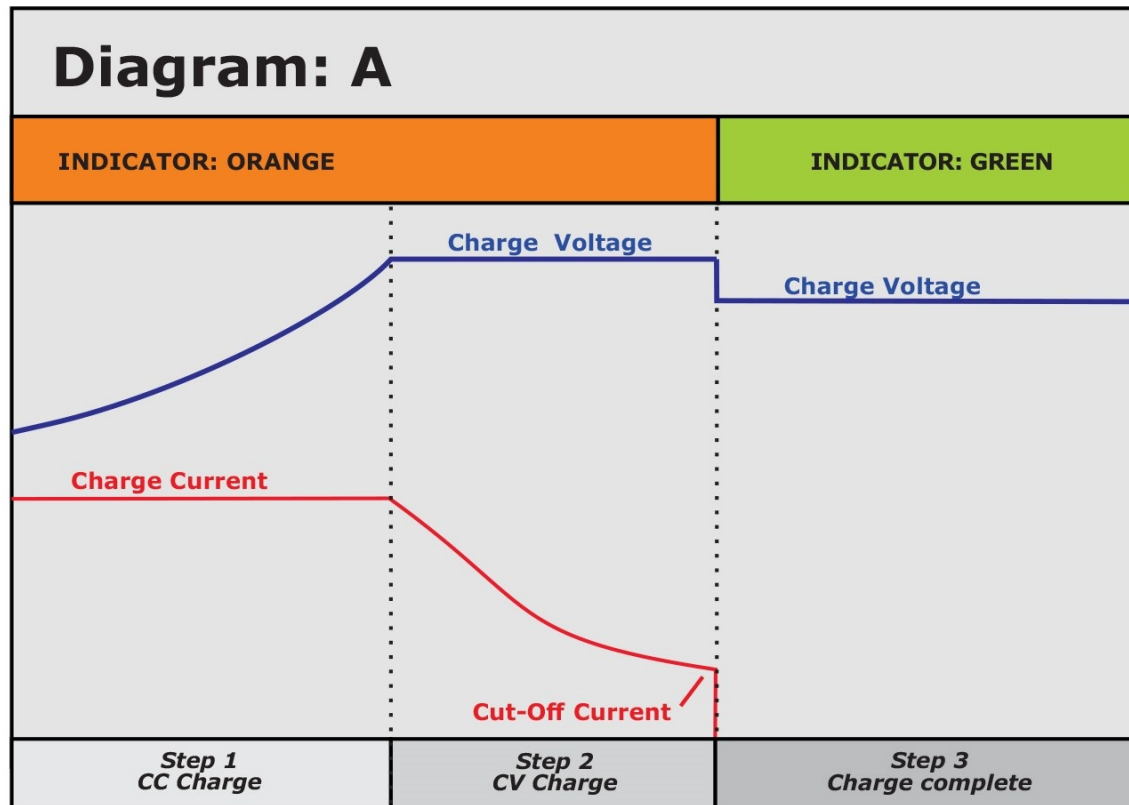


STEP 3 –CHARGE COMPLETE

The LED-indication on the charger is GREEN and the battery is fully charged.

For Li-Ion batteries the charge current is zero and the battery has been charged to its full capacity.

After end of charge battery voltage will remain at "Step 2" level even if output voltage of charger is indicated as lower in the diagram. The charger will return to Step 1 if the battery is used. A load larger than the cut-off current will initiate a new charge cycle.



EU & UK Declaration of Conformity



We, the responsible manufacturer;

Company Name:	Mascot Electronics AS				
Postal Address:	P.O.Box 177, N-1601 Fredrikstad, NORWAY				
Visiting Address:	Mosseveien 109, N-1624 Gressvik, NORWAY				
Telephone:	(+47) 69 36 43 00	E-mail:	sales@mascot.com	WEB:	www.mascot.com

declare that this Declaration is issued under our sole responsibility and belongs to the following product(s):

Product and intended purpose:	Battery Charger for Li-Ion-, LiFePO ₄ - or Lead-Acid Batteries		
Brand(s):	and/or MASCOT (may also carry additional customer name, logo or trade mark)		
Type(s)/Model(s)/UDI-DI:	2440 (may also carry additional customer model name) (model 2440 apply 2MOOP protection to IEC 60601-1, model 2440P apply 2MOPP)		
Batch / Serial No./ UDI-PI:	all CE- and/or UKCA- marked products produced from the date indicated below (for production date: see marking on the product)		
Description:	Input: max.1.6A 100-240VAC 50-60Hz, Class I or II Output: for Lead-Acid Batteries 6V to 48V: 4.5A - 1.0A for Li-Ion Batteries 1 to 16 cell: 4.5A - 1.0A for LiFePO ₄ Batteries 1 to 16 cell: 4.5A - 1.2A Power Supply Unit with fixed output within range 4 - 67VDC: 4.5A - 1.1A NOTES: - Versions with output voltage >42.4VDC are not within the scope of standard EN 60335-2-29 Cl.10.101. - For compliance with EN 60601-1 output terminals >60VDC must be inaccessible to the operator. - For EN 60950-1 output voltages >60VDC are regarded ELV and may not be accessible/interconnected. - Versions with output voltage >42.4 VDC are not within the scope of standard EN 60335-2-29 Ed.4 (ref. Cl.10.101).		

The product(s) described above are in conformity with the relevant European Union harmonisation legislation for CE-marking:

2014/35/EU	EU Directive - Safety of electrical equipment ("Low-Voltage Directive") (LVD) recast, repealing Directives 2006/95/EC & 73/23/EEC
2014/30/EU	EU Directive - Electromagnetic Compatibility (EMC) recast, repealing Directives 2004/108/EC & 89/336/EEC
(EU) 2017/745	EU Regulation - Medical Devices Regulation (MDR), Risk Class I Device amending Directive 2001/83/EC, Regulations (EC) 178/2002 & (EC) 1223/2009 and repealing Directives 90/385/EEC & 93/42/EEC
2009/125/EC	EU Directive - Energy Related Products, Ecodesign (ERP) recast, repealing Directive 2005/32/EC (EUP)
2015/863/EU	EU Directive - Restriction on use of Hazardous Substances in EEE ("RoHS3") recast, repealing Directives 2002/95/EC, 2008/35/EC & 2011/65/EU

The product(s) described above are in conformity with the relevant U.K. legislation for UKCA-marking:

Electrical Equipment (Safety) Regulations 2016
Electromagnetic Compatibility (EMC) Regulations 2016
The Medical Devices (Amendment etc.) (EU Exit) Regulations 2020, Risk Class I Device
Ecodesign for Energy-Related Products (External Power Supplies) Regulations 2020 Draft Regulation, awaiting implementation
The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

The following harmonised standards and technical specifications have been applied:

(International editions and comments indicated in brackets):

Electrical Safety (to LVD- & MDD-Directives):

EN 60950-1	EN 60950-1:2006 + /A1:2010, + /A11:2009, + /AC:2011, + /A12:2011 + /A2:2013 (IEC 60950-1:2005 modified + /A1:2009 modified + /A2:2013 modified, Edition 2.2)	IT-equipment (ITE), Edition 2.2 <i>(OBS! expired for CE-marking !!)</i>
EN 60335-1	EN 60335-1:2012 + /AC:2014 + /A11:2014 (IEC 60335-1:2010 modified, Edition 5.0)(also IEC 60335-1:2010 modified + /A1:2013 + /A2:2016, Edition 5.2)	Household and similar appliances-General requirements, Edition 5.0
EN 60335-2-29	EN 60335-2-29:2004 + /A2:2010 (IEC 60335-2-29:2002 + /A1:2004 + /A2:2009, Edition 4.2) (also IEC 60335-2-29:2016, Edition 5.0)	Household and similar appliances-Requirements for battery chargers, Edition 4.2
EN 60601-1	EN 60601-1:2006 + /AC:2010 + /A1:2013 (IEC 60601-1:2005 + /A1:2012)	Medical electrical equipment, Edition 3.1

Electrical Safety and Electromagnetic Compatibility (to MDR/MDD-Directives):

EN 60601-1	EN 60601-1:2006 + /AC:2010 + /A1:2013 (IEC 60601-1:2005 + /A1:2012)	Medical electrical equipment, Edition 3.1
EN 60601-1-2	EN 60601-1-2:2015 (IEC 60601-1-2:2014, Edition 4.0)	Medical equipment, EMC - Requirements and tests, Edition 4.0

Electromagnetic Compatibility (to EMC-Directive):

EN 61000-6-1	EN 61000-6-1:2007 (IEC 61000-6-1:2005, Edition 2.0) (also IEC 61000-6-1:2016, Edition 3.0, not yet an EN-norm)	Immunity-residential, comm. & light-industrial environment, Edition 2.0
EN 61000-6-3	EN 61000-6-3:2007 + /A1:2011 & /AC:2012 (IEC 61000-6-3:2007 + /A1:2010)	Emission-residential, comm. & light-industrial environment, Edition 2.1
EN 55014-1	EN 55014-1:2006 + /A1:2009 & /A2:2011 (CISPR 14-1:2005 + /A1:2008 & /A2:2011, Edition 5.2) (also CISPR 14-1:2016, Edition 6.0, but not yet an EN-norm)	Emission-household appliances, Edition 5.2
EN 55014-2	EN 55014-2:1997 + /AC:1997, /A1:2001, /A2:2008 (CISPR 14-2:1997 + /A1:2001 & /A2:2008, Edition 1.2) (also CISPR 14-2:2015, Edition 2.0, but not yet an EN-norm)	Immunity-household appliances, Edition 1.2
EN 55024	EN 55024:2010 (CISPR 24:2010, Edition 2.0) (also CISPR 24:2010 + /Corr.1:2011 + /A1:2015, Edition 2.1, but not yet an EN-norm)	Immunity-IT-Equipment, Edition 2.0
EN 55032	EN 55032:2012 + /AC:2013 (CISPR 32:2012 + /Corr.1:2012 + /Corr 2:2012, Edition 1.0) (also CISPR 32:2015, Edition 2.0, but not yet an EN-norm)	Emission-Multimedia Equipment, Edition 1.0

Ecodesign to EU ERP-Directive:

Commission Regulation (EC) No 2019/1782	implementing Directive 2005/32/EC with regard to ecodesign requirements for no-load condition electric power consumption and average active efficiency of external power supplies (Repealing Commission Regulation (EC) No 2019/1782 from 2020-04-01) (Note: not applicable to Battery Chargers, ref. Article 1.2 item c)
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Ecodesign for U.K.:

Draft Regulation only (awaiting implementation)	Draft "Ecodesign for Energy-Related Products (External Power Supplies) Regulations 2020" (Note: not applicable to Battery Chargers)
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Ecodesign for U.S.A. (Note: depends on battery used !):

US Code of Federal Regulations (CFR) Also called "DoE compliance"	10 CFR Part 430 - Energy Conservation Program for Consumer Products, 10 CFR Part 430, Subpart B - Test Procedures, 10 CFR Appendix Y to Subpart B of Part 430, Uniform Test Method for Measuring the Energy Consumption of Battery Chargers or 10 CFR Appendix Z to Subpart B of Part 430, Uniform Test Method for Measuring the Energy Consumption of External Power Supplies, whichever applicable.
California Code of Regulations (CCR) Also called "CEC-400 compliance" referring to CEC-400-2017-002 "2016 Appliance Efficiency Regulations" issued by California Energy Commission	CCR Title 20 - Public Utilities and Energy, Division 2 - State Energy Resources Conservation and Development Commission, Chapter 4 - Energy Conservation, Article 4 - Appliance Efficiency Regulations, Sections 1601 to 1609

Restriction of the Use of certain Hazardous Substances (RoHS) for EU:

2015/863/EU "RoHS3"	EU Directive - Restriction on use of Hazardous Substances in EEE Restriction of the Use of certain Hazardous Substances in Electrical and Electronic Equipment
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Restriction of the Use of certain Hazardous Substances for UK:

The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

EU & UK Declaration of Conformity



Additional Information:

Compliance with harmonised standards and technical specifications may have been verified by the manufacturer, by third party testing or by a Certification Body (NCB).

The products are considered Risk Class I devices according to EU Medical Device Regulation (MDR) and the U.K. Medical Devices (Amendment etc.) (EU Exit) Regulations 2020.

The product(s) may be produced at production sites (for specific product: see "Made in"-marking on the product):

- Mascot Baltic OÜ, Taevakivi 15, EE-13619 Tallinn, ESTONIA
- Mascot Power Supplies (Ningbo) Co.,Ltd, No.128 Jinchuan Road, Zhenhai, Ningbo 315221, CHINA

The production sites are certified to standard EN 29001:2015 (ISO 9001:2015) by:

- Mascot Baltic OÜ: Metrosert, certificate ref. K-144
- Mascot Power Supplies (Ningbo) Co.,Ltd: DNV-GL, certificate ref. 179027-2015

The most recent issue of this Declaration is available at www.mascot.com.

Fredrikstad, Norway

Place of issue

2021-08-16

Date of issue

Signed on behalf of Mascot Electronics AS


Finn-Erik Wailin, Compliance Manager

Name, function, signature