phocos

Product Catalog

www.phocos.com

We design and deliver innovative solutions for solar power conversion, energy production, and storage

Phocos is a leading Original Equipment Manufacturer (OEM) with 25 years of experience designing and delivering innovative solutions for solar power conversion, energy production, and storage. We focus on precision engineering, integrating advanced technology with purpose-driven design. No matter the size or complexity of the project, we deliver with the speed, accuracy, quality, and flexibility that define our personalized approach. Partnering with Phocos means more than just getting a product manufactured. It means gaining a long-term ally dedicated to your success in the market.

Types of Projects We Support

Catalog-Based Project

Select a product from our catalog that best suits your needs and our team will customize it to your specifications

Fully Custom Project

Our team will develop a tailored solution that best suits your needs and specifications

For more information, contact us at info.na@phocos.com

Applications

From solar lighting to recration and more, we offer flexible solutions for a broad range of solar power applications

Transportation & Traffic Lights

High-quality & robust energy solutions for low-power applications that require maximum charging efficiency

Table of Contents

Introduction / Table of Contents	2
Any-Grid™ Inverter Portfolio	4
Any-Grid™ Hybrid Inverter	6
Any-Grid™ Battery Inverter	10
Any-Cell™ Energy Storage System	14
Remote Monitoring	18
Charge Controller Portfolio	22
MPPT Charge Controllers	24
PWM Charge Controllers	28
DC Refrigeration	36
Wire Gauge Recommendations	38

Recreation

Supporting clean, sustainable living on the road, on the water or off the beaten path

Solar Lighting

Rugged, efficient and dependable solutions with advanced lighting controls

Industrial

Reliable industrial power for remote monitoring, oil & gas, traffic signals, security and telecom towers

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Any-Grid™ Inverters

Any Grid

Any-Grid Inverter Portfolio

Max. Power Ratings			Battery Voltage			Features							
Model	Rated Power	Surge Power (for 5 secs.)	12 V	24 V	48 V	AC Output Voltage	AC Charge Current	MPPT Charge Current	Max. PV Voltage	MPPT Qty.	No Load Power Draw	Battery-Free Mode	Common Terminal (for grounding)
PSW-H: Hybrid Inverter Charger													
PSW-H-3KW-230/24V	3,000 W	6,000 W		●		220~240 Vac	80 A	80 A	450 Vdc	1	<40 W	●	Isolated
PSW-H-5KW-230/48V	5,000 W	10,000 W			●	220~240 Vac	80 A	80 A	450 Vdc	1	<40 W	●	Isolated
PSW-H-8KW-230/48V	8,000 W	16,000 W			●	220~240 Vac	120 A	120 A	500 Vdc	2	< 75 W	●	Isolated
PSW-H-3KW-120/24V	3,000 W	6,000 W		●		110~127 Vac	80 A	80 A	250 Vdc	1	<40 W	●	Isolated
PSW-H-6.5KW-120/48V	6,500 W	13,000 W			●	110~127 Vac	120 A	120 A	250 Vdc	2	<58 W	●	Isolated
PSW-B: Battery Inverter Charger													
PSW-B-0.5KW-120/12V	500 W	1,000 W	●			110~127 Vac	20 A	40 A	100 Vdc	1	<15 W		Isolated
PSW-B-1.6KW-120/24V	1,600 W	3,200 W		●		110~127 Vac	60 A	60 A	145 Vdc	1	<37 W		Isolated
PSW-B-1KW-230/12V	1,000 W	2,000 W	●			110~240 Vac	20 A	40 A	100 Vdc	1	<15 W		Isolated
PSW-B-3KW-230/24V	3,000 W	6,000 W		●		110~240 Vac	60 A	60 A	145 Vdc	1	<37W		Isolated

The Any-Grid Inverter Charger Series offers flexibility and reliability for a broad range of applications

PSW-H (3kW/5kW/6.5kW/8kW)

Any-Grid™ Hybrid Inverter Charger

Product Introduction

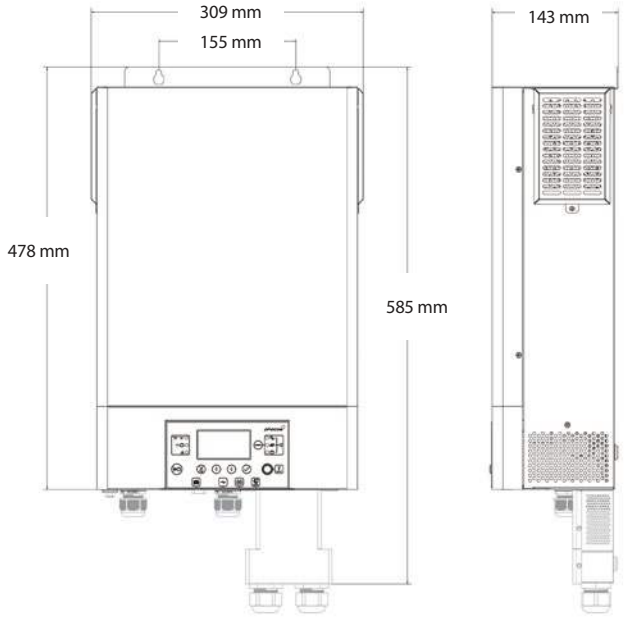
The Phocos Any-Grid™ PSW-H Inverter Charger Series (Pure Sine Wave Hybrid) represents Phocos' most versatile line of inverters/chargers. Flexibility and reliability are key characteristics of this product line, with a strong potential for cost saving opportunities in real world conditions. The Any-Grid PSW-H converts DC (Direct Current) energy into AC (Alternating Current), with multiple advantages beyond standard inverters. This product includes an integrated MPPT charge controller and can function as an AC to DC battery charger, which provides flexible energy access solutions in a broad range of applications.

The battery can be charged from solar and/or an AC source (public grid or generator), with easily programmable priorities. The Any-Grid PSW-H can function without an AC source or alternatively even without solar, as a pure uninterruptible power supply (UPS). When the utility grid or AC generator fails, the Any-Grid PSW-H immediately switches to 'Off-Grid' mode within 10 ms (typical, in UPS mode) to securely power the loads at all times. Solar can be set as the priority energy source to save electricity costs.

The Any-Grid PSW-H can function in a battery-free mode. In this mode, for installations with stable public grids, grid energy consumption can be reduced without the need to invest in a costly battery bank. Additionally, power can be supplied directly to loads from the grid and solar simultaneously.

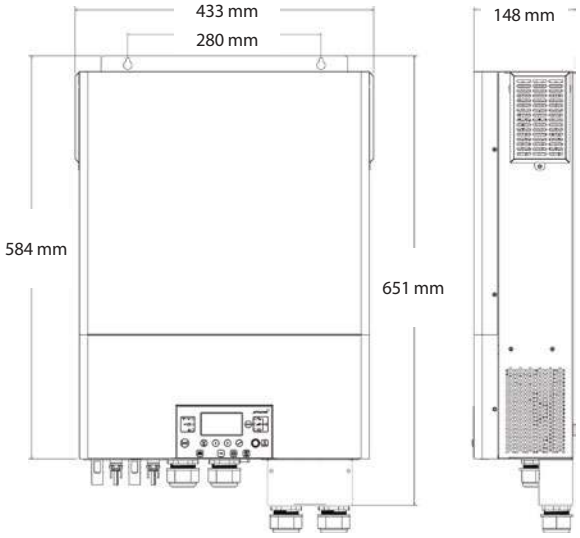
This unit comes with one to two quality, integrated MPPT charge controller(s). The controller(s) accept(s) particularly high PV voltages, allowing many PV modules to be connected in series, decreasing installation cost and avoiding combiner boxes. Up to 9 inverters can be connected parallel, 3-phase or split-phase for up to 72 kW of synchronized AC power.

Technical Drawing



PSW-H-3KW-120/24V, PSW-H-3KW-230/24V and PSW-H-5KW-230/48V*

*only the PSW-H-3KW-120/24V model includes greyed out bottom cable glands and extension box



PSW-H-6.5KW-120/48V and PSW-H-8KW-230/48V*

*only the PSW-H-6.5KW-120/48V model includes bottom greyed out extension box

PhocosLink App
GET IT ON Google Play
Download on the App Store

Subject to change without notice

PSW-H (3 kW/5 kW/6.5 kW/8 kW)

Any-Grid™ Hybrid Inverter Charger

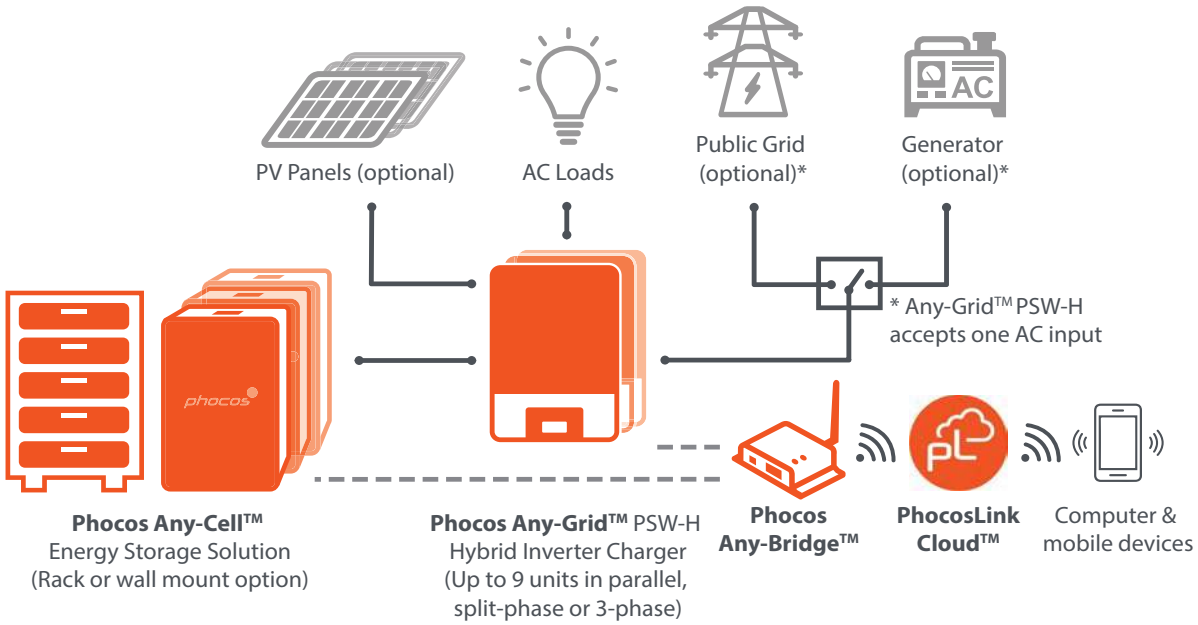
Product Features

- Flexible, advanced features with options to solve many common challenges in the field
- Integrated high-voltage MPPT charge controller(s). The high-voltage PV connection means in most scenarios the PV modules can simply be connected in series of one or two strings, avoiding costly combiner boxes and string fuses or diodes, thus reducing total system cost
- Integrated AC battery charger
- Charge controller(s) function(s) even if inverter is turned off to keep batteries fully charged
- Compatible with Lithium batteries
- Functions even without an expensive battery to reduce energy consumption from the grid with minimal investment
- Detachable display / communication unit with 6 LEDs and an intuitive LCD screen
- High level of connectivity: BLE, USB-OTG (on-the-go), CAN Bus, RS-485, RS-232, relay for generator start
- Datalogger with up to 60 days of data storage
- Compatible with Phocos Any-Bridge™ AB-PLC and PhocosLink Cloud for remote monitoring & control
- Integrated buzzer for button feedback and error indications
- Galvanic isolation of battery allows positive or negative grounding of the same
- Up to 9 inverters can be connected in parallel, 3-phase or split-phase for up to 72 kW of synchronized AC power
- Washable filter reduces dust buildup in the inverter
- Grid feed-in option is code-protected to avoid accidental feed-in

What is Any-Grid™?

Traditionally, the energy industry defines power systems relative to their access to the grid as Off-Grid or On-Grid. At Phocos, we believe energy access should be available under 'Any-Grid' conditions whether you have full or partial access to renewable energy and/or grid power, and if energy sources are unreliable. The Phocos Any-Grid Inverter Series provides flexible energy access solutions that optimize the use of locally available energy resources that can adapt as access to resources changes over time.

Any-Grid™ PSW-H (Off-Grid and/or On-Grid) Capability



Technical Data

Type	PSW-H-3KW-120/24V	PSW-H-3KW-230/24V	PSW-H-5KW-230/48V	PSW-H-6.5KW-120/48V	PSW-H-8KW-230/48V
Output Waveform	Pure Sine Wave				
System Voltage	24 Vdc		48 Vdc		
Rated AC Output Power	3000 VA / 3000 W		5000 VA / 5000 W	6500 VA / 6500 W	8000 VA / 8000 W
Max. Charge Current (PV)	80 Adc			120 Adc	
Max. Charge Current (AC)	80 Adc			120 Adc	
Max. Total Charge Current	80 Adc			120 Adc	
Max. AC Input Current	38.3 Aac	30 Aac	40 Aac	60 Aac	
Float Charge	27.6 Vdc (adjustable)		55.2 Vdc (adjustable)		
Boost Charge	28.8 Vdc (adjustable)		57.6 Vdc (adjustable)		
Equalization Charge	29.6 Vdc (adjustable)		59.2 Vdc (adjustable)		
Deep-Discharge Protection	22 Vdc (adjustable)		44 Vdc (adjustable)		
Reconnect Level	27.1 Vdc (adjustable)		54.7 Vdc (adjustable)		
Overvoltage Protection	33 Vdc		66 Vdc		
Undervoltage Protection	18.8 Vdc		37.5 Vdc		
Battery Discharge Current Requirement	168 Adc continuous 336 Adc surge (5s)		140 Adc continuous 280 Adc surge (5s)	154 Adc continuous 308 Adc surge (5s)	184 Adc continuous 368 Adc surge (5s)
Max. PV Panel Voltage	250 Vdc	450 Vdc		250 Vdc x 2 MPPTs	500 Vdc x 2 MPPTs
PV Panel MPP Voltage	90 ~ 230 Vdc	90 ~ 430 Vdc	120 ~ 430 Vdc	90 ~ 230 Vdc x 2 MPPTs	120 ~ 450 Vdc x 2 MPPTs
Max. Usable PV Current	22 Adc			22 Adc x 2 MPPTs, 36 Adc total	27 Adc x 2 MPPTs, 40 Adc total
Max. Usable PV Power	4000 W (2400 W for battery charging)		4800 W	4000 W x 2 MPPTs	
Max. PV Array Power	5000 Wp		6000 Wp	5000 Wp x 2 MPPTs	
AC Frequency	50 / 60 Hz auto recognition				
AC Output Voltage	110 ~ 127 Vac ± 5% (adjustable)	220 ~ 240 Vac ± 5% (adjustable)		110 ~ 127 Vac ± 5% (adjustable)	220 ~ 240 Vac ± 5% (adjustable)
Surge Power	2x rated power for 5 seconds				
Extensibility	Up to 9 units in parallel, 3-phase or split-phase	Up to 9 units in parallel or 3-phase		Up to 9 units in parallel, 3-phase or split-phase	Up to 9 units in parallel or 3-phase
Inverter Efficiency (from Battery)	> 90 % peak	> 91 % peak	> 93 % peak	> 92 % peak	
Inverter Efficiency (from PV)	> 96 % peak				> 97 % peak
Idle Self-Consumption	< 40 W on			< 58 W on	< 75 W on
Grounding	Galvanically isolated battery allows positive or negative battery grounding				
Ambient Temperature	-10 to +50 °C / +14 to +122 °F				
Storage Temperature & Humidity	-15 to +60 °C / +5 to +140 °F, 5-95 % (non-condensing)				
Transfer time between grid mode and off-grid mode and vice versa	10ms typical when in UPS mode, 20ms typical when in APL mode, up to 50ms when using multiple synchronized Any-Grids				
Max. Altitude	4,000 m above sea level, 1 % power de-rating per 100m above 1,000 m above sea level				
Battery Type	Lead acid (gel, AGM, flooded), Lithium				
Datalogger	60 days				
Max. Wire Cross Section	Battery: 50 mm² (AWG 0), PV: 16 mm² (AWG 4), AC: 10 mm² (AWG 7)			Battery: 70 mm² (AWG 2/0), PV: 16 mm² (AWG 4), AC: 16 mm² (AWG 6)	
Dimensions (WxHxD)	478 x 309 x 143 mm / 18.8 x 12.2 x 5.6 in			584 (651) x 433 x 148 mm / 23 (25.6) x 17 x 5.8 in (with extension box)	584 x 433 x 148 mm / 23 x 17 x 5.8 in
Weight	12 kg / 27 lbs	11.2 kg / 24.7 lbs	11.8 kg / 26 lbs	18.2 kg / 40 lbs	21.5 kg / 47.4 lbs
Ingress Protection	IP21				
Certificates	RoHS compliant	CE compliant, RoHS compliant		UL1741, CSA C22.2 No. 107.1-16, FCC Class A, RoHS compliant	CE compliant, RoHS compliant
Warranty	3 years				

PSW-B (0.5~3kW)

Any-Grid™ Battery Inverter Charger

NEW

Any Grid

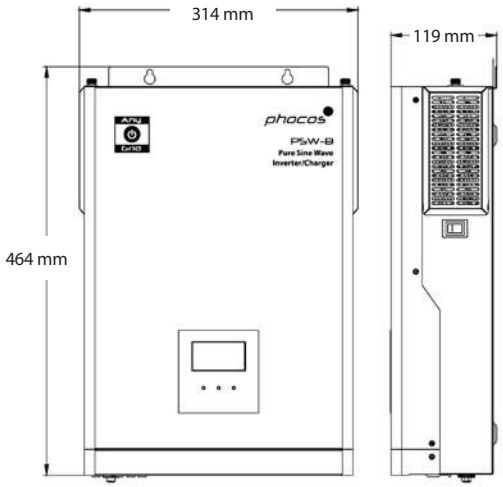
Product Introduction

The Phocos Any-Grid™ PSW-B Series (Pure Sine Wave Battery Inverter Charger) is part of Phocos' versatile line of Any-Grid inverters/chargers. Flexibility and reliability are key characteristics of this product line, with a strong potential for cost saving opportunities in real world conditions. The Any-Grid PSW-B converts DC (Direct Current) into AC (Alternating Current), with multiple advantages beyond standard inverters. This product includes an integrated MPPT charge controller and can function as an AC to DC battery charger, which provides flexible energy access solutions in a broad range of applications.

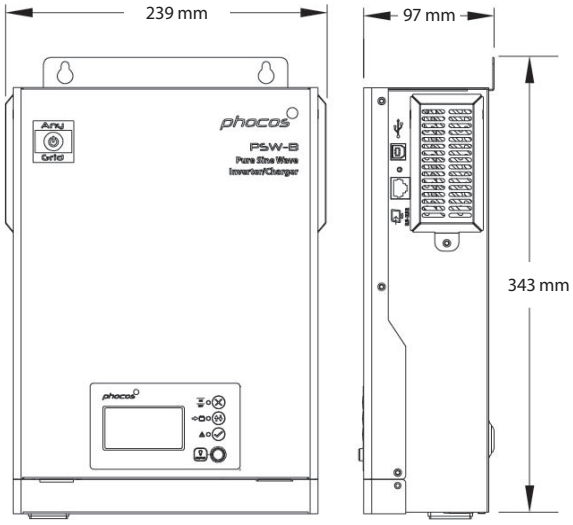
The battery can be charged from solar and/or an AC source (public grid or generator), with easily programmable priorities. The Any-Grid PSW-B can function without an AC source or alternatively even without solar, as a pure uninterruptible power supply (UPS). When the utility grid or AC generator fails, the PSW-B immediately switches to 'Off-Grid' mode within 10 ms (typical, in UPS mode) to securely power the loads at all times. Solar can be set as the priority energy source to save electricity costs.

This unit comes with a quality, integrated MPPT charge controller, avoiding the need to buy a separate solar charge controller. Solar panels can be connected directly into the Any-Grid PSW-B unit.

Technical Drawing



PSW-B-3KW-230/24V and
PSW-B-1.6KW-120/24V



PSW-B-1KW-230/12V and
PSW-B-0.5KW-120/12V

Any-Grid PSW-B Series is compatible with Lithium batteries

Subject to change without notice

PSW-B (0.5~3kW)

Any-Grid™ Battery Inverter Charger

Product Features

- Flexible, advanced features with options to solve many common challenges in the field
- Integrated MPPT charge controller
- Integrated AC battery charger
- Charge controller functions even if inverter is turned off to keep batteries fully charged
- Compatible with Lithium batteries
- Display unit with 3 LEDs, 3/4 buttons, and an intuitive LCD screen
- RS-232 and USB connectivity
- Integrated buzzer for error indications
- Common negative and galvanically isolated inverter
- Washable filter reduces dust buildup in the inverter

Any-Grid PSW-B Series is the most cost-effective entry point to all-in-one inverter chargers

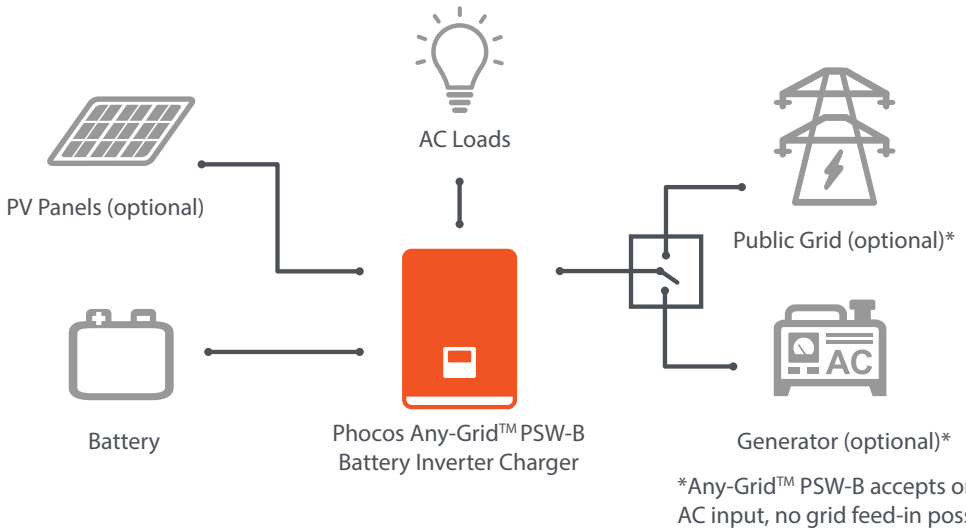
Power Connections:

- Solar/PV
- AC Source
- Battery
- AC Output

What is Any-Grid™?

Traditionally, the energy industry defines power systems relative to their access to the grid as Off-Grid or On-Grid. At Phocos, we believe energy access should be available under 'Any-Grid' conditions whether you have full or partial access to renewable energy and/or grid power, and if energy sources are unreliable. The Phocos Any-Grid Inverter Series provides flexible energy access solutions that optimize the use of locally available energy resources that can adapt as access to resources changes over time.

Any-Grid™ PSW-B Capability



Technical Data

Type	PSW-B-3KW-230/24V	PSW-B-1.6KW-120/24V	PSW-B-1KW-230/12V	PSW-B-0.5KW-120/12V
Output Waveform	Pure Sine Wave			
System Voltage	24 Vdc		12 Vdc	
Rated Output Power	3000 VA / 3000 W at 220 ~ 240 Vac*	1500 / 1637 / 1732 VA / W at 110 / 120 / 127 Vac, respectively	1000 VA / 1000 W at 220 ~ 240 Vac	500 VA / 500 W at 110 ~ 127 Vac
Max. Charge Current (PV)	60 Adc		40 Adc	
Max. Charge Current (AC)	60 Adc		20 Adc	
Max. Total Charge Current	120 Adc		60 Adc	
Max. AC Input Current	30 Aac		10 Aac	
Float Charge	27.6 Vdc (adjustable)		13.8 Vdc (adjustable)	
Boost Charge	28.8 Vdc (adjustable)		14.4 Vdc (adjustable)	
Equalization Charge	29.6 Vdc (adjustable)		14.8 Vdc (adjustable)	
Deep-Discharge Protection	22 Vdc (adjustable)		11 Vdc (adjustable)	
Reconnect Level	25.6 Vdc (adjustable)		12.8 Vdc (adjustable)	
Overvoltage Protection	33 Vdc		16 Vdc	
Undervoltage Protection	18.8 Vdc		9.4 Vdc	
Max. PV Panel Voltage	145 Vdc		100 Vdc	
PV Panel MPP Voltage	30 ~ 115 Vdc		15 ~ 80 Vdc	
Max. Usable PV Power	1800 W		600 W	
Max. PV Array Power	2250 Wp		750 Wp	
AC Frequency	50 / 60 Hz auto recognition			
AC Output Voltage	110 ~ 240 Vac ± 5%	110 ~ 127 Vac ± 5%	110 ~ 240 Vac ± 5%	110 ~ 127 Vac ± 5%
Surge Power	2x rated power for 5 seconds			
Inverter Efficiency (from Battery)	> 93 % peak		> 90 % peak	
Idle Self-Consumption	< 37 W		< 15 W	
Grounding	Common negative, galvanically isolated inverter			
Ambient Temperature	-10 to +50 °C / +14 to +122 °F			
Storage Temperature & Humidity	-15 to +60 °C / +5 to +140 °F, 5~95% (non-condensing)			
Max. Altitude	4,000 m above sea level, 1 % power de-rating per 100 m above 1,000 m above sea level			
Battery Type	Lead acid (gel, AGM, flooded), Lithium			
Max. Wire Cross Section	Battery: 35 mm^2 (AWG 2) PV: 16 mm^2 (AWG 6) AC: 10 mm^2 (AWG 8)		Battery: 35 mm^2 (AWG 2) PV: 16 mm^2 (AWG 6) AC output: 2.5 mm^2 (AWG 14)	
Dimensions (WxHxD)	314 x 464 x 119 mm / 12.4 x 18.3 x 4.7 in		239 x 343 x 97 mm / 9.4 x 13.5 x 3.8 in	
Weight	9.6 kg / 21.2 lbs		4.5 kg / 9.9 lbs	
Ingress Protection	IP21			
Certificates	CE compliant, RoHS compliant			
Warranty	2 years			

** Rated output power 1500 / 1637 / 1732 VA/W at 110 / 120 / 127 Vac, respectively.*

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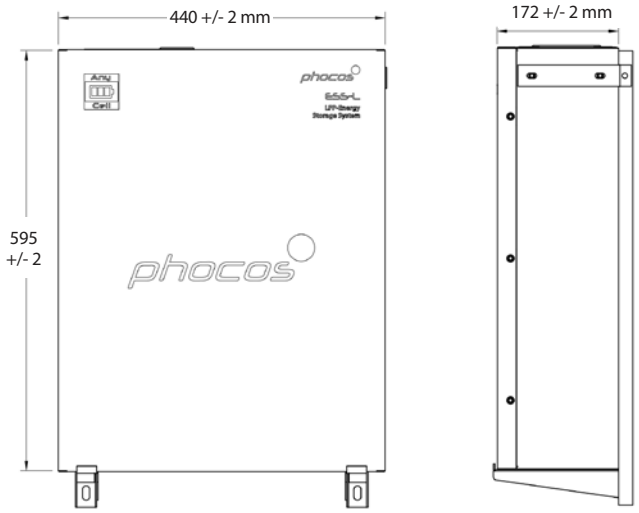
Any-Cell™ Energy Storage System

Any Cell

Now With Third-Party Inverter Compatibility

Rack Mount Configuration

Technical Drawing



Any-Cell ESS-L-5kWh-48V

Product Introduction

The Phocos Any-Cell™ Energy Storage System LFP Series (ESS-L) is a compact, modular LiFePO4 solution offering a safe, environmentally friendly, long cycle-life storage system. Enhanced by an integrated advanced battery management system (BMS), the Any-Cell ESS-L provides seamless integration with other Phocos products. Lithium Iron Phosphate (LiFePO4) technology is environmentally friendly compared to other traditional storage options, offering longer life span, maintenance-free operation, and overall improved discharge and charge efficiency. When combining with Phocos Any-Grid hybrid inverters, these important advantages make the Any-Cell ESS-L Series key to offering customers the lowest total cost of ownership over the life of their system.

Compatibility with the Phocos Any-Grid™ Hybrid Inverter Charger Series makes the Any-Cell Energy Storage System the perfect fit for a complete, modular power solution that serves a broad spectrum of applications and power requirements. With Any-Cell's modularity, system design and installation can be customized to scale and grow systems easily as power requirements change over time. When paired with the Phocos Any-Bridge™ AB-PLC Monitoring & Control Gateway, the Any-Cell ESS-L seamlessly integrates with the PhocosLink Cloud Portal enabling remote real-time system monitoring and control from anywhere in the world.

Any-Cell makes energy storage installation quick and easy with integrated handles to support both wall mount and rack mount installations. Designed and tested to meet rigorous international safety and reliability standards, the Any-Cell is supported by a standard 10-year warranty backed by a proven, industry-leading supplier in Phocos. The Any-Cell ESS-L Series represents the latest in Phocos innovation, complementing an existing portfolio of products designed to provide flexible energy access solutions Anywhere, Anytime, Any-Grid.

Product Features

- Compatible with select thrid-party inverters*
- Seamless integration with Phocos Any-Grid portfolio
- Safe, maintenance-free, LiFePO4 / LFP Chemistry
- Advanced Battery Management System
- Compact, high efficiency form factor
- Modular, scalable up to 8 batteries in parallel
- Wall or Rack mount
- High efficiency and low resistance
- High charge / discharge rate
- Greater than 6,000 cycles @90% DoD

*Only available from stock in Tucson, AZ and Bubesheim, Germany. Contact our sales team for more information.

Any-Cell ESS-L Shipping Information

Configuration	Quantity	Weight (kg)	Dimensions
Box	1	59	705 x 540 x 240mm +/- 5mm
Pallet	8	480	1100 x 700 x 1100 +/- 5 mm
20' Ocean Container	256	15,360	32 Pallets
40' Ocean Container	352	21,120	44 Pallets

- HS Code: 8507600090
- UN Certificate: 38.3

Technical Data

Type	ESS-L-5kWh-48V
Chemistry	LiFePO4 / LFP
Nominal Voltage	51.2 V
System Voltage	48 Vdc
Capacity (kWh)	5.12 kWh
Capacity (Ah)	100 Ah
Max. Discharge	100 A
Peak Discharge	200 A
Max. Charge	75 A
Max DoD	90%
Cycle Life (@ 25 °C)	> 6,000 Cycles @ 90% DoD
Extensibility	Up to 8 batteries in parallel
Idle Self-Consumption	< 3 W continuous

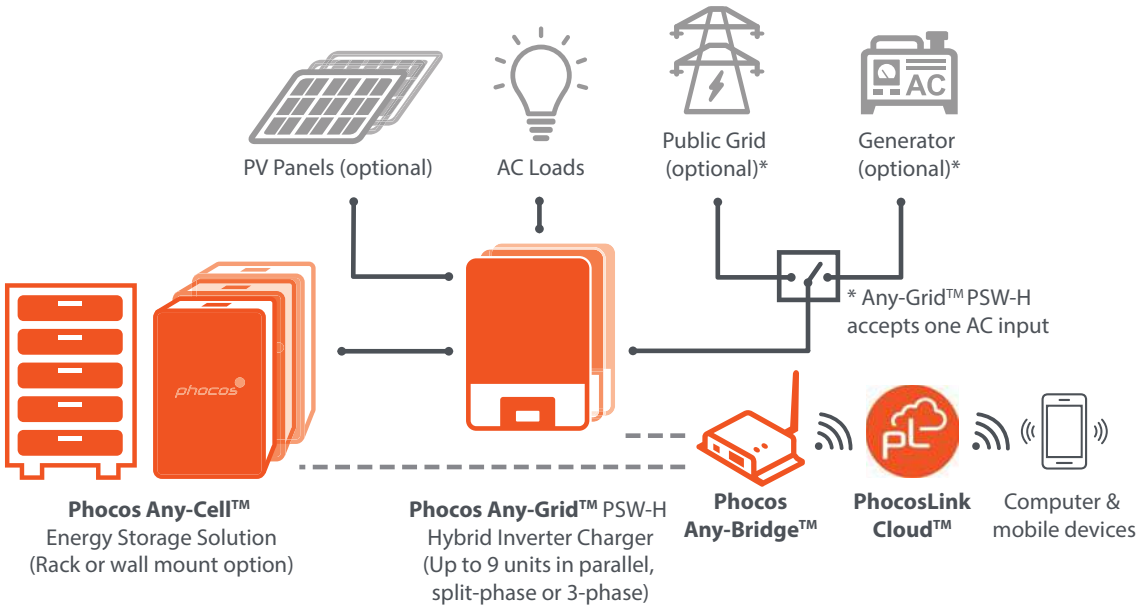
Type	ESS-L-5kWh-48V
Ambient Temperature	-10 to +50 °C / +14 to +122 °F
Storage Temperature	-30 to +60 °C / -22 to +140 °F
Max. Altitude	2,000 m
Humidity	5% to 95%
Communication	CANbus
Dimensions (WxHxD)	440 x 595 x 172 +/-2 mm / 17.3 x 23.4 x 6.8 in (without bracket)
Weight	56 kg / 123.5 lbs
Mounting	Wall or rack mount (wall mount hardware included)
Ingress Protection	IP20*
Certificates	UL 1642, UL1973, IEC 62619, UN38.3, CE, RoHS
Warranty	10 years

**IP20 applies when wall mounted, IP54 applies when rack mounted.*

What is Any-Cell™?

The Phocos Any-Cell™ is a compact and modular Lithium energy storage system that complements the Any-Grid™ hybrid inverter series to allow energy to be stored on site regardless of charging resources available. Combining Phocos Any-Cell energy storage with Any-Grid hybrid inverters and Any-Bridge remote monitoring provide seamless integration between power conversion and energy storage while optimizing the use of locally available energy resources. Any-Cell represents the latest in Phocos innovation, showcasing our commitment to provide flexible energy access solutions Anywhere, Anytime, Any-Grid™.

Any-Cell™ (Off-Grid and/or On-Grid) Capability



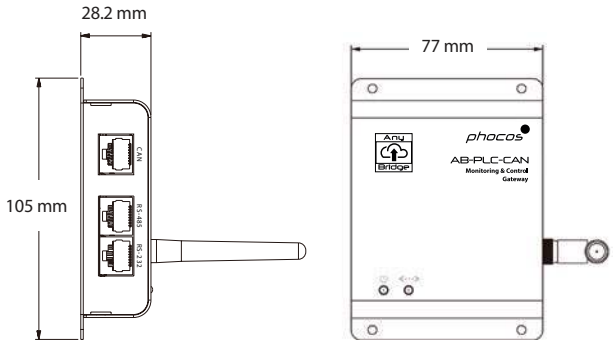
Subject to change without notice

phocos

Remote Monitoring

Any Bridge

Technical Drawing



Product Introduction

The Any-Bridge™ AB-PLC-CAN Monitoring & Control Gateway allows access to your Phocos power system via the PhocosLink Cloud portal.

Attaching to an internet-connected router through the Wi-Fi or Ethernet LAN port on the Any-Bridge gives you access to the PhocosLink Cloud portal enabling rich visual access to your system from anywhere in the world.

Remote monitoring via the PhocosLink Cloud allows for quick and easy system diagnostics improving system reliability and minimizing the need for costly site visits.

Product Features

- Free introductory access to the PhocosLink Cloud service**
- Compatible with all Any-Grid™ PSW-H Inverter/Chargers
- Connect up to 9 units of Any-Grid PSW-H
- RS-232, RS-485, CAN bus, Ethernet, Wi-Fi and BLE interfaces
- No external power supply required
- External antenna for extended wireless range
- Remote access of system status, operation mode, and system faults
- Historical and real time data access for key PV, AC source, battery, load and inverter/charger parameters

Technical Data

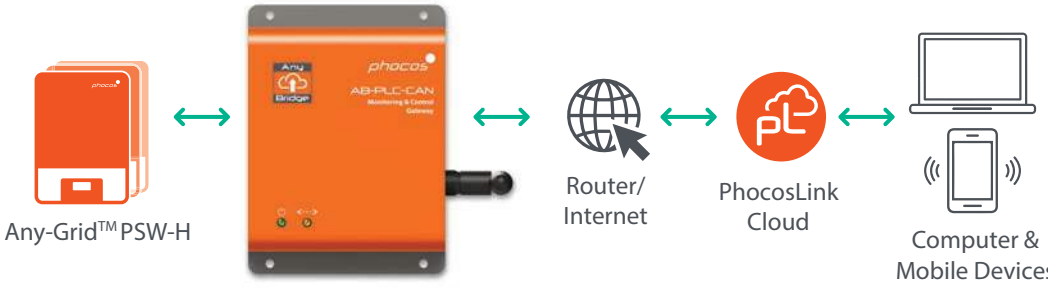
Type	Any-Bridge
Wired Interfaces	RS-232, RS-485, CAN bus, solid-state relay driver (≤ 12 mA, approx. 5 Vdc)
Wi-Fi Standards	802.11b/g/n, 2.4 Ghz
Wi-Fi Range	Approx. 46 m / 150 feet indoors*
BLE Standard	V4.2
BLE Range	Approx. 10 m, line-of-sight
Dimensions (WxHxD)	77 x 105 x 28.2 mm / 3 x 4.1 x 1.1 in
Weight	235 g / 0.52 lbs
Certifications	CE compliant

** Wi-Fi range can vary based on building materials, antenna orientation and other factors.*
*** Free introductory access limited to 24 months from date of PhocosLink Cloud account creation.*

Any Bridge

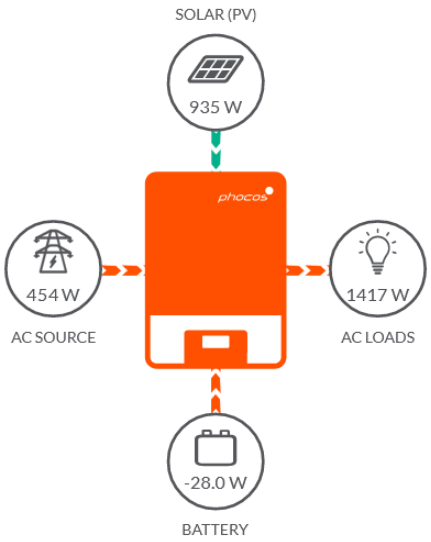
PhocosLink Mobile App
GET IT ON Google Play
Download on the App Store

Remote Monitoring: Any-Bridge™ AB-PLC-CAN Monitoring & Control Gateway Via The PhocosLink Cloud Portal



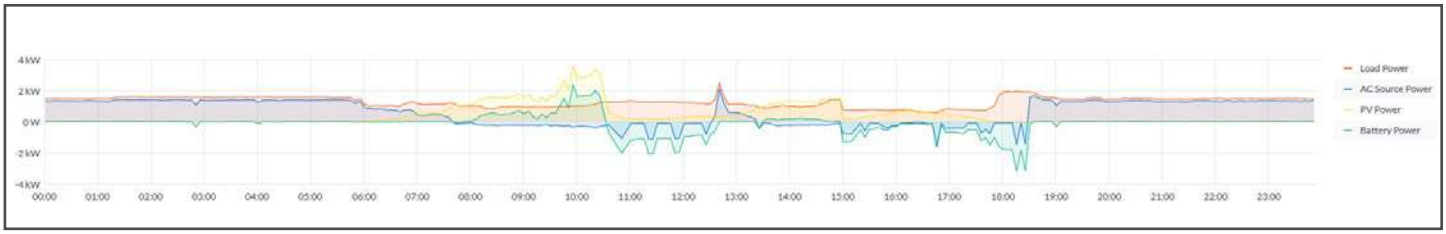
The PhocosLink Cloud gives you a dynamic and modern way to interact with your Phocos power system from anywhere in the world. Any internet-connected devices such as computers, tablets and smartphones can access a wealth of information about your system. Use this information to optimize and diagnose your system to improve reliability and minimize costly site visits.

- Solar PV
- AC Source
- Battery
- AC Loads
- Any-Grid

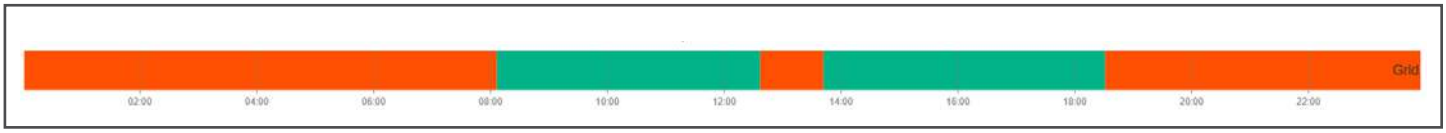


Power System Parameters

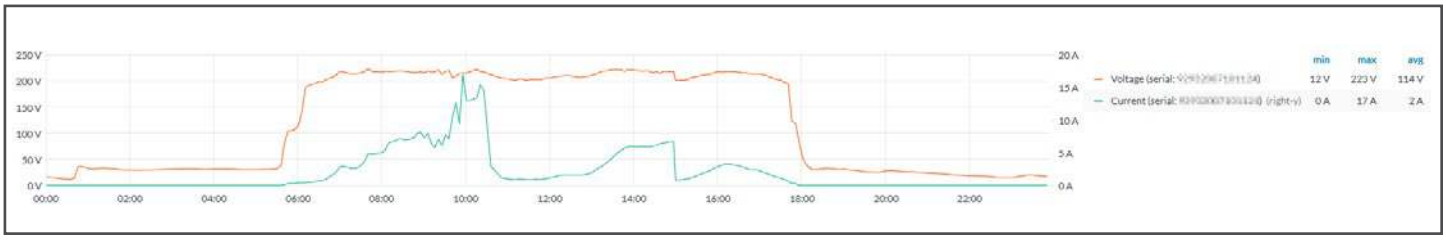
Power Mix



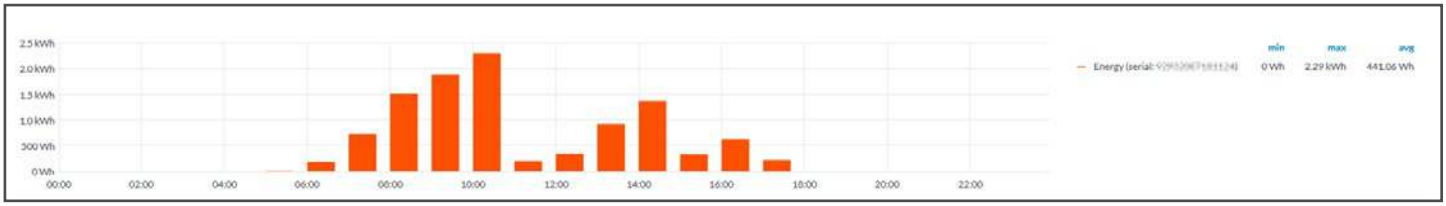
Operation Mode



Current and Voltage



Cumulative Energy



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Phocos Charge Controllers

Charge Controller Portfolio

Optimizing Energy from PV Arrays

Our MPPT (Maximum Power Point Tracking) and PWM (Pulse Width Modulation) solar charge controllers are designed with an optimal feature-to-cost ratio to minimize total cost of ownership of the off-grid system.

Our models offer these advantages:

- **CML**: Designed for rural electrification and mobile device charging
- **ECO**: Compact size and economical choice for low-power industrial applications
- **CXN**: Advanced features and intelligence for industry and lighting applications
- **CIS**: Built for the harshest environments with advanced lighting control features

MPPT Solar Charge Controllers

Max Solar Ratings				Battery Voltage				Features						
Model	Current	Voltage	Power	12V	24V	36V	48V	Potted	Data Logging	Low Voltage Disconnect	Ground-ing	Lighting Control	Dimming	LED Driver
ECO: Compact size and economical choice for low-power industrial applications														
ECO-N-MPPT 85/15	15A	85 Voc	250W/500W	•	•			•	•	•	NEG			
CIS: Built for the harshest environments with advanced lighting control features														
CIS-N-MPPT 85/15	15A	85 Voc	225W/450W	•	•			•	•	•	NEG	•	•	
CIS-N-MPPT 100/30	30A	95 Voc	450W/900W	•	•			•	•	•	NEG	•	•	
CIS-N-MPPT-LED	15A	85 Voc	225W/450W	•	•			•	•	•	NEG	•	•	•

PWM Solar Charge Controllers

Max Solar Ratings				Battery Voltage				Features								
Model	Current	Voltage	Power	12V	24V	36V	48V	Potted	LCD	USB Charger	Data Logging	Low Voltage Disconnect	Grounding	Lighting Control	Dimming	LED Driver
CML: Designed for rural electrification and mobile device charging																
CM04	4A	30V	70W	•									POS			
CM10	10A	30V	175W	•									POS			
CML-USB-10	10A	30V/50V	175W/350W	•	•					•		•	POS			
CML-USB-20	20A	30V/50V	350W/700W	•	•					•		•	POS			
ECO-N: Compact size and economical choice for low-power industrial applications																
ECO-N-10	10A	30V/50V	175W/350W	•				•				•	NEG			
ECO-N-10-T	10A	30V/50V	175W/350W	•	•			•				•	NEG			
ECO-N-20-T	20A	30V/50V	350W/700W	•	•			•				•	NEG			
CXN: Advanced features and intelligence for industry and lighting applications																
CXNup-10	10A	30V/50V	175W/350W	•	•				•	•	•	•	NEG	•		
CXNup-20	20A	30V/50V	350W/700W	•	•				•	•	•	•	NEG	•		
CXNup-40	40A	30V/50V	700W/ 1400W	•	•				•	•	•	•	NEG	•		
CIS: Built for the harshest environments with advanced lighting control features																
CIS-N-10	10A	30V/50V	175W/350W	•	•			•				•	NEG	•	•	
CIS-N-20	20A	30V/50V	350W/700W	•	•			•				•	NEG	•	•	
CIS-N-LED-1050	20A	30V/50V	350W/700W	•	•			•				•	NEG	•	•	•
CIS-N-LED-1400	20A	30V/50V	350W/700W	•	•			•				•	NEG	•	•	•
CIS-N-LED-2800	20A	30V/50V	350W/700W	•	•			•				•	NEG	•	•	•

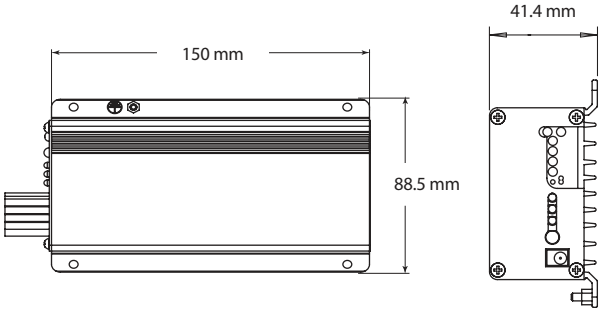
phocos

MPPT Charge Controllers

CIS-N-MPPT-LED (15 A)

Industrial MPPT Solar Charge Controller w/ LED Driver

Technical Drawing



Product Introduction

The CIS-N-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-N-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-N-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: MPPT 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
- Compatible with 60 cell PV modules
- Input for motion detector (PIR)
- Infrared-programmable load timing feature with dimming, which is ideal for lighting systems
- 2 year datalogging memory
- Programmable for LFP batteries with a BMS using CISCOM in expert mode
- Compatible with Lithium batteries (no BMS communication)

Driver Data

Type	CIS-N-MPPT-LED
Output Voltage	15-69 V (12 V), 30-69 V (24 V)
Nominal Output Current per String	350 - 3,500 mA
Max. Load Power	100 W / 200 W
Dimming Level	0-100 % (1.7 % steps)
PIR-Input	4-30 V with respect to battery negative, ≥0.7 mA; limited protection up to 50 V

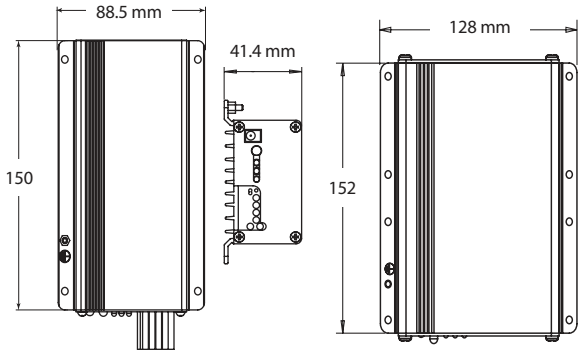
Technical Data

Type	CIS-N-MPPT-LED
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. PV Panel Voltage	50 V / 85 V
Max. Usable PV Power	225 W / 450 W
Max. PV Array Power	250 Wp / 500 Wp
Temperature Compensation	-25 mV/K (12 V); -50 mV/K (24 V)
Idle Self-Consumption	<10 mA
Grounding	Common Negative
Ambient Temperature	-40 to +60 °C
Max. Altitude	4,000 m above sea level
Battery Type	Lead acid (gel, AGM, flooded), Lithium, LFP
Datalogger	2 years
Wire Length	20 cm / 7.9 in
Wire Cross Section	2.5 mm² (AWG 13)
Dimensions (WxHxD)	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 (1.5 m, 72 h)
Certificates	CE compliant, RoHS compliant
Warranty	5 years

CIS-N-MPPT Series (15-30 A)

Industrial MPPT Charge Controllers w/ Lighting Control

Technical Drawing



CIS-N-MPPT 85/15

CIS-N-MPPT 100/30

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-N-MPPT charge controller family to prevent corrosion.

The CIS-N-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 / 30 cm connection wires (CIS-N-MPPT 85/15 / CIS-N-MPPT 100/30)
- Compatible with 60 cell solar modules
- Compatible with Lithium batteries (no BMS communication)
- IP68 Ingress Protection

Optional Accessories

CIS-CU

- Infrared remote control

MXI-IR

- Infrared to USB programming accessory and interface to CISCOM software

Technical Data

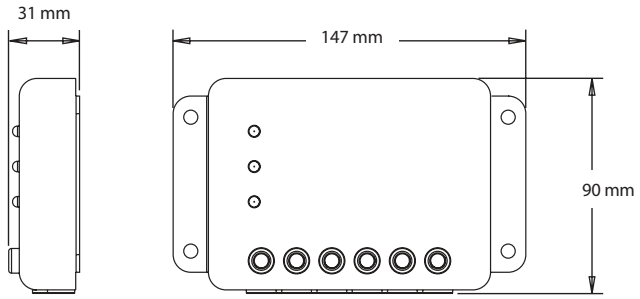
Type	CIS-N-MPPT 85/15	CIS-N-MPPT 100/30
System Voltage	12 / 24 V auto recognition	
Max. Charge/Load Current	15 A	30 A
Float Charge	13.8 / 27.6 V (25 °C)	
Main Charge	14.4 / 28.8 V (25 °C), 0.5 h daily	
Boost Charge	14.4 / 28.8 V (25 °C), for 2 h activation: battery voltage < 12.3 / 24.6 V	
Equalization 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	11-11.9 V / 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. PV Panel Voltage	50 / 85 V	95 V
Max. Usable PV Power	225 W / 450 W	450 W / 900 W
Max. PV Array Power	338 Wp / 675 Wp	675 Wp / 1350 Wp
Temperature Compensation	-25 mV/K (12 V); -50 mV/K (24 V)	
Idle Self-Consumption	8-16 mA	
Dimming Value	0-100 % (0-10 V output)	
Grounding	Common Negative	
Ambient Temperature	-40 to +60 °C	
Battery Type	Lead acid (gel, AGM, flooded) adjustable, Lithium	
Datalogger	2 years	
Wire Cross Section	2.5 mm² (AWG 13)	3.3 mm² (AWG 12)
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	1.3 kg / 2.86 lbs
Ingress Protection	IP68 (1.5 m, 72 h)	
Certificates	CE compliant, RoHS compliant	
Warranty	5 years	

Subject to change without notice

ECO-N-MPPT (15 A)

MPPT Solar Charge Controller

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 (external temperature sensor included) 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
- Lithium battery compatible
- Programmable night light, battery type, charging voltages and discharge voltage limit (MXI accessory required)

Optional Accessories

MXI and MXI-232

- Interface for ECO-N-MPPT controller communication with computer via USB or RS232 interface

Technical Data

Type	ECO-N-MPPT-85/15
System Voltage	12 / 24 V auto recognition
Max. Charge/Load 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	11.00-12.00 / 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
Max. PV Panel Voltage	50 / 85 V
Max. Usable PV Power	225 W / 450 W
Max. PV Array Power	250 Wp / 500 Wp
Temperature Compensation	-25 mV/K (12V); -50 mV/K (24 V)
Idle Self-Consumption	10 mA / 8 mA
Grounding	Common Negative
Ambient Temperature	-40 to +60 °C
Max. Altitude	4,000 m above sea level
Battery Type	Lead acid (gel, AGM, flooded), Lithium (selectable with MXI accessory)
Datalogger	2 years
Max. Wire Cross Section	16 mm^2 (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

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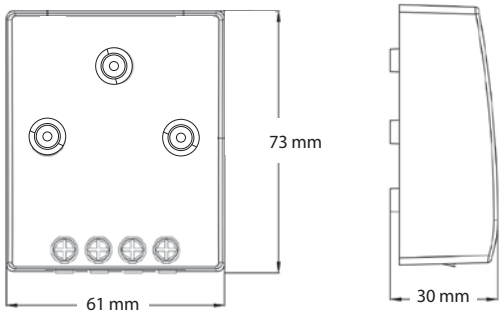
PWM Charge Controllers

CM Series (4 - 10 A)

Solar Charge Controller for Low Power Applications

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.

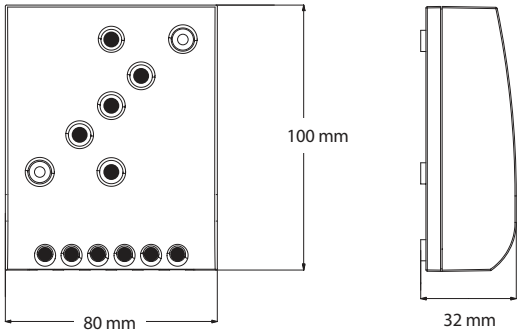
Product Features

- LED charging display
- Large terminals up to 16 mm² (AWG 6)
- 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	
Overvoltage Protection	30 V	
Max. PV Panel Voltage	30 V	
Idle Self-Consumption	4 mA	
Grounding	Common Positive	
Ambient Temperature	-40 to +50 °C	
Max. Altitude	4,000 m above sea level	
Battery Type	Lead acid (gel, AGM, flooded)	
Max. Wire Cross Section	16 mm² (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

Technical Data

Type	CML-USB-10	CML-USB-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), 0.5 h daily activation: battery voltage <12.3 / 24.6 V	
Equalization Charge	14.8 / 29.6 V (25 °C), 0.5 h daily 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. PV Panel Voltage	30 V / 50 V	
Temperature Compensation	-24 mV/K (12 V); -48 mV/K (24 V)	
Idle Self-Consumption	< 4 mA	
Grounding	Common Positive	
Ambient Temperature	-40 to +45 °C	
Max. Altitude	4,000 m above sea level	
Battery Type	Lead acid (gel, AGM, flooded)	
USB Charging Port	5 V, 700 mA	
Max. Wire Cross Section	16 mm^2 (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	

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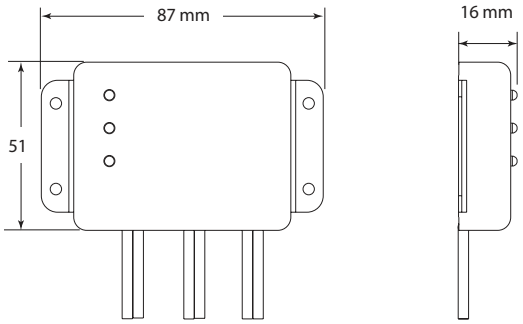
ECO-N (10 A)
Solar Charge Controller

Technical Drawing



Product Introduction

Phocos' ECO-N 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.

The ECO-N is equipped with the low-voltage disconnect feature. It is fully protected electronically, and has LEDs that communicate charge, battery and load status.

Product Features

- 3-stage charging: main, boost 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 (PV panel or battery), overload and short circuit at load
- Three LEDs indicate: charge status, state-of-charge (SOC), low-voltage disconnection (LVD), overload/short circuit
- IP68 ingress protection
- Common Negative grounding

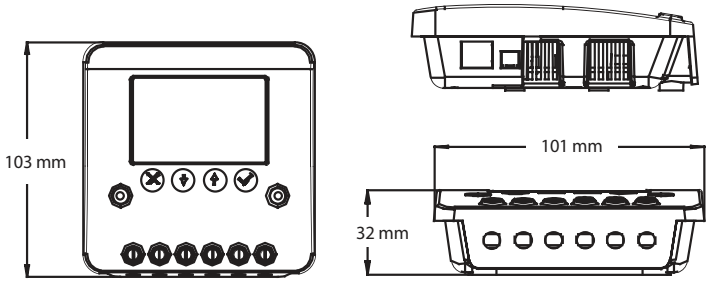
Technical Data

Type	**ECO-N**
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	Common Negative
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^2 (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

CXNup Series (10 - 40 A)

Solar Charge Controller w/ Datalogging and LCD

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, battery state-of-charge (SOC) in percent, charge and load current, and system status are clearly displayed on the large, backlit LCD. The CXNup series offer a USB port to charge mobile phones, tablets and other USB devices. Optional acoustic battery alarms and programmable street light settings are also standard.

Product Features

- USB charging port
- Datalogger 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 with up to 1.4 kW
- User friendly LCD shows extensive system information
- 2 year datalogging
- 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
- Compatible with LiFePO4 batteries (no communication to battery)

Optional Accessories

MXI and MXI-232

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

Technical Data

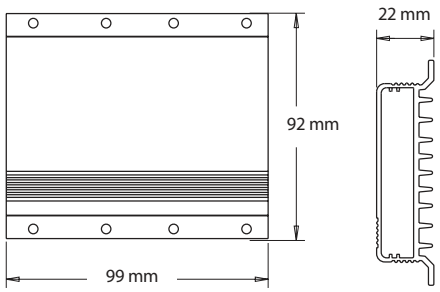
Type	CXNup10	CXNup20	CXNup40
System Voltage	12 / 24 V auto recognition		
Max. Charge Current	10 A	20 A	40 A
Load Current	10 A	20 A	40 A
Float Charge	13.8 / 27.6 V (25 °C)		
Main Charge	14.4 / 28.8 V (25 °C), 0.5 h daily		
Boost Charge	14.4 / 28.8 V (25 °C), 2 h activation: battery voltage < 12.3 / 24.6 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. PV 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	Common Negative		
Ambient Temperature	-40 to +60 °C		
Max. Altitude	4,000 m above sea level		
Battery Type	Lead acid (gel, AGM, flooded), LiFePO4 (selectable)		
Datalogger	2 years		
USB Charging Port	5.0 V, 1.5 A		
Max. Wire Cross Section	16 mm² (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		

Subject to change without notice

CIS-N-LED (10-20 A)

Solar Charge Controller w/ Integrated LED Driver

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
- IP68 Ingress Protection

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 % (1.7 % steps)		
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

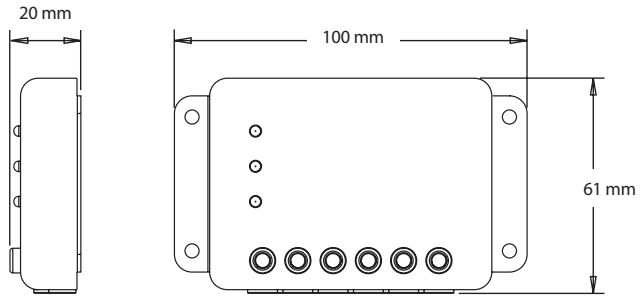
Type	CIS-N-LED-1050	CIS-N-LED-1400	CIS-N-LED-2800
System Voltage	12 / 24 V auto recognition		
Max. Charge Current	20 A (30 A, ≤ 50 °C*)		
Float Charge	13.8 / 27.6 V (25 °C)		
Main Charge	14.4 / 28.8 V (25 °C), 0.5 h daily		
Boost Charge	14.4 / 28.8 V (25 °C), 2 h activation: battery voltage < 12.3/24.6 V		
Equalization Charge	14.8 / 29.6 V (25 °C), 2 h; activation: battery voltage < 12.1/24.2 V (at east 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. PV Panel Voltage	30 / 50 V		
Temperature Compensation	-25 mV/K (12 V); -50 mV/K (24 V)		
Idle Self-Consumption	5-8 mA		
Grounding	Common Negative		
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 mm² (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.*

ECO-N-T Series (10-20 A)

Solar Charge Controller

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

The ECO-N-T is NRTL certified
UL listed to UL1741 and CSA C22.2 No. 107.1-16.
UL listed to ANSI/ISA 12.12.01 and C22.2 No. 213-15.

E497008 Photovoltaic Charge Controller
E490503 Photovoltaic Charge Controller for use in Hazardous Locations
Class 1, Div. 2 Groups A-D

c UL us LISTED

Technical Data

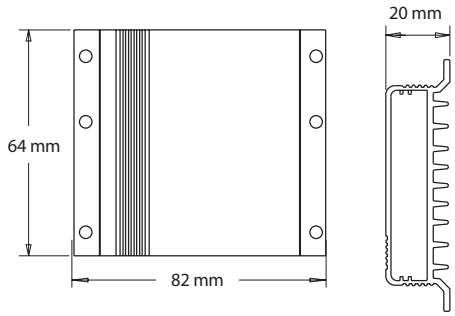
Type	ECO-N-10-T	ECO-N-20-T
System Voltage	12 / 24 V auto recognition	
Max. Charge/Load Current	10 A	20 A
Float Charge	13.8 / 27.6 V (25 °C)	
Main Charge	14.4 / 28.8 V (25 °C), 0.5 h daily	
Boost Charge	14.4 / 28.8 V (25 °C), 2 h activation: < 12.3 / 24.6 V	
Deep-Discharge Protection	11.0 / 22.0 V	
Overvoltage Protection	15.5 / 31.0 V	
Undervoltage Protection	10.5 / 21.0 V	
Range of Battery Voltage for Operation	9.0 to 15.5 V / 18.0 to 31.0 Vdc	
Load Output Voltage Range	11.0 to 15.5 / 22.0 to 31.0 Vdc	
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	Common Negative	
Ambient Temperature	-40 to +60 °C	
Max. Altitude	4,000 m above sea level	
Battery Type	Lead acid (gel, AGM, flooded)	
Max. Wire Cross Section	10 mm² (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 listed, UL121201 listed	
Warranty	5 years	

Subject to change without notice

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 (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
- Modifications available upon request
- Compatible with Lithium batteries (no BMS communication)

Optional Accessories

CIS-CU

- Infrared remote control programming accessory

MXI-IR

- Infrared to USB programming accessory and interface to CISCOM software

The CIS-N is NRTL certified
UL listed to UL1741 and CSA C22.2 No. 107.1-16.
UL listed to ANSI/ISA 12.12.01 and CSA C22.2 No. 213-15.

E497008 Photovoltaic Charge Controller
E490503 Photovoltaic Charge Controller for use in Hazardous Locations
Class 1, Div. 2 Groups A-D

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	
Min. Operating Voltage	9 V / 18 V	
Range of Battery Voltage for Operation	9.0 to 15.5 V / 18.0 to 31.0 Vdc	
Load Output Voltage Range	11.0 to 15.5 / 22.0 to 31.0 Vdc	
Max. PV Panel Voltage	30 V / 50 V	
Temperature Compensation	-25 mV/K (12 V), -50 mV/K (24 V)	
Idle Self-Consumption	5–8 mA / 6–10 mA	
Grounding	Common Negative	
Ambient Temperature	–40 to +60 °C	
Max. Altitude	4,000 m above sea level	
Battery Type	Lead acid (gel, AGM, flooded) adjustable, Lithium	
Wire Length	20 cm / 7.9 in	
Wire Cross Section	2.5 mm² (AWG 13)	
Dimensions (WxHxD)	82 x 64 x 20 mm / 3.2 x 3 x 1 in	
Weight	0.15 kg / 0.33 lbs	
Ingress Protection	IP68	
Certificates	CE compliant, RoHS compliant, UL1741 listed, ANSI/ISA 12.12.01 listed	
Warranty	5 years	

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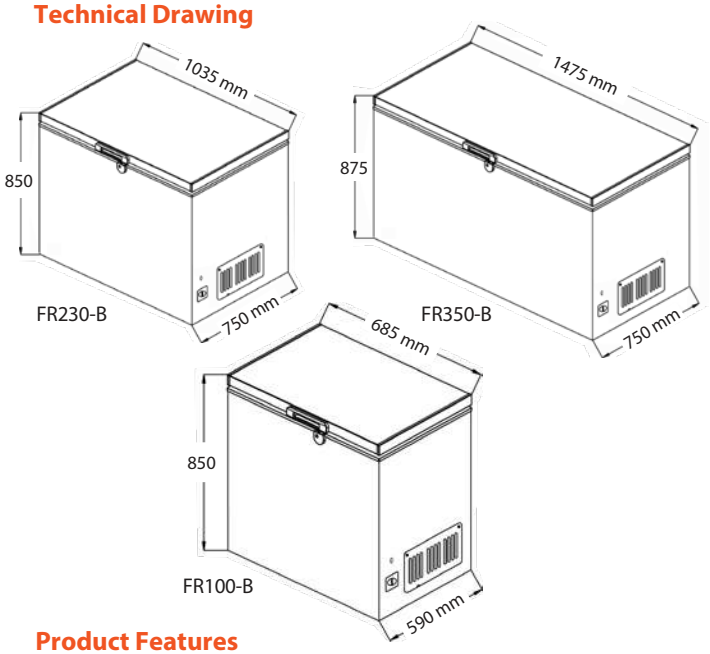
DC Refrigeration

FR-B Series (100/230/350 L)

DC Chest Refrigerator/Freezer with BOOST Feature

Technical Drawing



Product Introduction

The Phocos FR-B Series DC chest refrigerator/freezer with BOOST feature offers the most flexible solution for off-grid and edge-of-grid refrigeration in the market today. The unique BOOST feature provides the ability to choose between best cooling performance and highest efficiency to serve a variety of uses. In the field, all models can be used with 12 V or 24 V batteries, and can operate as a refrigerator or freezer by simply adjusting the thermostat.

The FR-B Series has been designed to maximize reliability by utilizing a maintenance-free brushless DC compressor for direct connection to a battery and long-lasting mechanical thermostat. An aluminum inner-lining and drain plug allow for easy clean up. FR-B refrigerator/freezers are also internally protected against low voltage and reverse polarity conditions.

Product Features

- New Feature: BOOST switch for faster cooling
- Works as a refrigerator or freezer with adjustable thermostat
- Does not require an inverter
- Intuitive setup including simple 2-wire DC connection
- High-efficiency cooling
- Environmentally-friendly R600a refrigerant
- Hanging basket(s) included for better space utilization
- Lockable lid

Technical Data

Type	FR100-B	FR230-B	FR350-B
System Voltage (Nominal)	12 / 24 V auto recognition		
Internal Operating Temperature Range	-18 to +8 °C / -0.4 to +46.4 °F		
Energy Consumption at 21°C / 70°F Ambient Temperature (in Default ECO Mode)	82 Wh / day (Fridge: 4 °C / 38 °F) 433 Wh / day (Freezer: -18 °C / 0 °F)	178 Wh / day (Fridge: 4 °C / 38 °F) 609 Wh / day (Freezer: -18 °C / 0 °F)	202 Wh / day (Fridge: 4 °C / 38 °F) 679 Wh / day (Freezer: -18 °C / 0 °F)
Energy Consumption at 32°C / 90°F Ambient Temperature (in Default ECO Mode)	174 Wh / day (Fridge: 4 °C / 38 °F) 561 Wh / day (Freezer: -18 °C / 0 °F)	193 Wh / day (Fridge: 4 °C / 38 °F) 899 Wh / day (Freezer: -18 °C / 0 °F)	228 Wh / day (Fridge: 4 °C / 38 °F) 981 Wh / day (Freezer: -18 °C / 0 °F)
Power consumption at 12 Vdc*	36 W ECO / 44 W BOOST	69 W ECO / 78 W BOOST	68 W ECO / 81 W BOOST
Content (Net Capacity)	104 L / 3.6 cu. ft	238 L / 8.4 cu. ft	358 L / 12.6 cu. ft
Refrigerant	Environmentally-Friendly R600a		
Ambient Temperature	+10 to +43 °C / +50 to +104 °F		
Door Type	Top-Opening with integrated handle and lock		
Storage Baskets	1 Basket	2 Baskets	3 Baskets
Boost Switch	Standard on all models - accelerates cooling when activated		
Cabinet Dimensions (WxHxD)	685 x 850 x 590 mm / 27 x 33.5 x 23.2 in	1035 x 850 x 750 mm / 40.8 x 33.5 x 29.5 in	1475 x 875 x 750 mm / 58.1 x 34.5 x 29.5 in
Inner Dimensions (WxHxD)	505 x 640 x 375 mm / 19.9 x 25.2 x 14.8 in Excludes compressor recess of 190 x 210 x 375 mm / 7.5 x 8.3 x 14.8 in	856 x 628 x 498 mm / 33.7 x 24.7 x 19.6 in Excludes compressor recess of 230 x 250 x 496 mm / 9.1 x 9.8 x 19.5 in	1290 x 619 x 498 mm / 50.8 x 24.4 x 19.6 in Excludes compressor recess of 300 x 240 x 498 mm / 11.8 x 9.4 x 19.6 in
Weight	23 kg / 50.7 lbs	50 kg / 110.2 lbs	65 kg / 143.3 lbs
Container Loading (20'/ 40' GP /40' HC)	54 pcs. / 108 pcs. / 170 pcs.	30 pcs. / 60 pcs. / 98 pcs.	20 pcs. / 42 pcs. / 66 pcs.
Certificates	CE compliant, RoHS compliant		
Warranty	2 years		

* Max. surge for compressor start-up 15 A / 8 A for 12 / 24 V, respectively. All surge durations below 0.2 s.

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^2)		Max. Voltage Drop (mm^2)		Max. Distance (m)		Min. Wire Cross Section (mm^2)		Max. Voltage Drop (mm^2)	
	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

Metric Cable Size (mm^2)	AWG	Diameter		Cross Section
		Inch	mm	mm^2
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. Fuse rating : charge current x 1.5 A.

Thank you for your business. The Phocos Global Network is proud to be your Off-Grid and Any-Grid partner.

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