

*phocos*<sup>®</sup>

# Product Catalog

2018-2019



[www.phocos.com](http://www.phocos.com)

Twenty years ago, our passion for off-grid solutions was our foundation. Today we are expanding on our innovation and success to also service any grid. From off-grid to any grid, we strive to make reliable energy access possible anywhere in the world, any time, and for any income level.

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The Phocos mission is to design and deliver world-class solutions for energy production, storage, and conservation to enable universal access to reliable energy. Our goal is to maximize system reliability and minimize total cost of ownership for our customers.

Our roots are tied deeply in rural electrification applications throughout the developing world. We built our off-grid reputation by supplying high-quality energy solutions to global markets where huge populations do not have access to reliable grid power. Phocos has emphasized the development of intelligent products and solutions for rural electrification applications, incorporating the latest technological advances at the most affordable cost.

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### MPPT Charge Controllers

ECO-N-MPPT  
 CIS-MPPT-LED-HC  
 CIS-MPPT Series  
 MPPT 100/40  
 CIS-MPPT-100/25 (Q1 2019)



### PWM Charge Controllers

CM Series      CXNsolid  
 CML-USB      CIS-N Series  
 CMLsolid      CIS-N-LED  
 ECO10      Dingo  
 ECO-N-T Series      SPS Serie  
 CXNup



Over time, our product portfolio and expertise have expanded to serve industrial off-grid applications. Phocos' solutions help ensure reliable energy is available for all types of industrial applications, equipment, and conditions. From solar lighting to oil and gas, traffic to telecom, we pride ourselves with meeting the challenging demands industrial customers face to offer the right solution that will last for years to come.

There is a growing demand for off-grid solutions for recreational activities like boats, cabins, RVs, and camping. In such applications, energy independence is not only a necessity, it is a way of life. Phocos is dedicated to developing solutions to support clean, sustainable living on the road, on the water, or off the beaten path.

Phocos is headquartered in Ulm, Germany. However, Phocos' global presence reaches far beyond its German origins. Today, we operate sales, support and R&D subsidiaries globally. Our commitment to local service and support anywhere in the world makes Phocos much more than a supplier of components and solutions for off-grid systems. It makes us "Your Off-grid Partner."

We look forward to having the opportunity of working with you!

Sincerely,  
The Phocos Global Network



**24-26**



**28-31**



**32-35**



## Off-Grid Inverters

PSW Series



## DC Lighting & Refrigeration

FR Series Refrigerator/Freezer  
SL LED Lamps



## Turnkey Solutions

Solar Home System Kits  
ECO Pico



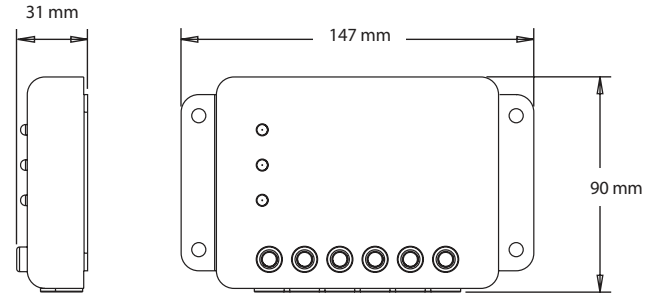
# MPPT Charge Controllers



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### Technical Drawing



### Product Introduction

ECO-N-MPPT is the intelligent, cost-effective choice for low-power applications that require maximum charging efficiency. Phocos' high-performance maximum power point tracking (MPPT) algorithm ensures optimal charging current from your panel/array in all conditions. This results in up to 30% higher power yield than conventional PWM charge controllers. This added efficiency paired with Phocos' precision 4-stage, temperature-compensated charge regime significantly extends battery lifespan, reducing number of battery replacements over the useable life of the system.

The encapsulated housing and corrosion-resistant wire terminals protect the ECO-N-MPPT from the harshest environments. An intuitive, 3-LED interface display basic system status data including: charge on/off, low battery warning, high/low-voltage disconnect, and load over current/short circuit.

### Product Features

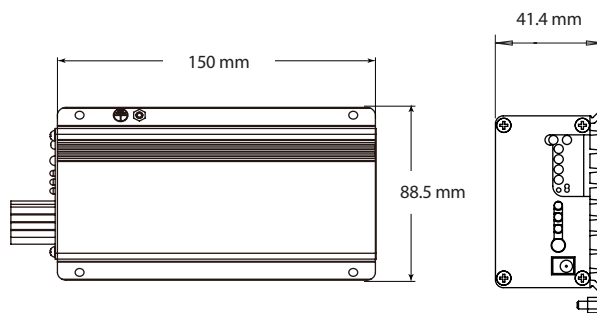
- Works in 12 or 24 V battery systems (auto recognition)
- Up to 98% power-conversion efficiency
- Compact footprint fits in tight spaces
- Rugged, potted design withstands vibration, dust, insects and water ingress
- Install requires only a flathead screwdriver
- Built-in low-voltage disconnect feature
- Four-stage charging ensures maximum battery lifespan
- User-selectable battery type

### Technical Data

Type	ECO-N-MPPT-15
System Voltage	12/24 V auto recognition
Max Charge/Load Current	15 A
Max. Panel Input Voltage	50/85 V
Float Charge	13.8/27.6 V (25 °C)
Main Charge	14.4/28.8 V (25 °C), 0.5 h daily
Boost Charge	14.4/28.8 V (25 °C), 2 h; activation: battery voltage <12.3/24.6 V
Equalization Charge	14.8/29.6 V (25 °C), 2 h; activation: battery voltage <12.1/24.2 V (at least every 30 days)
Deep-Discharge Protection	11.00-12.00/22.00-24.04 V (by SOC) 11.0-11.9/22.0-23.8 V (by voltage)
Reconnect Level	12.8/25.6 V
Overvoltage Protection	15.5/31.0 V
Undervoltage Protection	10.5/21.0 V
Temperature Compensation	-25 mV/K (12V); -50 mV/K (24 V)
Idle Self-Consumption	10 mA/8 mA
Grounding	Negative grounding
Ambient Temperature	-40 to +60 °C
Max. PV Input Power	250 W/500 W
Max Altitude	4,000 m above sea level
Battery Type	Lead acid (gel, AGM, flooded) LiFePO4 (selectable)
Max Wire Cross Section	16 mm <sup>2</sup> (AWG 6)
Dimensions (WxHxD)	147 x 90 x 31 mm / 5.8 x 3.5 x 1.2 in
Weight	1.10 kg / 2.43 lbs
Ingress Protection	IP68 casing / IP21 terminals
Certificates	CE compliant, RoHS compliant
Warranty	5 years



### Technical Drawing



### Product Introduction

The CIS-MPPT-LED is a multi-functional solar charge controller with built-in LED boost driver for solar outdoor lighting systems. Equipped with a widely-adjustable automatic light timer that uses solar input voltage to determine day and night, the CIS-MPPT-LED adjusts to seasonal changes. In addition, the built-in LED driver features timed and low-voltage dimming of LED strings.

Like all CIS family products, CIS-MPPT-LED has been designed for the harshest industrial environments and features a rugged, fully potted (IP68) enclosure that prevents damage from dust, insect and water ingress. The infrared communication feature allows for full-control of light timer settings and LVD customization via remote control accessory (CIS-CU) and full adjustment of the battery charge regime and access to 2 years of system data via USB adaptor (MXI-IR) and our free PC software (CISCOM).

### Product Features

- Three functions in one: charge controller + light timer + LED driver
- Works in 12 or 24 V systems
- Up to 30% additional power yield compared to conventional PWM controllers
- IP68 ingress protection
- Input for motion detector (PIR)
- Infrared-programmable load timing feature with dimming, which is ideal for lighting systems
- 2 year datalogging memory
- Compatible with 60 cell PV modules

### Driver Data

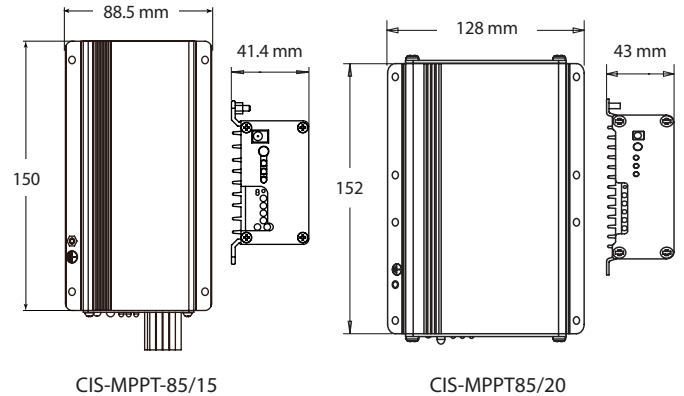
Type	CIS-MPPT-LED-HC
Output Voltage	15-69 V (12 V), 30-69 V (24 V)
Nominal Output Current per String	1,050 - 3,500 mA
Max load power	100 W/200 W
Dimming level	0-100% (10% steps)
PIR-Input	4-30 V with respect to battery negative, $\geq 0.7$ mA; limited protection up to 50 V

### Technical Data

Type	CIS-MPPT-LED-HC
System Voltage	12/24 V auto recognition
Max Charge Current	15 A
Float Charge	13.8/27.6 V (25 °C)
Main Charge	14.4/28.8 V (25 °C), 0.5 h daily
Boost Charge	14.4/28.8 V (25 °C), 2 h activation: battery voltage < 12.3/24.6 V
Equalization Charge	14.8/29.6 V (25 °C), 2 h activation: battery voltage < 12.1/24.2 V (at least every 30 days)
Deep-Discharge Protection	11.0-12.0/22.0-24.0 V (by SOC) 11.0-11.9/22.0-23.8 V (by voltage)
Reconnect Level	12.8/25.6 V
Overvoltage Protection	15.5/31.0 V
Undervoltage Protection	10.5/21.0 V
Max. Panel Input Voltage	50 Voc/85 Voc
Max. PV Power Input	250 W/500 W
Temperature Compensation	-25 mV/K (12 V); -50 mV/K (24 V)
Idle Self-Consumption	<10 mA
Grounding	Positive grounding
Ambient Temperature	-40 to +60 °C
Max Altitude	4,000m above sea level
Battery Type	Lead acid (gel, AGM, flooded)
Datalogger	2 years
Lead Wire Length	20 cm / 7.87 in
Lead Wire Cross Section	2.5 mm <sup>2</sup> (AWG 13)
Dimensions	88.5 x 150 x 41.4 mm / 3.5 x 6 x 1.6 in
Weight	0.78 kg / 1.72 lbs
Ingress Protection	IP68 (1.5m, 72 h)
Certificates	CE compliant, RoHS compliant
Warranty	5 years



Technical Drawing



Product Introduction

Off-grid PV systems exposed to extreme weather/environmental conditions impose increased risk of damage to the power electronics. In order to ensure reliable battery protection under such conditions, Phocos developed the CIS-MPPT charge controller family to prevent corrosion.

The CIS-MPPT series include convenient and advanced lighting control, which allows the user to decide whether they want the automatic lighting control with LED dimming to be either time or low-voltage activated.

Product Features

- Infrared-programmable load timing feature with dimming ideal for lighting systems
- 2 years of system performance data accessible via MXI-IR interface, PC software (CISCOM)
- Up to 98% power conversion efficiency
- Up to 4-stage charging increases battery lifespan
- I/V or I/U curve sweep algorithm increases performance when panels are shaded
- Fully encapsulated anodized aluminum housing design prevents damage from corrosion, insects and dust
- 20 cm connection wire
- Compatible with 60 cell modules
- Ingress Protection: IP68

Optional Accessories

CIS-CU

- Infrared remote control

MXI-IR

- Infrared to USB programming accessory and interface to CISCOM software

Technical Data

Type	CIS-MPPT-85/15	CIS-MPPT-85/20
System Voltage	12/24 V auto recognition	
Max. Charge/Load Current	15 A	20 A
Float Charge	13.8/27.6 V (25 °C)	
Main Charge	14.4/28.8 V (25 °C), 0.5 h daily	
Boost Charge	14.4/28.8 V (25 °C), for 2 h activation: battery voltage < 12.3/24.6 V	
Equalization Charge	14.8/29.6 V (25 °C), for 2 h activation: battery voltage < 12.1/24.2 V (at least every 30 days)	
Deep-Discharge Protection	11-11.9V/22-23.8 V (by SOC) 11-12.02 V/22-24.04 V (by voltage)	
Reconnect Level	12.8 V/25.6 V	
Overvoltage Protection	15.5 V/31.0 V	
Undervoltage Protection	10.5 V/21.0 V	
Max. Panel Voltage	50/85 V	85 V
Temperature Compensation	-25 mV/K (12 V), -50 mV/K (24 V)	
Max PV Power Input	250 W/500 W	400 W/800 W
Idle Self-Consumption	15 mA/8 mA	
Dimming Value	0-100% (0-10 V output)	
Grounding	Negative grounded	
Ambient Temperature	-40 to +60 °C	
Battery Type	Lead acid (gel, AGM, flooded), adjustable	
Datalogging	2 years	
Max. Wire Cross Section	2.5 mm <sup>2</sup> (AWG 13)	
Dimensions (WxHxD)	88.5 x 150 x 41.4 mm/ 3.5 x 6 x 1.6 in	128 x 152 x 43 mm/ 5.1 x 6 x 2 in
Weight	0.78 kg / 1.72 lbs	1.05 kg / 2.31 lbs
Ingress Protection	IP68 (1.5 m, 72 h)	
Certificates	CE compliant, RoHS compliant	
Warranty	5 years	



# MPPT 100/40 (40 A)

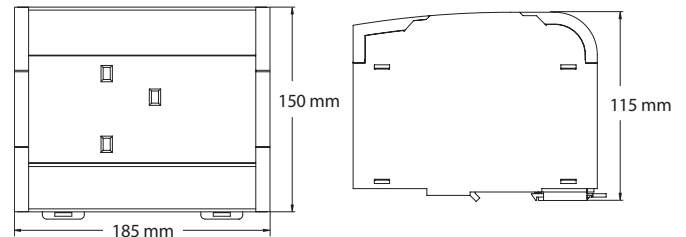
MPPT Charge Controller



phocos



## Technical Drawing



## Product Introduction

With innovative maximum power point tracking technology, Phocos' MPPT 100/40 ensures optimal performance from the solar array at all times and in all weather conditions. Innovative MPPT charging can yield an energy gain from your PV array of up to 30%.

The temperature-compensated three-stage I/V curve charge algorithm significantly extends the lifespan of the battery.

Power+™ current limiting allows for over-sizing PV power by up to 50% for winter months.

## Product Features

- Thermal overload protection and temperature compensation
- Equipped with a short circuit disconnect function
- Works in 12 or 24 V systems
- Use as a stand alone 40 A controller or part of modular system (MCU required)
- Faster recharging by converting excess PV voltage to charge current
- Highest charging efficiency in low irradiation conditions

## Optional Accessories

### MCU

- Modular Central Unit
- System voltage 12/24/48 V selectable

### MXI

- Interface for communication with computer USB interface

### MPS

- Modular Power Switch
- Auto recognition of system voltage 12/24/48 V
- Max. charge current: 45/80A versions

### MODCOM

- Application software for MCU communication with computer

### MCS

- Modular Current Sensor
- System voltage 12/24/48 V
- RS485 socket
- Current measurement range 50/100/200/400/800 A

### MTS

- External temp. sensor for MCU

### MRD

- Remote display for MCU
- Displays panel current, load current and battery voltage, Ah, SOC, etc.

### MXI 232

- Interface for M 112150180 CU RS232 interface communication with computer

## Technical Data

Type	MPPT 100/40 (40A)
System Voltage	12/24 V auto recognition
Nominal Charge Current	40 A
Max. Battery Charge Current	41 A
Float Charge	13.8/27.6 V (25 °C)
Main Charge	14.4/28.8 V (25 °C), 0.5 h daily
Boost Charge/Activation	14.4/28.8 V (25 °C), 2 h battery voltage < 12.3/24.6 V
Equalization Charge/ Activation	14.8/29.6 V (25 °C), 2 h battery voltage < 12.1/24.2 V (at east every 30 days)
Max. Battery Voltage	32 V
Max. PV Voltage	95 V
Min. PV Voltage	17/34 V
Max. PV Input Power	800 W/1600 W
Standby Power Consumption	< 30 mW (< 2 mA)/ < 80 mW (< 3 mA)
Temperature Compensation	-25 mV/K (12 V); -50 mV/K (24 V)
Power Conversion Efficiency	Up to 98%
Grounding	Negative grounded
Ambient Temperature	-40 to +45°C
Battery Type	Lead acid (gel, AGM, flooded)
Wire Cross Section	33 mm <sup>2</sup> (AWG 2)
Dimensions (WxHxD)	185 x 150 x 115 mm / 7.3 x 6 x 4.5 in
Weight	1.6 kg / 3.5 lbs
Ingress Protection	IP20
Certificates	CE compliant, RoHS compliant
Warranty	5 years

Subject to change without notice



# PWM Charge Controllers

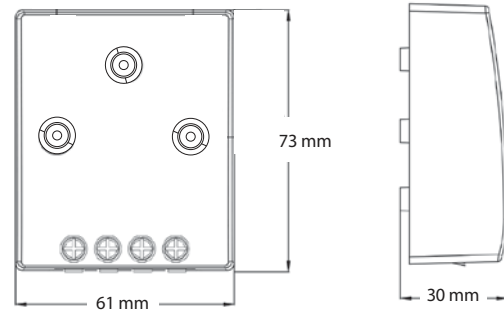




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### Technical Drawing



### Product Introduction

The CM series is an economic solution for preventing battery overcharging in low-power systems. It is simple, compact and easy to use and install.

CM series features a 2-stage PWM charging algorithm that supplies an even charge across all battery cells which lengthens battery lifespan. One green LED states when the CM controller is charging and reducing current via PWM.

### Product Features

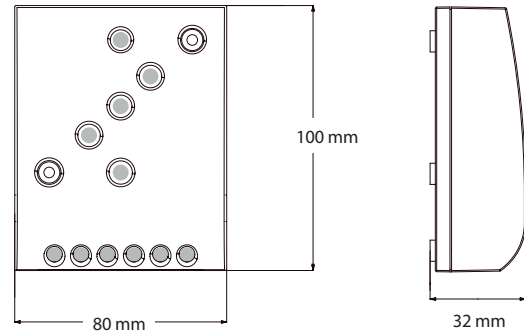
- LED charging display
- Large terminals up to AWG 6/16 mm<sup>2</sup>
- Two-stage PWM charging algorithm (boost & float charging)
- Reverse polarity protection
- Designed to work reliably and efficiently in small PV systems

### Technical Data

Type	CM04	CM10
System Voltage	12 V	
Max. Charge/Load Current	4 A	10 A
Float Charge	13.7 V	
Boost Charge	14.5 V Activation: battery voltage < 12.2 V	
Max. Panel Voltage	30 V	
Idle Self-Consumption	4 mA	
Overvoltage Protection	30 V	
Grounding	Positive grounded	
Ambient Temperature	-40 to +50 °C	
Max. Altitude	4,000 m above sea level	
Battery Type	Lead acid (gel, AGM, flooded)	
Wire Cross Section	16 mm <sup>2</sup> (AWG 6)	
Dimensions (WxHxD)	61 x 73 x 30 mm / 2.4 x 3 x 1.2 in	
Weight	0.07 kg / 0.15 lbs	
Ingress Protection	IP22	
Certificates	CE compliant, RoHS compliant	
Warranty	2 years	



**Technical Drawing**



**Product Introduction**

The CML-USB series is designed for low cost applications and is ideal for small solar systems in need of a low battery disconnect feature. The electronic circuit is equipped with a microcontroller that provides high-efficiency charging technology together with a number of outstanding features like status display, warning and safety functions.

Leisure and rural electrification systems are the typical applications for the CML-USB controllers. They provide a perfect solution for cost-sensitive systems that require state-of-the-art system management.

A built-in USB charging output is ideal for charging mobile devices off a solar home system. Low-voltage disconnect prevents battery damage from deep discharging.

**Product Features**

- 3 battery state-of-charge LEDs
- 4-stage PWM regulation
- Load disconnect prewarning by acoustic signal
- Boost, equalization, and float charging
- USB charging output for mobile devices

**Optional Accessories**

**CX-DR2**

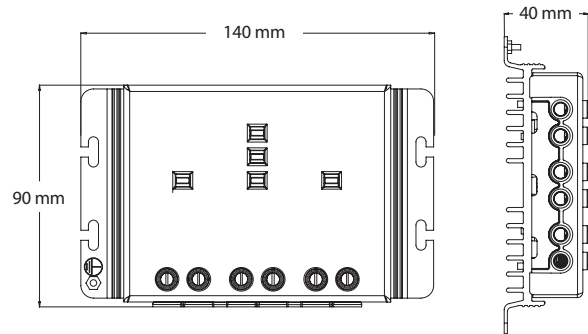
- DIN rail mounting plate that enables mounting the CML-USB controller on standard 35 mm DIN rail

**Technical Data**

Type	CML-USB-05	CML-USB-10	CML-USB-20
System Voltage	12/24 V auto recognition		
Max. Charge/Load Current	5 A	10 A	20 A
Float Charge	13.8/27.6 V (25 °C)		
Boost Charge	14.4/28.8 V (25 °C), for 2 h activation: battery voltage <12.3/24.6 V		
Equalization Charge	14.8/29.6 V (25 °C), for 2 h activation: battery voltage <12.1/24.2 V (at least every 30 days)		
Deep-Discharge Protection	11.4-11.9 V/22.8 -23.8 V (by SOC) 11.0/22.0 V (by voltage)		
Reconnect Level	12.8/25.6 V		
Overvoltage Protection	15.5/31.0 V		
Undervoltage Protection	10.5/21.0 V		
Max. Panel Voltage	30 V/50 V		
Temperature Compensation	-24 mV/ K (12 V); -48 mV/ K (24 V)		
Idle Self-Consumption	< 4 mA		
Grounding	Positive grounded		
Ambient Temperature	-40 to +45 °C		
Max. Altitude	4,000 m above sea level		
Battery Type	Lead acid (gel, AGM, flooded)		
USB Port	USB type A, 5 V, 700 mA		
Max. Wire Cross Section	16 mm <sup>2</sup> (AWG 6)		
Dimensions (WxHxD)	80 x 100 x 32 mm / 3.1 x 4 x 1.3 in		
Weight	0.16 kg / 0.35 lb		
Ingress Protection	IP20		
Certificates	CE compliant, RoHS compliant		
Warranty	5 years		



### Technical Drawing



### Product Introduction

At 30 A max. charge/load current, the CMLsolid is the highest powered version of Phocos' popular CML family. With over a million CML controllers in service all over the world, it is easily one of the most widely deployed controllers on earth.

An on-board USB port charges mobile phones, tablets and other portable devices from the PV system. The battery type, acoustic warning buzzer and LVD settings are selectable via 3-pole DIP switch.

### Product Features

- Battery state-of-charge indication via 3 LEDs
- Load disconnect pre-warning via acoustic signal can be switched ON/OFF
- Up to four-stage PWM charging algorithm with integrated temperature compensation (float, main, boost & equalization)
- Automatic 12/24 V detection
- Large terminals: up to 16 mm<sup>2</sup>
- SOC and voltage-controlled LVD settings
- Full electronic protection
- Rugged anodized aluminum housing
- Charger for external devices via USB port
- Remote output connector for the PSW inverter series

### Optional Accessories



#### CMMsolid

- Remote display for Phocos CMLsolid charge controller
- Displays panel current, load current and battery voltage

### Technical Data

Type	CMLsolid 30
System Voltage	12/24 V auto recognition
Max. Charge/Load Current	30 A
Float Charge	13.8/27.6 V (25 °C)
Main Charge	14.4/28.8 V (25 °C), 0.5 h daily
Boost Charge	14.4/28.8 V (25 °C), 2 h; activation: battery voltage <12.3/24.6 V
Equalization Charge	14.8/29.6 V (25 °C), 2 h; activation: battery voltage <12.1/24.2 V (at least every 30 days)
Deep-Discharge Protection	11.4–11.9/22.8–23.8 V (by SOC) 11.0/22.0 V (by voltage)
Reconnect Level	12.8/25.6 V
Overvoltage Protection	15.5/31.0 V
Undervoltage Protection	10.5/21.0 V
Max. Panel Voltage	30/50 V
Temperature Compensation	-25 mV/K (12 V); -50 mV/K (24 V)
Idle Self-Consumption	10 mA
Grounding	Positive grounded
Ambient Temperature	-40 to +50 °C
Max. Altitude	4,000 m above sea level
Battery Type	Lead acid (gel, AGM, flooded) adjustable
USB Port	5.0 V, 800 mA
Screw Terminal Max. Wire Cross Section	16 mm <sup>2</sup> (AWG 6)
Dimensions (WxHxD)	140 x 90 x 40 mm / 5.5 x 3.5 x 1.6 in
Weight	0.42 kg / 0.93 lbs
Ingress Protection	IP20
Certificates	CE compliant, RoHS compliant
Warranty	2 years

# ECO (10 A)

Solar Charge Controller



## Product Introduction

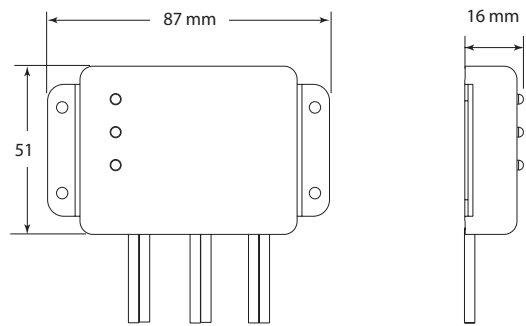
Phocos' ECO solar charge controller is the perfect option for any low-power application requiring superior resistance to the elements. Its small size, reliability, and price make it a great solution for a wide range of projects.

ECO is equipped with low-voltage disconnect. It is fully protected electronically, and it has an LED that communicates charge and load status.

## Product Features

- 3-stage charging: boost, main and float charge
- Deep discharge protection
- PWM series regulation (PV panel is not short-circuited)
- Integrated temperature compensation
- Fully electronically protected against: panel surge voltage, wrong polarity (panel or battery), overload and short circuit at load
- Three LEDs indicate: charge status, SOC, LVD, overload/short circuit
- IP68 protection

## Technical Drawing

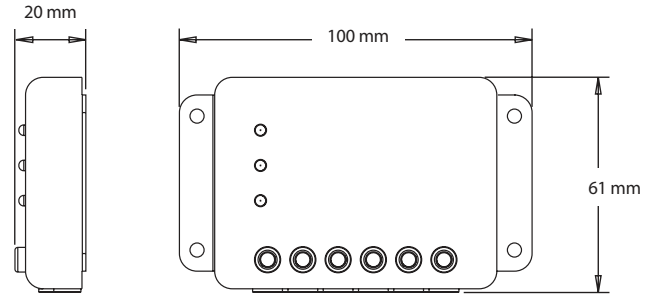


## Technical Data

Type	ECO 10
System Voltage	12 V
Max. Charge/Load Current	10 A
Float Charge	13.8 V (25 °C)
Main Charge	14.4 V (25 °C), 0.5 h daily
Boost Charge	14.4 V (25 °C), 2 h activation: battery voltage < 12.3 V
Deep-Discharge Protection	11.0 V
Overvoltage Protection	15.5 V
Undervoltage Protection	10.5 V
Max. PV Panel Voltage	30 V
Temperature Compensation	-25 mV/K
Idle Self-Consumption	4 mA
Grounding	Positive grounded
Ambient Temperature	-40 to +60 °C
Max. Altitude	4,000 m above sea level
Battery Type	Lead acid (gel, AGM, flooded)
Wire Cross Section	2.5 mm <sup>2</sup> (AWG 13)
Dimensions (WxHxD)	87 x 51 x 16 mm / 3.4 x 2 x 0.63 in
Weight	0.11 kg / 0.24 lbs
Ingress Protection	IP68
Certificates	CE compliant, RoHS compliant
Warranty	5 years



### Technical Drawing



### Product Introduction

Phocos' ECO-N-T is a cost effective solution for many challenging solar applications. Its compact size allows it to fit well in small spaces. The industrial grade ECO-N-T is fully encapsulated, which protects the circuit board from corrosion. This unit also features UL and other certifications, proving it is a robust charge controller that will perform well in a variety of harsh environments.

The ECO-N-T is versatile and offers the flexibility of operating with 12 or 24 V systems. This reliable charge controller is simple to use, as it requires no user programming and has easy to interpret LEDs. The ECO-N-T will protect your batteries from overcharging and over discharging, making for a strong return on investment.

### Product Features

- Ideal for almost any off-grid PV application
- Same model can be used in 12 or 24 V systems (fewer components to stock)
- Fully potted PCB
- Rugged housing with corrosion-resistant screw terminals
- Simple 3-LED system status interface
- Install only requires a flathead screwdriver
- UL1741/Class I Div. 2 certified

### Technical Data

Type	ECO-N-10-T	ECO-N-20-T
System Voltage	12/24 V auto recognition	
Max. Charge/Load Current	10 A	20 A
Float Charge	13.8/27.6 V (25 °C)	
Main Charge	14.4/28.8 V (25 °C), 0.5 h daily	
Boost Charge	14.4/28.8 V (25 °C), 2 h activation: < 12.3/24.6 V	
Deep-Discharge Protection	11.0/22.0 V	
Overvoltage Protection	15.5/31.0 V	
Undervoltage Protection	10.5/21.0 V	
Max. PV Panel Voltage	30/50 V	
Temperature Compensation	-25 mV/K (12 V); -50 mV/K (24 V)	
Idle Self-Consumption	4 mA	
Grounding	Negative grounded	
Ambient Temperature	-40 to +60 °C	
Max. Altitude	4,000 m above sea level	
Battery Type	Lead acid (gel, AGM)	
Screw Terminal Max. Wire Cross Section	10 mm <sup>2</sup> (AWG 8)	
Dimensions (WxHxD)	100 x 61 x 20 mm / 4 x 2.4 x 0.80 in	
Weight	0.16 kg / 0.35 lbs	
Ingress Protection	IP68 (case), IP21 (terminals)	
Certificates	CE compliant, RoHS compliant, UL1741, ANSI/ISA 12.12.021-2012 Class I Div. 2 Locations (Groups A-D)	
Warranty	5 years	

#### The ECO-N-T is NRTL certified

Hazardous Locations (HazLoc) tested according to: ANSI/ISA 12.12.01-2012, Class I Division 2 (Groups A-D).

Ordinary Locations (OrdLoc) tested according to: UL1741:2005 CAN/CSA C22.2 No. 107.1-01





# CXNup Series (10-40 A)

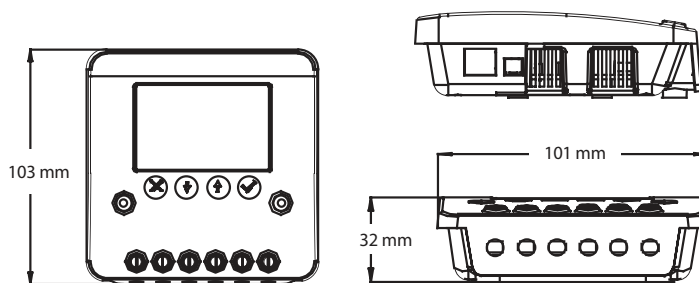
Solar Charge Controller w/ Datalogging/LCD



phocos



## Technical Drawing



## Product Introduction

The CXNup series is a highly intelligent charge controller family for a wide range of applications. It features an intuitive user interface and stores up to two (2) years of valuable system performance data, which is accessible via the LCD and PhocosLink software.

Real-time battery voltage, SOC %, charge and load current, and system status are clearly displayed on the large, backlit LCD. Optional acoustic battery alarms and programmable street light settings are also standard.

## Product Features

- USB charging port
- Data logger information can be exported
- Load status indication
- Touch keys ensure long lasting operation and eliminates mechanical button failures
- Prepared for 12 or 24 V battery charging
- Suitable for charging systems up to 1.4 kW
- 2 year datalogging
- User friendly LCD shows extensive system information
- Four-stage PWM charging algorithm with integrated temperature compensation
- Full electronic protection
- Programmable load function suitable for street lights
- Corrosion-resistant screw terminals
- Programmable battery type

## Optional Accessories



### MXI and MXI-232

- Interface for CXNup controller communication with computer via USB or RS232 interface

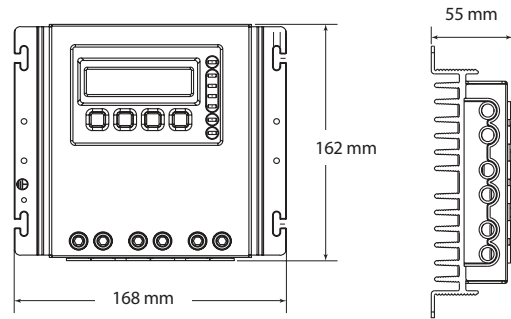
## Technical Data

Type	CXNup10	CXNup20	CXNup2B*	CXNup40
System Voltage	12/24 V auto recognition			
Max. Charge Current	10 A	20 A	20 A / 20 A	40 A
Max Load Current	10 A	20 A	N/A	40 A
Float Charge	13.8/27.6 V (25 °C)			
Main Charge	14.4/28.8 V (25 °C), 0.5 h daily			
Boost Charge	14.4/28.8 V (25 °C), 2 h activation: battery voltage < 12.3/24.6 V			
Equalization Charge	14.8/29.6 V (25°C), 2 h Activation: battery voltage < 12.1/24.2 V (at least every 30 days)			
Deep-Discharge Protection	11.5-12.0/23.0-24.0 V (by SOC) 11.0-11.5/22.0-23.0 V (by voltage)			
Reconnect Level	12.8/25.6 V			
Overvoltage Protection	15.5/31.0 V			
Undervoltage Protection	10.5/21.0 V			
Max. Panel Voltage	30 V/50 V			
Temperature Compensation	-25 mV/K (12 V); -50 mV/K (24 V)			
Idle Self-Consumption	<4 mA (backlight off); <12 mA (backlight on)			
Grounding	Negative grounded			
Ambient Temperature	-40 to +60 °C			
Max. Altitude	4,000 m above sea level			
Battery Type	Lead acid (gel, AGM, flooded), LiFePO4			
Datalogger	2 years			
USB Charging Port	5.0 V; 1.5 A			
Wire Cross Section	16 mm <sup>2</sup> (AWG 6)			
Dimensions (WxHxD)	101 x 103 x 32 mm / 4 x 4.1 x 1.3 in			
Weight	0.18 kg / 0.39 lbs			
Ingress Protection	IP22			
Certificates	CE compliant, RoHS compliant			
Warranty	5 years			

\*CXNup2B features dual battery bank charging. Battery voltages must be the same.



**Technical Drawing**



**Product Introduction**

The CXNsolid is a programmable PWM solar charge controller for the toughest industrial applications. At 50 A max. charge/load current, CXNsolid is suitable for PV systems up to 3.5 kW. CXNsolid can be easily paired with the PSW (Pure Sine Wave) series inverters for remote ON/OFF control.

The battery state of charge is clearly displayed using an LED bar graph. The deep discharge protection function can be set to up to 2 different modes: voltage-controlled or SOC-controlled. Acoustic warnings for load-disconnect are built-in.

**Product Features**

- Multifunction LCD shows system status
- User-friendly configuration interface with buttons
- LEDs display the battery state of charge
- Flexible load disconnect algorithms
- Temperature-compensated four-stage PWM series charging regulation
- External temperature sensor
- Remote output terminal for the Phocos inverter series
- Optional USB interface (MXI + PhocosLink)
- Aluminum housing (IP20)
- Real time clock
- Datalogger (2 years)
- Highly programmable

**Optional Accessories**



**MXI USB and MXI 232**

- Interface for CXNsolid controller communication with computer via USB or RS232 interface

**Technical Data**

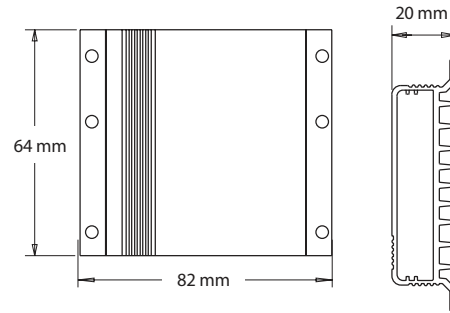
Type	CXNsolid50
System Voltage	12/24/48 V auto recognition
Max. Charge/Load Current	50 A
Float Charge	13.8/27.6/55.2 V (25 °C)
Main Charge	14.4/28.8/57.6 V (25 °C), 0.5 h daily
Boost Charge	14.4/28.8/57.6 V (25 °C), for 2 h; activation: battery voltage < 12.3/24.6/49.2 V
Equalization Charge	14.8/29.6/59.2 V (25 °C), for 2 h activation: battery voltage < 12.1/24.2/48.4 V (at least every 30 days)
Deep-Discharge Protection	11.5-12.0/23.0-24.0/46.0-48.0 V (by SOC) 11.0-11.5/22.0-23.0/44.0-46.0 V (by voltage)
Reconnect Level	12.8/25.6/51.2 V
Overvoltage Protection	15.5/31.0/62.0 V
Undervoltage Protection	10.5/21.0/42.0 V
Max. Panel Voltage	30/50/100 V
Temperature Compensation	-25 mV/K (12 V); -50 mV/K (24 V); -100 mV/K (48 V)
Idle Self-Consumption	<20 mA
Grounding	Negative grounded
Ambient Temperature	-20 to +50 °C
Max. Altitude	4,000 m above sea level
Battery Type	Lead acid (gel, AGM, flooded)
Datalogger	2 years
Max. Wire Cross Section	up to 50 mm <sup>2</sup>
Dimensions (WxHxD)	168 x 162 x 55 mm / 6.6 x 6.4 x 2.2 in
Weight	1 kg / 2.2 lbs
Ingress Protection	IP20
Certificates	CE compliant, RoHS compliant
Warranty	5 years

# PHOCOS CIS-N (10-20 A)

Solar Charge Controller w/ Lighting Control



## Technical Drawing



## Product Introduction

The CIS-N was especially developed to deliver optimum performance in industrial PV systems in demanding environments. It features 4-stage, series-switching PWM charge regulation and is fully programmable via infrared devices (CIS-CU or MXI-IR and CISCOM software).

The CIS-N includes convenient and advanced lighting control, which allows the user to decide whether they want the automatic lighting control with LED dimming to be time or low-voltage activated.

## Product Features and Functions

- Works in 12 or 24 V systems (auto recognition)
- Fully programmable charge/discharge program via infrared devices (CIS-CU or MXI-IR and CISCOM software)
- Timed and low-voltage dimming settings
- Dimming interface for external LED drivers
- Fully potted (IP68) aluminum housing
- UL1741/Class I Div. 2 certified
- Infrared-programmable load timing feature with dimming, ideal for lighting systems

## Optional Accessories

### CIS-CU

- Infrared remote control programming accessory

### MXI-IR

- Infrared to USB programming accessory and interface to CISCOM software

## Technical Data

Type	CIS-N-10	CIS-N-20
System Voltage	12/24 V auto recognition	
Max. Charge/Load Current	10 A	20 A
Float Charge	13.8/27.6 V (25 °C)	
Main Charge	14.4/28.8 V (25 °C), 0.5 h daily	
Boost Charge	14.4/28.8 V (25 °C), 2 h activation: battery voltage < 12.3/24.6 V	
Equalization Charge	14.8/29.6 V (25 °C), 2 h activation: battery voltage < 12.1/24.2 V (at least every 30 days)	
Deep-Discharge Protection	11.0–12.0/22.0–24.0 V (by SOC) 11.0-11.9/22.0-23.8 V (by voltage)	
Reconnect Level	12.8/25.6 V	
Overvoltage Protection	15.5/31.0 V	
Undervoltage Protection	10.5/21 V	
Max. Panel Voltage	30/50 V	
Temperature Compensation (Charge Voltage)	-25 mV/K (12 V), -50 mV/K (24 V)	
Max. Self-Consumption	5–8 mA/6–10 mA	
Grounding	Negative grounded	
Ambient Temperature	-40 to +60 °C	
Max. Altitude	4,000 m above sea level	
Battery Type	Lead acid (gel, AGM, flooded) adjustable	
Connection Wire Length	100 mm / 4 in	
Max. Wire Cross Section	2.5 mm <sup>2</sup> (AWG 13)	
Dimensions (WxHxD)	82 x 64 x 20 mm / 3.2 x 3 x 1 in	
Weight	0.15 kg / 0.33 lbs	
Certificates	CE compliant, RoHS compliant	
Ingress Protection	IP68	
Warranty	5 years	

### The CIS-N is NRTL certified

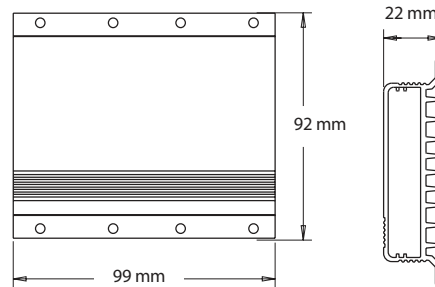
Hazardous Locations (HazLoc) tested according to: ANSI/ISA 12.12.01-2012, Class I Division 2 (Groups A-D).

Ordinary Locations (OrdLoc) tested according to: UL1741:2005 CAN/CSA C22.2 No. 107.1-01





**Technical Drawing**



**Product Introduction**

The CIS-N-LED is a 3-in-1 solution that increases lifetime, reliability, efficiency and cost effectiveness. It is the perfect charge controller for solar lighting applications such as streetlights or bus shelters, and its motion sensor interface capabilities regulate LED brightness to conserve energy.

To further conserve energy and extend the system's lifetime, the CIS-N-LED has two low voltage disconnect levels. The levels can be programmed using one of Phocos' handheld remote control accessories; the CIS-CU or the MXI-IR and our free CISCOM PC software.

**Product Features**

- Combines 3 functions in one: charge controller + flexible timer + LED driver
- Developed especially for rough environments, solar LED lamps, and solar LED streetlights
- Flexible dimming functions
- Input for motion detector (PIR)
- Small size: fits everywhere
- LiFePO4 available through CISCOM software
- True color PWM dimming
- Fully protected by the encapsulated case, which increases lifetime and reliability and reduces costs
- Auto-protection function: two low-voltage disconnects extend system operation time and reliability
- Infrared-programmable load timing feature + dimming is ideal for lighting systems
- Ingress Protection: IP68

**LED Driver Data**

Type	1050 mA	1400 mA	2800 mA
Output Voltage	15-49 V for 12 V system (5-15 LEDs in series), 30-49 V for 24 V system (10-15 LEDs in series)		
Nominal Output Current Per String	1050 mA	1400 mA	2800 mA
Max. Load Power	45 W	60 W	60 W (12 V)/120 W (24 V)
Dimming Level	0 – 100% (adjust step 10%)		
PIR Input	4 – 30 V with respect to battery negative, >= 0.7 mA; limited protection up to 50 V		

**Optional Accessories**

**MXI-IR**

- Infrared to USB programming accessory and interface to CISCOM software

**CIS-CU**

- Infrared remote control programming accessory

**Technical Data**

Type	CIS-N-LED-1050	CIS-N-LED-1400	CIS-N-LED-2800
System Voltage	12/24 V auto recognition		
Max. Charge Current	20 A (30 A, ≤ 50 °C*)		
Float Charge	13.8/27.6 V (25 °C)		
Main Charge	14.4/28.8 V (25 °C), 0.5 h daily		
Boost Charge	14.4/28.8 V (25 °C), 2 h activation: battery voltage < 12.3/24.6 V		
Equalization Charge	14.8/29.6 V (25 °C), 2 h; activation: battery voltage < 12.1/24.2 V (at least every 30 days)		
Deep-Discharge Protection	11.00-12.02/22.00-24.04 V (by SOC) 11.0-11.9/22.0-23.8 V (by voltage)		
Reconnect Level	12.8/25.6 V		
Overvoltage Protection	15.5/31.0 V		
Undervoltage Protection	10.5/21.0 V		
Max. Panel Voltage	30/50 V		
Temperature Compensation	-25 mV/K (12 V); -50 mV/K (24 V)		
Idle Self-Consumption	5-8 mA		
Grounding	Negative grounded		
Ambient Temperature	-40 to +60 °C		
Max. Altitude	4,000 m above sea level		
Battery Type	Lead acid (gel, AGM, flooded), LiFePO4 adjustable		
Wire Cross Section	2.5 mm <sup>2</sup> (AWG 13)		
Dimensions (WxHxD)	92 x 99 x 22 mm / 3.6 x 4 x 1 in		
Weight	0.25 kg / 0.55 lbs		
Ingress Protection	IP68 (1.5 m, 72 h)		
Certificates	CE compliant, RoHS compliant		
Warranty	5 years		

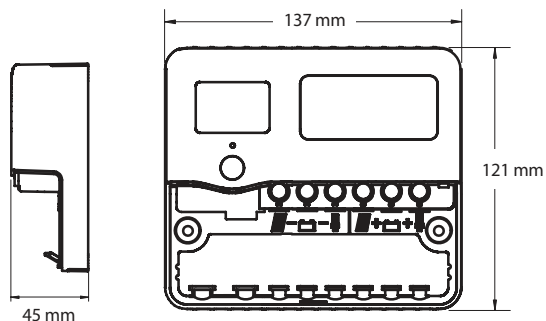
\* Without simultaneous LED output current at a maximum ambient temperature of 50 °C. Please note: The CIS-N-LED features an integrated over-temperature protection that will reduce the average charge current in case of too high temperatures.

# Phocos Dingo (20 A)

Programmable PWM Solar Charge Controller



## Technical Drawing



## Product Introduction

Phocos' DINGO charge controller has a negative ground that makes it a great option to be used in vehicles. Its communication interface uses the MODBUS protocol, which has been tried and tested in harsh environments.

The DINGO's large memory tracks data such as charging Ah, load Ah, battery voltage range and the daily state of charge for 512 days. The data of the past 99 days can be accessed directly using the built-in LCD display with LED backlighting.

## Product Features and Functions

- User-programmable charge regime and low-voltage disconnect
- Powerful event control feature can be programmed for the load port and/or a general purpose, voltage-only port
- Up to 512 days of datalogging
- Backlit LCD shows real time and 99 days of historical data
- Auto generator start feature ideal for backup diesel and fuel cell gensets
- Terminals can be configured for diversion load controllers for wind/hydro charging inputs
- Remote monitoring with accessories and modem

## Optional Accessories

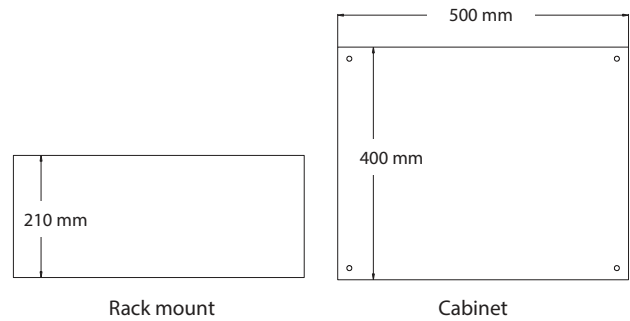
- D232** - RS232 Interface
- DUSB** - USB Interface
- DNet** - Ethernet Adapter
- DSA** - External Shunt Adapter
- PRISM** - PC Software
- DT** - Remote Temperature Sensor
- DTB** - Remote (bolt on) Temperature Sensor (neoprene)
- SHUNT** - External Current Shunt

## Technical Data

Type	D2020N
System Voltage	12/24/32/36/48 V selectable
Max. Charge/Load Current	20 A
Float Charge	13.0 V - 60.0 V (adjustable)
Boost Charge	13.5 V - 66.0 V (adjustable)
Equalization Charge	14.0 V - 68.0 V (adjustable) (at least every 30 days)
Deep-Discharge Protection	10.0 V - 50.0 V (adjustable)
Reconnect Level	11.0 V - 64.0 V (adjustable)
Max. Panel Voltage	100 V
Temperature Compensation	Default: -5 mV/K per cell (adjustable)
Idle Self-Consumption	9 mA (12 V) - 26 mA (60 V)
Grounding	Negative grounded
Ambient Temperature	-20 to 55 °C
Max. Altitude	4,000 m above sea level
Battery Type	Lead acid (AGM, gel, flooded)
Screw Terminal Max. Wire Cross Section	16 mm <sup>2</sup> (6 AWG)
Dimensions (WxHxD)	137 x 121 x 45 mm / 5.4 x 4.8 x 1.8 in
Weight	0.45 kg / 1 lb
Ingress Protection	IP20
Warranty	5 years



### Technical Drawing



### Product Introduction

The SPS series solar charge controllers are advanced electronic systems for solar powered applications in remote locations, such as telecommunication sites. They prevent overcharging, reduce electrolyte loss and stop deep discharge. These features extend battery life considerably.

The SPS system's simple modular construction enables optimal performance while also providing more features than any other controller in its class. Additionally, slow-switching regulation minimizes EMI emissions, making the SPS system ideal for telecom applications.

### Product Features and Functions

- Ideal for large telecom sites up to 21 kWp
- All control levels are fully adjustable and can be changed via serial interface
- Bank switching design creates ultra-low EMI emissions
- Two-stage boost/float charging with low heat generation
- Setup data stored in non-volatile EEPROM memory
- Available in positive and negative ground versions
- Available in cabinet or rack mount configurations
- Customizable to site requirements
- Interface for additional alarms and generator control
- Configurable for remote monitoring

### Technical Data

Type	SPS 100	SPS 200	SPS 300
System Voltage	12/24/48 V versions		
Max. Charge/Load Current	100 A	200 A	300 A
Float Charge	12-15/24-30/48-60 V (adjustable)		
Boost Maximum	13.5-17/27-34/54-68 V (adjustable)		
Boost Activation	12-13.5/24-27/48-54 V (adjustable)		
Deep-Discharge Protection	11-11.75/22-23.5/44-47 V (adjustable)		
Overvoltage Protection	Adjustable		
Max. PV Panel Voltage	23.5/47.5/94 V		
Temperature Compensation	-30 mV/K (12 V), -60 mV/K (24 V), -120 mV/K (48 V) (with optional remote sensor)		
Idle Self-Consumption	60 mA (typical), 170 mA (max)		
Grounding	Positive or negative ground available		
Ambient Temperature	-15 to 55 °C		
Max. Altitude	5,000 m above sea level		
Battery Type	Lead acid (gel, AGM, flooded)		
Screw Terminal Max. Wire Cross Section	Battery: variable by version, up to 150 mm <sup>2</sup> Solar: variable by version, up to 50 mm <sup>2</sup> Load: 50 mm <sup>2</sup> Alarms: 1 mm <sup>2</sup>		
Dimensions (WxHxD)	500 x 400 x 210 mm / 19.7 x 15.8 x 8.3 in		
Weight	16 kg / 35.3 lbs		
Ingress Protection	IP66 cabinet		
Certificates	CE compliant, RoHS compliant		
Warranty	5 years		





# Off-Grid Inverters

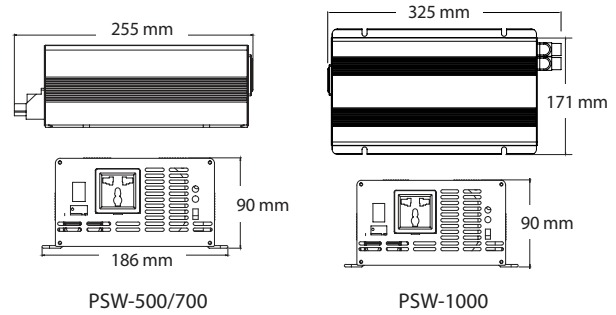




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### Technical Drawings



### Product Introduction

The Phocos PSW (Pure Sine Wave) inverter series converts DC (Direct Current) energy from solar and other renewable sources, into AC (Alternating Current) power to operate most standard appliances. Phocos has designed these units to be highly efficient and have a long lifespan to maximize their value in everyday applications. Pure sine wave power is a sophisticated technology that protects even the most sensitive electronics, making it ideal for many modern appliances like TVs, computers, digital clocks, various battery chargers, audio equipment, lamps, and inductive loads like brushless motors, to name a few.

An investment in the Phocos PSW inverter series will make equipment run more efficiently and can help to maximize the life of products being powered. The THD (Total Harmonic Distortion) of Phocos' pure sine wave inverters is below 3%, which translates to a high performance benefit of premium efficiency. Overload, short-circuit, DC over/under voltage and overheating protection are standard on all models. PSW series inverters are ideal for standard, mobile and outdoor applications (e. g. cabins/homes, RV's, boats, cars, and various industrial loads).

### Product Features

- Low battery warning before shutdown
- Fully isolated input & output
- Load controlled cooling fan
- Output frequency 50/60 Hz switch selectable
- Input reverse polarity/under voltage/over voltage protections
- Output short-circuit/overload/over temperature protections
- Tri-color indicators display output load level & failure status
- CE, RoHS, E-mark approved
- Ingress protection: IP20
- Automatic re-start in case of overload: Every 60 s approx.

### Model-Specific Data

Model	Rated Power	Surge Power	DC Voltage	No Load Power Consumption (110 V Model)	No Load Power Consumption (230 V Model)	Green Mode Consumption (110 V Model)	Green Mode Consumption (230 V Model)
PSW-500	500 W	1000 W (for 2 seconds)	12/24 V versions	<12 / <19.2 W	<12 / <19.2 W	<2.4 / <3.6 W	<2.4 / <3.6 W
PSW-700	700 W	1400 W (for 2 seconds)	12/24 V versions	<12 / <19.2 W	<12 / <19.2 W	<2.4 / <3.6 W	<2.4 / <3.6 W
PSW-1000	1000 W	2000 W (for 2 seconds)	12/24/48 V versions	<12 / <19.2 / 38.4 W	<12 / <19.2 / 38.4 W	<2.4 / <3.6 / 4.8 W	<2.4 / <3.6 / 4.8 W
PSW-2000	2000 W	4000 W (for 2 seconds)	12/24/48 V versions	<14.4 / <24 / <38.4 W	<14.4 / <24 / <38.4 W	<2.4 / <4.8 / <4.8 W	<2.4 / <4.8 / <4.8 W
PSW-3000	3000 W	6000 W (for 2 seconds)	12/24/48 V versions	<12 / <19.2 / 38.4 W	<18 / <28.8 <57.6 W	N/A	<3 / <4.8 / <4.8 W

### Technical Data

#### Common specifications for all inverters

Output Waveform	Pure Sine Wave (THD <3%)
Frequency	50/60 Hz ± 0.5 Hz selectable by DIP switch
AC Regulation	±5%
AC Voltage	110 / 230 V versions
Standard Receptacles	Universal
USB Port	5 V, 2.1 A (Not available on 48 V models)
LED Indicators	A: output load level: <20%-off, between 20% and 50% -green, <90%-orange, >90%-red; B: green for power on, red for protection/failure
Frequency and Sleep Mode Settings (DIP switch)	S4-frequency 50/60 Hz; S3-15% output load, S2-10% output load, S1-5% load setting
Low Battery Shutdown	10.5 ± 0.25 (12 V)/ 21.0 ± 0.5 (24 V) / 42.0 ± 1.0 (48 V)
Ambient Temperature	0 to +40 °C
Storage Temperature & Humidity	-30 to +70 °C, 10-95%
Overvoltage (VDC)	15.5 ± 0.5 (12 V)/ 31.0 ± 1.0 (24 V)/ 62.0 ± 2.0 (48 V)
Overload	Shutdown
Efficiency	≥85% worst case; ≥90% typical
Ingress Protection	IP20
Certificates	CE compliant, RoHS compliant
Warranty	2 years

Type	Weight	Dimensions (mm/in)
PSW-500	2.5 kg / 5.5 lbs	255 x 186 x 90 / 10 x 7.3 x 3.5
PSW-700	2.5 kg / 5.5 lbs	255 x 186 x 90 / 10 x 7.3 x 3.5
PSW-1000	3.2 kg / 7.1 lbs	325 x 171 x 90 / 12.8 X 6.7 X 3.5
PSW-2000	5.2 kg / 11.5 lbs	320 x 152 x 105 / 12.6 x 6 x 4.1
PSW-3000	6.0 kg / 13.2 lbs	426 x 152 x 105 / 16.8 x 6 x 4.1





DC Lighting/Refrigeration

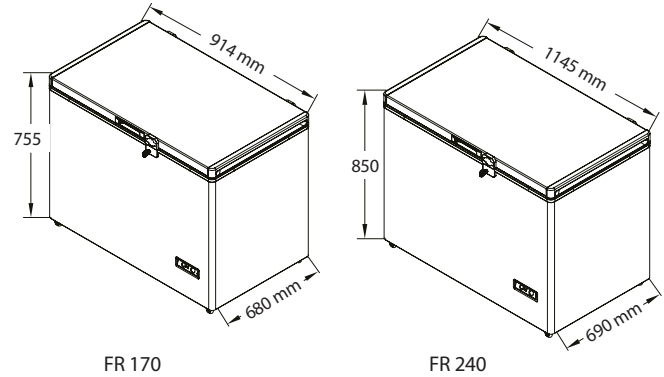




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### Technical Drawing



### Product Introduction

The Phocos FR Series provides flexibility to our customers, creating a valuable solution for various applications. In the field, these units can be used with 12V or 24V batteries, and can operate as a refrigerator or freezer (by simply adjusting the thermostat). The FR series units are battery-powered and do not require an inverter to operate. Their maintenance-free, Danfoss brushless DC compressor allows for direct operation from a battery. Energy-efficient features such as extra-thick insulation and a lockable lid make them especially suited for solar-powered applications.

These DC appliances come with easy-to-clean aluminum lining and a low-frost system that reduces the formation of water condensation and ice.

### Product Features and Functions

- Adjustable thermostat
- Doesn't require an inverter
- Works with both 12/24 V systems (auto recognition)
- High-efficiency cooling
- Plastic inner-lining prevents corrosion

### Technical Data

Type	FR170MP	FR240MP
System Voltage	12/24 V auto recognition	
Temperature Range	-12 °C* to +6 °C	
PV Panel Size (typ. max.)	80/160W	100/200W
Energy Consumption at 70 °F/21 °C	97 Wh/day (fridge), 296 Wh/day (freezer)	104 Wh/day (fridge), 398 Wh/day (freezer)
Energy Consumption at 90 °F/32 °C	166 Wh/day (fridge), 440 Wh/day (freezer)	218 Wh/day (fridge), 552 Wh/day (freezer)
Content (Capacity)	170 L	240 L
Refrigerant	R-134a	
Door Type	Top opening	
Color	White	
Cabinet Dimensions (WxHxD)	914 x 755 x 680 mm / 36 x 29.7 x 26.8 in	1145 x 850 x 690 mm / 45 x 33.5 x 27.2 in
Inner Dimensions (WxHxD)	671 x 670 x 436 mm / 26.4 x 26.4 x 17.2 in	900 x 671 x 440 mm / 35.4 x 26.4 x 17.3 in
Battery Compartment Dimensions (WxHxD)	250 x 200 x 220 mm/ 9.8 x 7.9 x 8.7 in	
Ambient Temperature	10 to 43 °C**	
Wheels	On request***	
Weight	50 kg / 110 lbs (without package and pallet)	57.5 kg / 126.8 lbs (without package and pallet)
Warranty	5 years	

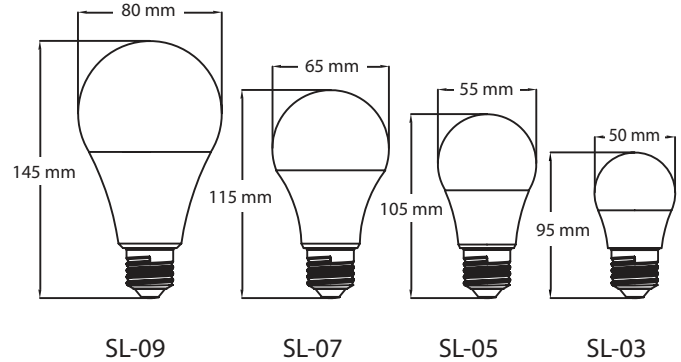
\*Up to 38 °C ambient temperature.

\*\*It is recommended to keep the fridge/freezer at maximum 32 °C ambient temperature or below.

\*\*\*Extra costs may apply. Available in container quantity orders shipping EXW factory.



**Technical Drawing**



**Product Introduction**

The Phocos solar SL LED lamps provide high illumination levels with very low power consumption and a long lifespan.

The DC LED lamps can be used directly in 12 V or 24 V battery or solar systems without any ballast. The lamps have a standard E27 socket.

**Product Features**

- Extremely low power consumption
- High luminous efficiency
- Lifespan 50,000 h
- Infinite number of switching cycles

**Technical Data**

Type	SL-03	SL-05	SL-07	SL-09
Voltage Range	10.5 – 30 V			
Power Consumption	3 W	5 W	7 W	9 W
Supply Current (±10%)	220 mA at 12.5 V	360 mA at 12.5 V	500 mA at 12.5 V	650 mA at 12.5 V
Luminous Intensity	>250 lm	> 500 lm	> 630 lm	> 900 lm
Luminous Efficiency	>115 lm/W			
Irradiation Angle	120-140°			
Light Color	Cool white (typical: 5,600 K)			
Ambient Temperature	-20 to +60 °C			
Humidity Max.	95% not condensing			
Socket	E27 (Edison)			
Diameter	50 mm / 2 in	55 mm / 2.2 in	65 mm / 2.6 in	80 mm / 3.1 in
Length	95 mm / 3.7 in	105 mm / 4.1 in	115 mm / 4.5 in	145 mm / 5.7 in
Ingress Protection	IP30			
Warranty	2 years			



Turnkey Solutions



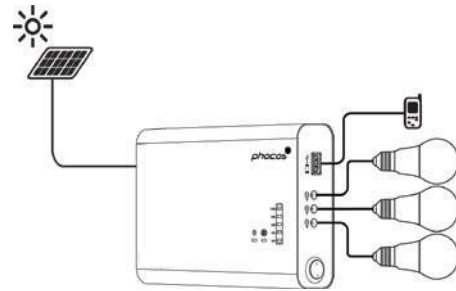




*phocos* 



### Technical Drawing



### Product Introduction

Phocos proudly offers solar home system (SHS) kits to bring compact, autonomous power to remote locations. SHS kits are designed for easy operation and selection, with three different kit wattage options available to meet various energy and budget requirements. Each kit converts the sun's energy into electricity, to power various DC electrical appliances (from lights to fans to mobile phone chargers). Phocos developed these SHS kits to offer an economical solution that provides reliable, safe, quiet, and maintenance-free off-grid power.

The eco-friendly SHS kit series has technology that increases each kit's charging efficiency for optimum performance. Using energy dense Lithium technology (safest chemistry LFP), combined with energy efficient DC LED lighting, Phocos has created an innovative packaged solution to perform at the highest standards. The SHS series kits also include features like LED indicators, battery status information and protection functions to help maximize the life of the equipment.

### Product Features

- Compact, portable, lightweight
- Charges 12.8 V battery (included)
- LFP battery offers long cycle life, is safe and energy dense
- USB output to charge mobile devices
- MPPT technology (automatically maximizes power output)
- Battery status through LEDs (simple indicator lights)
- Maintenance-free
- Efficient DC LED lighting
- Regulates current and voltage for longer battery life
- Low-voltage disconnect features (LVD)
- Overcharge and discharge protection
- Load short circuit/ overload protection
- Quiet, reliable DC power

### Accessories Included in Kits

- Solar panel (1 pc) (5 W, 10 W or 20 W)
- Charge controller/ LFP (LiFePO4) battery (1 pc)
- DC LED lamps (3 pcs) (1 W, 2 W or 3 W)
- Panel cable (1 pc)
- E-27 lamp holder assembly with switch (3 pcs)
- Mobile charging adapter (1 pc)

### Technical Data

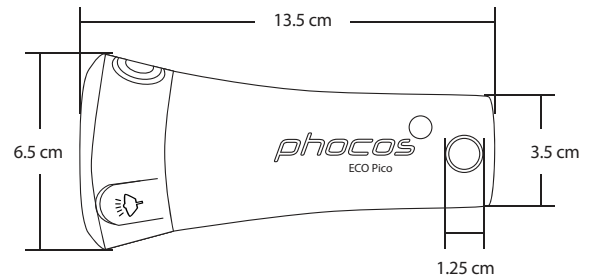
Type	SHS-5W	SHS-10W	SHS-20W
Charging Type	Maximum Power Point Tracking (MPPT)		
System Voltage	12.8 V		
Solar Input Power	5 Wp	10 Wp	20 Wp
DC LED Lamps	1 W	2 W	3 W
Open Circuit Voltage	21 V		
Battery Capacity (approx.)	20 Wh	40 Wh	75 Wh
Battery Protection	HVD and LVD, inbuilt BMS circuit		
Overvoltage Protection	14.6 V ± 0.1 V		
Undervoltage Protection	11.0 V ± 0.1 V		
Max Charging Current	1000 mA	1500 mA	3000 mA
Max Discharging Current	1500 mA	2600 mA	5000 mA
Estimated Run Time	1 lamp: 15 h*, 2 lamps: 8 h*, 3 lamps: 5 h*		
Electronic Protection	PV reverse polarity, reverse current flow at night, surge & transient protection, over current, battery high and low voltage protection, battery short circuit.		
LED Indicators	Green: solar charging; Yellow: battery SOC; Red: fault indication		
Ambient Temperature	0 to 50 °C while charging, -20 to 55 °C while discharging		
Load Terminals	DC jack 6.5 mm, 3 output terminals		
Battery Type	LiFePO4		
USB Port	USB type A, 5.2 V, 1000 mA		
Dimensions (mm/in) (WxHxD)	375 x 200 x 130/ 14.8 x 7.9 x 5.1**	375 x 200 x 130/ 14.8 x 7.9 x 5.1 (without panel)	
Weight	2.57 kg / 5.66 lbs**	2.30 kg / 5.07 lbs	2.63 kg / 5.80 lbs
Ingress Protection	IP20		
Warranty	2 years		

\*Conditions apply: back up time varies and depends upon the ambient temperature and operating conditions. The run time estimate does not account for mobile phone charging.

\*\*With panel inside



### Technical Drawing



### Product Introduction

The ECO Pico has the power capacity of a solar home system and the flexibility of a portable LED torch flashlight. It uses highly efficient LiFePO4 batteries and is resistant to capacity losses, allowing the system to provide up to 10 years of maintenance-free operation.

The ECO Pico is extremely efficient, with LED lights supplying up to 135 lm/W. This cost-effective product has a potential lifespan of 50,000+ hours. Additional load outputs offers flexibility to connect different applications, such as a mobile device, a radio or a small additional lamp. This German-engineered, high quality product offers an industry-leading warranty.

### Product Features

- Option for 16-200 lumen output
- Compact and portable
- 3 step brightness switch
- Low-battery mode
- Doubles as a ceiling lamp
- Battery state of charge indicator
- Can be charged with a 2.5 Wp solar panel or laptop
- Lasts up to 60 hours on a full day charge (Mode 1)

### Accessories Included in Kits

- ECO Pico torch flashlight (1 pc)
- Lanyard (1 pc)
- 2.5 Wp solar panel (1 pc)
- USB cable (1 pc)

### Technical Data

Type	ECO Pico
System Voltage	3.25 V
System Capacity	3.2 Ah
Illuminance (Mode 1)	16 lm
Illuminance (Mode 2)	88 lm
Illuminance (Mode 3)	200 lm
Weight	0.173 kg
Dimensions	13.5 x 6.5 cm
Operation Runtime (Mode 1)	60 hrs
Operation Runtime (Mode 2)	10 hrs
Operation Runtime (Mode 3)	5 hrs
Deep Discharge Protection	Yes
Overcharge Protection	Yes
Short Circuit Protection	Yes
Overcurrent Protection	Yes
Recommended Charge Current	0.58 A
Max Charge Current	2.20 A
Recommended Solar Module	2.5 Wp
Certificates	CE compliant, RoHS compliant
Warranty	3 years

**The distance between the battery and charge controller should be as short as possible to minimize voltage drops due to resistance in the wiring.**

### Battery to Charge Controller

Phocos recommends the maximum voltage drop between the battery and charge controller not exceed 0.1V in a 12V system and 0.2V in a 24V system.

### Solar to Charge Controller

Phocos recommends the maximum voltage drop between the solar panel/array and the charge controller should not exceed 1.0VDC in a 12V system and 2.0V in a 24V system.

**The following tables contain a selection of possible combinations of minimum wire cross sections and matching maximum wire lengths to limit the voltage drop due to resistance in wiring.**

Current	Charge Controller / Battery						Charge Controller / PV-Module / Load					
	Max Distance (m)		Min. Wire Cross Section (mm <sup>2</sup> )		Max Voltage Drop (mm <sup>2</sup> )		Max Distance (m)		Min. Wire Cross Section (mm <sup>2</sup> )		Max Voltage Dro (mm <sup>2</sup> )	
	12V	24V	12V	24V	12V	24V	12V	24V	12V	24V	12V	24V
5A	1	1	2.5	1	0.07	0.18	5	5	1.5	1	0.60	1.80
	2	2	4	2.5	0.09	0.14	20	40	4	4	0.90	1.80
	3	3	6	4	0.09	0.14	20	40	4	4	0.90	1.80
10A	1	1	4	2.5	0.09	0.14	5	10	2.5	2.5	0.72	1.44
	2	2	6	4	0.12	0.18	10	20	4	4	0.90	1.80
	3	3	10	6	0.11	0.18	20	30	10	6	0.72	1.80
20A	1	1	6	4	0.12	0.18	5	10	6	4	0.60	1.80
	2	2	16	10	0.09	0.14	10	15	10	6	0.72	1.80
	3	3	25	16	0.09	0.14	20	25	16	10	0.90	1.80
30A	1	1	10	6	0.11	0.18	5	10	6	6	0.90	1.80
	2	2	16	16	0.14	0.14	10	15	10	10	1.08	1.62
	3	3	25	25	0.13	0.13	20	25	25	16	0.86	1.69
40A	1	1	16	10	0.09	0.14	5	10	20	10	.72	1.44
	2	2	25	16	0.12	0.18	10	20	16	16	0.90	1.80
	3	3	35	25	0.12	0.17	20	30	35	25	0.82	1.73
50A	1	1	16	10	0.11	0.18	5	10	10	10	0.90	1.80
	2	2	35	25	0.10	0.14	10	20	25	25	0.72	1.44
	3	3	50	35	0.11	0.15	20	30	35	35	1.03	1.54

## Wire Gauge Recommendations for Solar Installations, Cont.



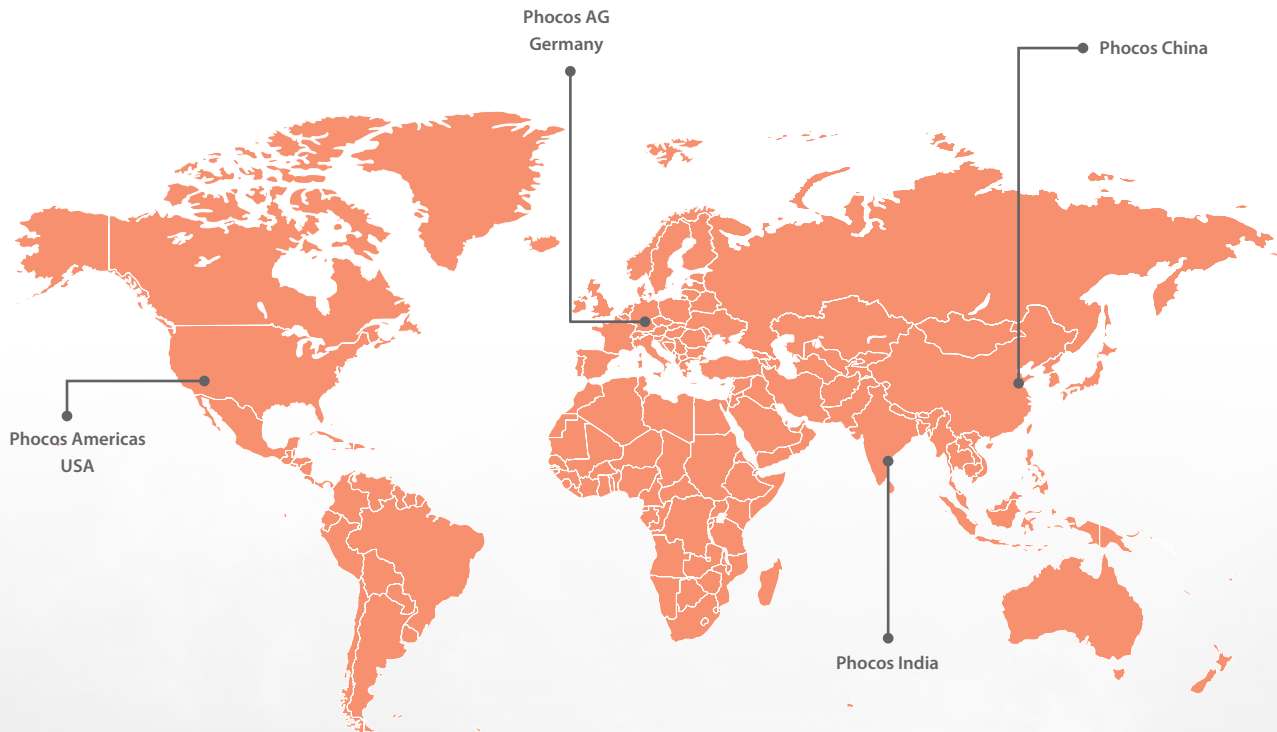
Metric Cable Size (mm <sup>2</sup> )	AWG	Diameter		Cross Section mm <sup>2</sup>
		Zoll	mm	
50	1	0.289	7.35	42.4
35	2	0.258	6.54	33.62
25	3	0.229	5.83	26.67
	4	0.204	5.19	21.15
16	5	0.182	4.62	16.75
	6	0.162	4.11	13.30
10	7	0.144	3.67	10.55
	8	0.128	3.26	8.37
6	9	0.114	2.91	6.63
	10	0.102	2.59	5.26
4	11	0.0907	2.30	4.17
	12	0.0808	2.05	3.31
2.5	13	0.0720	1.83	2.62
	14	0.0641	1.63	2.08
1.5	15	0.0571	1.45	1.65
	16	0.0508	1.29	1.31
1.0	17	0.0453	1.15	1.038
	18	0.0403	1.024	0.823
0.5	19	0.0359	0.912	0.653
	20	0.0320	0.812	0.518
	21	0.0285	0.723	0.410

*\*Phocos strongly recommends installing an inline fuse as close to the battery terminal as possible. 15A fuse for 10A charging or 30A fuse for 20A charging.*

**Thank you for your business.  
The Phocos Global Network is  
proud to be your off-grid partner.**



# Phocos Group



**Phocos Americas, Inc.**  
325 S. Euclid Ave., Ste. 101  
Tucson, AZ 85719 USA  
Phone +1 (520) 777-7906  
Fax +1 (520) 882-3191  
info.na@phocos.com  
www.phocos.com

**Phocos AG**  
Magirus-Deutz-Str. 12  
89077 Ulm Germany  
Phone +49 731 9380688-0  
Fax +49 731 9380688-50  
info@phocos.com  
www.phocos.com

**Phocos India Solar Pvt Ltd.**  
Plot No. 8,9&10,  
East Coast Road(E.C.R)  
Krishna Nagar, Lawspet,  
Puducherry 605 008 India  
Phone +91 0413 2912182  
Fax +91 0413 6453173  
info-india@phocos.com  
www.phocos.com

**Phocos China Ltd.**  
4/F.1st, Bldg., 4A ChangYi Rd.  
Qingdao 266021, China  
Phone +86 532 8380-2060  
Fax +86 532 8383-2075  
info-china@phocos.com  
www.phocos.com



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