1500W/1200W Li-Ion Diamond™ Series Battery Charger Data Sheet

Description:

Green Watt Power's 1500W/1200W Diamond™ Series universal Li-ion battery on-board and off-board chargers are designed with ultra-high efficiency. The low power dissipation and extraordinary performance directly result in higher reliability and a longer charger lifetime. This Diamond series of chargers offers solid and safe power conversion to charge Li-Ion batteries in e-motorcycles, e-boats, e-vehicles, e-machines, and similar applications.

Features:

- Universal AC Input: 90 – 264V.
- Output power: 1500W @ 230V nominal high
  1200W @ 120V nominal low.
- Ultra wide DC output voltage: 28V – 58.8V.
- High efficiency: Up to 92%.
- All-Around Protections: OVP, OCP, SCP, OTP.
- Fan cooled for ambient temperature operation to 60 °C without handle and 50 °C with handle.
- CAN communication.
- LED Status indicator.
- IP67 waterproof rating.
- Two mechanical versions available:
  - Fixed ON-board mounting and
  - portable OFF-board version with handle.
- Optional 12V/60W AUX ouput.

Model Selection Table

Input Voltage Range (AC)	Output Power Max.	Output Voltage Range (DC)	Output Current Range	Efficiency (typ.)	Model Number * (factory number *)	Mechanical Design
90 – 264V	1.5kW @ 230Vnom (180 – 264V) 1.2kW @ 120Vnom (90 – 180V)	28 – 58.8V	0 – 25.5A	90% @ 120Vnom 92% @ 230Vnom	**EVC-60-1500M** (PLD1500-EVCS01-58M)	Connector version, **No** Handle
					EVC-60-1500 (PLD1500- EVCS01-58)	Connector version, **Includes** Handle
					EVC-60-1500MW (PLD1500-EVCS01-58MW)	Flying lead version, **No** Handle
					EVC-60-1500W (PLD1500-EVCS01-58W)	Flying lead version, **Includes** Handle

Note: *Add a -12 Suffix to the Model number for optional isolated 12V/5A Auxiliary Output.
For example: EVC-60-1500M-12 (PLD1500-EVCS01-58M-12)

General Condition: ***25°C ambient, input 230VAC @ full load unless noted.***

Input Specification		
Input Voltage	90 – 264VAC	
Input Frequency	47 – 63Hz	
Input Current Max.	12.3A @120VAC	7.3A @230VAC
Power Factor (min./typical)	0.97 / 0.98 @120VAC	0.96 / 0.98 @230VAC
Efficiency at full load (min./typical)	89% / 90% @120VAC	91% / 92% @230VAC
Output Specification		
Output Voltage	28 – 58.8V (±1V)	
Output Current	0 – 25.5A (±0.5A)	
Voltage Accuracy	±0.4V	
Output Power	1.2kW @ 120V nom line and 1.5kW @ 230Vnom line input voltage	
Optional Auxiliary Output (-12 suffix)	12V/5A Output (isolated from main power output)	
Current Ripple	±15% Iout max. (constant current mode). 20MHz BW, rated input and rated output.	
Communication	CAN	
Turn On Delay	5.0s max. @ Full Load	
Protection	**OVP, OCP, SCP, OTP**	
Input Under Voltage Protection (UVP)	Charger shut down at Vin <80VAC (±5V) and auto-recovers at Vin >90VAC (±5V)	
Output Over Voltage Protection (OVP)	With Vout >61V, the charger enters latch mode. Recycle AC input after fault removal to return to normal operation.	
Battery Under Voltage Protection	A battery voltage <25V (±2V) triggers charger latch mode. Recycle AC input after fault removal to return to normal operation.	
Short Current Protection (SCP)	Charger self-protects when output is in short-circuit. Charger resumes normal operation after removal of fault condition.	
Output Overcurrent Protection	Output overcurrent protection triggers >27A for >2 seconds. Charger resumes normal operation after removal of fault condition.	
Reverse Polarity Protection	Charger enters self-protection mode with output in reverse polarity. Charger resumes normal operation after removal of fault condition.	
Timing protection	Timing protection activates after 11 hours (±1h) of charging. Recycle AC input to return to normal operation.	
Over Temperature Protection	**Thermal protection ON** **No Handle** >85°C (±5°C) Tcase **Incl. Handle** >75°C (±5°C) Tcase	**Thermal protection OFF** <75°C (±5°C) Tcase <70°C (±5°C) Tcase
Max. Case Temperature Range (see also derating curve for max load)	**Without Handle**: -40°C to +80°C	**Including Handle**: -40°C to +60°C
Storage Temperature Range	-40°C to +85°C	
Surge Protection	1kV DM / 2kV CM	
Isolation Test Voltage	Prim. to Sec.: 3000VAC / Prim. to Earth: 1500VAC / Sec. to Earth: 500VAC Condition: Leakage current 10mA max. duration 60s max.	
Intrusion & Moisture Protection	IP67 * (IEC-C20 connector excluded; mating connector must match charger IP rating)	

* IP54 for Fan version with production date codes before Nov. 2023.

Immunity (Designed to meet):

EN61000-3-2: Harmonic Current Emission.

EN61000-3-3: Voltage Fluctuations and Flicker.

EN61000-4-2: ESD 8kV Air Discharge, 4kV Contact Discharge, Criteria B.

EN61000-4-3: Radio-Frequency Electromagnetic Field Susceptibility Test-Rs Level 3, Criteria A.

EN61000-4-4: Electrical Fast Transient/Burst-EFT 1kV, Criteria B.

EN61000-4-5: Surge Immunity Test, AC Power Line: Line to Line 1kV; Line to Earth 2kV Criteria B.

EN61000-4-6: Conducted Radio Frequency Disturbance Test-CS Level 3, Criteria A.

EN61000-4-8: Power Frequency Magnetic Field Test 3A/m, Criteria A.

EN61000-4-11: Voltage Dips, Criteria B.

EMI: Test with the system.

Safety (Designed to meet):

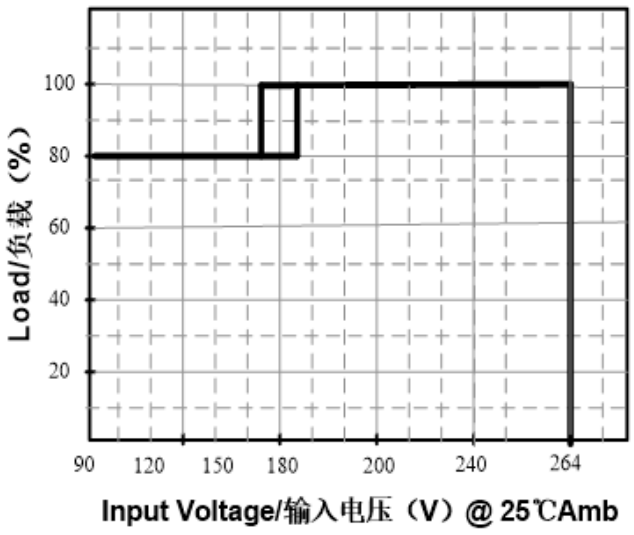
EN60335 & UL62368

Communication Protocol:

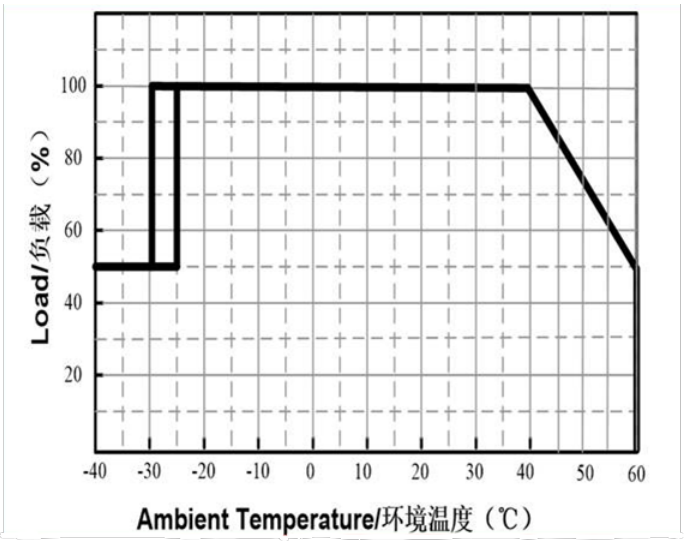
The charger has CAN communication function with a baud rate of 500kbit. The charger does not have a terminal resistor by default, it is optional. Please ask factory for our standard CAN communication protocol or if you have your own communication, you can provide us with your specific protocol for evaluation.

Derating Curves

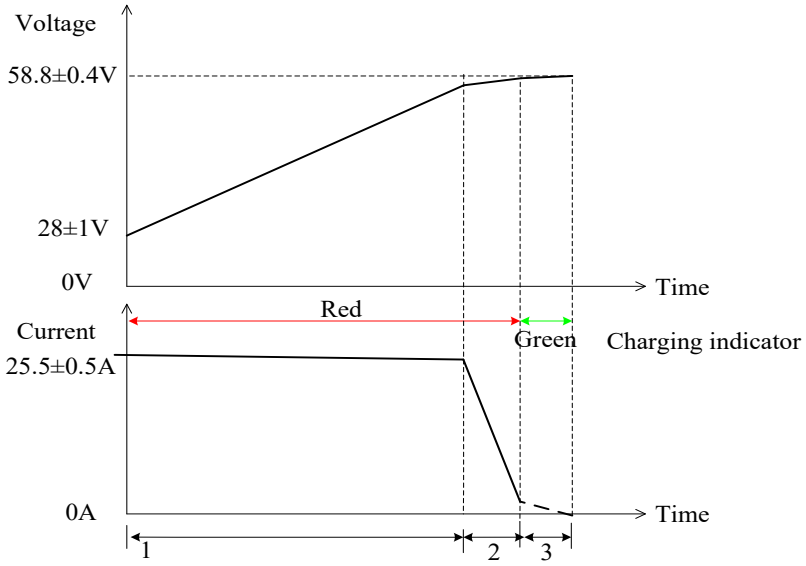
Input Voltage vs. Load



Temp vs. Load



Typical Charge Curves



Note:

1. The charging curve is based on the charging request, output current and voltage, sent by the BMS. When the requested current and voltage received are higher than the maximum output capacity of the charger, the charger outputs the current and voltage based on its own maximum output capacity.
2. When the BMS board sends a command to inform the completion of charging, the charger finished charging and the LED color changes to continuous green.
3. When the battery voltage is at 58.8V (±1V), the charger enters constant voltage mode. When the battery voltage is between 28 – 57.5V (±1V), the charger operates in constant current mode.
4. Derating conditions should be considered for the actual output current.

LED Status Indicator:

The LED indicator shows the charging status by color:

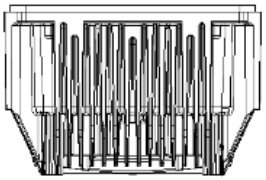
Battery Status	**LED Indicator**
Battery disconnected	Flashing GREEN
Battery fully charged (charging current <400mA ±200mA)	GREEN
Battery charging (charging current >800mA ±200mA)	RED
Fault Condition (OVP, UVP, Short Circuit, OTP, OCP, RPP）	Flashing RED

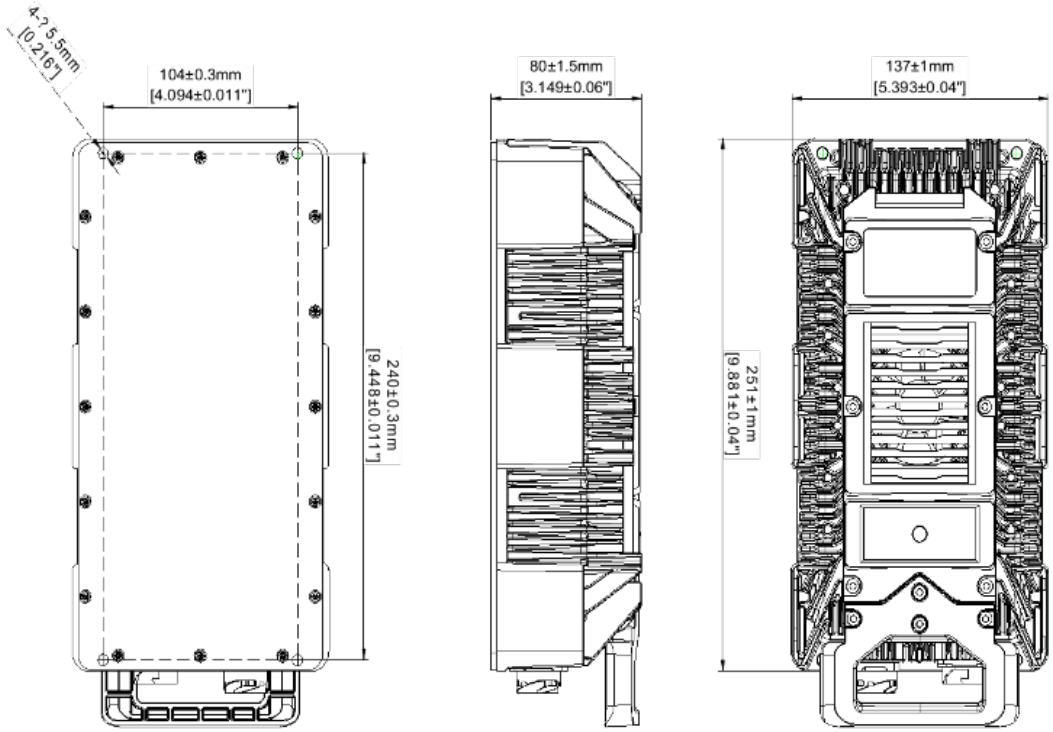
Note: During short-circuit protection, it is normal for the LED to blink from green to off and then to red again for a short time, which does not affect the protection function. It's normal for the LED to change to red when the output current is 600mA to 1000mA, because it is within the range of its hysteresis.

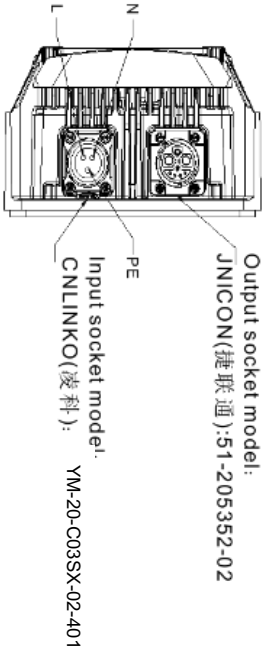
MECHANICAL DATA

On-Board Connector Version:

(See also connector details)





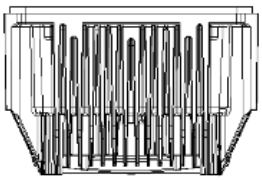


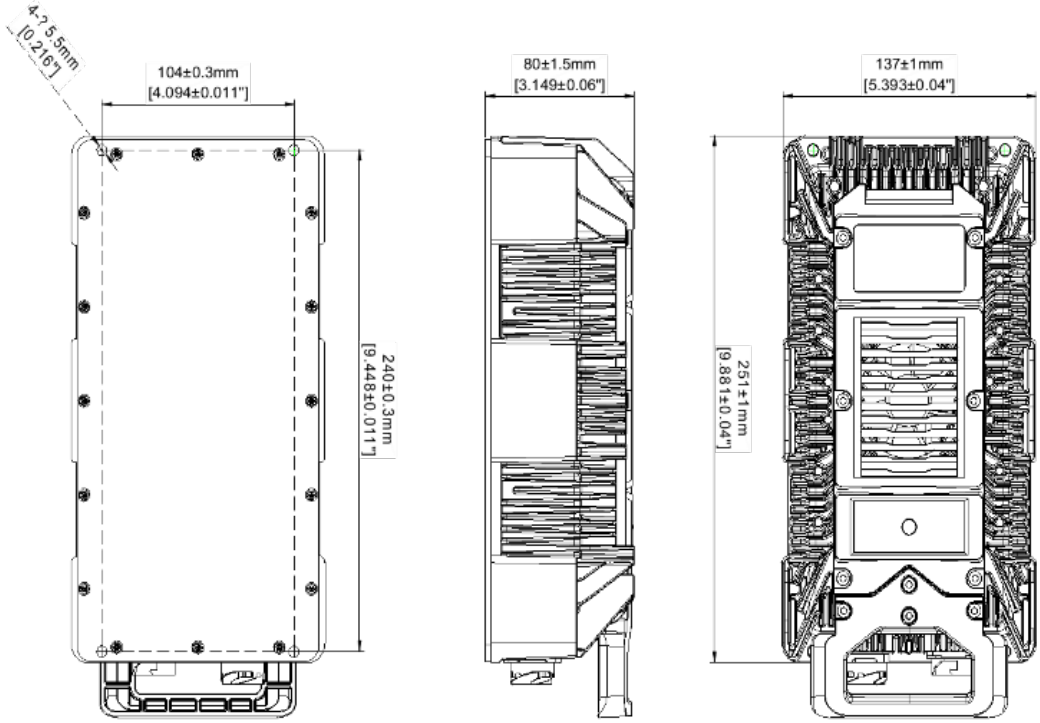
Mechanical	Fan-type No Handle
Dimensions (L x W x H)	251 x 137 x 80 mm 9.88 x 5.39 x 3.15 in
Weight	3.8kg / 8.38 lbs.

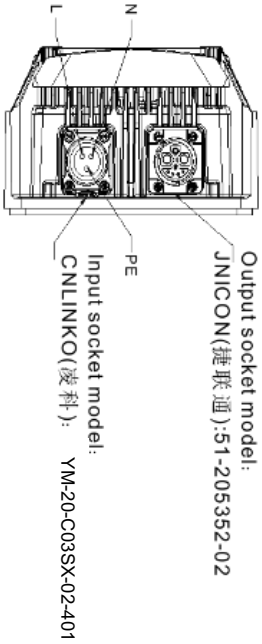
MECHANICAL DATA

Off-Board Connector Version:

(See also connectors details)





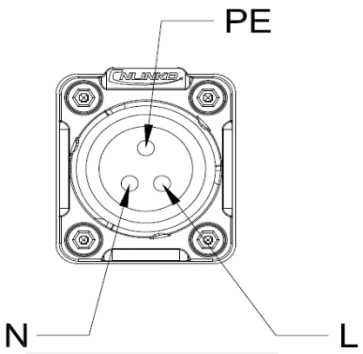


Mechanical	Fan-type with Handle
Dimensions (L x W x H)	277 x 137 x 80 mm 10.91 x 5.39 x 3.15 in
Weight	4.0kg / 8.82 lbs.

CONNECTOR DETAILS: On&Off Board Connector Version

Charger Side Connector Details

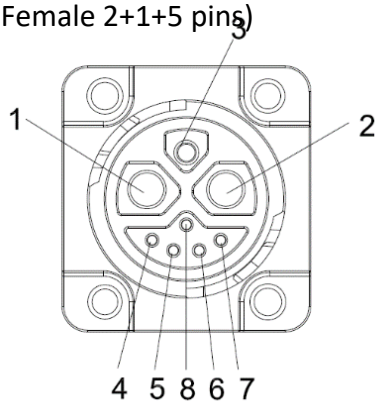
AC connector on Charger：
CNLINKO, YM-20-C03SX-02-401 (3-pin male)



DC/Signal connector on Charger:
Jnicon, 51-205352-02 (Female 2+1+5 pins)

Pin	Function	Wire
1	BAT+	10AWG
2	BAT-	10AWG
3	NC (optional +12V)	20AWG
4	NC (*reserved*)	22AWG
5	NC (*reserved*)	22AWG
6	CAN_H	22AWG
7	CAN_L	22AWG
8	NC (optional -12V)	20AWG

* Consult factory for Wake-up function

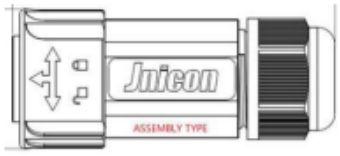


Customer Side Mating Connector Info:

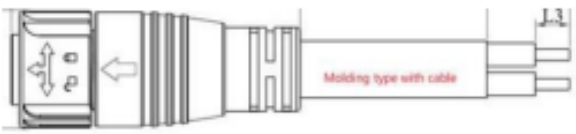
(will be provided with samples; for volume orders, customer must source separately).

AC mating connector (not provided):
CNLINKO, YM-20-J03PE-02-001 (3 pin, female)
http://www.cnlinkousa.com/where-to-buy.html

DC/Signal mating connector (not provided):
Jnicon, 51-105311-01 (Assembly, 2+1+5 pins)



Jnicon, 51-105311-01-0001 (Molding option)

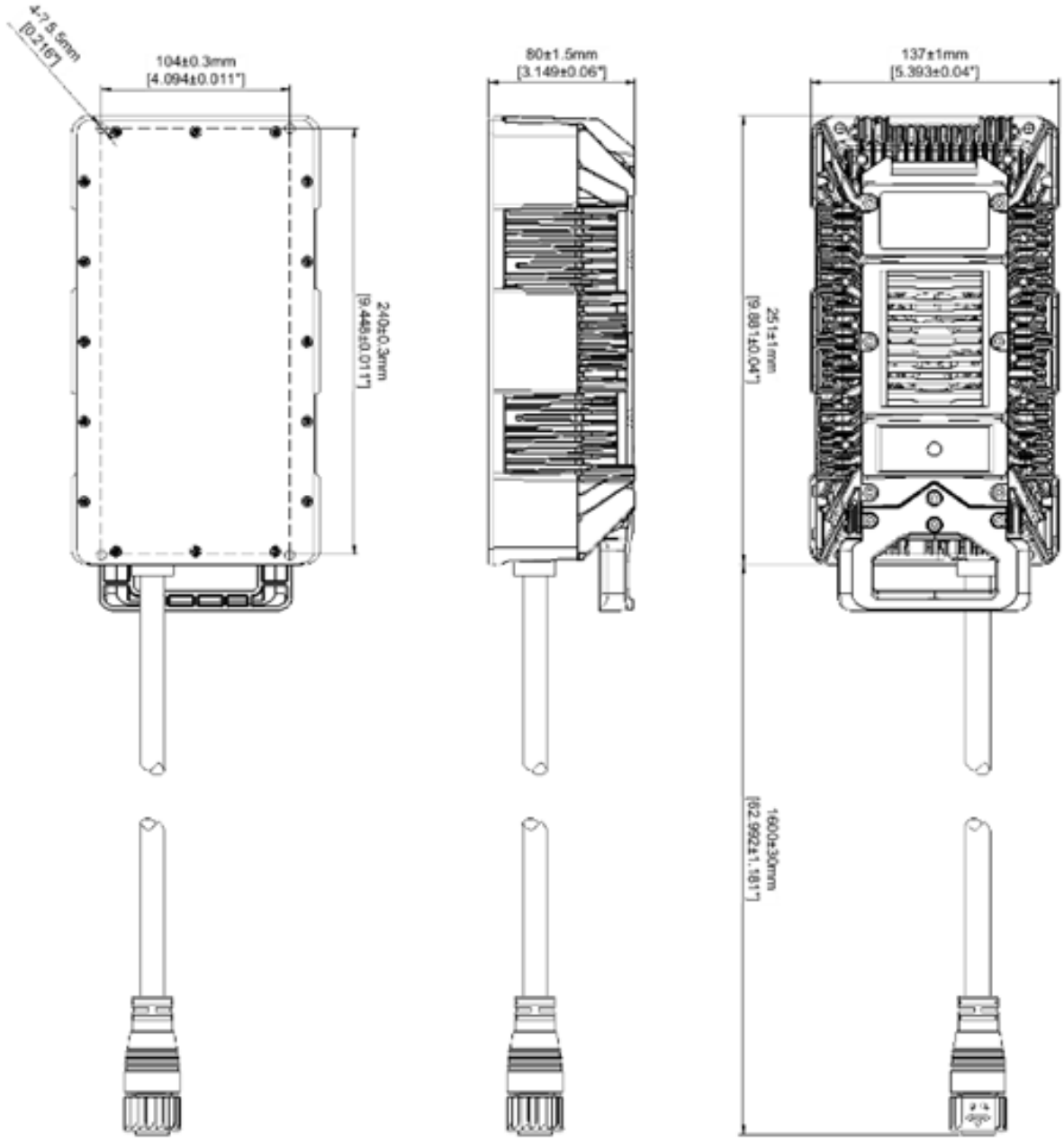


https://www.jniconconnector.com/buy-M23_self_locking_2+1+5.html

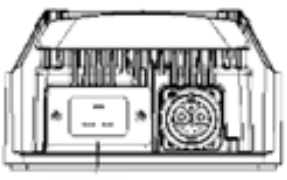
MECHANICAL DATA

On-Board Flying Lead Version:

(See also connector details)



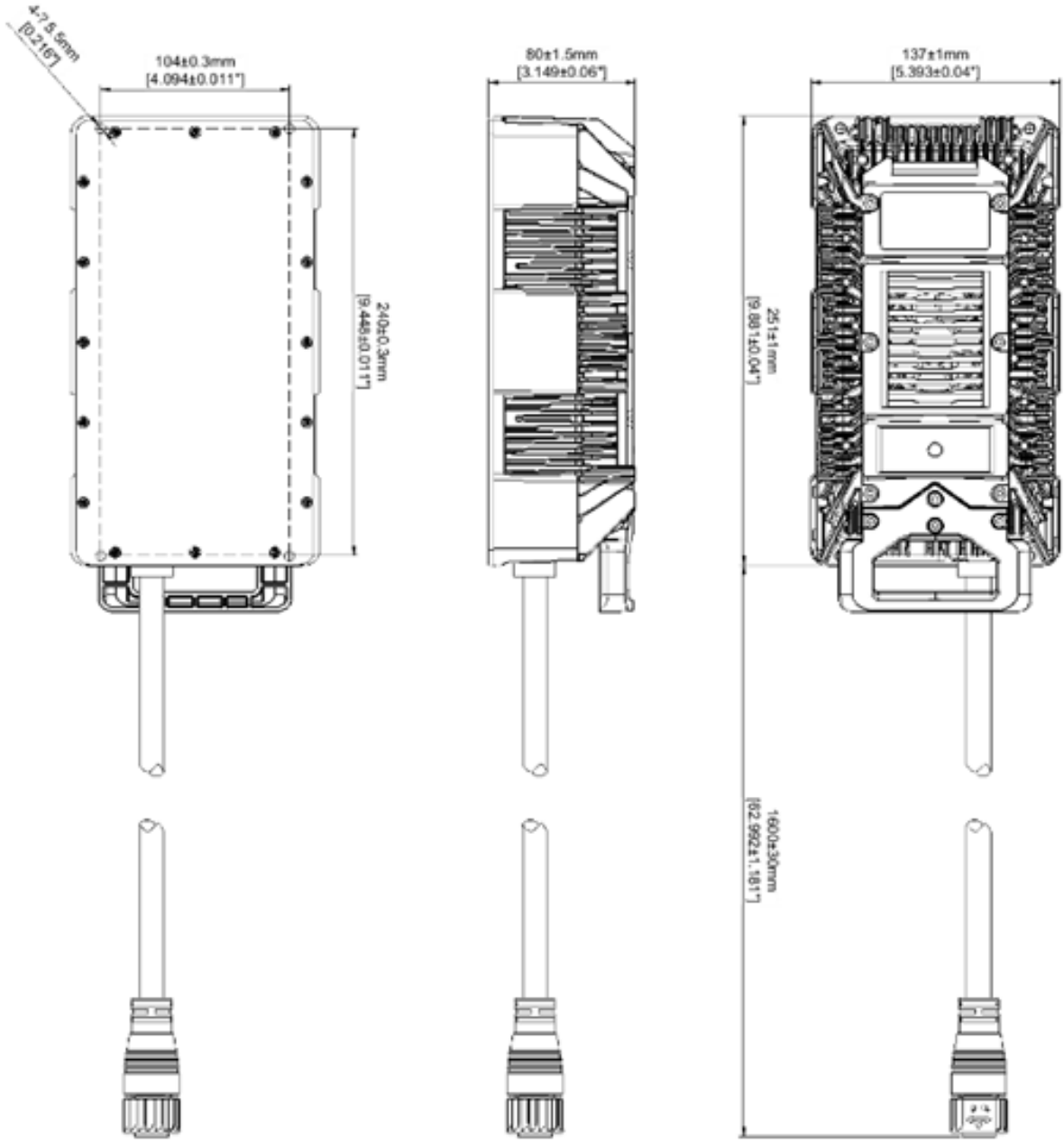
Mechanical	Fan-type No Handle
Dimensions (L x W x H)	251 x 137 x 80 mm 9.88 x 5.39 x 3.15 in
Weight	3.8kg / 8.38 lbs.



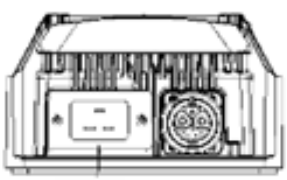
MECHANICAL DATA

Off-Board Flying Lead Version:

(See also connector details)



Mechanical	Fan-type with Handle
Dimensions (L x W x H)	277 x 137 x 80 mm 10.91 x 5.39 x 3.15 in
Weight	4.0kg / 8.82 lbs.



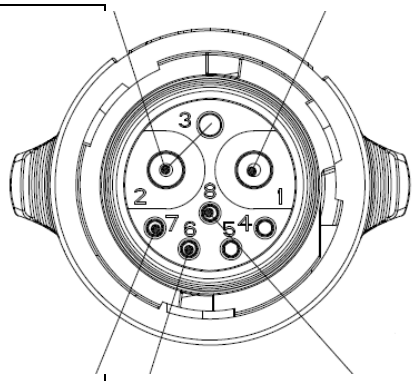
CONNECTOR DETAILS: On&Off Board Flying Lead Version

Charger Side Connector Details

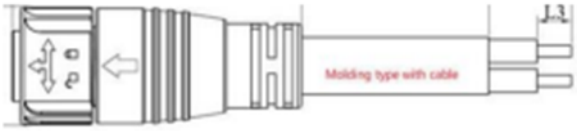
AC Socket on Charger:
Standard IEC-C20 (male)

DC/Signal Male connector on Charger:
Jnicon 51-105311-01-0001 (Molding, 2+1+5)

Pin	Function	
1	BAT+	
2	BAT-	
3	NC (optional +12V)	
4	NC (*reserved*)	
5	NC (*reserved*)	
6	CAN_H	
7	CAN_L	22AWG
8	NC (optional -12V)	20AWG



* Consult factory for Wake-up function



Mating Connector Info: Customer Side

(will be provided with samples; for volume orders, customer must source separately).

AC mating connector (not provided):
Standard IEC-C20 (female) with cable.

DC/Signal mating connector (not provided):
Jnicon, 51-205352-02 (Female 2+1+5 pins)

https://www.jniconconnector.com/buy-M23_self_locking_2+1+5.html