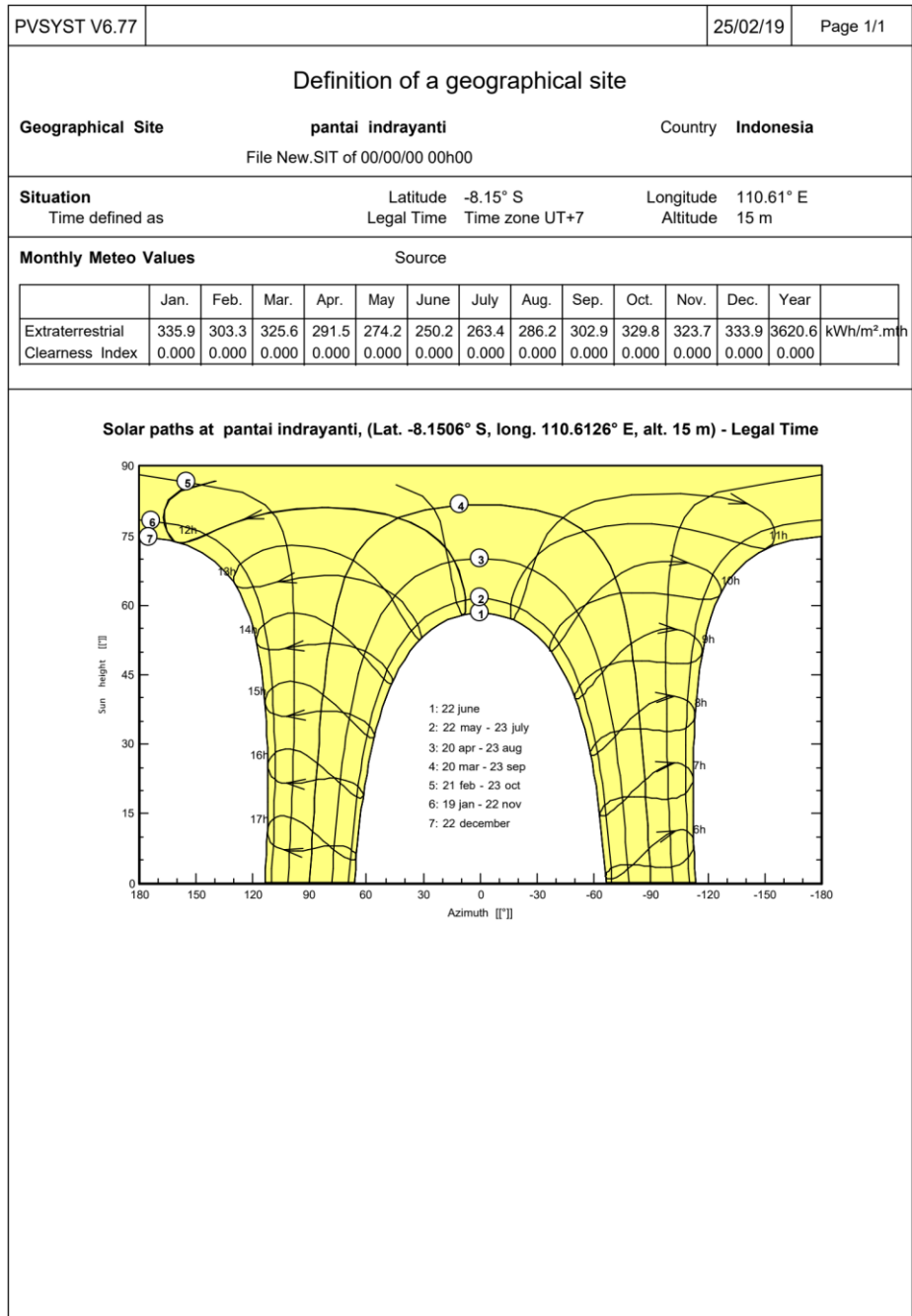


LAMPIRAN

Lampiran 1. Data Geografi Lokasi Penelitian

1. Nilai Iradiasi Lokasi Penelitian



Lampiran 2. Data Jumlah Rumah dan Beban Listrik

1. Data Beban Listrik

A. Rumah Tangga

Jenis Beban	Rumah 1	Rumah 2	Rumah 3	Rumah 4	Rumah 5	Hasil
Lampu 12 W	3	2	2	3	3	3
Lampu 10 W	1	2	-	-	2	1
TV	1	1	1	1	1	1
Setrika	-	1	1	1	1	1
Penanak Nasi	1	1	-	1	-	1
Pompa Air	1	-	1	-	1	1

B. Warung dan Toko

Jenis Beban	Rumah 1	Rumah 2	Rumah 3	Rumah 4	Rumah 5	Hasil
Lampu 10 W	2	2	2	2	2	2
Lampu 12 W	1	1	1	-	1	1
TV	1	1	-	-	1	1

Lampiran 3. Data Spesifikasi Peralatan

1. Panel Surya

Electrical Performance (STC : AM 1.5, 1000W/m², 25°C)

Module Type	ST72M330	ST72M325	ST72M320	ST72M315	ST72M310	ST72M305	ST72M300	ST72M295	ST72M290	ST72M285
Maximum Power (P _{max} / W)	330	325	320	315	310	305	300	295	290	285
Power Tolerance	0 - +3%									
Maximum Power Voltage (V _m / V)	37.8	37.4	37.0	36.8	36.4	36.1	35.9	35.6	35.5	35.3
Maximum Power Current (I _m / A)	8.72	8.68	8.64	8.55	8.51	8.45	8.36	8.30	8.16	8.07
Open Circuit Voltage (V _{oc} / V)	45.7	45.5	45.4	45.3	45.2	45.0	44.8	44.6	44.4	44.3
Short Circuit Current (I _{sc} / A)	9.21	9.16	9.11	9.02	8.96	8.95	8.91	8.89	8.83	8.70
Module Efficiency (%)	17.09	16.84	16.58	16.32	16.06	15.80	15.54	15.28	15.02	14.76

Electrical Performance (NOCT : wind speed 1m/s, 800W/m², 20°C)

Module Type	ST72M330	ST72M325	ST72M320	ST72M315	ST72M310	ST72M305	ST72M300	ST72M295	ST72M290	ST72M285
Maximum Power (P _{max} / W)	241	237	234	230	226	223	219	215	212	208
Maximum Power Voltage (V _m / V)	34.4	34.1	33.7	33.5	33.1	32.9	32.8	32.4	32.4	32.2
Maximum Power Current (I _m / A)	6.99	6.96	6.93	6.86	6.83	6.77	6.69	6.65	6.54	6.47
Open Circuit Voltage (V _{oc} / V)	42.0	41.9	41.8	41.7	41.6	41.4	41.2	41.0	40.9	40.8
Short Circuit Current (I _{sc} / A)	7.45	7.40	7.36	7.29	7.24	7.23	7.20	7.18	7.13	7.03

Mechanical Properties

Dimensions (LxWxH / mm)	1950x990x45
Weight (Kgs)	25.8
Solar Cells	Monocrystalline 156x156mm
No. of Cells	72 (6x12)
Glass	3.2mm low-iron tempered glass
Frame	Anodized aluminum alloy
Junction box	IP 65 above, 6 bypass diodes
Cables	4mm ² , length 1100mm
Connectors	IP67, MC4 compatible

Operation Conditions

Maximum System Voltage (VDC)	1000 (IEC) / 600 (UL)
Maximum Series Fuse Rating (A)	15
Operating Module Temperature (°C)	-40 to +85

Temperature Properties

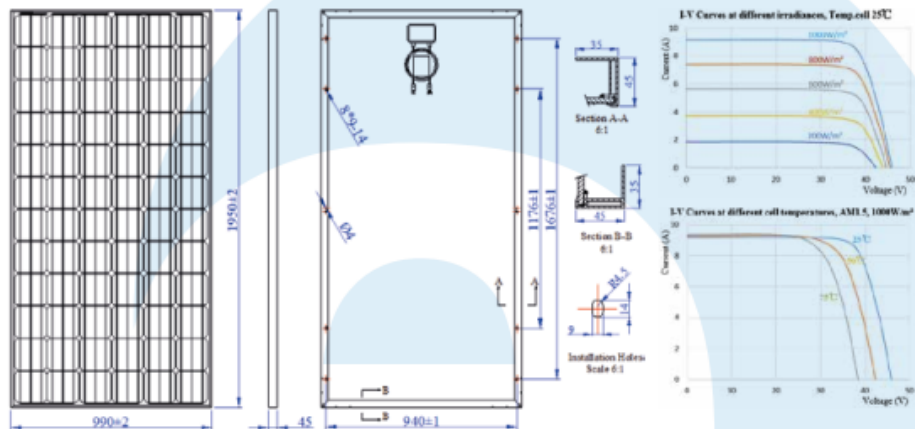
Normal Operating Cell Temperature	45±2 °C
Temperature Coefficient of P _m	-0.38 %/°C
Temperature Coefficient of V _{oc}	-0.356 %/°C
Temperature Coefficient of I _{sc}	+0.056 %/°C

System Design

Hail safety impact velocity	D 25mm at 23mm/s
Static Load (Front/Back)	5400Pa/2400Pa
Application class	Class A
Fire safety class (IEC61730)	Class C

Packing Configuration

Container Sizes	20GP	40HC
Pieces per pallet	22	22/27
Pallets per Container	10	11+11
Total pieces	220	539



2. Baterai

Rolls

FLOODED DEEP CYCLE BATTERIES

6 CS 25P



CONTAINER: (INNER)	Polypropylene	WEIGHT DRY:	115 kg	254 Lbs.
COVER: (INNER)	Polypropylene - heat sealed to inner container	WEIGHT WET:	144 kg	318 Lbs.
CONTAINER: (OUTER)	High Density Polyethylene	LENGTH:	559 mm	22 Inches
COVER: (OUTER)	High Density Polyethylene snap fit to outer container	WIDTH:	286 mm	11 1/4 Inches
TERMINALS:	Flag with stainless steel nuts & bolts	HEIGHT:	464 mm	18 1/4 Inches
HANDLES:	Molded			

6 VOLTS

PLATE HEIGHT:	273 mm	10.750 Inches
PLATE WIDTH:	143 mm	5.625 Inches
THICKNESS (POSITIVE):	6.60 mm	0.260 Inches
THICKNESS (NEGATIVE):	4.57 mm	0.180 Inches

POSITIVE PLATE DOUBLE WRAPPED WITH SLYVER
ENVELOPED WITH HEAVY DUTY SEPARATOR

COLD CRANK AMPS (CCA):	0°F / -17.8°C	2184
MARINE CRANK AMPS (MCA):	32°F / 0°C	2610
RESERVE CAPACITY (RC @ 25A):		1624 Minutes

CAPACITY 820 AH

HOUR RATE:	SPECIFIC GRAVITY	CAPACITY / AMP HOUR	CURRENT / AMPS
@ 100 HOUR RATE	1.280	1156	11.56
@ 72 HOUR RATE	1.280	1091	15.15
@ 50 HOUR RATE	1.280	1009	20.17
@ 24 HOUR RATE	1.280	853	35.53
@ 20 HOUR RATE	1.280	820	41.00
@ 15 HOUR RATE	1.280	763	50.84
@ 12 HOUR RATE	1.280	713	59.45
@ 10 HOUR RATE	1.280	681	68.06
@ 8 HOUR RATE	1.280	640	79.95
@ 6 HOUR RATE	1.280	582	97.03
@ 5 HOUR RATE	1.280	549	109.88
@ 4 HOUR RATE	1.280	508	127.10
@ 3 HOUR RATE	1.280	459	153.07
@ 2 HOUR RATE	1.280	394	196.80
@ 1 HOUR RATE	1.280	279	278.80

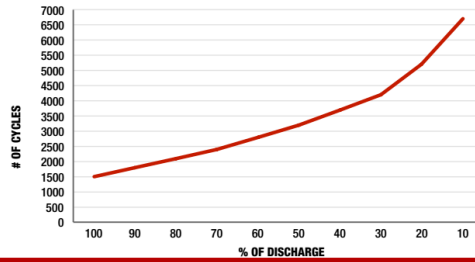
Amphere Hour capacity ratings based on specific gravities of 1.280. Reduce capacities 5% for 1.265 specific gravity and 10% for specific gravities of 1.250

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SPEC 01

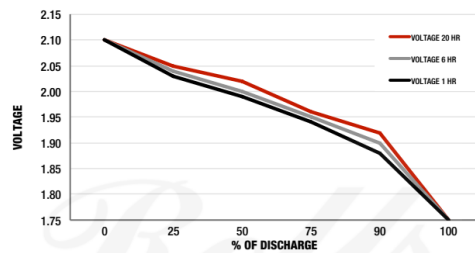


CELLS:	25 Plates/Cell	3 Cell
SEPARATOR THICKNESS:	3 mm	0.105 Inches
GLASS MAT INSULATION:	1 mm	0.020 Inches
ELECTROLYTE RESERVE: ABOVE PLATES	95 mm	3.75 Inches

CYCLE LIFE VS. DEPTH OF DISCHARGE



VOLTAGE VS. DEPTH OF DISCHARGE



SURRETTE BATTERY COMPANY 1 STATION RD SPRINGHILL, NS CANADA B0M 1X0
1/1/2014 REV. 1

3. Solar Charge Controller

FLEXmax 100 SPECIFICATIONS

10/2017

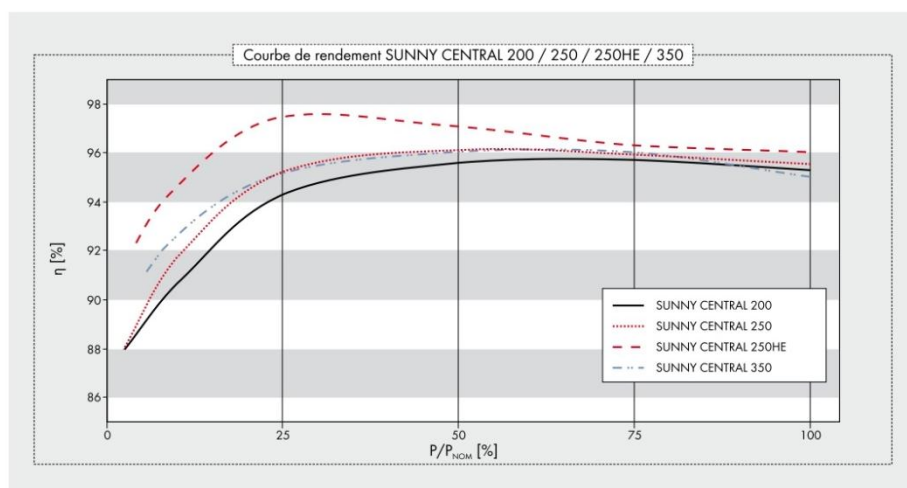
Model:	FLEXmax 100
Nominal Battery System Voltage	24VDC / 36VDC / 48VDC
Maximum Continuous Output Current	100A
Maximum Input Current (Short-Circuit)	64A
Maximum Array (STC Nameplate)	3000W / 4500W / 6000W (charging output limited to 100A at battery voltage)
Maximum PV System Voltage¹	300VDC
Operating Input Voltage Range²	30VDC to 290VDC
Standby Power Consumption	~2.5W
Power Conversion Efficiency	24V: 96% 48V: 97%
Peak Efficiency	24V: 97.5% 48V: 98.8%
Charging Regulation	Three-stage
Voltage Regulation Set Points	Absorption, float, silent and equalization
Equalization Charging	Programmable start time, voltage set point and duration, automatic termination when completed
Battery Temperature Compensation	Adjustable from 2mV/cell/°C to 6mV/cell/°C
Voltage Step-Down Capability	Down convert from any acceptable array voltage to any battery voltage (example: 72VDC array to 24VDC battery)
Programmable Auxiliary Control Output	12VDC output signal which can be programmed for different control applications (maximum of 0.25ADC)
Status Display	LED indicators
Remote Display and Controller	MATE3s compatible
Network Cabling	Proprietary network system using RJ-45 modular connectors
Data Logging	128 days
Operating Temperature Range³	Ambient, -25°C to 60°C (-13°F to 140°F), output power reduced above 25°C
Ingress Protection Rating	IP54
Enclosure Type	3R
Maximum Altitude Rating	10,000ft
Conduit Knockouts	Bottom and sides
Warranty	5 years
Weight (lb/kg)	Unit: 18.3 / 8.3 Shipping: 22 / 10
Dimensions H x W x D (in/cm)	Unit: 22 x 8.8 x 6 / 55.9 x 22.4 x 15.2 Shipping: 25.5 x 12 x 10 / 64.8 x 30.5 x 25.4
Options	Remote Temperature Sensor (RTS), HUB4, HUB10.3, MATE3s
Certifications	UL 1741, CSA C22.2 No. 107.1, IEC 62109-1
Minimum Battery Bank Size	100Ah
Charging Range (Output)	20VDC to 68VDC
Additional Features	Built-in GFCI, field-replaceable cooling fan

¹Highest open-circuit voltage before equipment damage. ²Operational limits. ³Derates to 50A at 60°C in a 48VDC system with 220VDC input. Lower input voltage improves thermal performance.

4. Inverter

SUNNY CENTRAL 200 / 250 / 250HE / 350

Caractéristiques techniques	Sunny Central 200	Sunny Central 250	Sunny Central 250HE	Sunny Central 350
Valeurs d'entrée				
Puissance DC nominale	210 kW	262 kW	261 kW	369 kW
Puissance DC max.	230 kW ⁽¹⁾	290 kW ⁽¹⁾	285 kW ⁽¹⁾	405 kW ⁽¹⁾
Plage de tension MPP	450 V - 820 V ⁽²⁾	450 V - 820 V ⁽²⁾	450 V - 820 V ⁽²⁾	450 V - 820 V ⁽²⁾
Tension DC max.	880 V	880 V	880 V	880 V
Courant DC max.	472 A	591 A	591 A	800 A
Nombre d'entrées DC	5	8	8	12
Valeurs de sortie				
Puissance nominale AC	200 kW	250 kW	250 kW	350 kW
Tension nominale AC	400 V	400 V	270 V	400 V
Courant nominal AC	289 A	361 A	535 A	505 A
Fréquence du réseau AC, 50Hz	●	●	●	●
Fréquence du réseau AC, 60 Hz	●	●	●	●
Cos φ max.	> 0,98	> 0,98	> 0,98	> 0,98
Coefficient de distorsion harmonique max.	< 3 %	< 3 %	< 3 %	< 3 %
Consommation				
Autoconsommation en service	< 1000 W	< 1500 W	< 1500 W	< 2500 W
Consommation en mode veille	< 70 W	< 80 W	< 80 W	< 70 W
Tension d'alimentation auxiliaire externe	230 V, 50/60 Hz	400 V, 50/60 Hz	400 V, 50/60 Hz	400 V, 50/60 Hz
Dijoncteur pour alimentation des auxiliaires externes	16 A, type B unipolaire	16 A, type B à 3 pôles	16 A, type B à 3 pôles	16 A, type B à 3 pôles
Dimensions et poids				
Hauteur	2120 mm ⁽⁴⁾	2120 mm ⁽⁴⁾	2120 mm ⁽⁴⁾	2 120 mm ⁽⁴⁾
Largeur	2000 mm	2400 mm	2400 mm	2 800 mm
Profondeur	850 mm	850 mm	850 mm	850 mm
Poids	1600 kg	2070 kg	1170 kg	2 800 kg
Rendement⁽²⁾				
Rendement max.	95,7 %	96,1 %	97,5 %	96,0 %
Euro-eta	94,5 %	95,2 %	96,7 %	95,2 %
Indice de protection et conditions ambiantes				
Indice de protection (selon IEC 60529)	IP20	IP20	IP20	IP20
Plage de températures de fonctionnement	-20 °C ... +40 °C	-20 °C ... +40 °C	-20 °C ... +40 °C	-20 °C ... +40 °C
Humidité relative de l'air	15 % ... 95 %	15 % ... 95 %	15 % ... 95 %	15 % ... 95 %
Volume d'air frais nécessaire	3300 m ³ /h	4200 m ³ /h	3500 m ³ /h	6500 m ³ /h
Hauteur max. au-dessus du niveau de la mer (NN)	1000 m	1000 m	1000 m	1000 m

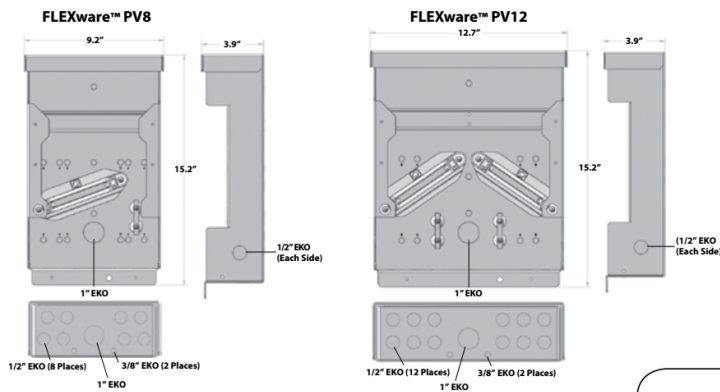


5. Komponen Pendukung

FLEXware PV Combiner Box Specifications

	FWPV-8	FWPV-12
Enclosure Material	Powder coated aluminum with stainless steel hardware	Powder coated aluminum with stainless steel hardware
Mounting Options	Vertical wall mount, pole mount or sloped roof mount to 14 degrees incline (3 in 12 roof pitch)	Vertical wall mount, pole mount or sloped roof mount to 14 degrees incline (3 in 12 roof pitch)
Enclosure Rating	Outdoor Rainproof, NEMA 3R	Outdoor Rainproof, NEMA 3R
Enclosure Security	Padlock hole in chassis and cover for up to 3/8 inch padlock	Padlock hole in chassis and cover for up to 3/8 inch padlock
Output Terminals	#14 - 2/0 AWG (2.08-67.4 mm ²) Two box lug terminals included	#14 - 2/0 AWG (2.08-67.4 mm ²) Two box lug terminals included
Number of Separate Circuits	One Circuit	One or Two Circuits
Number of 150VDC Breakers	Up to 8	Up to 12 (two groups of six)
Number of 600VDC Fuse Holders	Up to 6	Up to 8 (two groups of four)
Input Terminal	150VDC Breakers / #14 -6 AWG (2.08 - 13.3 mm ²)	150VDC Breakers / #14 -16 AWG (2.08 - 13.3 mm ²)
Certifications	ETL Listed to UL1741, UL67, CSA22.2 #29	ETL Listed to UL1741, UL67, CSA22.2 #29
Weight (lbs/kg)	Unit 4.4 / 2.0 Shipping 5.5 / 2.5	5.9 / 2.7 7.4 / 3.3
Dimensions H x W x L (in/cm)	Unit 15.2 x 9.2 x 3.9 / 38.7 x 23.3 x 9.9 Shipping 4.3 x 9.5 x 19 / 10.9 x 24.1 x 48.3	15.2 x 12.7 x 3.9 / 38.7 x 32.2 x 9.9 4.3 x 13 x 19 / 10.9 x 33 x 48.3

Specifications subject to change without notice



Available From:



Corporate Office:
5917 195th St. NE
Arlington, WA 98223 USA
Phone: (360) 435.6030
Fax: (360) 435.6019

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Latin American Office:
15105 Cedar Bluff Pl.
Wellington, FL 33414 USA
Phone: (561) 792.9651
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02/12

Model: MATE3s	
Display	4.0 x 1.2" full graphical display
Quick System Access	5 system operation hot keys, 4 user programmable soft keys
Status Indicators	(9) LED indicators
Navigational Controls	5 navigational keys
Setpoint Adjustment	Touch sensitive scroll wheel
Communication Protocols	Proprietary OutBack communications protocol and SunSpec Modbus
Interconnect Cabling Included	Standard CAT5 network cable with RJ-45 modular jack - 6' (2m) included
PC Computer Interface	HTML system status dashboard over local intranet connection
Field Update Capability	Yes (includes Radian Series inverter/chargers and FLEXmax Series charge controllers (rev 3.0 or higher))
Microprocessor	80MHz 32 bit processor
Set Point and Data Memory	8Mb RAM/ 64Mb of flash RAM
Clock/Calendar	On-board real time clock with battery backup
Operating Temperature Range	0 to 50°C
Mounting	Surface-mount (various brackets available)
Environmental Rating	Indoor Type 1 (IP 30)
Maximum Cable Length	300' (100m)
Warranty	Standard 5 year Warranty
Weight (lb/kg)	Unit: 1.4 / 0.64 Shipping: 3.0 / 1.36
Dimensions H x W x D (in/cm)	Unit: 7.1 x 7.5 x 1.6 / 18 x 19 x 4.1 Shipping: 3.25 x 9 x 13.5 / 8.26 x 22.9 x 34.3

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AXS Port Specifications

03/2015

Model: AXS Port	
Power	Supplied by OutBack device
Status Indicators	Seven LED indicators
Clock	On-board real-time clock with battery backup
Internet Standards	TCP/IP, DNS, SMTP, FTP, DHCP, NTP
Ports	HUB 10.3 Device: RJ-45 Communications: RJ-45 Temperature Sensor: RJ-11
Communication Protocol	Modbus TCP to the SunSpec standard
OutBack Device Interface	OutBack proprietary
PC Interface	10/100 Ethernet
Mounting	DIN clip (provide-d) or surface mounting
Environmental Rating	Indoor Type 1 (IP 30) non-condensing
Temperature Ranges	AXS Port: -40 to 75°C SD Card: -25 to 75°C
Weight (lb/kg)	Unit: 0.5 / 0.23 Shipping: 2.1 / 0.95
Dimensions H x W x D (in/cm)	Unit: 1.29 x 3.5 x 4.99 / 3.3 x 8.9 x 12.7 Shipping: 3.25 x 9 x 13.5 / 8.3 x 22.9 x 34.3
SD Card Size	MicroSD type 2 (2GB capacity)
Options	OutBack RTS
Certifications	FCC Part 15, subpart B CE, RoHS, SunSpec

System Diagram



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master of the digital power™
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Worldwide Corporate Offices

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Fax: +1 360.435.6019	Fax: +1 561.792.7157	Fax: +49 9122.79889.21	Fax: +852 2199.7988

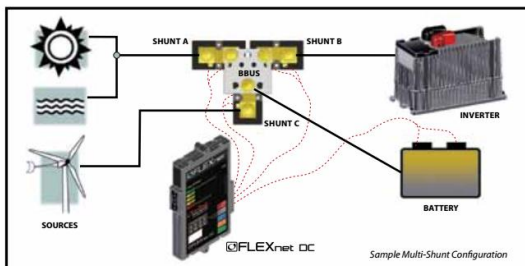
AVAILABLE FROM



FLEXnet-DC Specifications

Battery Voltage Input Range		8.0 to 80.0 VDC
Battery Voltage Resolution		0.1 VDC
Number of Current Channels		One to Three (each can be a Source or Load)
Current Range (Each Channel)		-1000.0 Amps to +1000.0 Amps DC
Current Resolution		0.1 Amps DC
State of Charge Display		0 to 100% (1% increments)
Aux Relay Configuration		SPST, Magnetic Latching Relay
Aux Relay Max Rating		5A @ 30 VDC
Current Shunt Type (order separately)		500A / 50mv
Display	Primary	MATE, MATE2 or MATE3
	Secondary	Five LED Indicators on front of FLEXnet DC
Battery AH Capacity Range		100 to 10,000 Amp Hours
Data Logging Memory		Most recent 128 Days
Programmable AUX Relay Settings	Battery Volts	Adjustable from 8.0 to 80.0 VDC
	State of Charge	Adjustable from 0 to 100%
	Time Delay	Adjustable from 0 to 240 Minutes
Accuracy		0.5% of Reading +/- 2 LSDs per channel
Operating Temperature Range		0 to 50°C / 32 to 122°F
Mounting		3/4" Panel Mount Breaker Slot or Surface Mount using Built-in Mounting Bars
Warranty		Standard 5 year
Weight	Unit	5 oz (.14 kg)
	Shipping	2 lbs (.91 kg)
Dimensions (H x W x L)	Unit	0.7 x 3.7 x 6.6" (1.9 x 9.4 x 16.8 cm)
	Shipping	2.1 x 9.0 x 11.5" (5.4 x 22.9 x 29.2 cm)

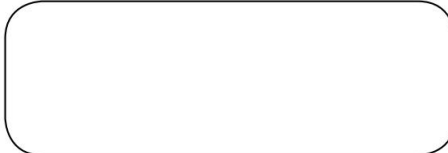
*Specifications subject to change without notice



Additional Available Data

- Total Battery Amps
- Averaged Battery Amps
- Averaged Battery Volts
- DC Amp-Hours IN Per Shunt
- DC Amp-Hours OUT Per Shunt
- DC kWh IN Per Shunt
- DC kWh OUT Per Shunt
- Last Cycle Amp Hours
- Last Cycle Watt Hours
- Last Cycle Amp Hour Charge Factor
- Last Cycle Watt Hour
- Charge Efficiency
- Total Number of Days Full
- Cumulative Battery Amp Hours Removed

Available From:



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Latin American Office:
15105 Cedar Bluff Pl.
Wellington, FL 33414 USA
Phone: +1 561 792 9651
Fax: +1 561 792 7157

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11/12

DC CONNECTION BOX

REKA PANEL - DC Connection Box merupakan panel listrik yang mengintegrasikan beberapa komponen PLTS seperti Solar Charge Controller, Battery, dan Inverter.

Memiliki proteksi terhadap arus lebih untuk melindungi peralatan-peralatan yang terkoneksi tersebut dari kerusakan

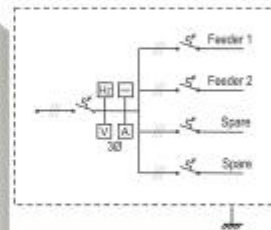


PANEL DISTRIBUSI *three phase* PDB-xx03



REKAPANEL PDB-xx03 adalah panel distribusi 3 fasa, yang menghubungkan sumber pembangkit ke beberapa feeder sesuai dengan kebutuhan masing-masing feeder.

Dilengkapi dengan proteksi arus lebih, baik secara thermal maupun elektromagnetik. Proteksi Induksi Petir, juga dilengkapi dengan indikator/alat ukur tegangan per fasa dan arus tiap fasa serta frekuensi.



SPESIFIKASI

- | | |
|-------------------------------|--|
| 1. Capacity | = 19kVA - 950 kVA |
| 2. Input / Output Phase | = 3 phase |
| 3. Output Feeder (Customized) | = Network feeders, Local Feeder |
| 4. Metering (Customized) | = Voltage (Volts) and Current (Amps)
Frequency (Hz), Energy (kWh) |
| 5. Type | = Indoor, wall-mounted |
| 6. Material & Finishing | = Metal with Powder Coating |

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