



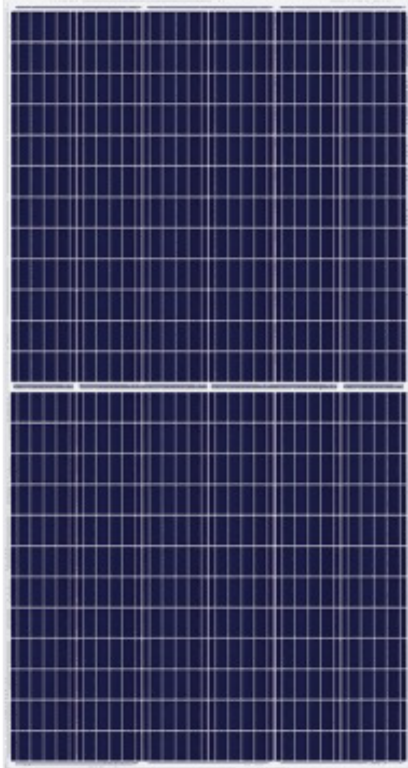
PRODUCTS CATALOGUE



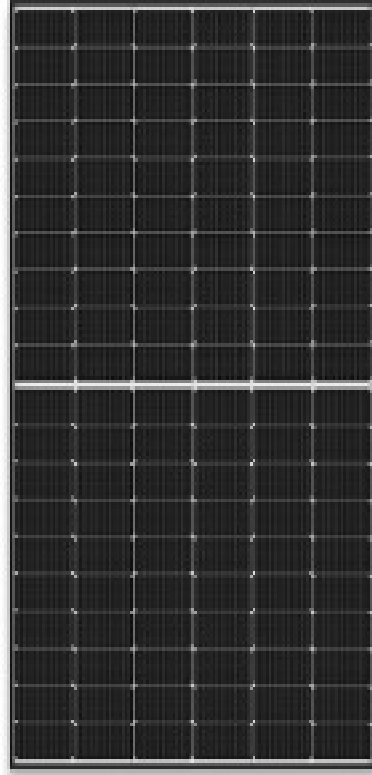
01- SOLAR PANELS

OUR PRODUCTS


CanadianSolar




TrinaSolar




JA SOLAR





HiKu5 Mono

475 W ~ 500 W

CS3Y-475 | 480 | 485 | 490 | 495 | 500MS

MORE POWER

500 W Module power up to 500 W
Module efficiency up to 21.2 %

Up to 4.0 % lower LCOE
Up to 4.2 % lower system cost

Comprehensive LID / LeTID mitigation technology, up to 50% lower degradation

Compatible with mainstream trackers, cost effective product for utility power plant

Better shading tolerance

MORE RELIABLE

Minimizes micro-crack impacts

Heavy snow load up to 5400 Pa, enhanced wind load up to 2400 Pa*

12 Years Enhanced Product Warranty on Materials and Workmanship*

25 Years Linear Power Performance Warranty*

1st year power degradation no more than 2%
Subsequent annual power degradation no more than 0.55%

*According to the applicable Canadian Solar Limited Warranty Statement.

MANAGEMENT SYSTEM CERTIFICATES*

ISO 9001: 2015 / Quality management system
ISO 14001: 2015 / Standards for environmental management system
ISO 45001: 2018 / International standards for occupational health & safety

PRODUCT CERTIFICATES*

IEC 61215 / IEC 61730 / CE / INMETRO
UL 61730 / IEC 61701 / IEC 62716 / IEC 60068-2-68
UN1 9177 Reaction to Fire: Class 1 / Take-e-way



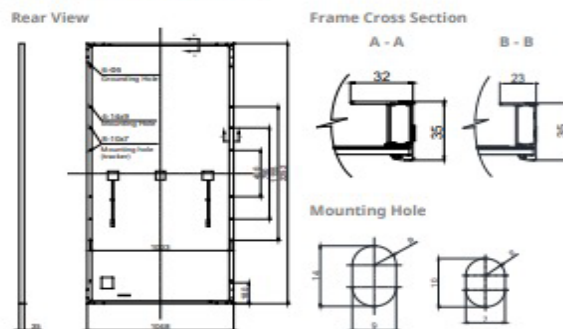
* As there are different certification requirements in different markets, please contact your local Canadian Solar sales representative for the specific certificates applicable to the products in the region in which the products are to be used.

CANADIAN SOLAR INC. is committed to providing high quality solar products, solar system solutions and services to customers around the world. Canadian Solar was recognized as the No. 1 module supplier for quality and performance/price ratio in the IHS Module Customer Insight Survey, and is a leading PV project developer and manufacturer of solar modules, with over 46 GW deployed around the world since 2001.

* For detailed information, please refer to the Installation Manual.

CANADIAN SOLAR INC.
545 Speedvale Avenue West, Guelph, Ontario N1K 1E6, Canada, www.canadiansolar.com, support@canadiansolar.com

ENGINEERING DRAWING (mm)



ELECTRICAL DATA | STC*

CS3Y	475MS	480MS	485MS	490MS	495MS	500MS
Nominal Max. Power (Pmax)	475 W	480 W	485 W	490 W	495 W	500 W
Opt. Operating Voltage (Vmp)	44.0 V	44.2 V	44.4 V	44.6 V	44.8 V	45.0 V
Opt. Operating Current (Imp)	10.81 A	10.87 A	10.94 A	11.00 A	11.06 A	11.12 A
Open Circuit Voltage (Voc)	52.7 V	52.9 V	53.1 V	53.3 V	53.5 V	53.7 V
Short Circuit Current (Isc)	11.52 A	11.57 A	11.62 A	11.67 A	11.72 A	11.77 A
Module Efficiency	20.1%	20.3%	20.6%	20.8%	21.0%	21.2%
Operating Temperature	-40°C ~ +85°C					
Max. System Voltage	1500V (IEC/UL) or 1000V (IEC/UL)					
Module Fire Performance	TYPE 1 (UL 61730 1500V) or TYPE 2 (UL 61730 1000V) or CLASS C (IEC 61730)					
Max. Series Fuse Rating	20 A					
Application Classification	Class A					
Power Tolerance	0 ~ +10 W					

* Under Standard Test Conditions (STC) of irradiance of 1000 W/m², spectrum AM 1.5 and cell temperature of 25°C.

ELECTRICAL DATA | NMOT*

CS3Y	475MS	480MS	485MS	490MS	495MS	500MS
Nominal Max. Power (Pmax)	355 W	359 W	362 W	366 W	370 W	374 W
Opt. Operating Voltage (Vmp)	41.1 V	41.3 V	41.5 V	41.7 V	41.8 V	42.0 V
Opt. Operating Current (Imp)	8.64 A	8.70 A	8.74 A	8.78 A	8.86 A	8.91 A
Open Circuit Voltage (Voc)	49.7 V	49.9 V	50.1 V	50.2 V	50.4 V	50.6 V
Short Circuit Current (Isc)	9.29 A	9.33 A	9.38 A	9.42 A	9.46 A	9.50 A

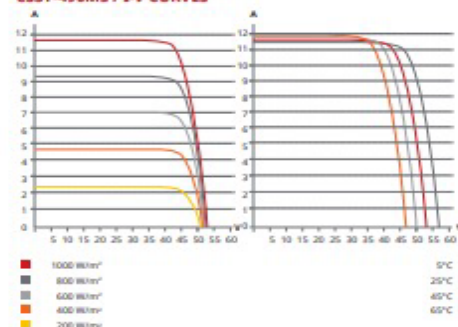
* Under Nominal Module Operating Temperature (NMOT), irradiance of 800 W/m² spectrum AM 1.5, ambient temperature 20°C, wind speed 1 m/s.

* The specifications and key features contained in this datasheet may deviate slightly from our actual products due to the on-going innovation and product enhancement. Canadian Solar Inc. reserves the right to make necessary adjustment to the information described herein at any time without further notice.

Please be kindly advised that PV modules should be handled and installed by qualified people who have professional skills and please carefully read the safety and installation instructions before using our PV modules.

CANADIAN SOLAR INC.
545 Speedvale Avenue West, Guelph, Ontario N1K 1E6, Canada, www.canadiansolar.com, support@canadiansolar.com

CS3Y-490MS / I-V CURVES



MECHANICAL DATA

Specification	Data
Cell Type	Mono-crystalline
Cell Arrangement	156 [2 X (13 X 6)]
Dimensions	2252 X 1048 X 35 mm (88.7 X 41.3 X 1.38 in)
Weight	25.7 kg (56.7 lbs)
Front Cover	3.2 mm tempered glass
Frame	Anodized aluminium alloy
J-Box	IP68, 3 bypass diodes
Cable	4 mm ² (IEC), 12 AWG (UL)
Cable Length (Including Connector)	500 mm (19.7 in) (+) / 350 mm (13.8 in) (-) or customized length*
Connector	T4 series or H4 UTX or MC4-EVO2
Per Pallet	30 pieces
Per Container (40' HQ)	600 pieces

* For detailed information, please contact your local Canadian Solar sales and technical representatives.

TEMPERATURE CHARACTERISTICS

Specification	Data
Temperature Coefficient (Pmax)	-0.34 % / °C
Temperature Coefficient (Voc)	-0.26 % / °C
Temperature Coefficient (Isc)	0.05 % / °C
Nominal Module Operating Temperature	42 ± 3°C

PARTNER SECTION



Harvest the Sunshine

DEEP BLUE 3.0

Mono

550W MBB Half-cell Module

JAM72S30 525-550/MR Series

Introduction

Assembled with 11BB PERC cells, the half-cell configuration of the modules offers the advantages of higher power output, better temperature-dependent performance, reduced shading effect on the energy generation, lower risk of hot spot, as well as enhanced tolerance for mechanical loading.



Higher output power



Lower LCOE



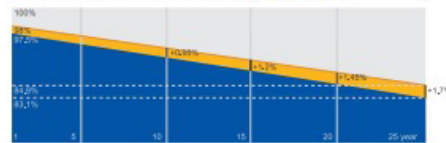
Less shading and lower resistive loss



Better mechanical loading tolerance

Superior Warranty

- 12-year product warranty
- 25-year linear power output warranty



■ New linear power warranty ■ Standard module linear power warranty

Comprehensive Certificates

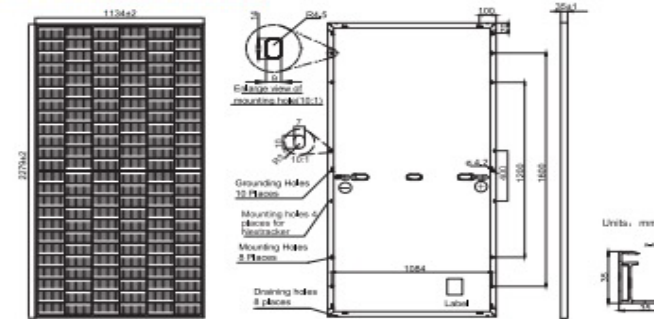
- IEC 61215, IEC 61730, UL 61215, UL 61730
- ISO 9001: 2015 Quality management systems
- ISO 14001: 2015 Environmental management systems
- ISO 45001: 2018 Occupational health and safety management systems
- IEC TS 62941: 2016 Terrestrial photovoltaic (PV) modules – Guidelines for increased confidence in PV module design qualification and type approval



JA SOLAR

JAM72S30 525-550/MR Series

MECHANICAL DIAGRAMS



Remark: customized frame color and cable length available upon request

SPECIFICATIONS

Cell	Mono
Weight	28.6kgs±3%
Dimensions	2279±2mm×1134±2mm×35±1mm
Cable Cross Section Size	4mm ² (IEC) ; 12 AWG(UL)
No. of cells	144(6×24)
Junction Box	IP68, 3 diodes
Connector	QC 4.10(1000V) QC 4.10-35(1500V)
Cable Length (Including Connector)	Portrait: 300mm(+)/400mm(-); Landscape: 1300mm(+)/1300mm(-)
Packaging Configuration	31pcs/Pallet, 620pcs/40ft Container

ELECTRICAL PARAMETERS AT STC

TYPE	JAM72S30-525/MR	JAM72S30-530/MR	JAM72S30-535/MR	JAM72S30-540/MR	JAM72S30-545/MR	JAM72S30-550/MR
Rated Maximum Power(P _{max}) [W]	525	530	535	540	545	550
Open Circuit Voltage(V _{oc}) [V]	49.15	49.30	49.45	49.60	49.75	49.90
Maximum Power Voltage(V _{mp}) [V]	41.15	41.31	41.47	41.64	41.80	41.96
Short Circuit Current(I _{sc}) [A]	13.65	13.72	13.79	13.86	13.93	14.00
Maximum Power Current(I _{mp}) [A]	12.76	12.83	12.90	12.97	13.04	13.11
Module Efficiency [%]	20.3	20.5	20.7	20.9	21.1	21.3
Power Tolerance	0~+5W					
Temperature Coefficient of I _{sc} (α _{Isc})	+0.045%/°C					
Temperature Coefficient of V _{oc} (β _{Voc})	-0.275%/°C					
Temperature Coefficient of P _{max} (γ _{Pmp})	-0.350%/°C					
STC	Irradiance 1000W/m ² , cell temperature 25°C, AM1.5G					

Remark: Electrical data in this catalog do not refer to a single module and they are not part of the offer. They only serve for comparison among different module types.

ELECTRICAL PARAMETERS AT NOCT

TYPE	JAM72S30-525/MR	JAM72S30-530/MR	JAM72S30-535/MR	JAM72S30-540/MR	JAM72S30-545/MR	JAM72S30-550/MR
Rated Max Power(P _{max}) [W]	397	401	405	408	412	416
Open Circuit Voltage(V _{oc}) [V]	46.05	46.18	46.31	46.43	46.55	46.68
Max Power Voltage(V _{mp}) [V]	38.36	38.57	38.78	38.99	39.20	39.43
Short Circuit Current(I _{sc}) [A]	10.97	11.01	11.05	11.09	11.13	11.17
Max Power Current(I _{mp}) [A]	10.35	10.39	10.43	10.47	10.51	10.55
NOCT	Irradiance 800W/m ² , ambient temperature 20°C, wind speed 1m/s, AM1.5G					

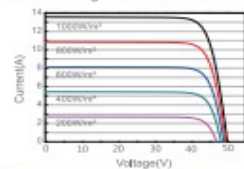
*For MaxTracker installations, Maximum Static Load, Front is 2400Pa while Maximum Static Load, Back is 2400Pa.

OPERATING CONDITIONS

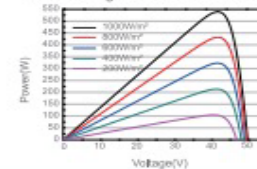
Maximum System Voltage	1000V/1500V DC
Operating Temperature	-40°C~+85°C
Maximum Series Fuse Rating	25A
Maximum Static Load, Front*	5400Pa(112lb/m ²)
Maximum Static Load, Back*	2400Pa(50lb/m ²)
NOCT	45±2°C
Safety Class	Class II
Fire Performance	UL Type 1

CHARACTERISTICS

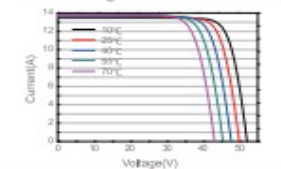
Current-Voltage Curve JAM72S30-540/MR



Power-Voltage Curve JAM72S30-540/MR



Current-Voltage Curve JAM72S30-540/MR



JA SOLAR

www.jasolar.com

Specifications subject to technical changes and tests. JA Solar reserves the right of final interpretation.



Premium Cells, Premium Modules

Version No.: Global_EN_20201207A



BIFACIAL DUAL GLASS MONOCRYSTALLINE MODULE

PRODUCT: TSM-DEG20C20
PRODUCT RANGE: 580-600W

600W+
MAXIMUM POWER OUTPUT

0~+5W
POSITIVE POWER TOLERANCE

21.2%
MAXIMUM EFFICIENCY



High customer value

- Lower LCOE (Levelized Cost Of Energy), reduced BOS (Balance of System) cost, shorter payback time
- Lowest guaranteed first year and annual degradation;
- Designed for compatibility with existing mainstream system components
- Higher return on Investment



High power up to 600W

- Up to 21.2% module efficiency with high density interconnect technology
- Multi-busbar technology for better light trapping effect, lower series resistance and improved current collection



High reliability

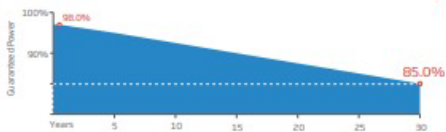
- Minimized micro-cracks with innovative non-destructive cutting technology
- Ensured PID resistance through cell process and module material control
- Resistant to harsh environments such as salt, ammonia, sand, high temperature and high humidity areas
- Mechanical performance up to 5400 Pa positive load and 2400 Pa negative load



High energy yield

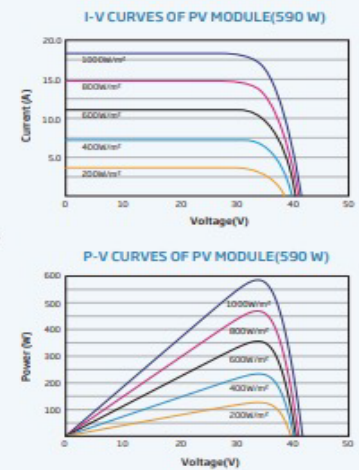
- Excellent IAM (Incident Angle Modifier) and low irradiation performance, validated by 3rd party certifications
- The unique design provides optimized energy production under inter-row shading conditions
- Lower temperature coefficient (-0.34%) and operating temperature
- Up to 25% additional power gain from back side depending on albedo

Trina Solar's Vertex Bifacial Dual Glass Performance Warranty



BIFACIAL DUAL GLASS MONOCRYSTALLINE MODULE

DIMENSIONS OF PV MODULE(mm)



ELECTRICAL DATA (STC)

Peak Power -Pmax (Wp)*	580	585	590	595	600
Power Tolerance -Pmax (W)	0 ~ +5				
Maximum Power Voltage -Vmp (V)	33.8	34.0	34.2	34.4	34.6
Maximum Power Current -Imp (A)	17.16	17.21	17.25	17.30	17.34
Open Circuit Voltage -Voc (V)	40.9	41.1	41.3	41.5	41.7
Short Circuit Current -Isc (A)	18.23	18.26	18.31	18.36	18.42
Module Efficiency - η_m (%)	20.5	20.7	20.8	21.0	21.2

*STC Irradiance: 1000W/m², Cell Temperature: 25°C, Air Mass: AM1.5. **Measuring tolerance: ±0.5%

Electrical characteristics with different power bin (reference to 10% irradiance ratio)

Total Equivalent power -Pmax (Wp)	621	626	631	637	642
Maximum Power Voltage -Vmp (V)	33.8	34.0	34.2	34.4	34.6
Maximum Power Current -Imp (A)	18.36	18.41	18.46	18.51	18.55
Open Circuit Voltage -Voc (V)	40.9	41.1	41.3	41.5	41.7
Short Circuit Current -Isc (A)	19.48	19.54	19.59	19.65	19.71
Irradiance ratio (rear/front)	10%				
Power Reliability (%)	25±0%				

ELECTRICAL DATA (NOCT)

Maximum Power -Pmax (Wp)	439	443	447	451	454
Maximum Power Voltage -Vmp (V)	31.5	31.7	31.9	32.0	32.2
Maximum Power Current -Imp (A)	13.93	13.97	14.01	14.05	14.10
Open Circuit Voltage -Voc (V)	38.5	38.7	38.9	39.1	39.3
Short Circuit Current -Isc (A)	14.68	14.72	14.76	14.80	14.84

NOCT: Irradiance at 800W/m², Ambient Temperature 25°C, Wind Speed 3m/s.

MECHANICAL DATA

Solar Cells	Monocrystalline
No. of cells	120 cells
Module Dimensions	2172*1303*40mm (85.51*51.30*1.57 inches)
Weight	35.3 kg (77.8 lb)
Front Glass	2.0mm (0.08 inches), High Transmission, AR Coated Heat Strengthened Glass
Encapsulant material	POE/EVA
Back Glass	2.0mm (0.08 inches), Heat Strengthened Glass (White Grid Glass)
Frame	40mm (1.57 inches) Anodized Aluminium Alloy
J-Box	IP68 rated
Cables	Photovoltaic Technology Cable 4.0mm² (0.006 inches²), Portrait: 280/280mm (11.02/11.02 inches) Landscape: 1400/1400mm (55.12/55.12 inches)
Connector	MC4 EVO2 / TS4*

*Please refer to regional database for specific connection.

TEMPERATURE RATINGS

NOCT (Nominal Operating Cell Temperature)	43°C (±2°C)
Temperature Coefficient of Pmax	-0.34%/°C
Temperature Coefficient of Voc	-0.25%/°C
Temperature Coefficient of Isc	0.04%/°C

MAXIMUM RATINGS

Operational Temperature	-40 ~ +85°C
Maximum System Voltage	1500V DC (IEC)
	1500V DC (UL)
Max Series Fuse Rating	35A

WARRANTY

12 year Product Workmanship Warranty
30 year Power Warranty
2% first year degradation
0.45% Annual Power Attenuation

*Please refer to product warranty for details.

PACKAGING CONFIGURATION

Modules per 40' container: 448 pieces

Comprehensive Products and System Certificates



IEC61215/IEC61730/IEC61701/IEC62716/UL61730
ISO 9001: Quality Management System
ISO 14001: Environmental Management System
ISO 14064: Greenhouse Gases Emissions Verification
ISO 45001: Occupational Health and Safety Management System



CAUTION: READ SAFETY AND INSTALLATION INSTRUCTIONS BEFORE USING THE PRODUCT.

© 2020 Trina Solar Limited, All rights reserved, Specifications included in this datasheet are subject to change without notice.

Version number: TSM_EN_2020_PA2

www.trinasolar.com



02- SOLAR BATTERIES

OUR PRODUCTS



- ! The DEKA Solar series of valve-regulated, gelled-electrolyte
- ! batteries is designed to offer reliable, maintenance-free power
- ! for renewable energy applications where frequent deep cycles
- ! are required and minimum maintenance is desirable.



Deka SOLAR

PHOTOVOLTAIC BATTERIES



**GEL MONOBLOC/
6V & 12V**

The **Deka Solar Valve-Regulated Gel Monobloc series** offers reliable, versatile, maintenance-free power. The thixotropic

gel enables these batteries to be completely spillproof providing many available options

for installation. The gelled electrolyte gives more protection to the battery plates, and is better suited for deep cycle discharge. With longer discharge and less charging time, these batteries are ideal for many renewable energy applications.

FEATURES & BENEFITS

Valve-Regulated	Sealed construction eliminates periodic watering, corrosive acid fumes, and spills
Gelled Electrolyte	Electrolyte will not stratify
Positive and Negative Plate	Lead calcium
Self-Discharge	Less than 2% per month stand loss means little deterioration during transport and storage
Exclusive IPF® Technology	Optimizes power capacity, cell consistency, and long-term reliability
Rated Non-Spillable by ICAO, IATA, and DOT	Transports easily and safely by air, no special containers needed

APPLICATIONS

- Renewable Energy • Water pumping • Residential • Communications
- Cathodic protection • Remote monitoring • Refrigeration
- Lighting • Aids to navigation • Wind generation



QUALITY SYSTEM
CERTIFIED
ISO 9001
ISO 14001



Deka SOLAR

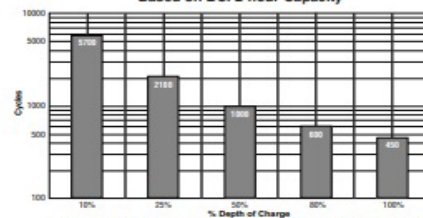
PHOTOVOLTAIC BATTERIES

The Deka Solar series of valve-regulated, gelled-electrolyte batteries is designed to offer reliable, maintenance-free power for renewable energy applications where frequent deep cycles are required and minimum maintenance is desirable.

Specifications

Voltage 12 volts nominal (8GGC2 is 6 volts)
Plate alloy Lead calcium
Container/cover Polypropylene
Electrolyte Sulfuric acid thixotropic gel
Valve Self sealing

**Gel Cycle Life vs Depth of Discharge at +25°C (77°F)
Based on BCI 2-hour Capacity**



Cycle Chart applies to types with similar design characteristics, ex., U1, 22NF, 24, 27, 31.

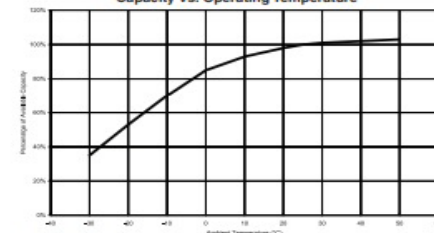
The solar battery excels in cycling applications.

*Dependent upon proper charging and ambient temperatures.

Photovoltaic Charging Parameters		
Bulk Charge	Max Current (amps)	30% of 20 Hr Rate
Absorption (Regulation) Charge	Constant Voltage	2.35 - 2.45 vpc
Float Charge	Constant Voltage	2.25 vpc ± .01
Equalize Charge	Constant Voltage	2.30 - 2.43 vpc
Temperature Coefficient		-0.003 v / °C

Cut-off parameters per charge & equalize intervals are application specific and will vary dependent upon site specific characteristics such as temperature, days of autonomy, array to load ratio, ect.

Capacity vs. Operating Temperature



Capacity vs. Operating Temperatures: Above are the changes in capacity for wider ambient temperature range, giving the available capacity, as a percentage of the rated capacity, at different ambient temperatures. The curves show the behavior of the battery after a number of cycles.

Terminal Information



BATTERY TYPE	FOOT NOTE	VOLTS	AMPERE HOUR CAPACITY 77°F (25°C)				WEIGHT lb (kg)	DIMENSIONS - in (mm)		
			10 HR	20 HR	24 HR	100 HR		L	W	H
8G1U	38.39 Y	12	30.5	31.6	31.9	36.0	23 (10.5)	7.71 (196)	5.18 (132)	7.22 (183)
8G1UH	17.38 39 Y	12	30.5	31.6	31.9	36.0	23 (10.5)	8.31 (211)	5.18 (132)	7.22 (183)
8G40C	38.38 C	12	37.0	40.0	40.8	48.0	32 (14.5)	7.70 (194)	6.62 (168)	6.87 (174)
8G22HF	38.35 G	12	47.5	51.0	51.6	58.0	31 (13.8)	8.99 (228)	5.41 (139)	9.24 (235)
8G54R	38.38 C	12	53.0	60.0	61.7	70.0	42 (19.1)	10.20 (259)	6.85 (169)	7.95 (179)
8G24	17.38 39 G	12	88.0	73.6	74.9	84.5	52 (23.6)	10.20 (259)	6.80 (173)	9.24 (235)
8G27	17.38 39 G	12	80.3	88.0	88.1	99.0	65 (29.6)	12.83 (326)	6.56 (167)	9.24 (235)
8G30H	17.38 39 B	12	90.0	97.6	98.4	108	70 (31.8)	12.93 (329)	6.75 (171)	9.76 (248)
8G57	17.38 39 X	12	90.0	97.6	98.4	108	70 (31.8)	12.93 (329)	6.75 (171)	9.24 (235)
8GGC2	38.35 U	6	188	180	182	198	68 (30.8)	10.16 (261)	7.89 (199)	11.06 (281)
8G40	17.38 39 I	12	189	183	187	219	127 (57.6)	20.73 (527)	6.44 (164)	19.82 (275)
8G80	17.38 39 J	12	210	225	229	265	157 (71.2)	21.83 (554)	11.00 (279)	19.82 (275)
8G5SHP	17.38 39 B	12	107	115	116	123	85 (38.5)	13.58 (345)	6.77 (172)	11.42 (290)

ALL RATINGS ARE AFTER 15 CYCLES AND CONFORM TO B.C.I. SPECIFICATIONS.

IMPORTANT CHARGING INSTRUCTIONS: WARRANTY VOID IF OPENED OR IMPROPERLY CHARGED. Do not install in a sealed container. Constant under or overcharging will damage any battery and shorten its life! Use a good constant potential, voltage-regulated charger. The open circuit voltage of a fully charged 12-volt battery is 12.8V at 68°F (20°C).

Batteries manufactured in polypropylene cases and covers. Batteries manufactured with gray case / gray cover unless noted.

Footnotes:

- 17 - Includes handle
- 38 - "Non-Spillable" defined by DOT (Department of Transportation) definitions
- 39 - "Non-Spillable" defined by ICAO (International Commercial Airline Organization) and IATA (International Airline Transport Association) definitions.

- B - Flag Terminal w/ 3/8" diameter hole
- C - 1/4-20 Threaded Insert
- G - Flag Terminal w/ 5-16" diameter hole
- T - "L" Terminal w/ 3/8" diameter hole
- U - 5/16" Threaded Post / SAE
- X - 3/8-16 stainless steel threaded post
- Y - Small "L" terminal w/ 5/16" diameter hole

POWERED FOR PERFORMANCE[®] EAST PENN manufacturing co., inc.

Lyon Station, PA 19536-0147 • Fax: 610-682-4781
Domestic & International Inquiries Call: 610-682-3263
www.eastpennunigy.com • e-mail: sales@eastpennunigy.com
E.P.M. Form No. 0919 Rev. 1/12 © 2012 by EPM Printed in U.S.A.



Domestic Inquiries Call: 1-800-372-9253
www.mkbattery.com • e-mail: sales@mkbattery.com

All data subject to change without notice. No part of this document may be copied or reproduced electronically or mechanically without written permission from the company.

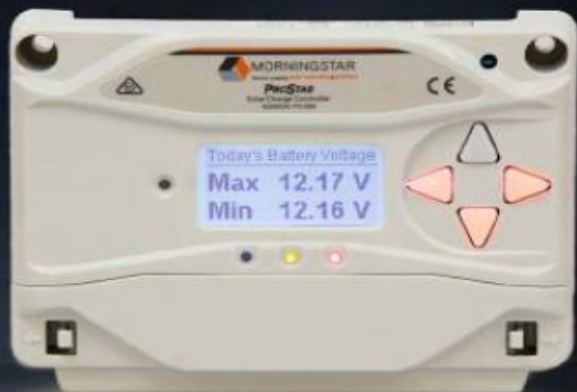


03- Charge Controllers

OUR PRODUCTS



PWM Controllers



Pulse-Width Modulation (PWM) technology controllers are ideal for use in solar energy situations where 36 or 72 cell PV modules are available and the site is unshaded with no physical space limitations. All models incorporate advanced thermal design requiring no cooling fans, which ensures long-term reliability with no moving parts to fail-- a unique feature among higher- powered controllers.

TriStar™ Controller

45A or 60A at 12-48V



"It is a Morningstar, what do you expect! It is great"

Ambient Operating Temperature	-40 °C to +45 °C -40 °F to +113 °F
Terminal	35 mm ² / 2 AWG
Product Weight	TS-45 1.6 kg / 3.5 lbs TS-60 1.6 kg / 3.5 lbs TS-60M 1.8 kg / 4 lbs
Unit Shipping Weight	TS-45 2.0 kg / 4.4 lbs TS-60 2.0 kg / 4.4 lbs TS-60M 2.2 kg / 4.8 lbs
Dimensions	26.0 x 12.7 x 7.1 cm 10.3 x 5.0 x 2.8 in
Warranty	5 years

Certifications

- CE, RoHS and REACH Compliant
- IEC 62109
- ETL Listed [UL-1741 and Canadian CSA C22.2 No. 107.1.01]
- EMC Compliance
- FCC Title 47 (CFR), Part 15 Subpart B for Class B Device
- Manufactured in a Certified ISO 9001 Facility

PWM Controllers

Three-function PWM controller for larger systems, providing reliable PWM solar battery charging or load control or diversion regulation.

- **Built for reliability and performance**, with an oversized heatsink and over-spec'd components. Fully-rated for operation at temperatures up to 45C.
- **More information with LED indicators**. Optional meter displays extensive system and controller information in five languages; automatic self-test and reset.
- **Communications capability** with RS-232 port, connects to a PC for custom settings, data logging, remote monitoring and control.
- **Fully adjustable** with DIP switches for seven digital presets. Additional custom setting via RS-232.
- **Extensive electronic protection** against reverse polarity, short circuits, overcurrent and excessive temperature.
- **Fanless design** for long-term reliability.



TriStar

	TS-45	TS-60	TS-60M
Rated Solar, Load or Diversion Current	45A	60A	60A
Nominal System Voltage	12, 24 or 48 Vdc		

Options

	TS-45	TS-60	TS-60M
TriStar Meter-2 (TS-M-2)	Yes	Yes	Pre-installed
TriStar Remote Meter-2 (TS-RM-2)	Yes	Yes	Yes
MeterHub (HUB-1)	Yes	Yes	Yes
EIA-485 Adapter (RSC-1)	Yes	Yes	Yes
Remote Temperature Sensor (RTS)*	Yes	Yes	Yes
Ground Fault Protection Device (GF-PD-150V and GFPD-600V)	Yes	Yes	Yes

* Required for temperature compensated charging. Not included.



Portable LED lighting towers providing 24/7 illumination for safer, more efficient mining operations throughout Brazil and Latin America.

"I like to use Morningstar because it's really robust and reliable"

Ricardo Righi Reis

ProStar™ Controller

15A or 30A at 12/24V



"...you get what you pay for, and this one is worth every penny...count on Morningstar"

Ambient Operating Temperature	-40 °C to +60 °C -40 °F to +140 °F
Terminal	16 mm ² / 6 AWG
Product Weight	
PS-15	0.3 kg / 0.86 lbs
PS-15M	0.4 kg / 0.9 lbs
PS-30	0.3 kg / 0.86 lbs
PS-30M	0.4 kg / 0.9 lbs
Unit Shipping Weight	
PS-15	0.6 kg / 1.4 lbs
PS-15M	0.7 kg / 1.6 lbs
PS-30	0.6 kg / 1.4 lbs
PS-30M	0.7 kg / 1.6 lbs
Dimensions	15.3 x 10.5 x 5.5 cm 6.01 x 4.14 x 2.17 in
Warranty	5 years

Certifications

- CE, RoHS and REACH Compliant
- IEC 62109
- Manufactured in a Certified ISO 9001 Facility
- FCC Part-15 Class B Compliant

PWM Controllers

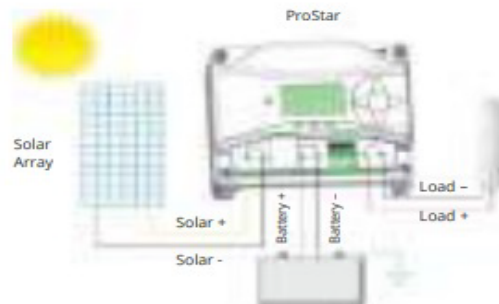
Mid-range PWM solar charge controller for both professional and consumer applications, incorporating legendary ProStar design and performance.

- **Longer battery life** through 4-stage charging and temperature compensation. Constant voltage PWM series regulation. Choice of three battery types. Voltage-sense terminals for more accurate battery monitoring.
- **More information** with three battery-level LED indicators. Optional meter includes safety disconnect and displays amps, volts, temperature and self-test.
- **Extensive electronic protection** against reverse polarity, reverse current at night, short circuits, overcurrent and excessive temperature. No mechanical fuses.
- **Fanless design** for long-term reliability.

ProStar	PS-15	PS-15M	PS-30	PS-30M
Rated Solar Current	15A	15A	30A	30A
Rated Load Current *	15A	15A	30A	30A
Nominal System Voltage	12/24 Vdc			

Options	PS-15	PS-15M	PS-30	PS-30M
Digital Meter	No	Included	No	Included
Remote Meter (RM-1)	Yes	Yes	Yes	Yes
Ethernet MeterBus Converter (EMC-1)	Yes	Yes	Yes	Yes
Remote Temperature Sensor (RTS)	Yes	Yes	Yes	Yes
Ground Fault Protection Device (GF-PD-150V and GFPPD-600V)	Yes	Yes	Yes	Yes

* Low voltage disconnect included on all ProStar controllers.



SunSaver™ Controller

6A, 10A or 20A at 12V or 24V



"This is the only one I'd use...it's the one I wish I bought first"

Ambient Operating Temperature	-40 °C to +60 °C -40 °F to +140 °F
Terminal	5 mm ² / 10 AWG
Product Weight	0.23 kg / 0.5 lbs
Unit Shipping Weight	0.4 kg / 0.9 lbs
Dimensions	15.2 x 5.5 x 3.4 cm 6.0 x 2.2 x 1.3 in
Warranty	5 years

Certifications

- Hazardous Locations - Class 1, Div. 2 Groups A-D
- CE, RoHS and REACH Compliant
- UL 1604/ANSI/ISA 12.12.01-2000 (USA) and CSA C22.2 No. 213-M1987 (Reaffirmed 2004) (CANADA) Listed
- ETL Listed: UL 1741 (with terminal cover)*
- FCC Title 47 (CFR), Part 15 Subpart B for Class B Device
- Manufactured in a Certified ISO 9001 Facility

* Wire terminal cover included with every SunSaver



PWM Controllers

The world's leading small solar controller for industrial and consumer markets. Proven in demanding locations, including mines and oilfields.

- **Ideal for oil/gas applications.** Approved for use in hazardous locations: Class 1, Division 2, Groups A-D.
- **Longer battery life** through PWM 4-stage charging and temperature compensation. Sealed or flooded battery select.
- **Tropicalization** - hardened for field use with anodized aluminum enclosure, epoxy encapsulation, marine-rated terminals.
- **Additional features** include full electronic protections, 3-state battery LED indicators, terminal cover, dead battery recovery, high voltage load protection for sensitive loads.
- **L-versions** include low-voltage load disconnect.

SunSaver	SS-6-12V	SS-6L-12V	SS-10-12V
Rated Solar Current	6A	6A	10A
Rated Load Current	6A	6A	10A
Nominal System Voltage	12 Vdc		
Low Voltage Disconnect	No	Yes	No

SunSaver	SS-10L-12V	SS-10L-24V	SS-20L-12V	SS-20L-24V
Rated Solar Current	10A	10A	20A	20A
Rated Load Current	10A	10A	20A	20A
Nominal System Voltage	12Vdc	24Vdc	12Vdc	24Vdc
Low Voltage Disconnect	Yes	Yes	Yes	Yes

Options	All Versions
DIN Rail Clips (DIN-1)	Yes
Ground Fault Protection Device (GFPPD-150V and GFPPD-600V)	Yes



SunLight™ Controller

10A or 20A at 12V or 24V

PWM Controllers



"Bulletproof and dependable...I will use them again and again"

World's leading solar lighting controller for street and pathway lighting, parking areas, bus stations, signage, and much more.

- **Provides 10 lighting options** with accurate on-board timer. User adjustable for 2 to 10 hours ON or for ON all night. Unique ON/OFF/ON settings conserve energy and turn lights on again for 1 or 2 hours before sunrise. Timer accuracy is within 2 seconds.
- **Easy to set-up**, with test-button feature and LED indicator. To confirm correct installation, test button turns light on during the day and LED indicates selected lighting option.
- **Rugged design** with anodized aluminum enclosure, epoxy encapsulation, corrosion-resistant terminals.



Ambient Operating Temperature	-40 °C to +60 °C -40 °F to +140 °F
Terminal	5.2mm ² / 10 AWG
Product Weight	0.27 kg / 0.6 lbs
Unit Shipping Weight	0.3 kg / 0.7 lbs
Dimensions	16.8 x 5.5 x 3.4 cm 6.6 x 2.2 x 1.3 in
Warranty	5 years

SunLight	SL-10L-12	SL-10L-24	SL-20L-12	SL-20L-24
Rated Solar Current	10A	10A	20A	20A
Rated Load Current*	10A	10A	20A	20A
Nominal System Voltage	12Vdc	24Vdc	12Vdc	24Vdc

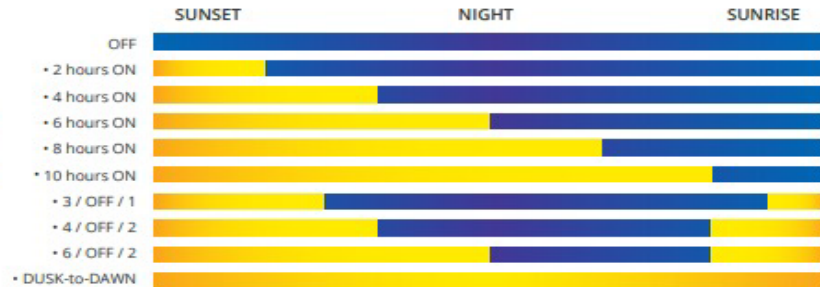
Options	All Versions			
DIN Rail Clips (DIN-1)	Yes	Yes	Yes	Yes
Ground Fault Protection Device (GFPD-150V and GFPD-600V)	Yes	Yes	Yes	Yes

* Low Voltage Disconnect is included in all SunLight Controllers.

Certifications

- CE, RoHS and REACH Compliant
- Manufactured in a Certified ISO 9001 Facility

Lighting Control Options



SunGuard™ Controller

4.5A at 12V

PWM Controllers



"Rock solid, potted so waterproof, long track-record...great charge controller for a small system"

Single module, compact solar charge controller for small systems, ideal for both professional and consumer use.

- **Rugged design** - 100% solid state, epoxy encapsulated; rated for 25% overloads (no need to de-rate)
- **Longer battery life** - series design PWM charging (instead of shunt) with temperature compensation, low self-consumption.
- **Easy to install** - outdoor rated connecting wires make a waterproof connection to the solar module and battery.

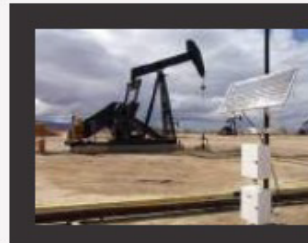
Ambient Operating Temperature	-40 °C to +60 °C -40 °F to +140 °F
Product Weight	0.1 kg / 0.2 lbs
Unit Shipping Weight	0.1 kg / 0.3 lbs
Dimensions	6.4 x 5.1 x 3.8 cm 2.5 x 2.0 x 1.5 in
Warranty	5 years

SunGuard	SG-4
Rated Solar Current	4.5A
Rated Load Current*	None
Nominal System Voltage	12Vdc

* There is no load connection on the SunGuard.

Certifications

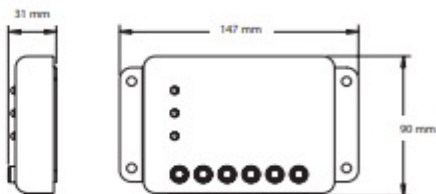
- CE, RoHS and REACH Compliant
- Manufactured in a Certified ISO 9001 Facility



Morningstar SunKeeper and SunSaver controllers are standard operating equipment for solar-powered applications on remote oil and gas extraction sites.



Technical Drawing



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 (1.2V); -50 mV/K (24V)
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), LiFePO4 (selectable)
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

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
- LiFePO4 battery compatible
- Programmable night light, battery type, charging voltages and discharge voltage limit

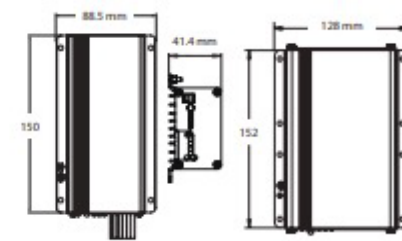
Optional Accessories

MXI and MXI-232

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



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 (CISCOSM)
- 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 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 CISCOSM software

Technical Data

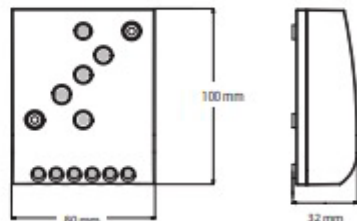
Type	CIS-N-MPPT 85/15	CIS-N-MPPT 100/30
System Voltage	12 / 24 V auto recognition	
Max. Charge/Load Current	15 A	30 A
Float Charge	13.8 / 27.6 V (25 °C)	
Main Charge	14.4 / 28.8 V (25 °C), 0.5 h daily	
Boost Charge	14.4 / 28.8 V (25 °C), for 2 h activation: battery voltage < 12.3 / 24.6 V	
Equalization 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	250 Wp / 500 Wp	600 Wp / 1200 Wp
Temperature Compensation	-25 mV/K (1.2V); -50 mV/K (24V)	
Idle Self-Consumption	15 mA / 8 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	
Datalogger	2 years	
Wire Cross Section	2.5 mm ² (AWG 13)	3.3 mm ² (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	1.45 kg / 2.54 lbs
Ingress Protection	IP68 (1.5 m, 72 h)	
Certificates	CE compliant, RoHS compliant	
Warranty	5 years	

phocos CML-USB (5-20 A)

Solar Charge Controllers w/ USB Charging Output



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

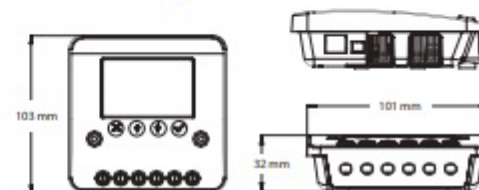
Type	CML-USB-05	CML-USB-10	CML-USB-20
System Voltage	12 / 24 V auto recognition		
Max. Charge/Load Current	5 A	10 A	20 A
Float Charge	13.8 / 27.6 V (25 °C)		
Main Charge	14.4 / 28.8 V (25 °C), 0.5 h daily		
Boost Charge	14.4 / 28.8 V (25 °C), 0.5 h daily activation: battery voltage < 12.3 / 24.6 V		
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		

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			



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. These units are 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 and a cleaner AC sine wave than many public grids. 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, RVs, boats, cars, and various industrial loads).

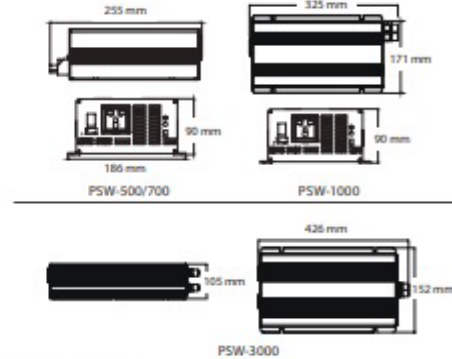
Product Features

- Low battery warning before shutdown
- Fully isolated input & output
- Load controlled cooling fan
- Output frequency 50/60 Hz switch selectable and universal AC socket allows usage in most parts of the world
- Input undervoltage/overvoltage protections
- Output short-circuit/overload/over temperature protections
- Tri-color indicators display output load level & failure status
- Automatic re-start in case of overload: every 60 s approx.
- Low self-consumption and extremely low-consumption green mode
- High-power USB charging port to recharge smartphones, tablets, etc.

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 Drawings



Technical Data

Common specifications for all inverters

Output Waveform	Pure Sine Wave (THD <3%)
AC Frequency	50 / 60 Hz ± 0.5, Hz selectable by DIP switch
AC Voltage	110 / 230 V (±5 %) versions
Overvoltage Protection	15.5 ± 0.5 (12 V) / 31.0 ± 1.0 (24 V) / 62.0 ± 2.0 (48 V)
Undervoltage Protection	10.5 ± 0.25 (12 V) / 21.0 ± 0.5 (24 V) / 42.0 ± 1.0 (48 V)
Efficiency	≥85 % worst case, ≥90 % typical
Storage Temperature & Humidity	-15 to +60 °C, 5-95 % (non-condensing)
Ambient Temperature	-10 to +50 °C
USB Charging Port	5 V, 2.1 A (Not available on 48 V models)
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

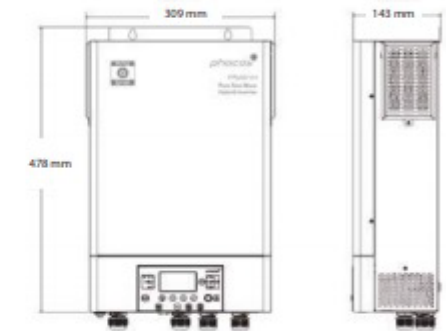
NEW



Technical Drawing



230 Vac models



120 Vac model

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 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 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 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 grid, 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 a quality, integrated MPPT charge controller. The controller accepts 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 in parallel or 3-phase for up to 45 kW of synchronized AC power.





04- Off-Grid Inverter

OUR PRODUCTS

MUST[®]

phocos[®]



MUST

PV1800 VHM SERIES (2KW-5.5KW)
High Frequency Off Grid Solar Inverter



(2KW-3KW)



(3KW-5.5KW)

INTRODUCTION

PV1800 VHM is a multi-functional inverter/charger, combining functions of inverter, solar charger and battery charger to offer uninterruptible power support in portable size. Its comprehensive LCD display offers user-configurable and easy-accessible button operation such as battery charging current, AC/solar charger priority, and acceptable input voltage based on different applications.

FEATURES

- Pure sine wave solar inverter
- Output power factor 1
- High PV input voltage range
- Built-in 80A MPPT solar charger
- Battery equalization function to optimize battery performance and extend lifecycle
- Built-in anti-dusk kit for harsh environment



Rated power
2kw-5.5kw



Battery Voltage
24VDC/48VDC



Auto Frequency Sensing
50Hz/60Hz



Multi Protection



Battery smart
charge design



Lead-acid/Lithium Battery
Optional

MUST®

MUST

Solar Power System

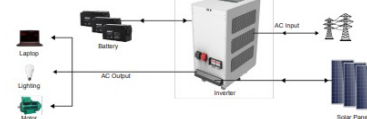
Low Frequency On/Off Grid Hybrid Solar Inverter



PH3000 Series (9-12KW)

Features

- 3phase or Single-phase
- Smart LCD setting (Working modes, Charge Current, Charge Voltage, etc.)
- Built-in MPPT 180A solar charge controller
- MPPT Efficiency max 98%
- Combining solar system, AC utility, and battery power source to supply continuous power
- Multiple operations: basic Grid-tie, Off-Grid, Grid-Interactive
- Support CAN, RS485 monitoring function with free CD
- WIFI remote monitoring (optional)
- Compatible to generator

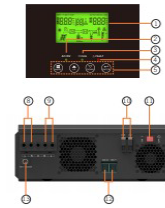


Selection Guide

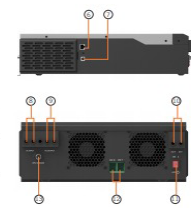
MODEL	PH3000-0048-T	PH3000-12048-T
INVERTER OUTPUT	48VDC	120VDC
Rated output power	9000W	12000W
Output wave	Pure sine wave	
Rated output voltage	230 VAC (P-N) / 400 VAC (P-P)	
Rated output current	13.5A per phase	17.4A per phase
Rated output frequency	50 Hz / 60 Hz	
Rate of wave distortion(THD)(Linearly loads)	Off grid<2%, Grid discharge <3%, Grid charge <3%	
Inverting efficiency	>93%	
Power factor	0.8 lead - 0.8 lag	
Overload capability	100%load<10min, 30 minutes; 110%load<15min, 1 minutes; 125%load<150s, 30 seconds; load<150%, 10 seconds; Short circuit<5 seconds	
AC input maximum current	20.5A per phase	
AC INPUT	50Hz / 60Hz	
Acceptable input voltage range	Default: 180Vdc - 253Vdc per phase; Narrow: 174Vdc - 272Vdc per phase; Wide 90Vdc - 272Vdc per phase	
BATTERY	Charger 34.0VDC, Inverter 40.0VDC	
Rated Voltage	48.0VDC	
Absorption Voltage	54.0VDC	
Float Voltage	57.2VDC	
P.V. Open Circuit Voltage	145VDC	
SOLAR CHARGER & AC CHARGER	60A per phase	80A per phase
Max AC Charging Current	120A per phase	
Mounting	Vertical	
MECHANICAL SPECIFICATIONS	391*182*165	418*182*170
Machine Dimension(W*H*D)(mm)	133	140
Net Weight (kg)	155	160
Communication terminal	RS485/CAN bus	
Operation Temperature Range	0℃ ~ 55℃	
Environmental Protection Rating	IP20	
Relative Humidity	0 ~ 95% relative humidity(non-condensing)	
Altitude	<2000m	

MUST

PV1800 VHM SERIES (2KW-5.5KW)
High Frequency Off Grid Solar Inverter



(2KW-3KW)



(3KW-5.5KW)

1. LCD Display
2. Status Indicator
3. Charging Indicator
4. Fault Indicator
5. Function Buttons
6. RS-485 Communication port
7. USB
8. AC Input
9. AC Output
10. PV Input
11. Power On/Off Switch
12. Battery Input
13. Circuit breaker

MODEL	PV18-202A VHM	PV18-302A VHM	PV18-304B VHM	PV18-404B VHM	PV18-504B VHM	PV18-554B VHM
INVERTER OUTPUT	24VDC					
Rated Power	2000W	3000W	3000W	4000W	5000W	5500W
Surge Power	4000W	6000W	6000W	8000W	10000W	11000W
Waveform	Pure Sine Wave					
AC Voltage Regulation (Grid Mode)	±2.0%					
Inverter Efficiency(Peak)	93%					
Transfer Time	10ms (For Personal Computer) 20ms (For Home Appliance)					
AC INPUT	230VAC					
Voltage	170-280VAC(For personal computer) 90-280VAC(For Home Appliance) 184-253VAC(IEE4105)					
Selectable Voltage Range	50Hz/60Hz(Auto sensing)					
Frequency Range	24VDC					
BATTERY	48VDC					
Normal Voltage	27VDC					
Floating Charge Voltage	54VDC					
Overcharge Protection	31VDC					
60VDC						
SOLAR CHARGER & AC CHARGER	145VDC					
Maximum PV Array Open Circuit Voltage	30-130VDC		64-130VDC			
PV Array MPPT Voltage Range	2W					
Standby Power Consumption	1440W/1530W					
PV Input Power	2880W/3840W					
Maximum Solar Charge Current	80A/80A					
Maximum Efficiency	98%					
Maximum AC Charge Current	20A/30A		50A			
Maximum Charge Current	80A					
Machine Dimension(W*H*D)(mm)	272*355*100		297.5*468*125			
Package Dimension(W*H*D)(mm)	540*395*241		638*395*241			
MECHANICAL SPECIFICATIONS	10		11		13.3	
Net Weight(kg)	11.7		12		14.4	
Humidity	5% to 95% Relative Humidity (Non-condensing)					
OTHER	Operating Temperature 0℃ ~ 55℃					
Storage Temperature	-15℃ ~ 60℃					

Smart String Inverter



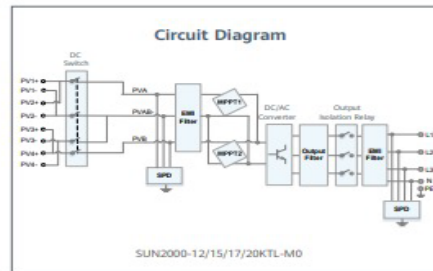
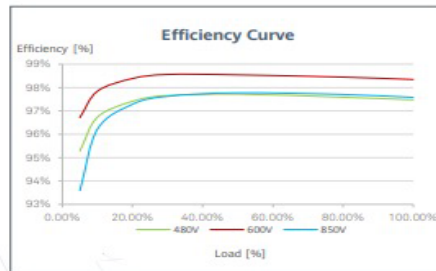
Higher Revenue
 Max. efficiency 98.65%



Simple & Easy
 25 kg



Safe & Reliable
 Arc fault protection



Technical Specification	SUN2000-12KTL-M0	SUN2000-15KTL-M0	SUN2000-17KTL-M0	SUN2000-20KTL-M0
Efficiency				
Max. efficiency	98.50%	98.65%	98.65%	98.65%
European weighted efficiency	98.00%	98.30%	98.30%	98.30%
Input				
Recommended max. PV power	24,000 Wp	26,880 Wp	26,880 Wp	26,880 Wp
Max. input voltage		1,080 V		
Start voltage		200 V		
Operating voltage range		160 V ~ 950 V		
Rated input voltage		600 V		
Max. input current per MPPT		22 A		
Max. short-circuit current		30 A		
Number of MPP trackers		2		
Max. number of inputs		4		
Output				
Grid connection		Three phase		
Rated output power	12,000 W	15,000 W	17,000 W	20,000 W
Max. apparent power	13,200 VA	16,500 VA	18,700 VA	22,000 VA
Rated output voltage		220 Vac / 380 Vac, 230 Vac / 400 Vac, 3W + N + PE		
Rated AC grid frequency		50 Hz / 60 Hz		
Max. output current	20 A	25.2 A	28.5 A	33.5 A
Adjustable power factor		0.8 leading ... 0.8 lagging		
Max. total harmonic distortion		≤ 3 %		
Features & Protections				
Input-side disconnection device		Yes		
Anti-islanding protection		Yes		
AC over-current protection		Yes		
AC short-circuit protection		Yes		
AC over-voltage protection		Yes		
DC reverse-polarity protection		Yes		
DC lightning protection		Yes		
AC lightning protection		Yes		
Residual current monitoring unit		Yes		
Arc fault protection		Yes		
Ripple receiver control		Yes		
General Data				
Operation temperature range	-25 ~ + 60 °C (-13 °F ~ 140 °F) (Derating above 45 °C @ Rated output power)			
Relative humidity	0 % RH ~ 100% RH			
Max. operating altitude	0 - 4,000 m (13,123 ft.) (Derating above 2000 m)			
Cooling	Natural Convection			
Display	LED Indicators			
Communication	RS485; WLAN via Smart Dongle-WLAN; 4G / 3G / 2G via Smart Dongle-4G			
Weight (with mounting plate)	25 kg			
Dimensions (W x H x D) (incl. mounting plate)	525 x 470 x 262 mm (20.7 x 18.5 x 10.3 inch)			
Degree of protection	IP65			
Standard Compliance (more available upon request)				
Safety	EN/IEC 62109-1, EN/IEC 62109-2			
Grid connection standards	G98, G99, EN 50438, CEI 0-21, VDE-AR-N-4105, VDE-AR-N-4110, AS 4777, C10/11, ABNT, UTE C15-712, RD 1699, TOR D4, NRS 097-2-1, IEC61727, IEC62116, DEWA 2.0			

FRENIC-Multi series inverters, developed by Fuji Electric FA Components & Systems, are loaded with advanced technologies. The Multi series features class-highest control performance, abundant model variation, limited use of hazardous substances, reduced noise effect on peripheral equipment, and optimal functions for conveyance machines. The other features include easy operation and wiring, various protection functions, improved maintenance methods. The Multi series inverters can be used for a wide range of applications such as conveyance machines, fans, pumps, centrifugal separators, and food processing machines.

Gentler on the environment

Expanded capacity range and abundant model variation

The highest standards of control and performance in its class

Optimum for the operations specific to vertical and horizontal conveyance

Simple and thorough maintenance

Simple operation, simple connection

Consideration of peripheral equipment, and a full range of protective functions

You can use an inverter equipped with functions like these



Variation

Standard type						
Applicable motor rating [HP]	Three-phase 230V	Three-phase 460V	Single-phase 230V	Applicable motor rating [HP]	Three-phase 230V	Three-phase 460V
1/8	FRNF12E1S-2U		FRNF12E1S-7U	5	FRN005E1S-2U	FRN005E1S-4U
1/4	FRNF25E1S-2U		FRNF25E1S-7U	7.5	FRN007E1S-2U	FRN007E1S-4U
1/2	FRNF50E1S-2U	FRNF50E1S-4U	FRNF50E1S-7U	10	FRN010E1S-2U	FRN010E1S-4U
1	FRN001E1S-2U	FRN001E1S-4U	FRN001E1S-7U	15	FRN015E1S-2U	FRN015E1S-4U
2	FRN002E1S-2U	FRN002E1S-4U	FRN002E1S-7U	20	FRN020E1S-2U	FRN020E1S-4U
3	FRN003E1S-2U	FRN003E1S-4U	FRN003E1S-7U			

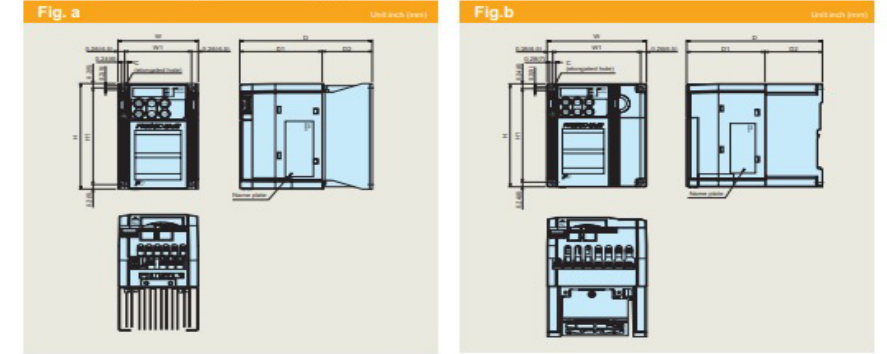
FRENIC-Multi Series

Standard specifications
Three-phase 230V

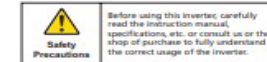
Item	Specifications											
	F12	F25	F50	001	002	003	005	007	010	015	020	
Type (FRN E1S-2U)	HP	1/8	1/4	1/2	1	2	3	5	7.5	10	15	20
Applicable motor rating *1)	HP	1/8	1/4	1/2	1	2	3	5	7.5	10	15	20
Rated capacity *2)	kVA	0.30	0.57	1.1	1.9	3.0	4.1	6.4	9.5	12	17	22
Rated voltage *3)	V	Three-phase 200V to 240V (with AVR function)										
Rated current *4)	A	0.8	1.5	3.0	5.0	8.0	11	17	25	33	47	60
Overload capability		150% of rated current for 1min, 200% - 0.5s										
Rated frequency	Hz	50, 60Hz										
Phases, voltage, frequency		Three-phase, 200 to 240V, 50/60Hz										
Voltage/frequency variations		Voltage: +10 to -15% (Voltage unbalance *6): 2% or less) Frequency: +5 to -5%										
Rated current *9)	A	(with DCR) 0.57	0.93	1.6	3.0	5.7	8.3	14.0	21.1	28.8	42.2	57.6
		(without DCR) 1.1	1.8	3.1	5.3	9.5	13.2	22.2	31.5	42.7	60.7	80
Required power supply capacity *5)	kVA	0.2	0.3	0.6	1.1	2.0	2.9	4.9	7.4	10	15	20
Torque *6)	%	150										
Torque *7)	%	—										
Braking		DC injection braking										
Braking transistor		Built-in										
Applicable safety standards		UL508C, C22 No.14, EN50178:1997										
Enclosure (IEC60529)		IP20, UL open type										
Cooling method		Natural cooling										
Weight	lbs (kg)	1.3(0.6)	1.3(0.6)	1.5(0.7)	1.8(0.8)	3.7(1.7)	3.7(1.7)	5.1(2.3)	7.5(3.4)	7.9(3.6)	13.6(1.1)	16(7.1)

*1) Full 4-pole standard motor
 *2) Rated capacity is calculated by assuming the output rated voltage as 230V for three-phase 230V series and 460V for three-phase 460V series.
 *3) Output voltage control exceed the power supply voltage.
 *4) When setting the carrier frequency (Fz) to 3 kHz or less. Use the current () or below when the carrier frequency setting is higher than 6kHz and continuously operating at 100%.
 *5) Obtained when a DC REACTOR is used.
 *6) Average braking torque obtained when reducing the speed from 50Hz with AVR control OFF (Varies with the efficiency of the motor).
 *7) Average braking torque obtained by use of external braking resistor (standard type available as option).
 *8) Voltage unbalance (%) = (Max voltage [V] - Min voltage [V]) / (67 SEC 61850-3)
 *9) If this value is 2 to 3%, use AC REACTOR (ACR: option).
 *10) The value is calculated on assumption that the inverter is connected with a power supply capacity of 500kVA (or 10 times the inverter capacity if the inverter capacity exceeds 50kVA) and 5%.

External Dimensions
Inverter main body (Standard type)



Power supply voltage	Inverter type	Fig.	Dimensions [Unit: inch (mm)]							
			W	W1	H	H1	D	D1	D2	C
Three-phase 230V	FRNF12E1S-2U	a	3.15(80)	2.64(67)	4.72(120)	4.33(110)	3.62(92)	3.23(82)	0.39(10)	4-0.20x0.24 (4-5x8) (elongated hole)
	FRNF25E1S-2U						4.21(107)		0.98(25)	
	FRNF50E1S-2U						5.20(132)		1.97(50)	
	FRN001E1S-2U									
	FRN002E1S-2U									
	FRN003E1S-2U									
		b	4.33(110)	3.82(97)	5.12(130)	4.65(118)	5.91(150)	3.39(86)	2.52(64)	4-0.20x0.28 (4-5x7) (elongated hole)



Before using this inverter, carefully read the instruction manual, specifications, etc. or consult us or the shop of purchase to fully understand the correct usage of the inverter.

Fuji Electric FA Components & Systems Co., Ltd.
Fuji Electric Corp. of America
http://www.fujielectric.com/products/ac_drives/
 47520 Westinghouse Drive Fremont, CA 94538, U.S.A. Tel. +1-510-440-1060 Fax. +1-510-440-1063



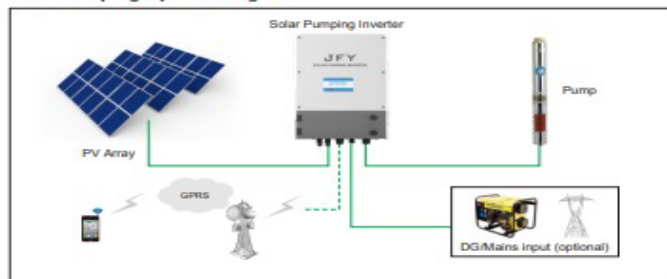
JFY SPRING Series Solar Pumping Inverter

- Solar Pumping System uses the solar power which is one of green energy and it drives the pump directly after the conversion of the inverter. The system requires no external battery, stores waters instead of electricity and then drives the AC pump. The system is economical, saving-energy and clean. It can be applied to many occasions such as people and animals drinking water in remote areas, farmland irrigation, desertification control and city landscape water use etc.
- SPRING series Solar Pumping Inverter from JFY company is dedicated to Solar Pumping System and it can be used for various application scenario. The Solar Pumping Inverter controls and regulates the system operation, converts the DC power from PV array to AC power and then drives AC pumps. It can adjust the output frequency real-time according to the irradiation change and fulfill maximum power point tracking(MPPT).

Product Features

- Designed dedicated for solar pump, and compatible with various motor types; have excellent performance;
- IP 65 protection level, inverter integrates the combiner box which contains the PV dedicated DC switch, SPD, fuse and other optional accessories;
- Plenty of communication interfaces, such as RS485/CAN/GPRS (optional); the running and status can be checked remotely;
- Inverter allows using grid or diesel generator as backup power supply, 24-hour running;
- Natural cooling design, IP65 high protection level guarantees inverter to be applied under all kinds of outdoor strict environment;
- Using advanced dynamic VI MPPT technique ; fast respond and good operating stability;
- Main circuit adopts intelligent power module, high reliability, conversion efficiency reach to 98%;
- Advanced IGBT module, the high and low water position detection control circuit optional;
- Full automatic running; no need manual duty; the pump speed range can be set freely according to the system conditions so that guarantee the running time as long as possible;
- The inverter outer casing is solid and durable, compact size, nice appearance; friendly UI, user can check the real time info and historical info via the LCD display located in the front board; can store the running data up to 8 years;
- Inverter has perfect running protection mechanism, such as output short-circuit protection, IGBT over-current protection, input overvoltage protection, overload protection, module over-temp protection, grounding protection and so on;

Solar Pumping System Diagram



Application Scenario

Farmland irrigation



Desertification control



Animal drinking water



Tourism water supply



JFY Solar Pumping Inverter Series & Technical Parameter

380V Triphase output series 3000W-22kW												
Inverter Model	MAX Input String Number	Start Voltage (Vdc)	MAX DC Input Voltage (Vdc)	Recomm MPPT Voltage Range (Vdc)	Rated Output Power (W)	MAX Output Current (A)	Output Frequency (Hz)	Protection Level	Weight (kg)	Pack Size (mm)		
										Length	Width	Height
SPRING 3000	2	250	900	500-680	3000	8	0-50/60	IP65	11.5	478	325	155
SPRING 3000-A	2	250	900	500-680	3000	8	0-50/60	IP65	12	478	325	155
SPRING 4000	2	250	900	500-680	4000	10	0-50/60	IP65	11.5	478	325	155
SPRING 4000-A	2	250	900	500-680	4000	10	0-50/60	IP65	12	478	325	155
SPRING 5500	2	250	900	500-680	5500	13	0-50/60	IP65	11.5	478	325	155
SPRING 5500-A	2	250	900	500-680	5500	13	0-50/60	IP65	12	478	325	155
SPRING 7500	3	250	900	500-680	7500	18	0-50/60	IP65	13.5	528	346	166
SPRING 7500-A	3	250	900	500-680	7500	18	0-50/60	IP65	14	528	346	166
SPRING 9200	3	250	900	500-680	9200	21	0-50/60	IP65	13.5	528	346	166
SPRING 9200-A	3	250	900	500-680	9200	21	0-50/60	IP65	14	528	346	166
SPRING 11K	3	250	900	500-680	11000	24	0-50/60	IP65	13.5	528	346	166
SPRING 11K-A	3	250	900	500-680	11000	24	0-50/60	IP65	14	528	346	166
SPRING 13K	6	250	900	500-680	13000	28	0-50/60	IP65	22.5	583	405	190
SPRING 13K-A	6	250	900	500-680	13000	28	0-50/60	IP65	22.5	583	405	190
SPRING 15K	6	250	900	500-680	15000	30	0-50/60	IP65	22.5	583	405	190
SPRING 15K-A	6	250	900	500-680	15000	30	0-50/60	IP65	22.5	583	405	190
SPRING 18K5	6	250	900	500-680	18500	39	0-50/60	IP65	22.5	583	405	190
SPRING 18K5-A	6	250	900	500-680	18500	39	0-50/60	IP65	22.5	583	405	190
SPRING 22K	6	250	900	500-680	22000	45	0-50/60	IP65	22.5	583	405	190
SPRING 22K-A	6	250	900	500-680	22000	45	0-50/60	IP65	22.5	583	405	190

380V Triphase output series 26kW-75kW													
Inverter Model	MAX Input String Number	Start Voltage (Vdc)	MAX DC Input Voltage (Vdc)	Recomm MPPT Voltage Range (Vdc)	Rated Output Power (W)	MAX Output Current (A)	Output Frequency (Hz)	Protection Level	Weight (kg)	Pack Size (mm)			
										Length	Width	Height	
SPRING 26K	1 (via combiner box)	250	900	500-680	26000	54	0-50/60	IP20	18.5	467	260	220	
SPRING 26K-A	1 (via combiner box)	250	900	500-680	26000	54	0-50/60	IP20	18.5	467	260	220	
SPRING 30K	1 (via combiner box)	250	900	500-680	30000	60	0-50/60	IP20	18.5	467	260	220	
SPRING 30K-A	1 (via combiner box)	250	900	500-680	30000	60	0-50/60	IP20	18.5	467	260	220	
SPRING 37K	1 (via combiner box)	250	900	500-680	37000	75	0-50/60	IP20	18.5	467	260	220	
SPRING 37K-A	1 (via combiner box)	250	900	500-680	37000	75	0-50/60	IP20	18.5	467	260	220	
SPRING 45K	1 (via combiner box)	250	900	500-680	45000	91	0-50/60	IP20	28	546	347	242	
SPRING 45K-A	1 (via combiner box)	250	900	500-680	45000	91	0-50/60	IP20	28	546	347	242	
SPRING 55K	1 (via combiner box)	250	900	500-680	55000	112	0-50/60	IP20	28	546	347	242	
SPRING 55K-A	1 (via combiner box)	250	900	500-680	55000	112	0-50/60	IP20	28	546	347	242	
SPRING 75K	1 (via combiner box)	250	900	500-680	75000	162	0-50/60	IP20	28	546	347	242	
SPRING 75K-A	1 (via combiner box)	250	900	500-680	75000	162	0-50/60	IP20	28	546	347	242	
JFY W1								Outdoor Cabinet, For Spring 26K-37K	IP54	33	550	320	790
JFY W1-A								Outdoor Cabinet, For Spring 26K-37K	IP54	49	650	320	790
JFY W2								Outdoor Cabinet, For Spring 45K-75K	IP54	35	650	320	940
JFY W2-A								Outdoor Cabinet, For Spring 45K-75K	IP54	53	750	320	940

*AC grid voltage range and frequency range depend on local standards.



- (1) Product Series
- (2) Rated Output Power
- (3) S-Output 220V/Single phase; Null-tripphase
- (4) L-Output 220V/tripphase; Null-Output 380V/tripphase
- (5) A-AC Input available; Null-AC Input Unavailable

Ducab دوکاب



H1Z2Z2-K Cables for Photovoltaic Systems 1.5 kVDC

APPLICATIONS:

Solar cable is the interconnection cable used in photovoltaic power plants, they connect solar panels and other electrical components of a photovoltaic system. The cables are suitable to be used with class II equipment as per BS50618.

CONSTRUCTION:

CONDUCTOR	Flexible Class 5 - Tinned annealed copper to IEC 60228.	INSULATION	Cross Linked (XLPO) to BS EN 50618:2014 1.5KVDC	SHEATH	Cross Linked (XLPO) to BS EN 50618:2014.	SHEATH COLOUR	BLACK (Other Colour on request)
STANDARDS	BS EN 50618 & TUV 2 PFG 1169/08.	VOLTAGE RATING	1.5 kVDC	OPERATING TEMP	-40° C to +120° C.		

No. of Cores	Conductor Area	Thickness of Insulation Specified Value	Thickness of Sheath Specified Value	Mean overall diameter (Approx)	Minimum Insulation resistance at 20°C	Minimum Insulation resistance at 90°C	Approx. Weight of Completed Cable
	(mm ²)	(mm)	(mm)	(mm)	MΩ km	MΩ km	(Kg/Km)
1C	1.5	0.7	0.8	5.4	860	0.86	35
1C	2.5	0.7	0.8	5.9	690	0.69	46
1C	4	0.7	0.8	6.6	580	0.58	59
1C	6	0.7	0.8	7.4	500	0.50	80
1C	10	0.7	0.8	8.8	420	0.42	120
1C	16	0.7	0.9	10.1	340	0.34	182
1C	25	0.9	1.0	12.5	340	0.34	282
1C	35	0.9	1.1	14.0	290	0.29	375
1C	50	1.0	1.2	16.3	270	0.27	520
1C	70	1.1	1.2	18.7	250	0.25	733
1C	95	1.1	1.3	20.8	220	0.22	963
1C	120	1.2	1.3	22.8	210	0.21	1196
1C	150	1.4	1.4	25.5	210	0.21	1504
1C	185	1.6	1.6	28.5	200	0.20	1851
1C	240	1.7	1.7	32.1	200	0.20	2425

ELECTRICAL DATA:

Conductor Size	DC Resistance at 20°C	Short circuit rating for 1Sec
(mm ²)	(ohm/km)	(kA)
1.5	13.7	0.19
2.5	8.21	0.32
4	5.09	0.50
6	3.39	0.75
10	1.95	1.26
16	1.24	2.02
25	0.795	3.15
35	0.565	4.42
50	0.393	6.31
70	0.277	8.84
95	0.210	11.9
120	0.164	15.2
150	0.132	18.9
185	0.108	23.3
240	0.0817	30.3

*The short circuit rating is calculated based on the condition of normal maximum operating conductor temperature of 120°C prior to short circuit and maximum conductor temperature of 250°C after the short circuit.

GENERAL INFORMATION

The following designations are used for insulation materials in this catalogue. All materials are halogen free.

The designation XLPO stands for cross-linked polyethylene compound. It has excellent mechanical and electrical characteristics.

Halogen-free - Halogen free refers to the absence of halogens, such as chlorine and fluorine, and is determined on the basis of halogen content and the acidity of gases of cable.

Smoke emission - Smoke emission refers to visibility in a fire. The greater the light transmittance, the better the visibility. When tested in accordance with IEC 61034-2 the minimum light transmittance shall be greater than 60%.

BSEN 50267-2-1 - Determine the halogen content of the material. To meet the requirement as halogen free the halogen content of the material may not exceed 0.5 % or 5mg/g.

BSEN 50267-2-2 - Determine the degree of acidity of gases evolved during combustion. The limit values are 4.3 for pH and 10 microS for conductivity.

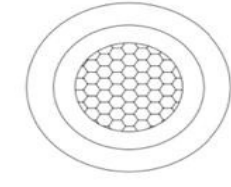
IEC 60332-1 is the test for single insulated wire and cable. Test procedure and requirements according to the picture, below. Min. 50 mm of the cable, measured from the upper support, must remain unburned after the specified time.



LEADER 技术规格书		Approval Sheets	
Customer/客户		Sheet NO/编号	S0905001
Standard/标准	EN50618	Construction Figure/截面图:	
Construction/规格	H1Z2Z2-K 1X4mm ²		
Construction Item	Units	4.0mm ²	
Construction/构造	mm	56/0.295±0.008	
Material/材质	---	Tinned copper wire	
O.D/绞合外径	mm	2.50	
Insulation (绝缘)			
Material/材质	---	XLPE	
Avg.Thick/平均厚度	mm	0.70	
Min.Thick最小厚度	mm	0.50	
O.D/线径	mm	3.95±0.15	
Color/颜色	---	黑色	
Twisted Pair (对绞)			
Ins.Color/芯线颜色	---	/	
Lay of Strand/绞距	mm	/	
O.D/绞合外径	mm	/	
Assemble (成缆)			
Filling/填充	---	/	
Lapping/包带	---	/	
Drain.wire/地线	---	/	
Covering (内护)			
Material/材质	---	/	
Avg.Thick/标准厚度	mm	/	
Min.Thick/最小厚度	mm	/	
O.D/线径	mm	/	
Color/颜色	---	/	
Armour (铠装)			
Construction/结构	'---	/	
Coverage/覆盖率	%	/	
Shield (屏蔽)			
Material/材质	---	/	
Construction/结构	---	/	
Coverage/覆盖率	%	/	
Jacket (护套)			
Material/材质	---	XLPE	
Avg.Thick/平均厚度	mm	0.80	
Min.Thick/最小厚度	mm	0.60	
O.D/线径	mm	5.6±0.2	
Color/颜色	'---	Black	
Surface/外观	---	/	
Marking (印字)			
TÜV DC1500V H1Z2Z2-K 1X4.0mm ² Solar PV Cable			
		APPROVED批准	CHECKED审查
		DESIGNED编制	
		张学武	赵亮亮
		王坤斌	
APPROVED BY THE CLIENT 客户认可			
Revision Date:2016-09-05			

备注:

Revision Date:2016-09-05

LEADER 技术规格书		Approval Sheets	
Customer/客户		Sheet NO/编号	S0918006
Standard/标准	EN 50618-2014	Construction Figure/截面图:	
Construction/规格	H1Z2Z2-K 1*6mm ²		
Conductor (导体)			
Construction Item	Units	6mm ²	
Construction/构造	mm	84/0.2950±0.008	
Material/材质	---	Tinned copper wire	
O.D/绞合外径	mm	2.59	
Insulation (绝缘)			
Material/材质	---	XLPE	
Avg.Thick/标准厚度	mm	0.72	
Min.Thick最小厚度	mm	0.65	
O.D/线径	mm	4.55±0.2	
Color/颜色	---	Black	
Twisted Pair (对绞)			
Ins.Color/芯线颜色	---	/	
Lay of Strand/绞距	mm	/	
O.D/绞合外径	mm	/	
Assemble (成缆)			
Filling/填充	---	/	
Lapping/包带	---	/	
Drain.wire/地线	---	/	
Covering (内护)			
Material/材质	---	/	
Avg.Thick/标准厚度	mm	/	
Min.Thick/最小厚度	mm	/	
O.D/线径	mm	/	
Color/颜色	---	/	
Armour (铠装)			
Construction/结构	'---	/	
Coverage/覆盖率	%	/	
Shield (屏蔽)			
Material/材质	---	/	
Construction/结构	---	/	
Coverage/覆盖率	%	/	
Jacket (护套)			
Material/材质	---	XLPE	
Avg.Thick/标准厚度	mm	0.80	
Min.Thick/最小厚度	mm	0.65	
O.D/线径	mm	6.4±0.2	
Color/颜色	'---	Black	
Surface/外观	---	/	
Marking (印字)			
TÜV DC1500V H1Z2Z2-K 1X6.0mm ² Solar PV Cable			
		APPROVED批准	CHECKED审查
		DESIGNED编制	
		王红梅	许胜才
		周灯	
APPROVED BY THE CLIENT 客户认可			
Revision Date:2016-04-19			

Version:1.0

Revision Date:2016-04-19



For More Information

Tel: +971 4 332 9118

Web: www.sunergysolar.ae

Email: sales@sunergysolar.ae

Social Media: [Solar.Sunergy](#)