600-1000W Battery Chargers for Material Handling Systems

Description:

Powerland's 600-1000W* universal Li-ion battery chargers are designed with ultra-high efficiency. The low power dissipation and extraordinary performance directly result in higher reliability and a longer lifetime, both crucial benefits in forklift and material handling applications. This series of chargers offer solid and safe power conversions for use in e-vehicles as on-board and/or off-board chargers.

* See also other models with up to 2.4kW power.

Features:

- Universal AC Input: 90 – 264V.
- Output power: 650W-1000W air cooled.
- 4 ultra-wide output voltage ranges covering 24V – 72V batteries.
- High efficiency: Up to 92%.
- All-Around Protections: OVP, OCP, SCP, OTP.
- Operational ambient temperature up to 50 °C.
- CAN communication.
- LED Status indicator.
- IP65-IP67 waterproof rating.
- Connectors versions with handle.

Model Selection Table

Input Voltage Range (AC)	Output Power Max.	Output Voltage Range (DC)	Output Current Range	Efficiency (typ. @ 230V)	Model Number (factory number)	Basic Mechanical Dimensions
90 – 264V	650W	27-54.6V	0 – 12A	92%	**EVCM-54-650** (PLD650-EVAN08-05412SB)	237*110*75mm (9.3*4.3*2.95in)
	750W	15-29.4V	0 – 25A	92%	**EVCM-30-750** (PLD750-EVCS01-24)	264*137*73mm (10.4*5.4*2.9in)
	1000W	28-58.8V	0 – 18A	92%	**EVCM-60-1000** (PLD1000-EVCS01-48)	277*137*80mm (10.9*5.4*3.15in)
	1000W	43 – 86V	0 – 12A	92%	**EVCM-86-1000** (PLD1000-EVCS01-72)	

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

Input Specification		***EVCM-54-650***	***EVCM-30-750***	***EVCM-60-1000***	***EVCM-86-1000***
Input Voltage		90 – 264Vac			
Input Frequency		45 – 65Hz			
Input Current Max.	115VAC	6A	7.5A	9.5A	
	230VAC	3A	3.75A	4.9A	
Power Factor (min./typical)	115VAC	0.98 / 0.99	0.98 / 0.99	0.97 / 0.98	
	230VAC	0.96 / 0.97	0.97 / 0.99	0.96 / 0.98	
Efficiency (full load min./typ.)	115VAC	88% / 89%	88% / 89%	89% / 90%	
	230VAC	91% / 92%	91% / 92%	91% / 92%	
Output Specification		***EVCM-54-650***	***EVCM-30-750***	***EVCM-60-1000***	***EVCM-86-1000***
Output Voltage		27 – 54.6V (±1V)	15 – 29.4V (±1V)	28 – 58.8V (±1V)	43 – 86V (±1V)
Output Current (see charging curve)		0 – 12A (±0.5A)	2 – 25A (±0.5A)	0 – 18A (±0.5A)	0 – 12A (±0.5A)
Voltage Accuracy		±0.5V @Vo max. CC Load 1A			
Output Power		650W	750W	1000W	1000W
Current Ripple		±15% Iout max., during constant current mode. Measurement is done by 20MHz bandwidth oscilloscope.			
Communication		CAN			
Turn On Delay		5 sec. max. @ Full Load			
Protection		**OVP, OCP, SCP, OTP**			
Input Under Voltage Protection (UVP)		Shut down at Vin 80VAC (±5V), auto-recovery at Vin >89VAC (±5V).			
Output Over Voltage Protection (OVP)		If output voltage is about 105% Vout max (±2V), charger enters latch mode. Recycle AC input after fault removal to resume operation.			
Battery Under Voltage Protection		Charger will not start with battery voltage is <90-95% Vout min (±2V). Recycle AC input after fault removal to resume 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 at approx. 105% of Io max for >2 seconds. Charger resumes normal operation after removal of fault condition.			
No Load and Reverse Polarity Protection		Charger enters self-protection mode with no Load or output in reverse polarity. Charger resumes normal operation after removal of fault condition.			
Timing protection		Timing protection activates after 12 hours (±1h) of charging. Recycle AC input to return to normal operation.			
Over Temperature Protection		**Thermal protection ON** >75°C (±5°C) Tcase **Thermal protection OFF** >70°C (±5°C) Tcase			
Case Temperature Range		-40°C to +60°C (Operating, see also derating curve for max load)			
Storage Temp.; Relative Humidity		-40°C to +85°C; 10% RH to 90% RH			
Surge Protection		1kV DM / 2kV CM			
Isolation Test Voltage		Prim. to Sec.: 3000VAC / Prim. to Earth: 1500Vac / Sec. to Earth: 1500VAC Condition: Leakage current 10mA max. duration 60s max.			
IP (excl. IEC-C20 connector; mating conn. must match charger IP rating)		IP65		IP67	

General	EVCM-54-650	EVCM-30-750	EVCM-60-1000	EVCM-86-1000
CAN open Communication Protocol *	Baud rate: 125kbit Terminal R: 240Ω		Baud rate: 500kbit Terminal R: optional	

* Please contact factory for specific communication protocol, the protocol can be defined as required by the customer.

Immunity and EMI (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 (2kV for EVCM-54-650), Criteria A.

EN61000-4-5: Surge Immunity Test, AC Power Line: Line to Line 1kV; Line to Earth 2kV, Criteria B (Line to Line 2kV; Line to Earth 4kV for EVCM-54-650, 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: Comply with EN55032 and EN 55014-1/EN 55014-2/FCC PART 15 CLASS B (system level tests).

Safety:

Designed to meet UL1564 & UL62368, EN60335 and CE.

Fan control (*all models)*:

When the chargers working case temperature exceeds 40±5℃, the fan starts working and when the case temperature falls below 35±5℃ or the charger is turned off, the fan stops working.

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 <600mA ±200mA)	GREEN
Battery charging (charging current >600mA ±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.

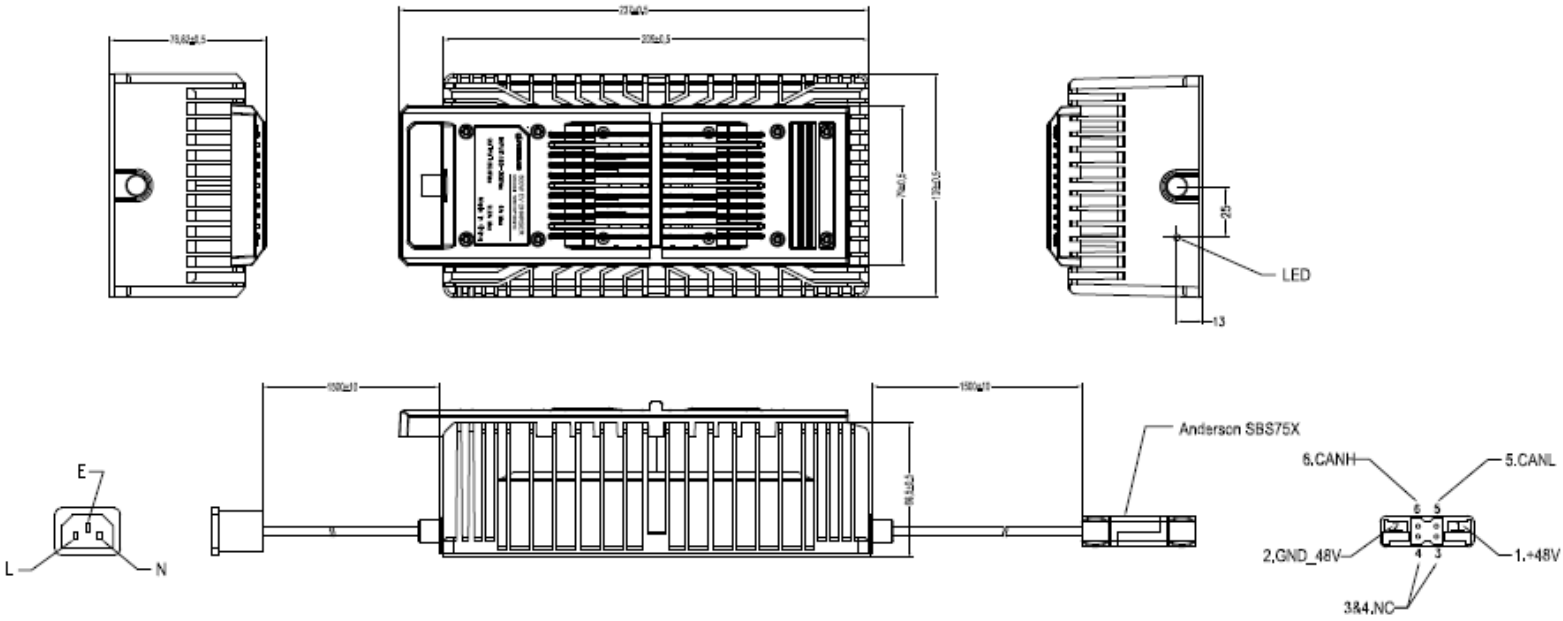
EVCM-54-650

Typical Charge Curve (650W unit)

Note: the cut-off current when almost fully charged is within 200~600mA and the charger will stop charging.

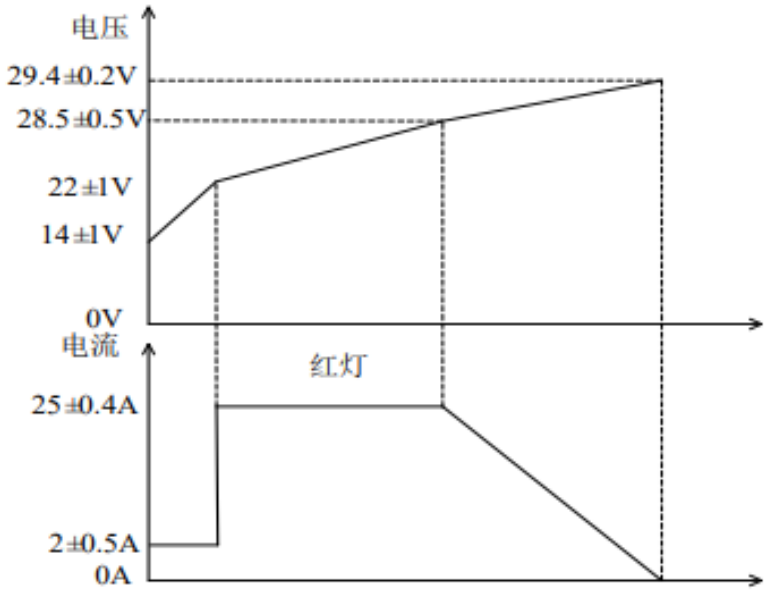
MECHANICAL (650W unit)

Dimension and Outline Drawing



EVCM-30-750

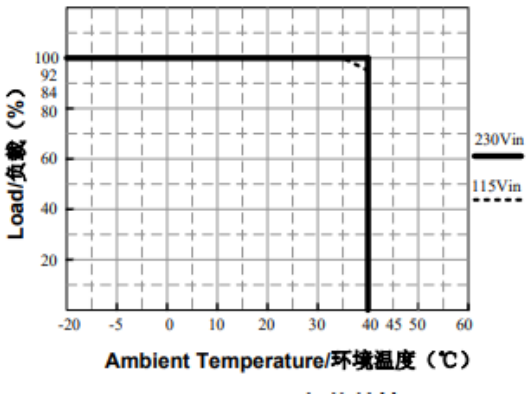
Typical Charge Curve (750W unit)



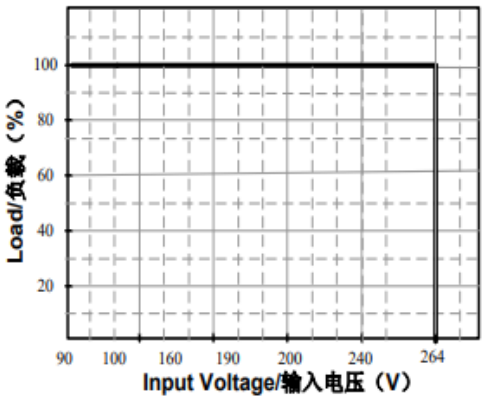
Note:

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 28.5 (±1V), the charger enters constant voltage mode.
When the battery voltage is between 22V and 28.5 (±1V), the charger operates in constant current mode.
4. Derating conditions should be considered for the actual output current.

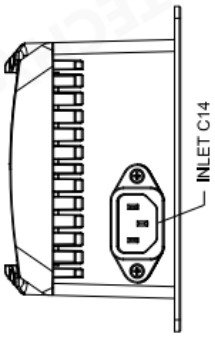
Derating: Input Voltage vs. Load



Temp vs. Load

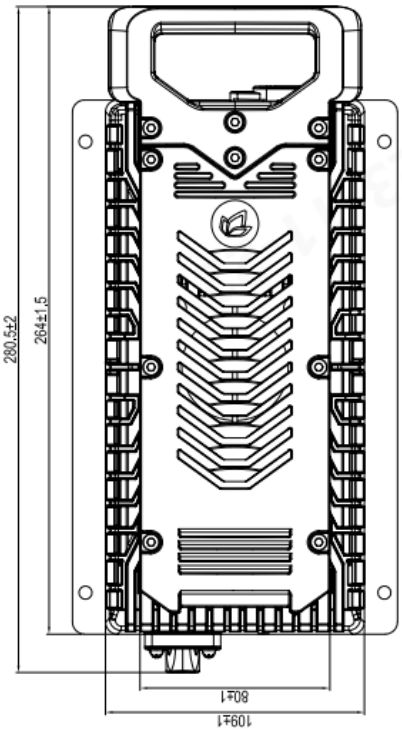


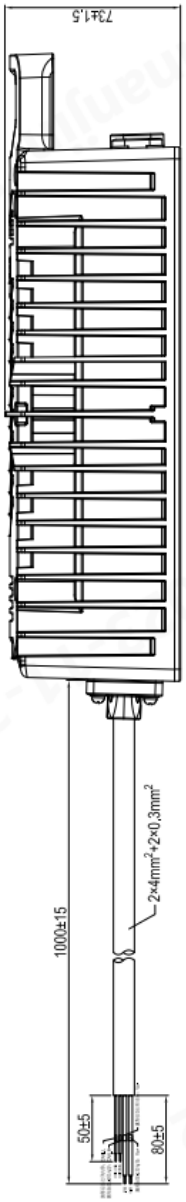
MECHANICAL DATA (750W unit)

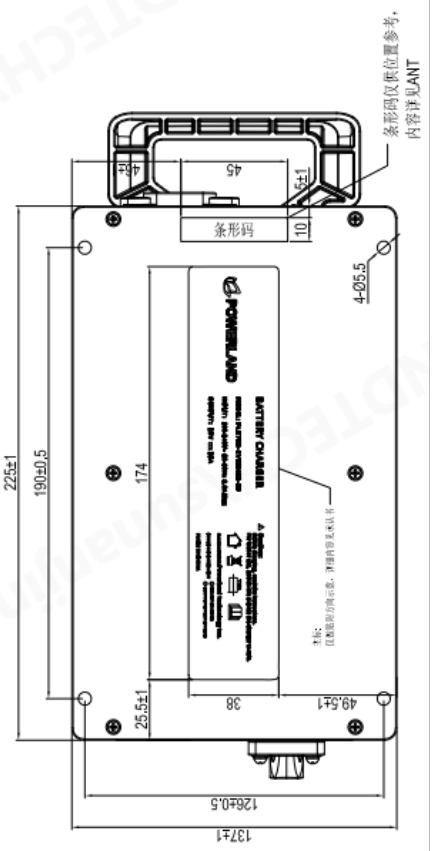


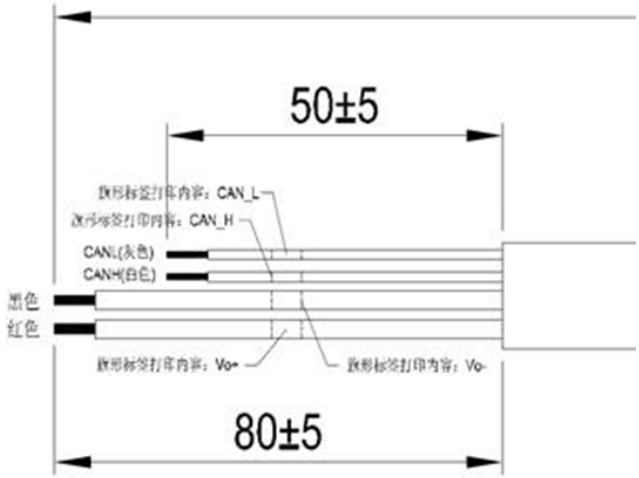
Input Connector:

Standard IEC-C14 Plug.









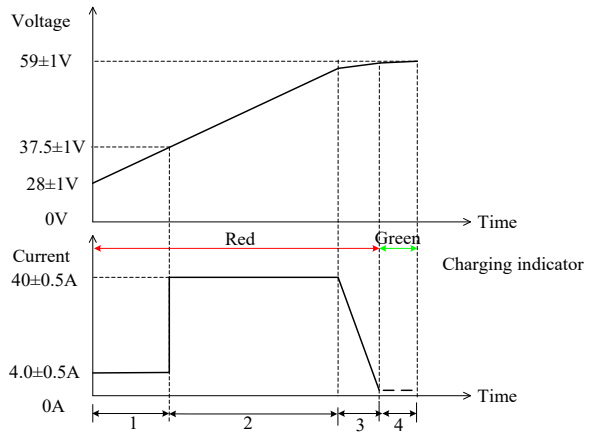
Output Connection Details:

Output cable, 1000mm (±15) long, with color coded flying leads.

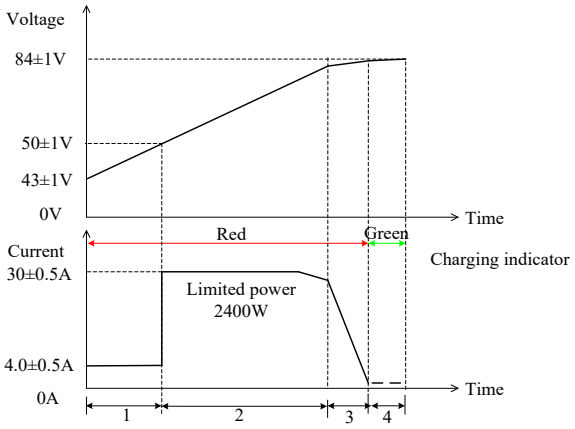
Function	Wire Color
CAN_H	White
CAN_L	Gray
BAT+	Red
BAT-	Black

Typical Charge Curves (1kW unit)

EVC-60-1000



EVC-84-1000

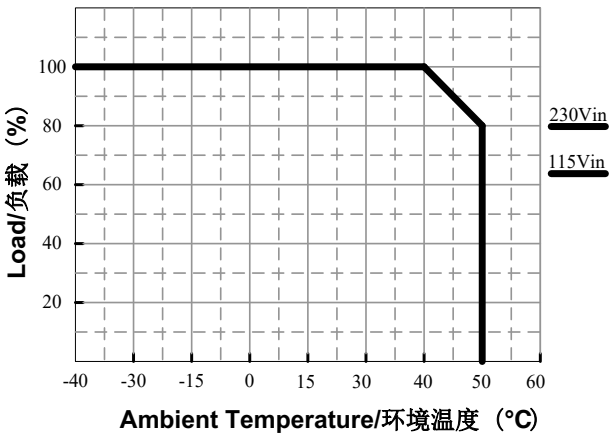


Notes:

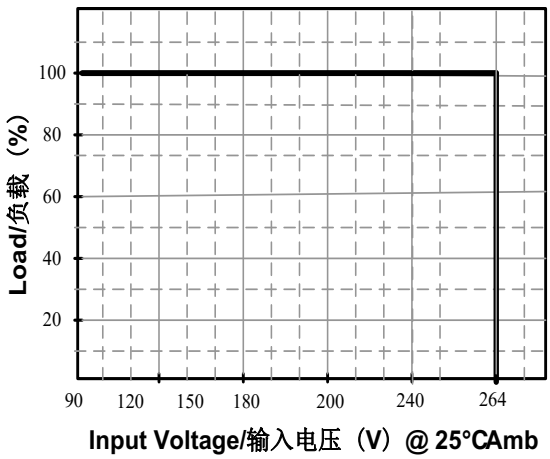
1. The charging curve is based on the charging request, output current and voltage, sent by the BMS. When the requested current and voltage received are higher than the maximum output capacity of the charger, the charger outputs the current and voltage based on its own maximum output capacity.
2. When 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 59/86V (±1V) respectively, the charger enters constant voltage mode. When the battery voltage is between 37.5-58.8V/43-84V (±1V), the charger operates in constant current mode.
4. When the battery voltage is higher than 28V/43V (±1V) and less than 37.5V/50V (±1V), the charger enters a pre-charge stage and the output current is 4A (±0.5A).
5. Derating is allowed during charging, refer to the derating curve for the actual output current.

Derating Curves (1kW unit)

Input Voltage vs. Load



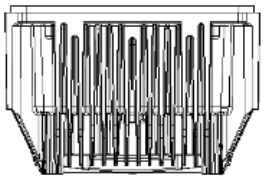
Temp vs. Load

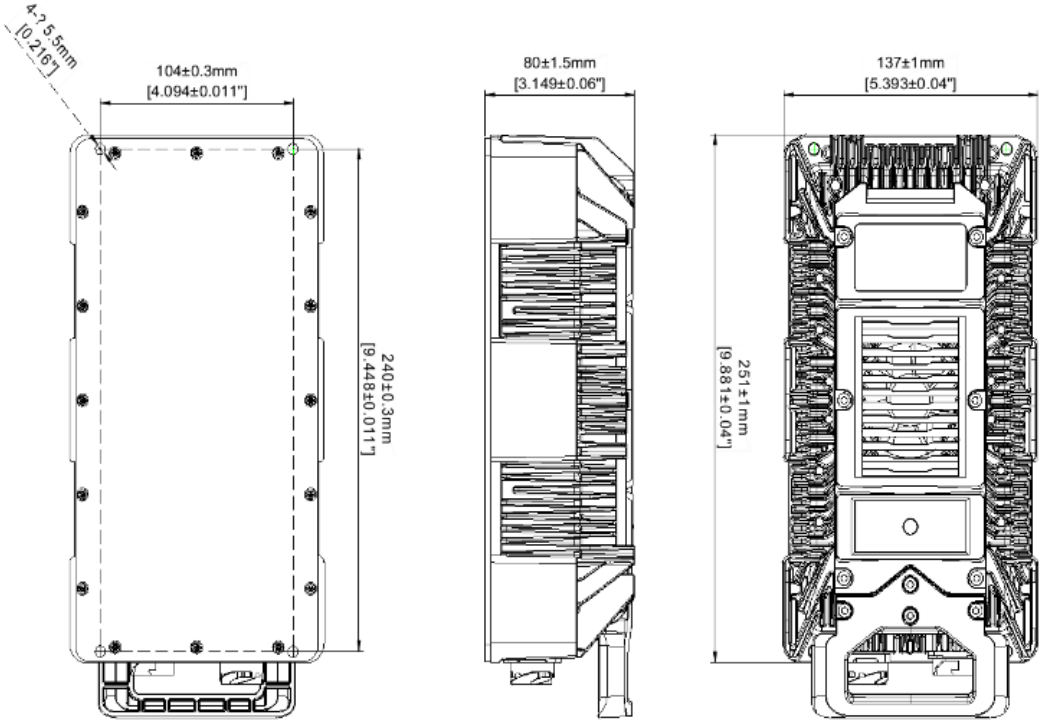


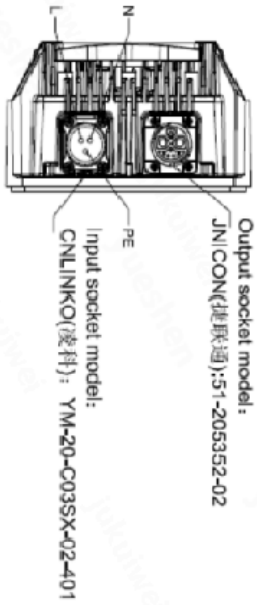
MECHANICAL DATA (1kW units)

Connector Version with Handle (no suffix):

(See also description of connectors)





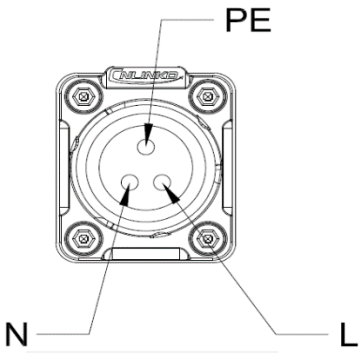


Mechanical	Fan-type with Handle
Dimensions (L x W x H)	277 x 137 x 80 mm 10.91 x 5.39 x 3.15 in
Weight	4.0kg / 8.82 lbs.

CONNECTOR DETAILS: Connector Version with or without Handle

Charger Side Connector Details

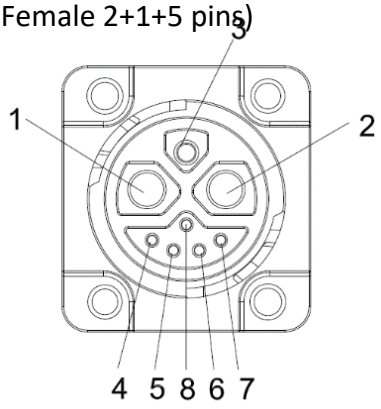
AC connector on Charger:
CNLINKO, YM-20-C03SX-02-401 (3-pin male)



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

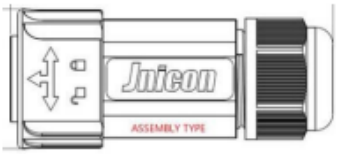


Customer Side Mating Connector Info:

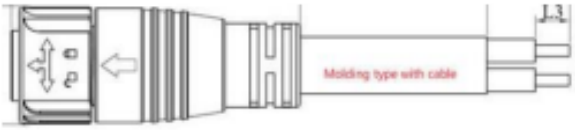
(will be provided with samples; for volume orders, customer must source separately).

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