

## Model 4040 NiMH

8A max out • 90-264 VAC input

- Universal input voltage
- Optimized battery performance and lifetime by:
  - Robust -dV sensitivity detection
  - Low cell temperature at end of fast charge
  - Top-off charge makes sure all cells are fully charged and balanced
  - Safety indication and protection: against reverse polarity, short circuit, charging battery packs with the wrong number of cells
- Approvals:
  - Medically certified
    - Safety: EN 60601-1 ed. 3.1 and ed. 3.2
    - Home healthcare EN 60601-1-11
    - EMC: EN 60601-1-2 ed. 4.1
  - 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](#)
- Configurable battery charger (CBC)

The CBC module offers a range of custom charge parameter settings, including: dV, dT/dt, 0 dV, Timer, Safety timer, dV threshold, temperature gradient adjustment.

The CBC is also configurable in field. For more information, [see CBC data sheet](#)



### Available versions

- 6-8 cells / 8,0A
- 8-12 cells / 5,4A
- 12-20 cells / 3,2A
- 20-30 cells / 2,18A
- 25-40 cells / 1,8A

#### Notes:

Desktop unit

Wall mount bracket available

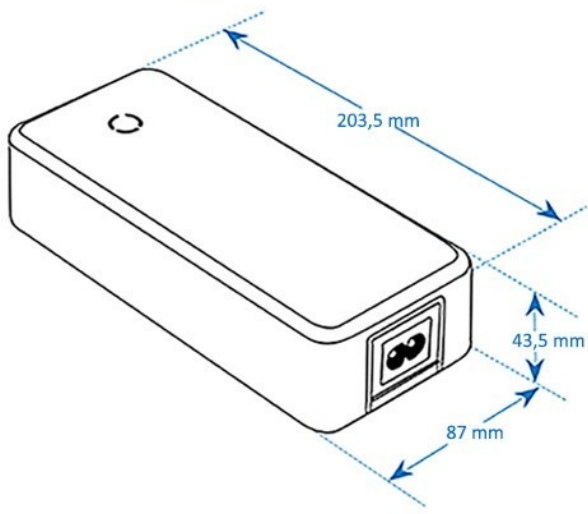
Std. DC output cord:

Open ends, L 0.75m, AWG 14, Black PVC, UL 1185

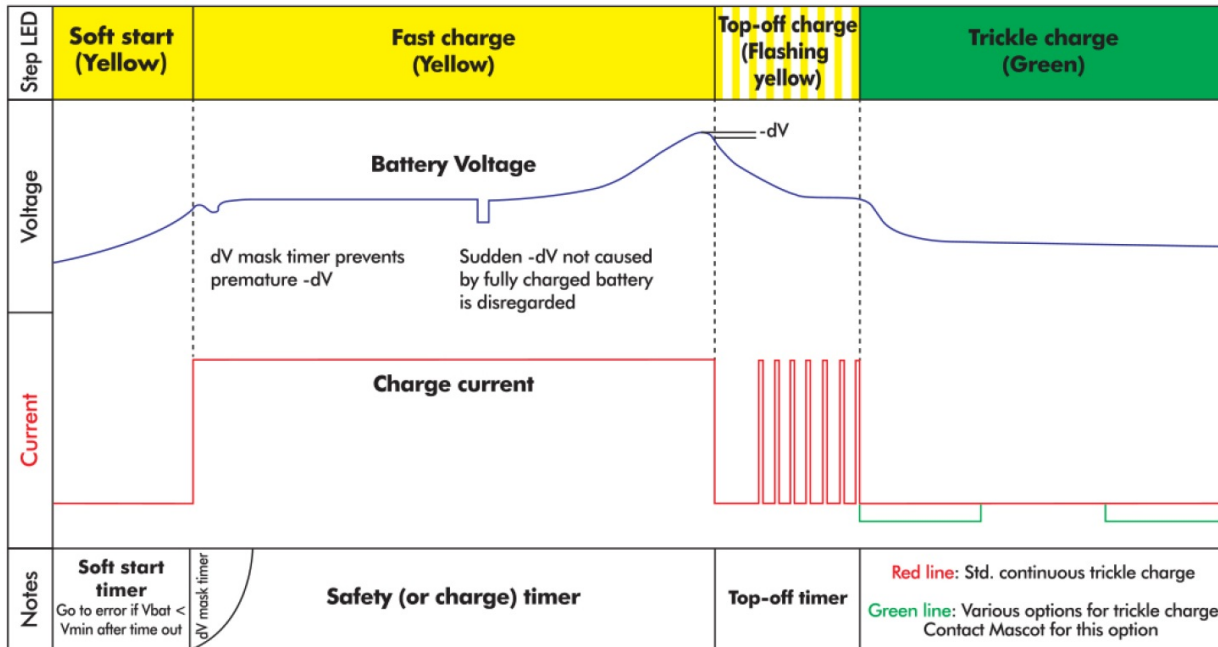
MASCOT type 4040 NiMH/NiCd:	6-8 cell	8-12 cell	12-20 cell	20-30 cell	25-40 cell
Input voltage	90 - 264VAC / 47 - 63Hz	90 - 264VAC / 47 - 63Hz	90 - 264VAC / 47 - 63Hz	90 - 264VAC / 47 - 63Hz	90 - 264VAC / 47 - 63Hz
Max. output power	109W	110W	109W	111W	115W
Min. output voltage for -ΔV detection	7.8V (min 6 cells x min 1.3V pr. cell)	10.4V (min 8 cells x min 1.3V pr. cell)	15.6V (min 12 cells x min 1.3V pr. cell)	26.0V (min 20 cells x min 1.3V pr. cell)	32.5V (min 25 cells x min 1.3V pr. cell)
Max. output voltage for -ΔV detection	13.6V (max 8 cells x max 1.7V pr. cell)	20.4V (max 12 cells x max 1.7V pr. cell)	34V (max 20 cells x max 1.7V pr. cell)	51.0V (max 30 cells x max 1.7V pr. cell)	64.0V (max 40 cells x max 1.60V pr. cell)
-ΔV sensitivity mV/cell	3mV/cell (approx.)	3mV/cell (approx.)	3mV/cell (approx.)	3mV/cell (approx.)	3mV/cell (approx.)
SoftStart current	300mA ± 50mA @ Vbat < 7.8V	200mA ± 50mA @ Vbat < 10.4V	200mA ± 50mA @ Vbat < 15.6V	200mA ± 50mA @ Vbat < 26.0V	100mA ± 25mA @ Vbat < 32.5V
Fast charge current	8.0A ± 250mA	5.4A ± 200mA	3.2A ± 200mA	2.18A +0.10/-0.2A	1.8A +0.1/-0.2A
Top off charge	1.0A ± 100mA	720mA ± 100mA	500mA ± 100mA	400mA ± 50mA	270mA ± 50mA
Trickle charge current	300mA ± 50mA	200mA ± 50mA	200mA ± 50mA	200mA ± 50mA	100mA ± 25mA
Efficiency at 230V and 100% load	89%	90%	90%	89%	89%
-ΔV mask start timer	3 min, no -ΔV de-tection in this period	3 min, no -ΔV de-tection in this period	3 min, no -ΔV de-tection in this period	3 min, no -ΔV de-tection in this period	3 min, no -ΔV de-tection in this period
SoftStart Timer	10 min	10 min	10 min	10 min	10 min
Top-off timer	1 hour	1 hour	1 hour	1 hour	1 hour
Safety timer	5 hours	5 hours	5 hours	5 hours	5 hours
The charger switch to trickle charge if no -ΔV is detected before the safety timer has run out.					

MASCOT type 4040 NiMH/NiCd:	6-8 cell	8-12 cell	12-20 cell	20-30 cell	25-40 cell
Switch frequency approx.	45-75kHz				
Temperature range	-20 to +40°C (these values are only for the charger, not for the batteries).				
Charge control	-ΔV principle. Fast charging stops when the voltage has dropped 3mV/cell below its maximum recorded level.				
Voltage changes during charging	-ΔV detection is disabled if the voltage changes quickly. This to avoid false -ΔV if an external load kicks in during charging.				
Leakage current from battery with mains switch off	< 1 mA at nominal battery voltage (< 0.72 Ah/month).				
Insulation class	Class II.				
Electrical safety	Medical EN 60601-1 / Home Health care EN 60601-1-11/ Battery Charger EN 60335-2-29. A/V and Comm. tech: IEC 62368-1				
EMC-standards	EN 55014-1 and -2, Emission EN 61000-6-3, Immunity EN 61000-6-1, EN 60601-1-2.				
Insulation voltage (prim-sec)	4000V AC / 5700V DC.				
Input terminals	2-pins IEC 320 connector, C8 or mains cable.				
Output terminals	DC connector, Battery clips, Push-on terminals or open ends.				
LED-indication	SoftStart / Fast charge: Yellow Top off charge: Flashing yellow Trickle charge: Green Battery not connected: Flashing green (1s/1s)				
Protection:	Protected against reversed polarity. Error indication: Red (2 blinks) Short circuit proof. Error indication: Red (3 blinks) Low battery voltage (SoftStart timer). Error indication: Red (4 blinks) No charge (or charge terminated) if connecting wrong battery pack with higher voltage. Indication: LED is OFF.				
NTC input, on request (std is 10kohm, B-value approx. 4000)	+dT/dt principle. Fast charging stops when the temperature increment is over 0.5°C/min. Battery temperature is too low (<0°C). Wait mode. Indication: Yellow with 1 red blink. Battery temperature is too high (>40°C). Wait mode. Indication: Yellow with 2 red blinks. High temperature (>60°C). Error Indication: Red (5 blinks). NTC missing or shorted. Error Indication: Red (6 blinks).				
Resetting	A new charging cycle starts by reconnecting a battery at the output, or by disconnecting and connecting the mains voltage.				
IP-grade	IP 41. IP44 with mains cable.				
Dimensions	203.5 × 87 × 43.5 mm				
Weight	590g				
Other	Possible options on request: Charger parameters programmable with "Configurator tool". Constant current charge (no battery management). 0dV detection for EoC.				

# Technical drawing



## Charging characteristics and LED indication



### CHARGE INDICATIONS

- Flashing green: Battery not connected
- Yellow: Fast charge (or soft start)
- Flashing yellow: Top-off
- Green: Trickle

### WAIT MODE INDICATIONS

- Yellow with 1 red blink: Battery temperature is too low ( $<0^{\circ}\text{C}$ )
- Yellow with 2 red blinks: Battery temperature is too high ( $>40^{\circ}\text{C}$ )

### ERROR INDICATIONS

- 2 red blinks: Battery is connected to charger with wrong polarity!
- 3 red blinks: Charger output is shorted. Check output cable connection!
- 4 red blinks: Battery voltage is low. Check battery status or voltage. (ss timer)
- 5 red blinks: Warm error. Temperature  $>60^{\circ}\text{C}$
- 6 red blinks: NTC missing or short (if mandatory)
- LED off: Battery voltage is too high. Check battery voltage.

# 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<sub>4</sub>-, Li-Titanate-, NiMH/NiCd- or Lead-Acid Batteries**

Brand(s): **and/or MASCOT (may also carry additional customer name, logo or trade mark)**

Type(s)/Model(s)/	<b>4040</b>	2xMOOP to IEC 60601-1, rated input voltage 100- 240 V, 50- 60 Hz
UDI-DI:	<b>4040V</b>	2xMOOP to IEC 60601-1, rated input voltage 100- 240 V 50 Hz/ 100- 220 V 60 Hz
	<b>4040P</b>	2xMOPP to IEC 60601-1, rated input voltage 100- 240 V, 50- 60 Hz
	<b>4040VP</b>	2xMOPP to IEC 60601-1, rated input voltage 100- 240 V 50 Hz/ 100- 220 V 60 Hz
	<b>4040B</b>	2xMOOP to IEC 60601-1, PWB-only, for building-in, rated input voltage 100 - 240 V, 50 - 60 Hz
	<b>4040VB</b>	2xMOOP to IEC 60601-1, PWB-only, for building-in, rated input voltage 100 - 240 V 50 Hz/ 100 - 220 V 60 Hz
	<b>4040BP</b>	2xMOPP to IEC 60601-1, PWB-only, for building-in, rated input voltage 100 - 240 V, 50 - 60 Hz
	<b>4040VBP</b>	2xMOPP to IEC 60601-1, PWB-only, for building-in, rated input voltage 100 - 240 V 50 Hz/ 100 - 220 V 60 Hz

(all models may also carry additional customer model name or part number)

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. 1.6 A 100-240 VAC 50-60 Hz, Class I or Class II**

**Output:**

versions for Lead-Acid Batteries 6 - 48 V:

6 V max. 10.0 A	12 V max. 8.0 A	18 V max. 5.3 A	24 V max. 4.0 A	36 V max. 2.66 A
48 V max. 2.0 A				

versions for Li-Ion Batteries 1 - 14 cell:

1 cell max. 10.0 A	2 cell max. 10.0 A	3 cell max. 9.0 A	4 cell max. 7.0 A	5 cell max. 5.6 A
6 cell max. 4.65 A	7 cell max. 4.0 A	8 cell max. 3.5 A	9 cell max. 3.1 A	10 cell max. 2.8 A
11 cell max. 2.54 A	12 cell max. 2.33 A	13 cell max. 2.15 A	14 cell max. 2.0 A	

versions for LiFePO<sub>4</sub> Batteries 1 - 16 cell:

1 cell max. 10.0 A	2 cell max. 10.0 A	3 cell max. 10.0 A	4 cell max. 8.0 A	5 cell max. 6.4 A
6 cell max. 5.3 A	7 cell max. 4.6 A	8 cell max. 4.0 A	9 cell max. 3.5 A	10 cell max. 3.2 A
11 cell max. 2.92 A	12 cell max. 2.68 A	13 cell max. 2.47 A	14 cell max. 2.3 A	15 cell max. 2.15 A
16 cell max. 2.0 A				

versions for Li-Titanate Batteries 1 - 20 cell:

1 cell max. 10.0 A	2 cell max. 10.0 A	3 cell max. 10.0 A	4 cell max. 10.0 A	5 cell max. 8.2 A
6 cell max. 6.8 A	7 cell max. 5.9 A	8 cell max. 5.1 A	9 cell max. 4.5 A	10 cell max. 4.1 A
11 cell max. 3.7 A	12 cell max. 3.4 A	13 cell max. 3.17 A	14 cell max. 2.94 A	15 cell max. 2.75 A
16 cell max. 2.57 A	17 cell max. 2.42 A	18 cell max. 2.29 A	19 cell max. 2.17 A	20 cell max. 2.00 A

versions for NiMH/NiCd Batteries:

2 cell max. 10.0 A	3-6 cell max. 10.0 A	4-8 cell max. 8.0 A	5-10 cell max. 6.5 A	6-12 cell max. 5.4 A
10-20 cell max. 3.2 A	10-22 cell max. 2.9 A	15-30 cell max. 2.18 A	20-40 cell max. 1.96 A	

NOTES:  
 - For compliance with EN 60601-1 output terminals >60 VDC must be inaccessible to operator and may not be interconnected.

# EU & UK Declaration of Conformity



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

2014/30/EU	<b>EU Directive - Electromagnetic Compatibility (EMC)</b> recast, repealing Directives 2004/108/EC & 89/336/EEC
(EU) 2017/745	<b>EU Regulation - Medical Devices Regulation (MDR), Risk Class I Device</b> repealing directive 93/42/EEC
2009/125/EC	<b>EU Directive - Energy Related Products, Ecodesign (ERP)</b> recast, repealing Directive 2005/32/EC (EUP)
2015/863/EU	<b>EU Directive - Restriction on use of Hazardous Substances in EEE ("RoHS3")</b> 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:

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

The following harmonised standards and/or technical specifications have been applied:

(International editions and comments indicated in brackets):

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

<b>EN 60601-1</b>	EN 60601-1:2006 + /AC:2010 + /A1:2013/A2:2021 (IEC 60601-1:2005 + /A1:2012/A2:2020)	Medical electrical equipment, Edition 3.2 (Also tested according to edition 3.1)
<b>EN 60601-1-2</b>	EN 60601-1-2:2015 (IEC 60601-1-2:2014, Edition 4.0)	Medical equipment, EMC - Requirements and tests, Edition 4.0
<b>EN 60601-1-11</b>	EN 60601-1-11:2015 (IEC 60601-1-2:2015/A1:2020, Edition 2.1)	Medical equipment, Home Healthcare, Edition 2.0

**Electromagnetic Compatibility (to EMC-Directive):**

<b>EN 61000-6-1</b>	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
<b>EN 61000-6-3</b>	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

**Ecodesign to EU ERP-Directive:**

<b>Commission Regulation (EC) No 2019/1782</b>	implementing Directive 2009/125/EC with regard to ecodesign requirements for no-load condition electric power consumption and average active efficiency of external power supplies (Note: not applicable to Battery Chargers, ref. Article 1.2 item c )
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**Ecodesign for U.K.:**

<b>Draft Regulation only</b> (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 !):**

<b>US Code of Federal Regulations (CFR)</b> 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.
<b>California Code of Regulations (CCR)</b> 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:**

<b>2015/863/EU "RoHS3"</b>	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:**

<b>The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012</b>
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**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 Devices Directive, EU Medical Devices Regulation 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](http://www.mascot.com).

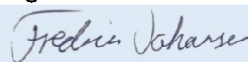
Signed on behalf of Mascot Electronics AS

Fredrikstad, Norway

Place of issue

2023-06-16

Date of issue



Fredrik Johansen, Compliance Manager

Name, function, signature