



PWM Charge Controllers $\square\square\square$

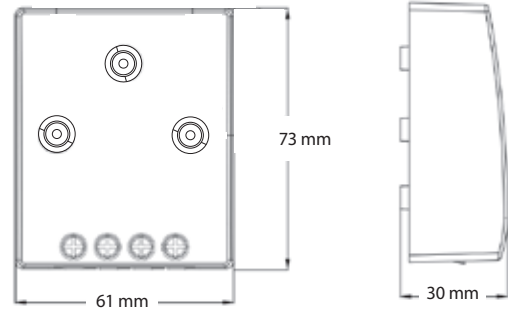




phocos 



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

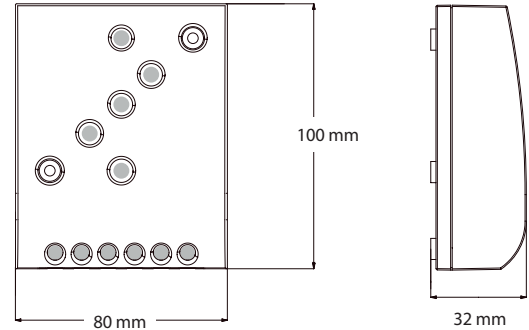
- LED charging display
- Large terminals up to 16 mm²/AWG 6
- Two-stage PWM charging algorithm (boost & float charging)
- Reverse polarity protection
- Designed to work reliably and efficiently in small PV systems

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 mm ² (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

- 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

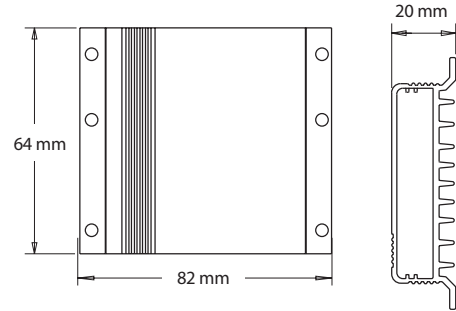
- DIN rail mounting plate that enables mounting the CML-USB controller on standard 35 mm DIN rail

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)		
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		



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

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	
Wire Length	20 cm / 7.9 in	
Wire Cross Section	2.5 mm ² (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	

ECO-N (10 A)

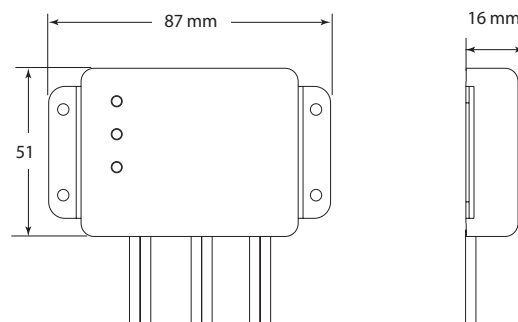
Solar Charge Controller



phocos



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

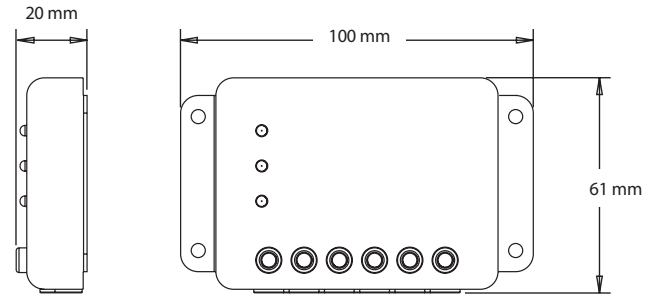
- Same model can be used in 12 or 24 V systems (fewer components to stock)
- 3-stage charging: main, boost and float charge
- Deep-discharge protection
- PWM series regulation (PV panel is not short-circuited)
- Integrated temperature compensation
- Fully electronically protected against: panel surge 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

Technical Data

Type	ECO-N
System Voltage	12 / 24 V auto recognition
Max. Charge/Load Current	10 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	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



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



Technical Data

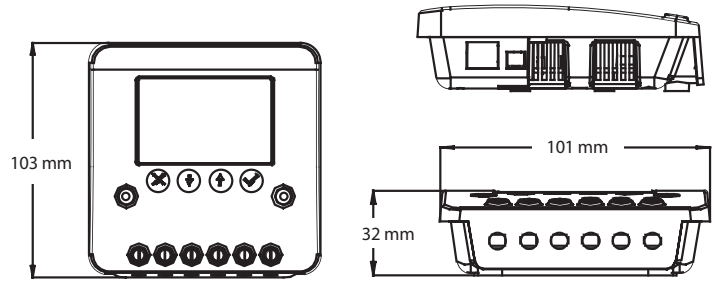
Type	ECO-N-10-T	ECO-N-20-T
System Voltage	12 / 24 V auto recognition	
Max. Charge/Load Current	10 A	20 A
Float Charge	13.8 / 27.6 V (25 °C)	
Main Charge	14.4 / 28.8 V (25 °C), 0.5 h daily	
Boost Charge	14.4 / 28.8 V (25 °C), 2 h activation: < 12.3 / 24.6 V	
Deep-Discharge Protection	11.0 / 22.0 V	
Overvoltage 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 mm ² (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, ANSI/ISA 12.12.01 listed	
Warranty	5 years	

phocos CXNup Series (10-40 A)

Solar Charge Controller w/ Datalogging/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 CXNup2B offers the possibility to charge two independent batteries with up to 20 A. All other variants 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

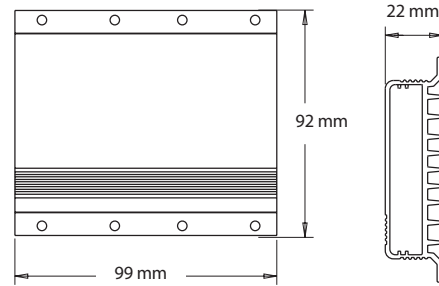
Type	CXNup10	CXNup20	CXNup2B*	CXNup40
System Voltage	12 / 24 V auto recognition			
Max. Charge Current	10 A	20 A	20 A / 20 A	40 A
Load Current	10 A	20 A	N/A	40 A
Float Charge	13.8 / 27.6 V (25 °C)			
Main Charge	14.4 / 28.8 V (25 °C), 0.5 h daily			
Boost Charge	14.4 / 28.8 V (25 °C), 2 h activation: 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		N/A	12.8 / 25.6 V
Overvoltage Protection	15.5 / 31.0 V			
Undervoltage Protection	10.5 / 21.0 V		N/A	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		N/A	5.0 V, 1.5 A
Max. Wire Cross Section	16 mm ² (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, but no load output. Battery voltages must be the same.

**Not for CXNup2B.



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		

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 mm ² (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.

Optional Accessories

MXI-IR

- Infrared to USB programming accessory and interface to CISCOM software

CIS-CU

- Infrared remote control programming accessory

Phocos Dingo (20 A)

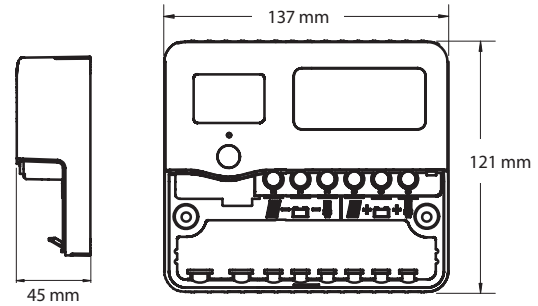
Programmable PWM Solar Charge Controller



phocos



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

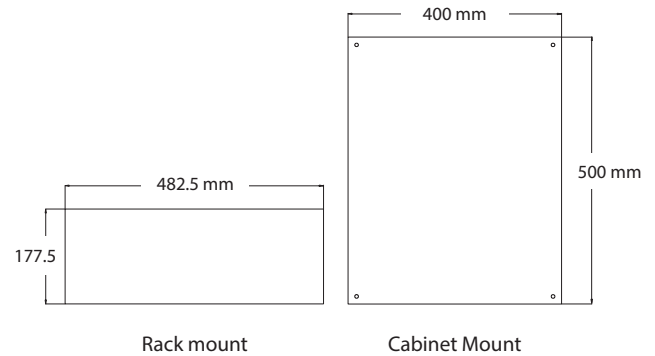
- D232** - RS232 Interface
- DT** - Remote Temperature Sensor
- DUSB** - USB Interface
- DTB** - Remote (bolt on) Temperature Sensor (neoprene)
- DNet** - Ethernet Adapter
- SHUNT** - External Current Shunt
- DSA** - External Shunt Adapter
- PRISM** - PC Software

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. PV Panel Voltage	100 V
Temperature Compensation	-5 mV/K per cell (adjustable)
Idle Self-Consumption	9 mA (12 V) - 26 mA (60 V)
Grounding	Common Negative
Ambient Temperature	-20 to +55 °C
Max. Altitude	4,000 m above sea level
Battery Type	Lead acid (AGM, gel, flooded) (selectable)
Datalogger	512 days
Max. Wire Cross Section	16 mm ² (AWG 6)
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 water loss in the battery electrolyte and prevent 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 common positive and negative 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 Charge	13.5-17 / 27-34 / 54-68 V (adjustable)		
Boost Charge 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	Common Positive or Negative available		
Ambient Temperature	-15 to +55 °C		
Max. Altitude	5,000 m above sea level		
Battery Type	Lead acid (gel, AGM, flooded)		
Max. Wire Cross Section	Battery: variable by version, up to 150 mm ² Solar: variable by version, up to 50 mm ² Load: 50 mm ² Alarms: 1 mm ²		
Cabinet Dimensions (WxHxD)	400 x 500 x 240 mm / 19.7 x 15.8 x 9.5 in		
Rack Dimensions (WxHxD)	482.5 x 177.5 x 285 mm / 19 x 7 x 11.3 in		
Weight	16 kg / 35.3 lbs		
Ingress Protection	IP66 cabinet		
Certificates	CE compliant, RoHS compliant		
Warranty	5 years		