

# DC - DC Converter

This DC - DC converter is designed to fulfill all kinds of auxiliary power requirements of Electric Vehicles. It has wide range of operating voltage from 35 VDC to 84 VDC. Its USP's are efficient, cost effective, compact in size and light in weight.

## SALIENT FEATURES:

- 1 Circuit designed with over voltage and under voltage protections.
- 2 Overload and short circuit protection.
- 3 Aluminium alloy cabinet with good heat dissipation and shock absorption.
- 4 High & performance due to high-end technology.
- 5 Overload protection and accurate battery current limit.



## Technical Specifications:

Parameters	DC-DC Converter Specifications	
	5A	10A
Variant	5A	10A
Input Voltage	48/60/72 VDC	48/60/72 VDC
Input Voltage Range	35VDC - 84VDC	35VDC - 84VDC
Outputs Voltage	12 ± 0.5 V	13.2 ± 0.5 V
Outputs Current	5.0A Continuous	10.0A Continuous
Efficiency	> 85% typical at full load.	
Load Regulation	± 5%.	
Output Short Circuit	Yes	
Input Reverse Polarity	Yes	
Surge Transient	Yes	
ESD	Yes	
Operation Ambient Temperature	-20°C to +60°C	
Storage Ambient Temperature	-20°C to +60°C	
Cooling	Natural	
Grade	Automotive	Non-Auto
Isolation	No	No
Insulation	IP64	IP64
Weight	~0.2kg	~0.4kg

# DC DC Converter-Isolated

## Technical Specifications:

Parameters	20A
Input Voltage	48/60/72 VDC
Input Voltage Range	42VDC - 72VDC
Outputs Voltage	12.2 ± 0.5 V
Outputs Current	20.0A Continuous
Efficiency	> 90%
Load Regulation	± 5%.
Output Short Circuit	Yes
Input Reverse Polarity	Yes
Surge Transient	Yes
ESD	Yes
Operation Ambient Temperature	-20°C to +60°C
Storage Ambient Temperature	-20°C to +60°C
Cooling	Natural
Grade	-20°C to +60°C
Isolation	-20°C to +60°C
Insulation	IP67
Weight	~0.52kg

# Battery Charger

Napino's battery charger is designed with micro-controller based SMPS with 4 stage battery charging algorithm for battery driven vehicles. This intelligent charger is capable of operating at a wide input AC voltage range of 150-300VAC. It is a compact, high efficiency charger that enhances battery life and retains its efficiency and prevents battery from early death.

## SALIENT FEATURES:

- 1 High efficiency - Consumes very little power.
- 2 Extended battery life - Battery life is enhanced greatly.
- 3 Intelligent with a powerful micro controller - Programmable battery profile adjustment is possible.
- 4 Deep discharge charging capability - Charges batteries with deep discharge voltage of 32V.
- 5 Over charge protection
- 6 Battery reverse polarity protection, overload protection and accurate battery current limit.



## Technical Specifications:

Parameters	VRLA Battery Charger Specifications	
	3-Wheeler	2-Wheeler
Input Voltage	220 V @ 50 Hz	220 V @ 50 Hz
Input Voltage Range	170 - 270 VAC rms	170 - 270 VAC rms
Outputs Voltage	65 V Max	78 V Max
Outputs Current	<b>12 Amp</b>	<b>3 Amp</b>
Efficiency	> 80%	> 80%
Charging Method	CC-CV	CC-CV
Output Short Circuit	Yes	Yes
Reverse Polarity	Yes	
Surge Transient	No	No
ESD	No	No
Operation Ambient Temperature	-20 to 60 Degree C	
Storage Ambient Temperature	-20 to 60 Degree C	
Cooling	Fan	Fan
Grade	Non-Automotive	Automotive
Isolation	Yes	Yes
Insulation	-	-
Weight	~3Kg	1Kg
Mounting	OFF Board	OFF Board
Communication	No	No

# Battery Charger

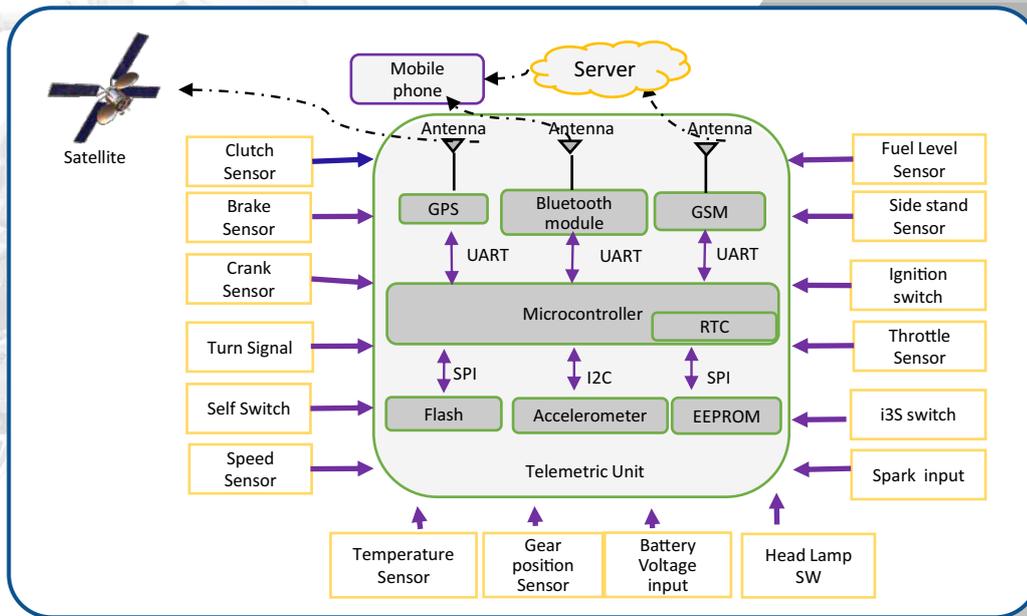
## Technical Specifications:

Parameters	Lithium Ion Battery Charger Specifications	
	2-Wheeler New Development	
Input Voltage	220 V @ 50 Hz	220 V @ 50 Hz
Input Voltage Range	170 - 270 VAC rms	170 - 270 VAC rms
Outputs Voltage	58~65 V	58~65 V
Outputs Current	<b>5 Amp (Max)</b>	<b>25 Amp (Max)</b>
Efficiency	> 95%	> 95%
Charging Method	CC-CV	CC-CV
Output Short Circuit	--	--
Reverse Polarity		Yes
Surge Transient		Yes
ESD	Yes	Yes
Operation Ambient Temperature	-20 to 60 Degree C	
Storage Ambient Temperature	-20 to 60 Degree C	
Cooling	Natural	Natural
Grade	Automotive	Automotive
Isolation	Yes	Yes
Insulation	IP 67	IP 67
Weight	~2.0 Kg	~3.0 Kg
Mounting	Frame Mounted	Frame Mounted
Communication	CAN	CAN

# Telematics Unit

Telematics unit enables connected vehicles. It sends vehicle's raw data on the server like Speed, RPM, Location, etc. The advantage of this telematics unit is to secure and monitor vehicle every time. It has provision to update firmware Over The Air as well as through CAN. This unit also has provision to update basic configuration through server as well as through SMS like IP Address, APN, data sending frequency etc. It has different alerts like Engine ON detection, Panic detection, Accident detection, Tow detection and much more and it also fulfills the automotive standards as per requirement of AIS 140.

## System Block Diagram



## Specifications:

### SPECIFICATIONS:

a) DC Input Voltage VDC	9 – 16VDC
b) DC Input Current	Up to 2 A
c) Sleep Mode Current	Less than 1 mA
d) Internal Battery Backup	More Than 6 Hours
e) GPS	GNSS
f) GSM	Quad Band 2G (GPRS)
g) SIM	Embedded SIM
h) GYRO and Accelerometer	3-Dimensional, 16G,2000DPS
i) Data Flash	128Mbit
j) Remote Update	FOTA, COTA
<b>2. Protections</b>	
a) Reverse Battery Protection	
<b>3. Environmental</b>	
a) Operating Temperature	-20°C to +70°C
b) Storage Temperature	-20°C to +85°C
c) IP	IP67
<b>4. Mechanical</b>	
a) Casing Material	Polyester PBC
b) Dimensions	W= 83 mm, H= 43 mm, L= 123 mm

# In-Wheel Hub Motor Assembly

Permanent Magnet Brushless DC In-Wheel Hub motor

## SALIENT FEATURES:

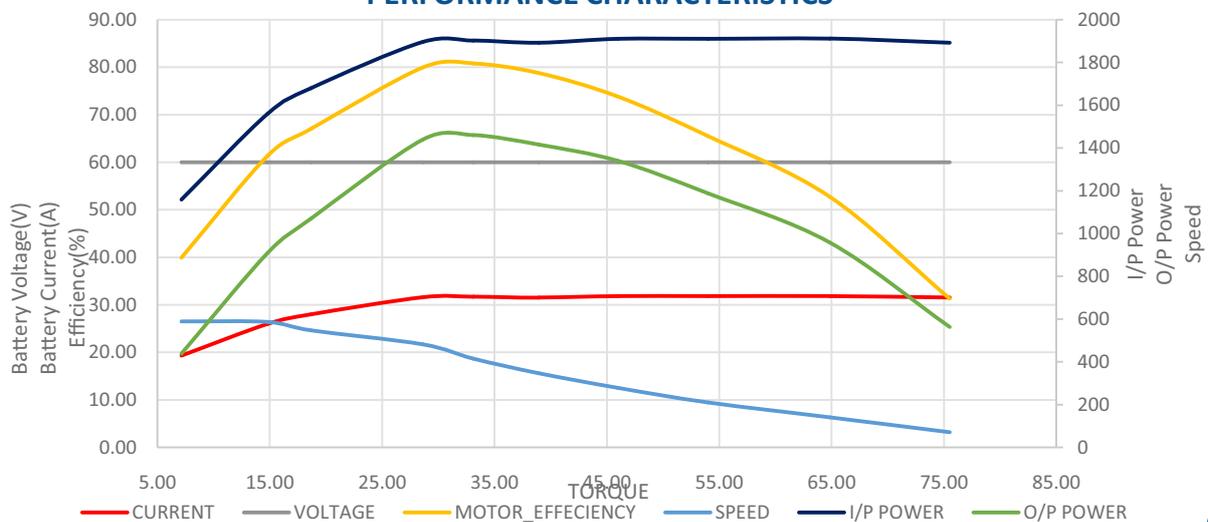
- 1 Directly mounted on wheel
- 2 Easy to install and replace

## SPECIFICATIONS:

- 1 Rated Voltage - 60 V DC
- 2 Rated Power - 0.8kW
- 3 Peak Power - 1.2kW
- 4 Peak Torque - 75 Nm @ 70rpm
- 5 Max speed - 43Kmph
- 6 Weight - 8Kg (Without 10" Wheel)
- 7 Operating Temperature Range : 10°C to + 80°C



PERFORMANCE CHARACTERISTICS



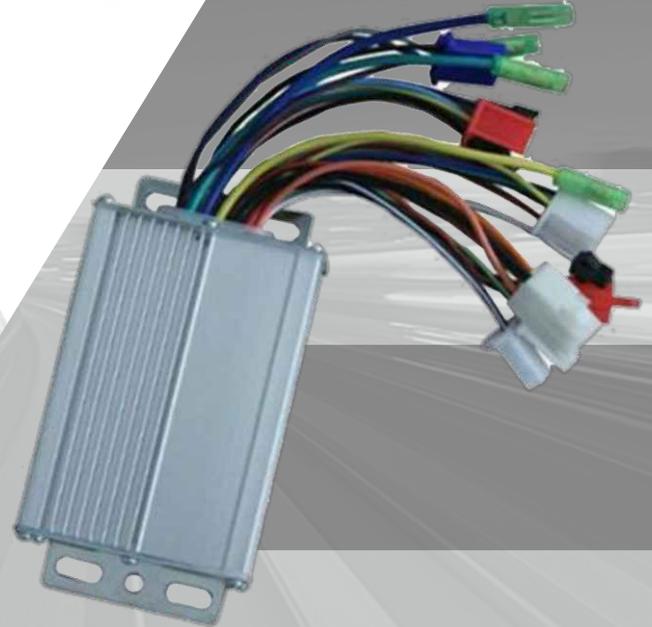
# BLDC Motor Controller

BLDC Motor Controller is designed for Electric 2 Wheelers. It is designed to drive a vehicle which has a motor up to 1.5 KW. It uses sinusoidal drive techniques to maximize the torque and efficiency. Sinusoidal drive technology provides the smooth driveability during the dynamic load condition. It can be used with 48V/60VDC system. It has regenerative braking functionality which improves the driving range of the vehicle by restoring energy back to the battery during braking/ deceleration condition.

Programmable BLDC Motor Controller provides high efficiency, smooth and low noise control of BLDC motor. BLDC motor controller is having high power MOSFETS to drive the motor using PWM to achieve Efficiency >85% in most cases. Powerful Micro-controller brings in comprehensive and precise control of BLDC motor.

## SALIENT FEATURES:

- 1 Compatible with 650W, 850W, 1000W, 1200W and 1500W motors.
- 2 Over temperature protection. Power limit when over temperature is sensed.
- 3 Programmable current limit, torque control and speed control.
- 4 Intelligence with a powerful micro controller.
- 5 Synchronous rectification, ultra low drop, fast PWM to achieve very high efficiency.
- 6 EMI/EMC Compliance.
- 7 Configurable 60-degree or 120-degree HALL position sensor.
- 8 Supports any number of poles.
- 9 Three modes of protection: brake switch, release throttle, 0-5V signal protections.



## Technical Specifications:

### 1. SPECIFICATIONS:

a) Operating Voltage Range	48V – 70VDC
b) Nominal Electric Current	30A DC
c) Driving Support	Sensor and Sensor-less
d) Driving Method	Sinusoidal
e) Efficiency	>90%
f) Braking	Electronic Braking (Regenerative)
g) Driving Modes	-
• Sports Mode	0 ~ 600 RPM (45 kmph)
• Economic Mode	0 ~ 450 RPM (35 kmph)
h) Rated Capacity	800W~1500W
i) Peak Current	40A DC
j) Over Voltage Cut -Off	75V DC

### 2. Protections

- a) Over Current
- b) Input Over Voltage
- c) Stall condition

### 3. Environmental

- a) Operating Temperature -20°C to +60°C
- b) Storage Temperature -20°C to +80°C

### 4. Mechanical

- a) Enclosure Aluminium Case
- b) Dimensions 146 mm x 78 mm x 44 mm
- c) Weight ~650 gms.
- d) IP Rating IP65

# Li-Ion Battery Pack

The Li-Ion battery pack is designed in several chemistries, specially the NMC and LFP variants to suffice all your EV energy needs. The Battery Management System is used for cell charging, balancing and other control / operations is integrated with a firmly protected thermally with a capacity of 1.5Kwh, it can provide a driving range of 60 to 70 kms in a single charge.



## SPECIFICATIONS:

a) Nominal Pack Voltage	60 V
b) Number Of Cells	16S 10P
c) Pack Capacity	26 Ah
d) Over Charge Cut-Off	67 V
e) Under Voltage Cut-Off	45 V
f) Max Charging Rate	0.5 C
g) Continuous Discharging Rate	1C
h) Peak Discharging Rate	2C for 5 Sec
i) Life Cycle	1000 @ 80% DOD
j) Thermal management	Passive
k) Cell Balancing	Passive

### 2. Protections

- a) Over Charge Current
- b) Over Charge Voltage
- c) Under Voltage
- d) Output Short Circuit
- e) Over Temperature
- f) Over Load

### 3. Environmental

- a) Operating Temperature 0°C to +60°C
- b) Storage Temperature 0°C to +60°C

### 4. Mechanical

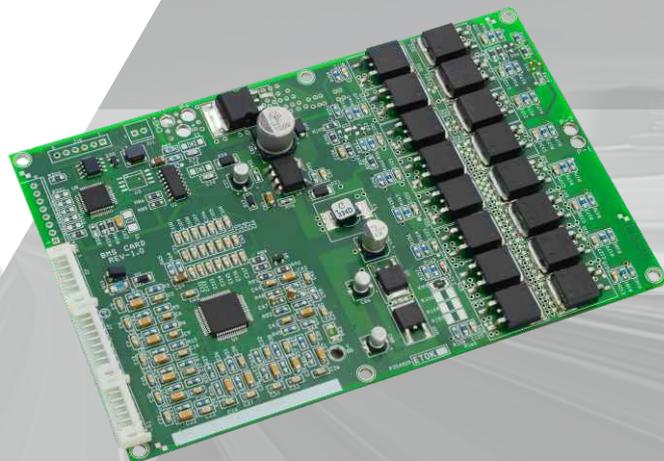
- a) Enclosure Aluminium Case
- b) Dimensions 252mm x 175mm x168mm
- c) Weight < 10 kg.
- d) IP Rating IP65

# Smart Battery Management System

Battery Management system is an electronic system that manages rechargeable battery (cell/ battery pack) , by protecting the battery from operating outside its safe operating area, monitoring its state, authenticating it and/or balancing it. It measures and reports crucial information for the operation of the battery and also protects the battery from damage in a wide range of operating conditions.

## BMS FEATURES:

- ① Developed keeping ISO26262 product lifecycle guidelines in mind.
- ② Supports Unified Diagnostics Service (UDS) over CAN bus.
- ③ Supports all Lithium battery chemistries (NMC, LFP, LTO, etc.).
- ④ Fully Customizable in terms of hardware as well as software.
- ⑤ Up to 100A continuous (customizable) & 180A peak (customizable).
- ⑥ Easy to integrate due to compact form factor.
- ⑦ Automotive grade and AEC qualified components used.
- ⑧ Detailed reporting of the performance of the batteries.
- ⑨ Real time tracking of the pack status and its operating conditions.
- ⑩ Comes with 'Battery Buddy™' mobile application, desktop version also available.



## Technical Specifications:

### SPECIFICATIONS:

a) No. of Cells	14 – 28
b) Cell Chemistry	NCM / LFP/ LTO
c) Cell Under Voltage Cut-Off	Configurable
d) Cut-Off Release Voltage	Configurable
e) Cell Over Charge Voltage Cut-Off	Configurable
f) Cell Over Charge Release Voltage	Configurable
g) Over Load Protection	Configurable
h) Over Charge Protection	Configurable
i) Over Temperature Protection	Configurable
j) Cell Balancing	Passive
k) No. Of Temperature Sensor	6
l) Communication	CAN and BLE
m) Balancing Current	Configurable up to 300 mA
<b>2. Protections</b>	
a) Over Charge Current	
b) Over Charge Voltage	
c) Output Short Circuit	
d) Over Temperature	
e) Under Voltage	
f) Over Load	
<b>3. Environmental</b>	
a) Operating Temperature	-20°C to +60°C
b) Storage Temperature	-20°C to +80°C
<b>4. Mechanical</b>	
a) Dimensions	150mm x 160mm x 25mm
a) Weigh	<100 gms.