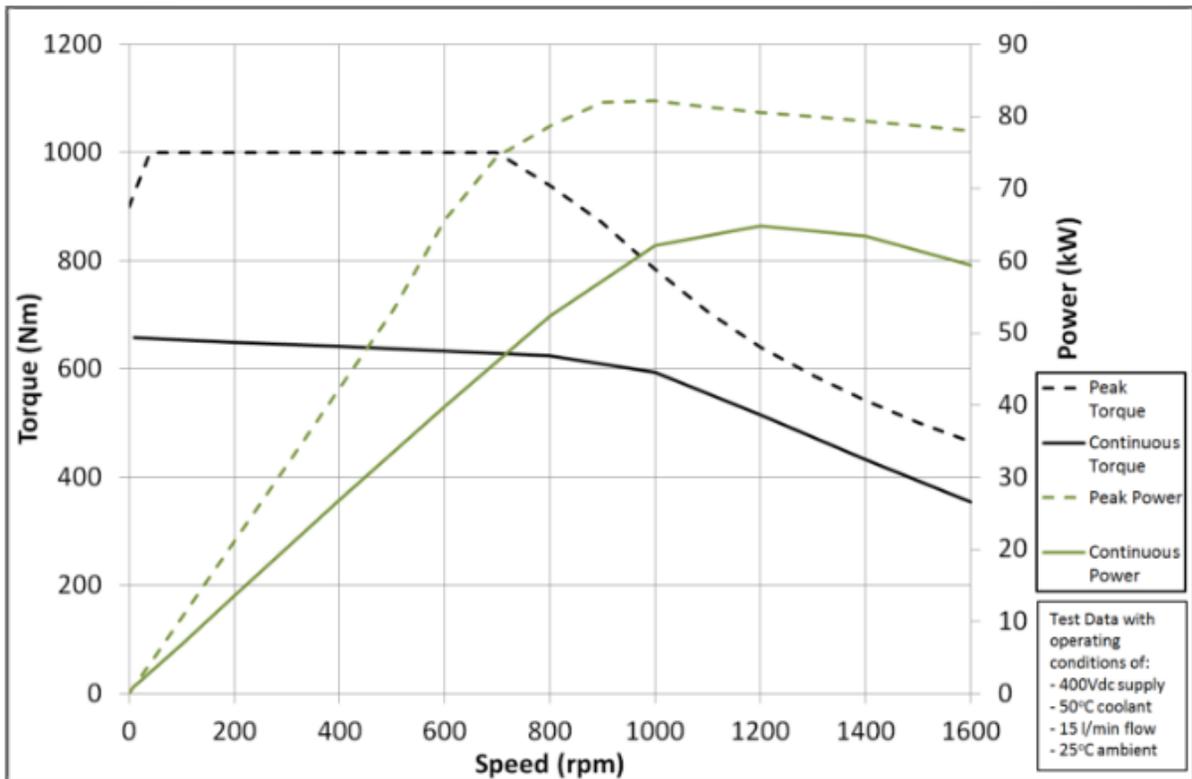




Protean Drive™ Specifications		
	Metric	English
Peak output power @ 400 Vdc	75 kW	100 HP
Continuous output power @ 400 Vdc	54 kW	72 HP
Peak output torque	1000 Nm	735 lb-ft
Continuous output torque	650 Nm	516 lb-ft
Nominal input voltage range	200-400Vdc	200-400Vdc
Width	115 mm	4.5 in
Diameter	420 mm	16.5 in
Total motor mass	34 kg	68 lb



## Features & Benefits

- High energy density
- Long stable power and long run time
- Ideal for notebook PCs, boosters, portable devices, etc.

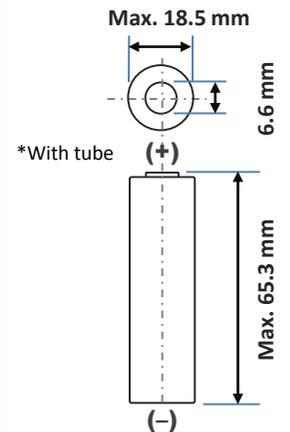
\* At temperatures below 10°C, charge at a 0.25C rate.

## Specifications

Rated capacity <sup>(1)</sup>	Min. 3200mAh
Capacity <sup>(2)</sup>	Min. 3250mAh Typ. 3350mAh
Nominal voltage	3.6V
Charging	CC-CV, Std. 1625mA, 4.20V, 4.0 hrs
Weight (max.)	48.5 g
Temperature	Charge*: 0 to +45°C Discharge: -20 to +60°C Storage: -20 to +50°C
Energy density <sup>(3)</sup>	Volumetric: 676 Wh/l Gravimetric: 243 Wh/kg

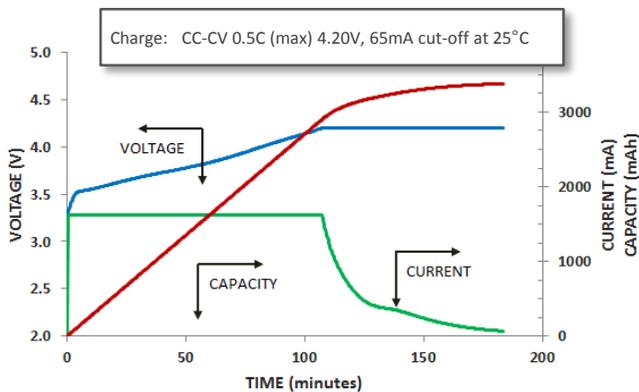
<sup>(1)</sup> At 20°C <sup>(2)</sup> At 25°C <sup>(3)</sup> Energy density based on bare cell dimensions

## Dimensions

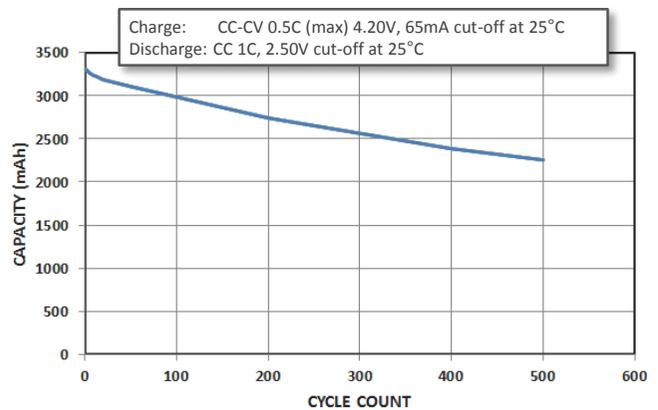


For Reference Only

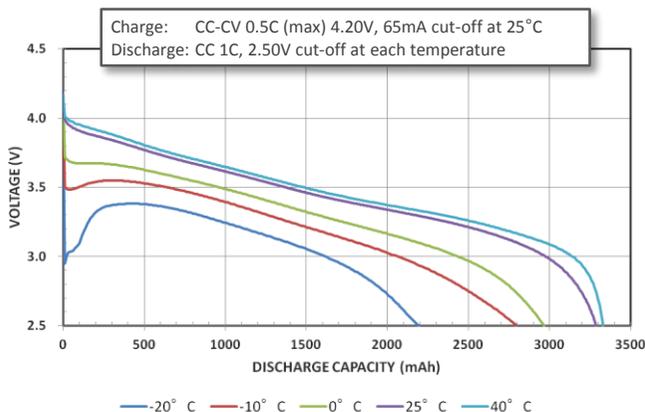
## Charge Characteristics



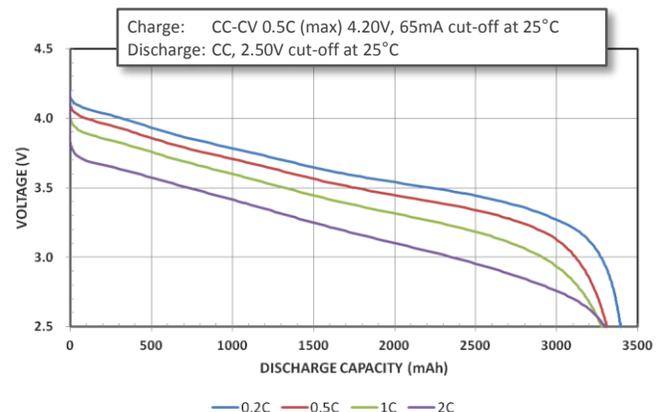
## Cycle Life Characteristics



## Discharge Characteristics (by temperature)



## Discharge Characteristics (by rate of discharge)



The data in this document is for descriptive purposes only and is not intended to make or imply any guarantee or warranty.

## FEATURES AND BENEFITS

- DuraBlue™ Shock and Vibration Technology
- Up to 1,000,000 duty cycles or 10 year DC life\*
- Highest power and energy
- Up to 18 kW/kg of Specific Power<sup>1</sup>
- Up to 4 Wh of Stored Energy<sup>1</sup>
- Threaded terminals or laser-weldable posts

## TYPICAL APPLICATIONS

- High shock and vibration environments
- Automotive subsystems
- Wind turbine pitch control
- Hybrid vehicles
- Rail
- Heavy industrial equipment
- UPS & telecom systems



## PRODUCT SPECIFICATIONS

### ELECTRICAL BCAP3400

Rated Voltage	2.85 V
Minimum Capacitance, initial <sup>2</sup> , rated value	3,400 F
Typical Capacitance, initial <sup>1,2</sup>	3,500 F
Maximum ESR <sub>DC</sub> , initial <sup>2</sup> , rated value	0.28 mΩ
Typical ESR <sub>DC</sub> , initial <sup>1,2</sup>	0.22 mΩ

### POWER & ENERGY

Minimum Usable Specific Power, P <sub>d</sub> <sup>3</sup>	6.7 kW/kg
Typical Usable Specific Power, P <sub>d</sub> <sup>1,3</sup>	8.5 kW/kg
Minimum Impedance Match Specific Power, P <sub>max</sub> <sup>4</sup>	14 kW/kg
Typical Impedance Match Specific Power, P <sub>max</sub> <sup>1,4</sup>	18 kW/kg
Minimum Specific Energy, E <sub>max</sub> <sup>5</sup>	7.4 Wh/kg
Typical Specific Energy, E <sub>max</sub> <sup>1,5</sup>	7.6 Wh/kg
Minimum Stored Energy, E <sub>stored</sub> <sup>6,13</sup>	3.84 Wh
Typical Stored Energy, E <sub>stored</sub> <sup>1,6,13</sup>	3.95 Wh

### SHOCK & VIBRATION

Vibration Specification	ISO 16750-3, Tables 12 & 14
Shock Specification	SAE J2464, IEC 60068-2-27, -29

### SAFETY

Short Circuit Current, typical (Current possible with short circuit from rated voltage. Do not use as an operating current.)	10,000 A
Certifications	UL810a, RoHS, REACH

### THERMAL

Thermal Resistance (R <sub>ca</sub> , Case to Ambient), typical	3.2°C/W
Thermal Capacitance (C <sub>th</sub> ), typical	640 J/°C
Maximum Continuous Current (ΔT = 15°C) <sup>7</sup>	131 A <sub>RMS</sub>
Maximum Continuous Current (ΔT = 40°C) <sup>7</sup>	211 A <sub>RMS</sub>

## TYPICAL CHARACTERISTICS

### TEMPERATURE BCAP3400

Operating temperature range (Cell case temperature)	
Minimum	-40°C
Maximum	65°C

### ELECTRICAL

Leakage Current at 25°C, maximum <sup>8</sup>	18 mA
Absolute Maximum Voltage <sup>9</sup>	3.0 V
Absolute Maximum Current	2,000 A

### LIFE

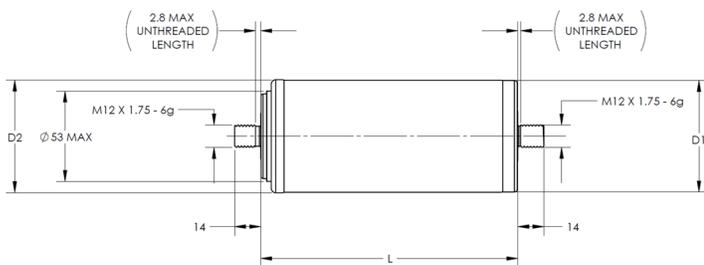
DC Life at High Temperature <sup>2</sup> (held continuously at Rated Voltage & Maximum Operating Temperature)	1,500 hours
Capacitance Change (% decrease from rated value)	25%
ESR Change (% increase from rated value)	110%
Projected DC Life at 25°C <sup>2</sup> (held continuously at Rated Voltage)	10 years
Capacitance Change (% decrease from rated value)	20%
ESR Change (% increase from rated value)	100%
Projected Cycle Life at 25°C <sup>2, 10, 11</sup>	1,000,000 cycles
Capacitance Change (% decrease from rated value)	20%
ESR Change (% increase from rated value)	100%
Shelf Life (Stored uncharged at 25±10°C)	4 years

### PHYSICAL

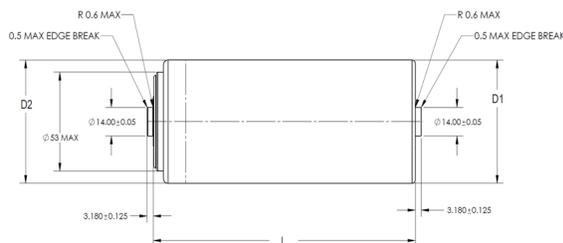
Mass, typical	520 g
Terminals	Threaded <sup>12</sup> or Weldable

\*Results may vary. Additional terms and conditions, including the limited warranty, apply at the time of purchase. See the warranty details for applicable operating and use requirements.

BCAP3400 P285 K04



BCAP3400 P285 K05



Part Description	Dimensions (mm)			Package Quantity
	L (±0.3mm)	D1 (±0.2mm)	D2 (±0.7mm)	
BCAP3400 P285 K04/05	138	60.4	60.7	15

NOTES

1. Typical values represent mean values of a production sample.
2. Capacitance and ESR<sub>DC</sub> measured using 100 A test current at 25°C per document number 1007239 available at maxwell.com.
3. Per IEC 62391-2,  $P_d = \frac{0.12V^2}{ESR_{DC} \times mass}$
4.  $P_{max} = \frac{V^2}{4 \times ESR_{DC} \times mass}$
5.  $E_{max} = \frac{1/2 CV^2}{3,600 \times mass}$
6.  $E_{stored} = \frac{1/2 CV^2}{3,600}$
7.  $\Delta T = I_{RMS}^2 \times ESR \times R_{ca}$
8. After 72 hours at rated voltage. Initial leakage current can be higher.
9. Absolute maximum voltage, non-repeated. Not to exceed 1 second.
10. Cycle using specified test current per waveform in K2 2.7V Series Datasheet.
11. Cycle life varies depending upon application-specific characteristics. Actual results will vary.
12. Maximum Torque is 14 Nm.
13. Per United Nations material classification UN3499, all Maxwell ultracapacitors have less than 10 Wh capacity to meet the requirements of Special Provisions 361. When packaged according to the regulation, both individual ultracapacitors and modules composed of those ultracapacitors shipped by Maxwell can be transported without being treated as dangerous goods (hazardous materials).

MOUNTING RECOMMENDATIONS

Do not reverse polarity. Please refer to document number 1016419, available at maxwell.com for welding recommendations.

MARKINGS

Products are marked with the following information: Rated capacitance, rated voltage, product number, name of manufacturer, positive terminal, warning marking, serial number.

Product dimensions are for reference only unless otherwise identified. Product dimensions and specifications may change without notice. Please contact Maxwell Technologies directly for any technical specifications critical to application. All products featured on this datasheet are covered by the following U.S. patents and their respective foreign counterparts: 6643119, 7295423, 7342770, 7352558, 7384433, 7440258, 7492571, 7508651, 7580243, 7791860, 7791861, 7859826, 7883553, 7935155, 8072734, 8098481, 8279580.



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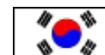
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## BSC6 - Bidirectional Auxiliary Supply Converter

The most efficient and versatile alternator ever



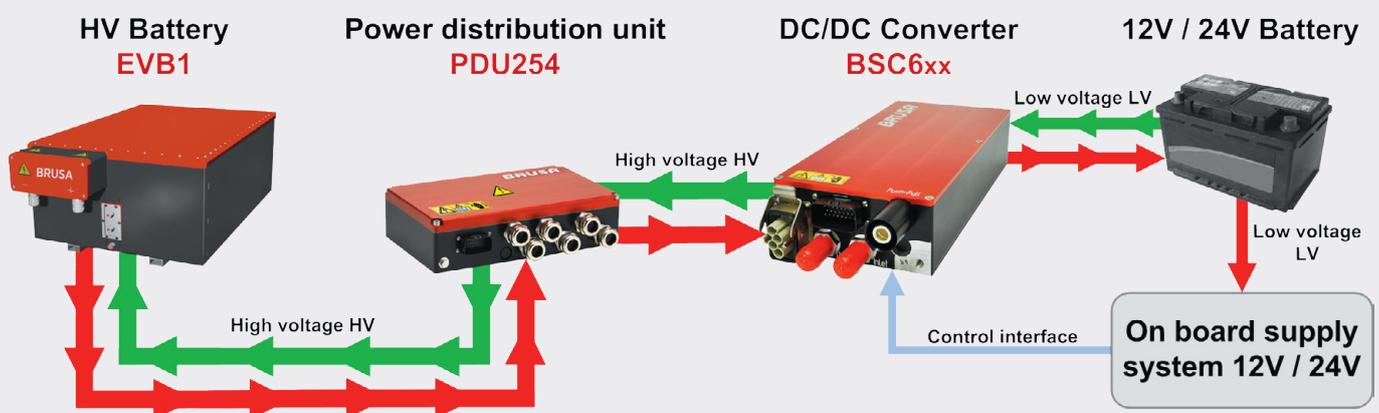
### Features

- Bidirectional operation
- Resonant topology ensures very low switching losses and excellent EMC - behavior
- Very high efficiency (up to 96%)
- Very compact and lightweight
- Fully automotive compliant
- PARAM - tool offers comprehensive configuration options and diagnostic function
- Optional operation without CAN (CAN - less mode)

### What makes it special - benefits through bidirectional operation

- In fuel cell applications it allows to start-up the fuel cell auxiliary circuits on the HV -side right from the 12V / 24V supply system
- Enables emergency recharge of traction battery via common jump - start - cable
- Increases availability of vehicle when traction battery system fails since the converter provides energy from the 12V / 24V supply system

### Application example





## Specifications BSC6xx

High voltage side	BSC623-12V	BSC624-12V	BSC614-24V	BSC618-24V	BSC628-12V	
High voltage range	170 - 425	220 - 450	220 - 450	400 - 900	400 - 900	V

Low voltage side	BSC623-12V	BSC624-12V	BSC614-24V	BSC618-24V	BSC628-12V	
Low voltage nominal	14.0	14.0	28.0	28.0	14.0	V
Low voltage range	8 - 16	8 - 16	16 - 32	16 - 32	8 - 16	V

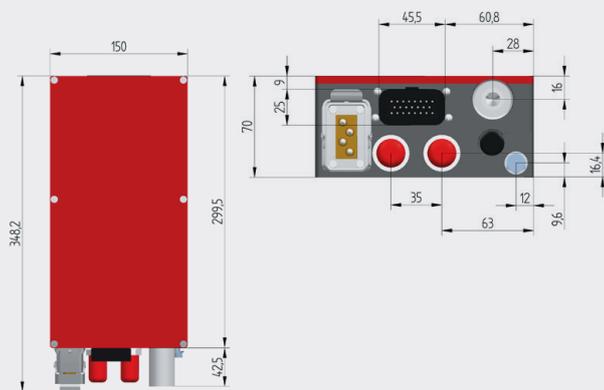
Performance	BSC623-12V	BSC624-12V	BSC614-24V	BSC618-24V	BSC628-12V	
Low voltage continuous current (@ T <sub>coolant</sub> = 65°C)	200	200	100	100	200	A
Low voltage maximum current	250	250	125	125	250	A
Continuous power (@ nominal low voltage)	2.8	2.8	2.8	2.8	2.8	kW
Maximum power (@ nominal low voltage)	3.5	3.5	3.5	3.5	3.5	kW
Efficiency (@ nominal voltage, low voltage continuous current)	93.5	94.4	96.0	95.9	94.7	%
Switching frequency buck/boost stage	30 - 135	40 - 150	44 - 150	44 - 157	44 - 168	kHz
Switching frequency transformer stage	220	197	205	192	181	kHz

Control	BSC623-12V	BSC624-12V	BSC614-24V	BSC618-24V	BSC628-12V	
Control bandwidth (3dB - point)	-1	-1	-1	-1	-1	kHz
Control accuracy of low voltage (buck mode)	<1.0	<1.0	<1.0	<1.0	<1.0	%
Control accuracy of high voltage (boost mode)	<1.0	<1.0	<1.0	<1.0	<1.0	%

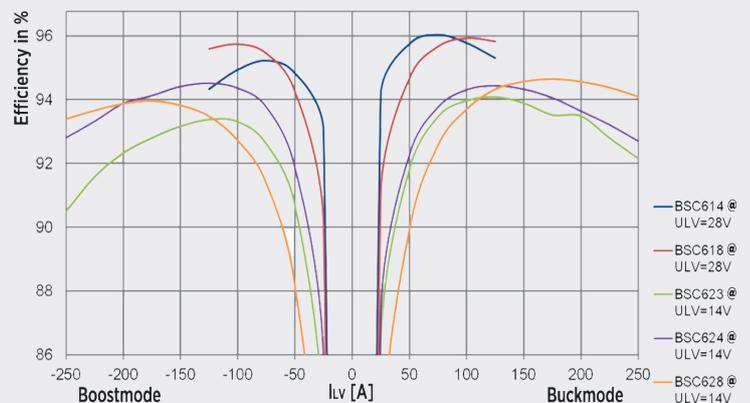
Mechanical & environmental conditions	BSC623-12V	BSC624-12V	BSC614-24V	BSC618-24V	BSC628-12V	
Cooling system	-----Liquid (50% water, 50% ethylene glycol)-----					---
Coolant flow rate min.	4	4	4	4	4	l/min
Coolant flow rate max.	10	10	10	10	10	l/min
Pressure drop (@ nominal flow rate)	<0.1	<0.1	<0.1	<0.1	<0.1	bar
Ambient temperature range (storage)	-40 bis +105	-40 bis +105	-40 bis +105	-40 bis +105	-40 bis +105	°C
Ambient temperature range (operation)	-40 bis +85	-40 bis +85	-40 bis +85	-40 bis +85	-40 bis +85	°C
Maximum coolant temperature	65	65	65	65	65	°C
Ingress protection class	IP65	IP65	IP65	IP65	IP65	---
Weight	4.8	4.8	4.8	4.8	4.8	kg

Galvanic insulation between high voltage circuit and low voltage circuit/user interface	BSC623-12V	BSC624-12V	BSC614-24V	BSC618-24V	BSC628-12V	
Test voltage (2 s)	2'700	2'700	2'700	4'000	4'000	V <sub>DC</sub>

## Dimensions



## Efficiency





# BRUSA

## NLG664 - On - Board - Fast Charger

The synthesis of performance and efficiency



**AWARD  
WINNER**



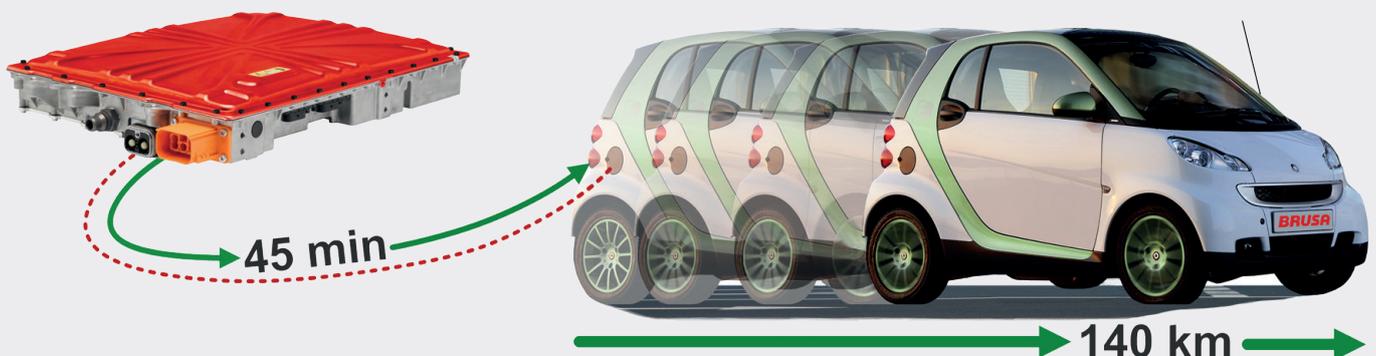
### Safety first

- Full separation of mains and HV battery through galvanic isolation
- VDE certified charger complies with all applicable legal requirements in Europe. In case of EMC requirements, compliance is given in combination with the vehicle
- High IP - protection rating
- Evaluation of external PT1000 sensors
- Fully compliant with the LV123
- No DC - fault current, therefore the use of a Class A ground fault interrupter is possible

### Cutting - Edge Technology

- 2 x CAN interface: Vehicle CAN and Diagnostic CAN
- Battery - friendly high power charging due to low battery ripple current
- Single and three-phase charging with up to 22 kW
- Enhanced temperature handling and maximum performance through patented Liquid Pin® cooling - technology and integrated power factor correction
- Optional: Smart Charge Communication via PLC according to ISO15118
- minimal reactive power over the entire power range

**6 times faster than standard!**





## Specifications NLG664

### AC Input

### NLG664

Voltage range single-phase (L1→N)	200 - 250	V <sub>rms</sub>
Voltage range three-phase (Phase - Phase L1 → L2 → L3)	360 - 440	V <sub>rms</sub>
Max. input current three - phase (each phase)	32	A <sub>rms</sub>
Max. input current single - phase	16	A <sub>rms</sub>
Input frequency (+/- 1%)	50	Hz
Powerfactor (at 16 A mains current single - and three - phase)	> 0.99	---

### DC Output

### NLG664

Voltage range three - phase	310 - 430	V <sub>DC</sub>
Voltage range single - phase	200 - 450	V <sub>DC</sub>
Max. charging current three - phase	60	A <sub>DC</sub>
Max. charging current single - phase	12	A <sub>DC</sub>
Max. charging power three - phase	20.75	kW
Max. charging power single - phase	3.3	kW
Efficiency (P = Pa <sub>lmax</sub> ) three - phase	> 94	%
Efficiency (P = Pa <sub>lmax</sub> ) single - phase	> 90	%
Max. charging current ripple at max. charging power single - / three - phase (mains operated)	< 8 / < 10	A <sup>eff</sup>

### Mechanical Data / Cooling System

### NLG664

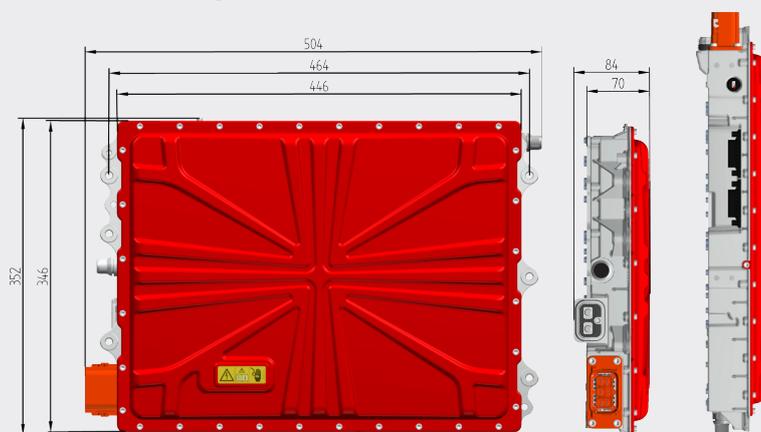
Housing material	Aluminium (EN AC - AISi9MgMn)	---
Weight	12	kg
Housing volume (without interfaces)	11	l
IP - protection	IP 6K9K	---
Coolant quantity in device	0.21	l
Coolant pressure loss @ 6l / min, T <sub>coolant</sub> = 25°C (water / glycol = 50 / 50)	< 100	mbar

### Safety

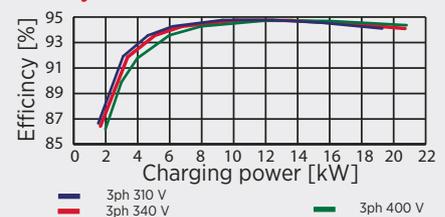
### NLG664

Isolation between Mains input and DC - output	LV 123 / IEC 61851	---
Mains input overvoltage protection	264	V
Open circuit protection	yes	---
Internal overtemperature protection	yes	---
Insulation resistance (initial) min.	> 5	MΩ

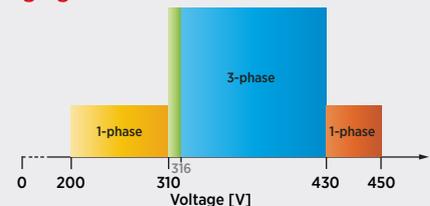
## Dimensions & Diagrams



## Efficiency



## Charging





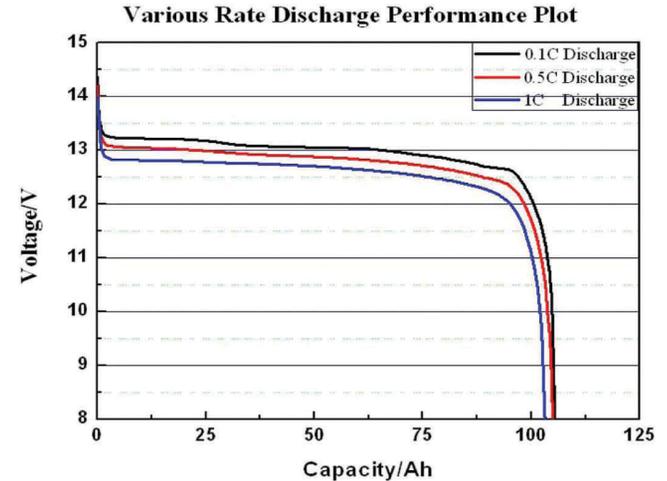
**SMARTBATTERY**  
LITHIUM ION TECHNOLOGY

# 12V 40AH Lithium Ion Battery



## SB40 DATA SHEET

### Discharge Curves 25°C (77°F)



### Cycle life

Capacity at different cycles(%)	100 cycles	102
	500 cycles	96.3
	1000 cycles	90.8
	1500 cycles	85.4
	2000 cycles	80.1
Max.Charge Voltage		14.6 V
Cut-off Voltage		8 V

**Amp Hours: 40AH**  
**Voltage: 12.8V Nominal**  
**Cold Cranking Amps: 400**  
**Life Expectancy: 3000 - 5000 Cycles**  
**LiFePo4 - SAFE BATTERY**

**Weight: 15 Lbs.**  
**Group Size SB40**  
**Minutes @ 20A 120**  
**Efficiency: 99%**  
**No Memory**

**Max Continuous Discharge 2C = 80A**  
**Max Continuous Charge 1C = 40A**  
**Operating Temp. - 4 F + 175 F**  
**Auto Low Voltage Cutoff 8V**  
**Auto Over Voltage Cutoff 16V**



Smart Battery®  
 6011 Benjamin Rd. Tampa FL, 33634

**WWW.SMARTBATTERY.COM 1-855-GO-LITHIUM**

