

LAMPIRAN

Lampiran 1

Data Sheet Panel Surya 120Wp (Sumber: Solar Werk Unlimited Energy)

Specification

Cells	Polycrystalline Silicon Solar Cells 156x130mm
Number of Cells	36 (4 x 9)
Dimensions (mm)	1245 x 670 x 30
Weight (kg)	10,0

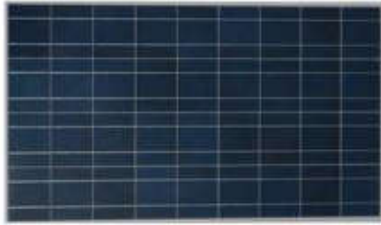
Electrical Characteristic

Values at Standard Test Conditions STC
(Air Mass AM 1.5, Irradiance 1000W/m², Cell Temperature 25°C)

Model	SWP-120
Max Power	120 Watt
Optimum Power Voltage (Vmp)	18.10 V
Optimum Power Current (Imp)	6.12 A
Open Circuit Voltage (Voc)	22.35 V
Short Circuit Current (Isc)	8.48 A
Solar Cell	156*130 poly
Cell Efficiency (%)	16,2%
Module Efficiency (%)	14,1%
Maximum System Voltage (V)	DC 1000 (TUVV) / DC 600 (UL)
Power Tolerance (%)	0~+3
Series Fuse Rating (A)	12

Components and Mechanical Data

Front Glass	High Transparency Tempered Glass 3.2 MM
Junction Box	Pass the TUV Certificate PPO (black/1P/65)
Output Cables	4mm ² /0.9m
Connectors	MCA (UV resistance and self-locking/1P/67)
Frame	Anodized aluminium alloy type 6063-T5
Encapsulation Material	EVA (0.50±0.03mm thickness)
Back Foil	White TPT (0.33±0.03mm thickness)
Fixing Adhesive	Silicone Sealant (White)
Temperature Range (°C)	-40°C to +90°C
Max Load (Kpa)	2.4 wind load / 5.4 snow load



Usage

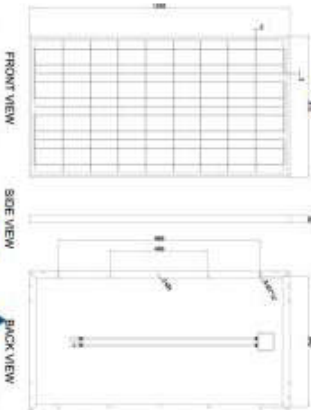
- Solar Power Plant
- Solar Street Light
- On Grid Commercial & Residential
- Off Grid Commercial & Residential
- BTS power supply
- and many more



Temperature Characteristic

NOCT (°C)	47 ± 2
Temperature Coefficient of Pm (%/°C)	-0.45 ± 0.05
Temperature Coefficient of Isc (%/°C)	0.05 ± 0.01
Temperature Coefficient of Voc (%/°C)	-0.35 ± 0.02

Module Diagram



Note:
 -STC: Irradiance 1000W/m², Cell Temperature 25°C, AM = 1.5
 -Deviation of Vm(V), Imp(A), and Isc(A) of ±10%



Lampiran 2

Data Sheet Schneider Conext MPPT 60/150 Solar Charge Controller

(Sumber: <https://solar.schneider-electric.com/product/conext-mppt-60-150/>)



Device short name	MPPT 60 150
Electrical specifications	
Nominal battery voltage	12, 24, 36, 48, 60 V
Battery voltage operating range	0 Vdc to 80 Vdc
PV array operating voltage	140 V
Max. PV array open circuit voltage	150 V including temperature correction factor
Max. array short-circuit current	60 A (48 A @ 51°C)
Max. charge current	60 A (for all battery voltages except 60 V)
Max. and min. wire size in conduit	#6 AWG to #14 AWG (10 to 2.5 mm ²)
Max. output power	3500 W
Charger regulation method	Three-stage (bulk, absorption, float) plus manual equalization Two-stage (bulk, absorption) plus manual equalization
Supported battery types	Flooded, GEL, AGM, Custom
Efficiency	
Max. power conversion efficiency	93% (nominal 12 V), 96% (nominal 24 V), 97% (nominal 36 V), 98% (nominal 48 V), 99% (nominal 60 V)
General specifications	
Power consumption, night time	2.5 W
Battery temperature sensor	Included
Auxiliary output	5 – 13 V, up to 200 mA
Enclosure material	Indoor, ventilated, sheet metal chassis with 2.2 cm and 2.8 cm (7/8 in and 1 in) knockouts and aluminum heat-sink
IP degree of protection	IP20
Product weight	4.8 kg (10.8 lb)
Shipping weight	8.0 kg (17.6 lb)
Product dimensions (H x W x D)	36.8 x 14.6 x 13.8 cm (14.5 x 5.8 x 5.5 in)
Shipping dimensions (H x W x D)	48.3 x 22.9 x 35 cm (19.0 x 9.0 x 9.8 in)
Device mounting	Vertical wall mount
Ambient air temperature for operation	-20 °C to 45 °C (-4 °F to 113 °F)
Storage temperature range	-40 °C to 85 °C (-40 °F to 185 °F) full power, power derating above 45 °C
Operating altitude	Sea level to 2000 m (6562 ft)
System network and remote monitoring	Available
Warranty	Five-year standard
Part number	865-1030-1
Features	
Display type	LCD, 2 lines 16 digits
Regulatory approvals	
Safety	CSA certified (UL1741, CSA 107.1) and CE marked for the Low-voltage Directive (EN50178)
EMC	FCC and Industry Canada (Class B), CE marked for the EMC Directive (EN61000-6-1, -6-3), C-Tick compliant
Compatible products	
Conext XW+ inverter/charger (230 V)	XW 7048 E product no. 865-7048-61/XW 8548 E product no. 855-8548-61
Conext XW+ inverter/charger (120/240 V)	XW 5548 NA product no. 865-5548-01/XW 6848 NA product no. 865-6848-01
Conext SW (230 V)	SW 2524 product no. 865-2524-61/SW 4024 product no. 865-4024-61/SW 4048 product no. 865-4048-61
Conext SW (120 V)	SW 2524 product no. 865-2524/SW 4024 product no. 865-4024/SW 4048 product no. 865-4048
Conext System Control Panel	Product no. 865-1050
Conext Automatic Generator Start	Product no. 865-1060
Conext ComBox	Product no. 865-1058
Conext portable installation and configuration tool	Product no. 865-1155-01

Lampiran 3

Data Sheet Sunlight Baterai 12V 200Ah

(Sumber: <http://www.systems-sunlight.com/wp-content/uploads/2014/11/spg-12v-200ah.pdf>.)



Applications

- Uninterruptible Power Supplies (UPS)
- Electric Power Systems (EPS)
- Emergency backup power supplies
- Electronic apparatus and equipment
- Communication power supplies
- DC power supplies
- Auto control system

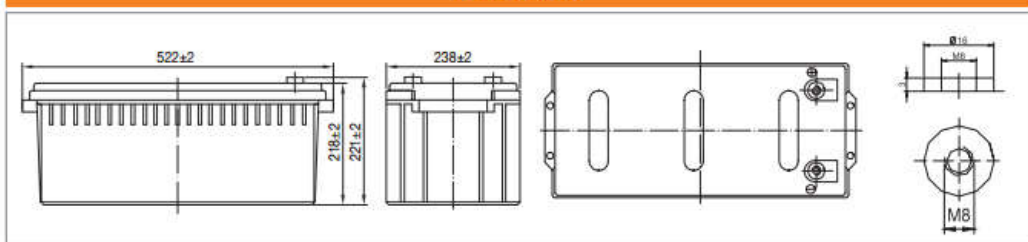
Specifications

Nominal Voltage	12 V	
Number of cells	6	
Design Life	10 years	
Dimensions	Length	522 mm
	Width	238 mm
	Height	218 mm
	Total Height	221 mm
Approx. Weight	57.0 kg	
Nominal Capacity (25°C)	20 hours rate (10.5 A, 10.8 V)	210 Ah
	10 hours rate (20.0 A, 10.8 V)	200 Ah
	5 hours rate (35.0 A, 10.5 V)	175 Ah
	1 hour rate (124.0 A, 9.6 V)	124 Ah
Max. Discharge Current (25°C)	1600 A (5s)	
Internal Resistance	3.0 mOhms	
Fully Charged battery (25°C)		
Self-Discharge	3% of capacity declined per month at 20°C (average)	
Operating Temperature Range	Discharge	-15°C-50°C
	Charge	-10°C-50°C
	Storage	-20°C-50°C
Short Circuit Current	5420 A	
	Cycle use	2.40-2.45 Vpc
Charge Methods:	Maximum charging current	60 A
	Temperature compensation	-30 mV/°C
	Standby use	2.23-2.27 Vpc
	Temperature compensation	-18 mV/°C

Battery Construction

Component	Positive Plate	Negative Plate	Container	Cover	Safety Valve	Terminal	Separator	Electrolyte
Raw material	Lead dioxide	Lead	ABS	ABS	Rubber	Copper	Fiberglass	Sulfuric acid

Dimensions



Constant Current Discharge (Amperes) at 25°C

End Voltage (Volts/Cell)	10min	15min	30min	1h	2h	3h	4h	5h	6h	8h	10h	20h
1.60 V	394	330	200	124	73.1	51.0	41.8	35.7	31.2	24.5	20.4	10.7
1.65 V	382	322	196	122	72.6	50.7	41.6	35.5	31.0	24.3	20.3	10.7
1.70 V	366	310	190	119	72.0	50.4	41.3	35.2	30.8	24.2	20.3	10.6
1.75 V	350	300	185	117	70.9	50.0	41.0	35.0	30.6	24.0	20.1	10.6
1.80 V	331	284	179	113	69.1	48.5	39.8	34.0	29.7	23.3	20.0	10.5

Constant Power Discharge (Watts) at 25°C

End Voltage (Volts/Cell)	10min	15min	30min	1h	2h	3h	4h	5h	6h	8h	10h	20h
1.60 V	4253	3623	2244	1414	846	600	492	422	369	291	243	128
1.65 V	4125	3536	2199	1392	841	596	489	419	367	289	243	128
1.70 V	3955	3406	2132	1357	834	592	486	417	364	287	242	128
1.75 V	3785	3290	2080	1330	821	588	482	414	362	285	240	127
1.80 V	3573	3116	2004	1289	800	570	468	401	351	277	239	126

Lampiran 4

Pure Sine Wave Solar Inverter YIY 10000W

(Sumber: https://www.alibaba.com/product-detail/Wall-Mount-Type-Off-Grid-DC_60691107118.html?spm=a2700.7724857.main07.61.181d505ddkZb4j)

YIY®



Electrical Specifications													
Inverter Output	Model	1.0KW 1.5KW 2.0KW 3.0KW 4.0KW 5.0KW 6.0KW 8.0KW 10.0KW 12.0KW											
	Continuous Output Power	1.0KW 1.5KW 2.0KW 3.0KW 4.0KW 5.0KW 6.0KW 8.0KW 10.0KW 12.0KW											
	Surge Rating(20s)	3.0KW 4.5KW 6.0KW 9.0KW 12.0KW 15.0KW 18.0KW 24.0KW 30.0KW 36.0KW											
	Output Waveform	Pure Sine wave/Same as input(Bypass Mode)											
	Nominal Efficiency	>88%(Peak)											
	Line Mode Efficiency	>95%											
	Power Factor	0.9-1.0											
	Nominal Output Voltage rms	100-110-120Vac / 220-230-240Vac											
	Output Voltage Regulation	±10% RMS											
	Output Frequency	50Hz ± 0.3Hz/60Hz ± 0.3Hz											
DC Input	Short Circuit Protection	Yes(1sec after fault)											
	Typical transfer Time	10ms(Max)											
	THD	< 10%											
	Nominal Input Voltage	12.0Vdc (*2 for 24Vdc, *4 for 48Vdc)											
	Minimum Start Voltage	10.0Vdc											
	Low Battery Alarm	10.5Vdc / 11.0Vdc											
	Low Battery Trip	10.0Vdc / 10.5Vdc											
Charger	High Voltage Alarm	16.0Vdc											
	Low Battery voltage recover	15.5Vdc											
	Idle Consumption-Search Mode	< 25 W when Power Saver On											
	Output Voltage	Depends on battery type											
	Charger Breaker Rating	10A	15A	20A	20A	20A	30A	30A	40A	40A	40A	40A	40A
	Max Charge Power Rate	1/3 Rating Power											
	Battery Initial Voltage for Start Up	10-15.7V for 12V(*2 for 24V, *4 for 48V)											
Bypass & Protection	Over Charge Protection Shutdown	15.7V for 12V (*2 for 24V, *4 for 48V)											
	Remote Control	Yes(Optional)											
	Input Voltage Waveform	Sine wave (Grid or Generator)											
	Nominal Voltage	110Vac	120Vac	220Vac	230Vac								
	Max Input AC Voltage	150VAC For 120Vac LV Mode;300VAC For 230Vac HV Mode;											
	Nominal Input Frequency	50Hz or 60Hz (Auto detect)											
	Low Freq Trip	47±0.3Hz for 50Hz, 57±0.3Hz for 60Hz											
	High Freq Trip	55±0.3Hz for 50Hz, 65±0.3Hz for 60Hz											
	Overload protection(SMPS load)	Circuit breaker											
	Output Short circuit protection	Circuit breaker											
Solar Charger(Optional)	Bypass breaker rating	10A	15A	20A	30A	40A	40A	40A	50A	63A	63A	63A	
	Transfer switch rating	30amp for UL & TUV			40amp for UL			80amp for UL					
	Bypass without battery connected	Yes (Optional)											
	Max bypass current	30amp			40amp			80amp					
	Rated Voltage	12Vdc / 24Vdc / 48Vdc											
	Solar Input Voltage Range	15-30Vdc / 30-55Vdc / 55-100Vdc											
	Rated Charge Current	40 ~ 60A											
Rated Output Current	15A												
Self Consumption	< 10mA												
Mechanical Spec	Bulk Charge	14.5V(default)											
	Floating Charge	13.5V(default)											
	Equalization Charge	14.0V(default)											
	Over Charge Disconnection	14.8V											
	Over Charge Recovery	13.6V											
	Over Discharge Disconnection	10.8 V(default)											
	Over Discharge Reconnection	12.3V											
Temperature Compensation	-13.2mV/°C												
Ambient Temperature	0 ~ 40°C(Full load) 40 ~ 60°C(Derating)												
Mechanical Spec	Mounting	Wall Mount											
	Inverter Dimensions(L*W*H)	398*415*200mm			488*415*200mm			588*415*200mm					
	Inverter Weight(Solar Chg)KG	21+2.5	22+2.5	23+2.5	27+2.5	38+2.5	48+2.5	49+2.5	60+2.5	66+2.5	70+2.5	70+2.5	70+2.5
	Shipping Dimensions(L*W*H)	550*520*310mm			650*520*310mm			750*520*310mm					
	Shipping Weight(Solar Chg)KG	23+2.5	24+2.5	25+2.5	29+2.5	40+2.5	60+2.5	61+2.5	82+2.5	88+2.5	72+2.5	72+2.5	72+2.5
	Display	Status LEDs / Status LEDs+LCD											
	Standard Warranty	1 Year (Optional)											

Lampiran 5

Penjelasan *Wiring Diagram* PLTS

PLTS *Off-Grid* merupakan PLTS yang bersifat independen/tidak terhubung dengan jala-jala PLN. Untuk panel surya dipilih tipe *polycrystalline* karena tipe ini dapat menghasilkan energi listrik dalam keadaan cuaca berawan dan mempunyai harga yang lebih murah sehingga banyak dipakai di pasaran. Pada Perencanaan PLTS ini menggunakan 280 panel surya 120 watt peak (Wp). Masing-masing panel surya mempunyai tegangan output (Vmp) 18,10 volt. Untuk menghindari *losses* listrik yang besar, perancangan PLTS ini menggunakan sistem 48 volt.

Dalam perancangan panel surya ini terdapat 7 PV *Array*, 1 PV *Array* terdiri dari 40 panel surya dengan dihubungkan menggunakan rangkaian seri – paralel, Supaya tegangannya mencakupi untuk pengisian baterai, maka panel surya harus diseri 4 panel 120 Wp menghasilkan tegangan (VoC) 89,4 volt dan arus maksimum (Isc) 8,48 A, setelah 4 panel 120 Wp diseri maka menghasilkan 10 kelompok panel surya untuk 1 PV *array* lalu selanjutnya diparalel dan menghasilkan tegangan 89,4 volt dan arus maksimum (Isc) 106 A, untuk gambarannya dapat dilihat di gambar *wiring diagram* dibawah ini.

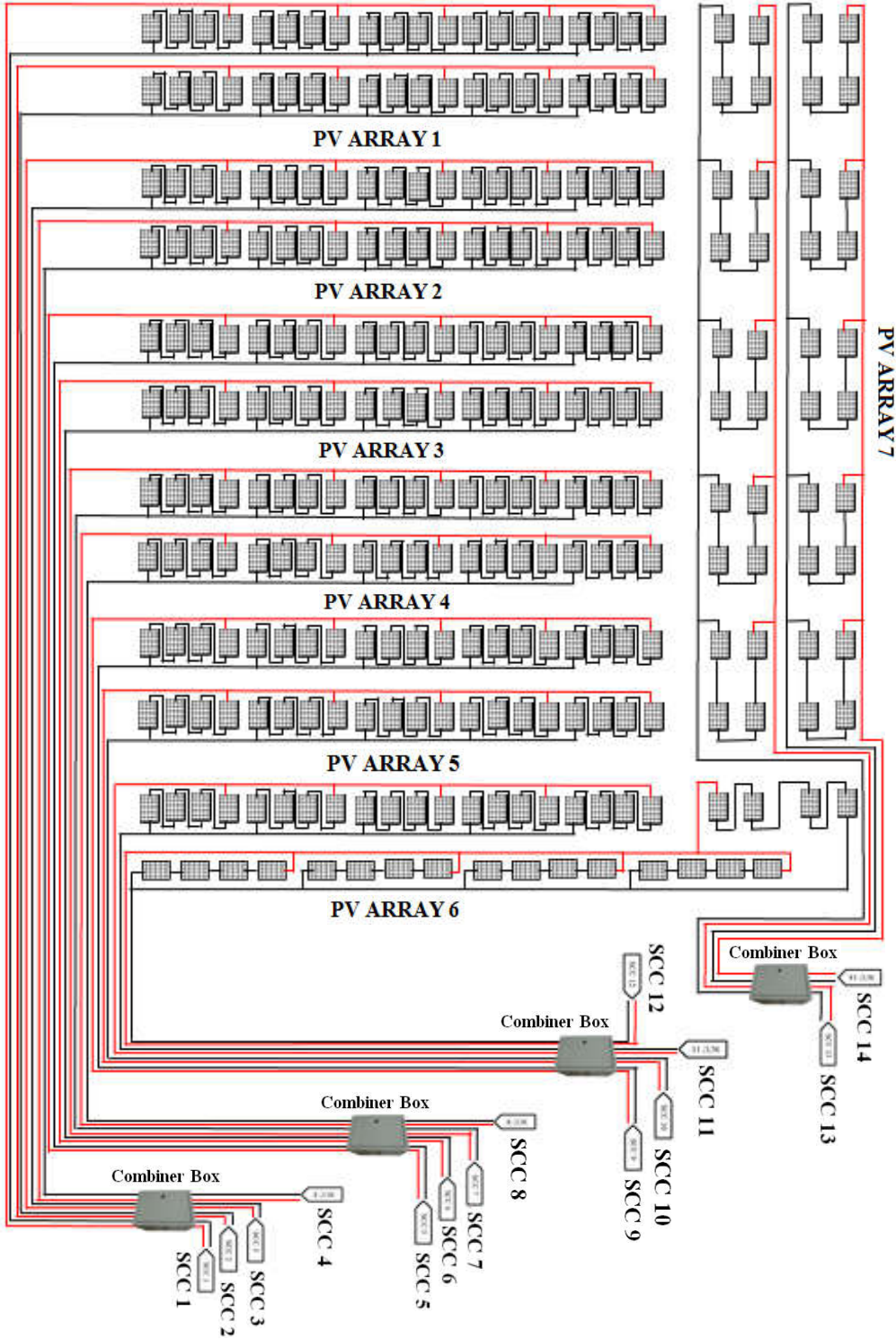
Output dari panel surya dialirkan ke *solar charge controller* yang kemudian diatur untuk pengisian baterai dan juga inverter ke beban. *Solar charge controller* yang digunakan tipe MPPT dengan kapasitas 60A/150V. setiap PV *Array* mendapatkan 2 Solar Charge controller dikarenakan besar nilai Isc (nilai arus maksimum yang dapat dikeluarkan panel surya) pada panel surya adalah 8,48 A sehingga dengan total pemakaian 20 panel surya memerlukan 42,4 A, sehingga diperlukannya *Solar Charge Controller* MPPT 60A. *Solar charge controller* berguna untuk *setting* arus listrik (*current regulator*) yang masuk dari panel PV maupun arus beban keluar/digunakan dan berfungsi untuk melindungi baterai dari pengisian yang berlebihan (*over charge*), dan dari panel surya ke baterai dapat di atur tegangan serta arusnya sesuai kebutuhan. Jenis baterai yang digunakan adalah baterai *deep cycle lead acid* sebanyak 336 baterai 12V 200Ah yang dikombinasikan seri dan paralel seperti *wiring diagram* gambar dibawah ini.

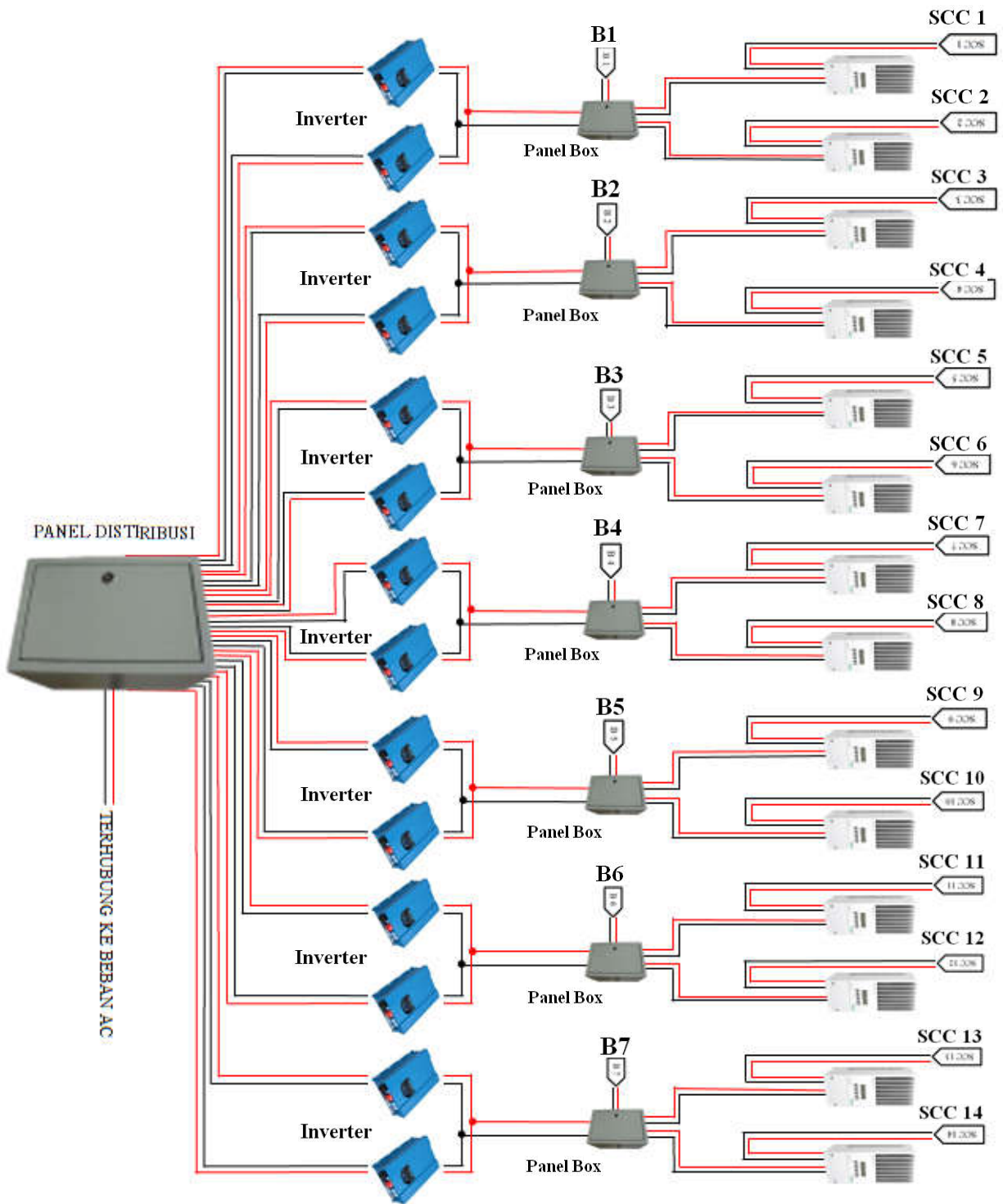
Dari konfigurasi tersebut diperoleh 7 kelompok, 1 kelompok baterai yang berisi 48 baterai. Selanjutnya 4 baterai diseri menjadi 12 kelompok dan menghasilkan tegangan baterai 48V dan kapasitas baterai 200 Ah, setelah itu kelompok baterai yang sudah diseri tersebut yaitu berjumlah 84 kelompok baterai yang diseri tersebut diparalel dan menghasilkan tegangan baterai 48V dan kapasitas baterai 16.800 Ah.

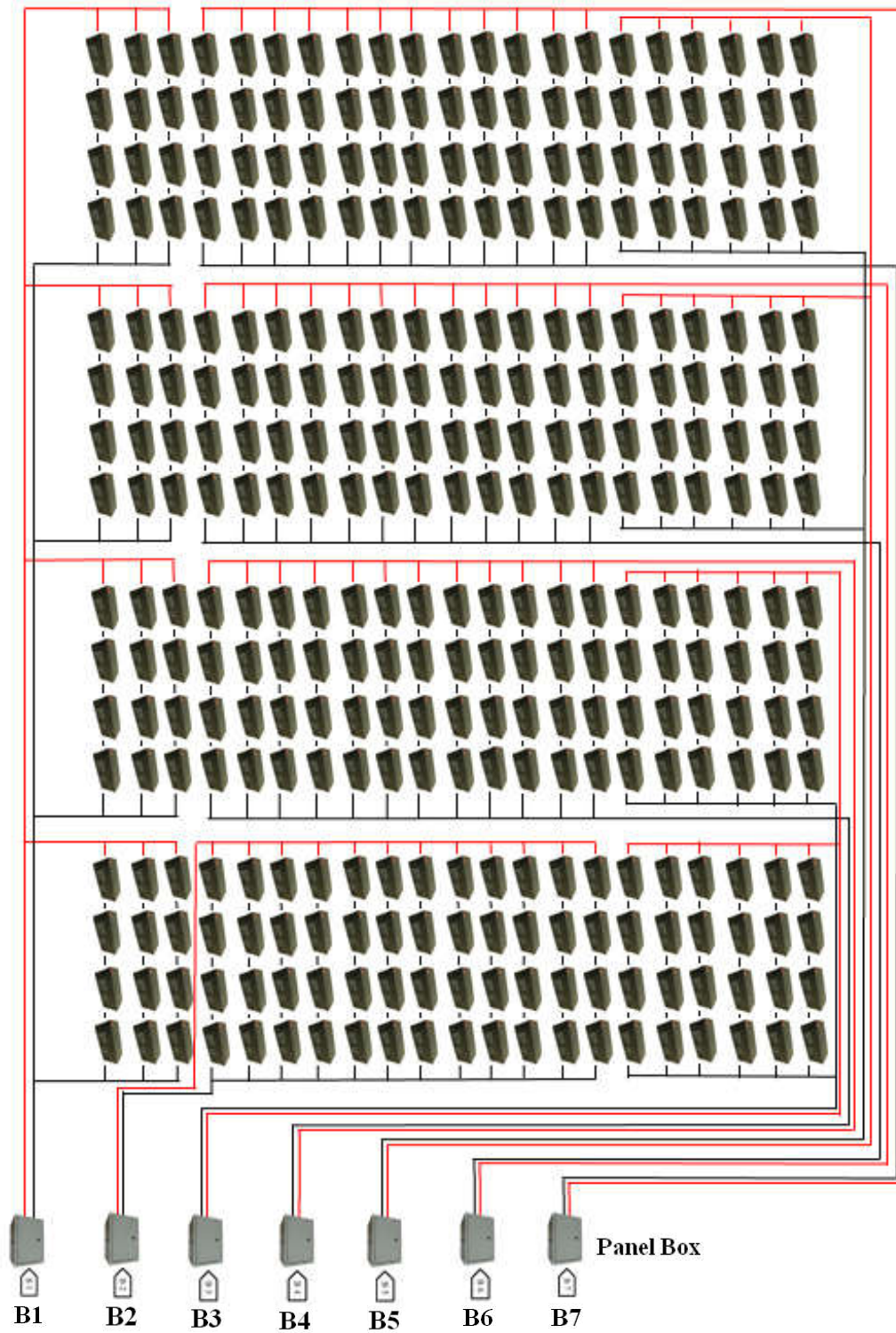
Inverter adalah suatu komponen PLTS yang memiliki sistem kontrol dapat merubah arus listrik searah (DC) yang dihasilkan solar modul menjadi listrik arus bolak-balik (AC) dan juga sebagai pengkondisi tenaga listrik (*power condition*), nantinya kualitas daya listrik yang dari inverter menuju beban atau jaringan listrik akan diatur berapa daya yang dikeluarkan dalam kebutuhan tersebut. Kemampuan inverter yang digunakan dan besarnya sistem penyimpanan yang digunakan (besarnya *ampere hour (AH)* atau amper jam dari batere) harus sesuai dengan besarnya tegangan dan daya keluaran yang dapat dihubungkan ke beban. Inverter yang digunakan adalah jenis *pure sine wave* dengan tegang sistem 48 Volt 10.000 Watt dengan jumlah 14 inverter, 2 inverter terhubung kepada 2 solar charge controller, setelah itu inverter terhubung ke panel distribusi. Panel distribusi daya adalah tempat menyalurkan dan berfungsi untuk mendistribusikan energi listrik dari panel daya atau sumber listrik ke beban (konsumen) baik untuk instalasi tenaga maupun untuk instalasi penerangan.

Pada Perancangan PLTS ini terdapat *Combiner Box*, adalah sebuah panel sistem tegangan dc yang berisi fuse atau MCB sebagai proteksi arus lebih dan *Surge Arrester* sebagai proteksi tegangan lebih jika ada gangguan tegangan induksi petir. Dan terdapat juga Panel Distribusi merupakan panel yang berfungsi sebagai penghubung dan pembagi antara Output Inverter dengan beban. Pada panel tersebut juga termonitor besarnya arus, tegangan, frekuensi dan energi yang disalurkan ke beban.

Gambar *Wiring Diagram* PLTS *Off-Grid*







Keterangan:

————— : Kabel Negative (-)

————— : Kabel Positive (+)

PV ARRAY 1 – 7 : Gabungan beberapa Panel Surya

SCC 1 – 14 : Sambungan kabel SCC (*Solar Charge Controller*)

B 1 – 7 : Sambungan kabel Baterai



: Panel Surya



: *Solar Charge Controller* (SCC)



: Baterai



: Inverter



: *Combiner Box/Panel Box/Panel Distribusi*

Lampiran 6

- Mengetahui Nilai Bunga (%)

Rumus :

$$\text{Bunga (\%)} = \frac{1}{(1 + i)^n}$$

Keterangan:

i = Nilai suku bunga yang digunakan yaitu ($i=4,5\%$)

n = Nilai Periode atau waktu arus kas

Tahun 1	$\text{Bunga (\%)} = \frac{1}{(1 + 0.045)^1}$ $= 0.956$	Tahun 7	$\text{Bunga (\%)} = \frac{1}{(1 + 0.045)^7}$ $= 0.734$
Tahun 2	$\text{Bunga (\%)} = \frac{1}{(1 + 0.045)^2}$ $= 0.915$	Tahun 8	$\text{Bunga (\%)} = \frac{1}{(1 + 0.045)^8}$ $= 0.703$
Tahun 3	$\text{Bunga (\%)} = \frac{1}{(1 + 0.045)^3}$ $= 0.876$	Tahun 9	$\text{Bunga (\%)} = \frac{1}{(1 + 0.045)^9}$ $= 0.672$
Tahun 4	$\text{Bunga (\%)} = \frac{1}{(1 + 0.045)^4}$ $= 0.838$	Tahun 10	$\text{Bunga (\%)} = \frac{1}{(1 + 0.045)^{10}}$ $= 0.643$
Tahun 5	$\text{Bunga (\%)} = \frac{1}{(1 + 0.045)^5}$ $= 0.802$	Tahun 11	$\text{Bunga (\%)} = \frac{1}{(1 + 0.045)^{11}}$ $= 0.616$
Tahun 6	$\text{Bunga (\%)} = \frac{1}{(1 + 0.045)^6}$ $= 0.767$	Tahun 12	$\text{Bunga (\%)} = \frac{1}{(1 + 0.045)^{12}}$ $= 0.589$
Tahun 13	$\text{Bunga (\%)} = \frac{1}{(1 + 0.045)^{13}}$ $= 0.547$	Tahun 20	$\text{Bunga (\%)} = \frac{1}{(1 + 0.045)^{20}}$ $= 0.414$

$$\begin{aligned}\text{Tahun 14 Bunga (\%)} &= \frac{1}{(1 + 0.045)^{14}} \\ &= 0.539\end{aligned}$$

$$\begin{aligned}\text{Tahun 15 Bunga (\%)} &= \frac{1}{(1 + 0.045)^{15}} \\ &= 0.516\end{aligned}$$

$$\begin{aligned}\text{Tahun 16 Bunga (\%)} &= \frac{1}{(1 + 0.045)^{16}} \\ &= 0.494\end{aligned}$$

$$\begin{aligned}\text{Tahun 17 Bunga (\%)} &= \frac{1}{(1 + 0.045)^{17}} \\ &= 0.473\end{aligned}$$

$$\begin{aligned}\text{Tahun 18 Bunga (\%)} &= \frac{1}{(1 + 0.045)^{18}} \\ &= 0.452\end{aligned}$$

$$\begin{aligned}\text{Tahun 19 Bunga (\%)} &= \frac{1}{(1 + 0.045)^{19}} \\ &= 0.433\end{aligned}$$

$$\begin{aligned}\text{Tahun 21 Bunga (\%)} &= \frac{1}{1 + 0.045^{21}} \\ &= 0.396\end{aligned}$$

$$\begin{aligned}\text{Tahun 22 Bunga (\%)} &= \frac{1}{1 + 0.045^{22}} \\ &= 0.379\end{aligned}$$

$$\begin{aligned}\text{Tahun 23 Bunga (\%)} &= \frac{1}{(1 + 0.045)^{23}} \\ &= 0.363\end{aligned}$$

$$\begin{aligned}\text{Tahun 24 Bunga (\%)} &= \frac{1}{(1 + 0.045)^{24}} \\ &= 0.347\end{aligned}$$

$$\begin{aligned}\text{Tahun 25 Bunga (\%)} &= \frac{1}{(1 + 0.045)^{25}} \\ &= 0.332\end{aligned}$$

Lampiran 7

- **Mengetahui Nilai Arus Kas**

Rumus:

$$\text{Nilai Arus Kas} = \text{Arus Kas} \times i$$

Keterangan:

i = Nilai suku bunga setiap tahunnya

$$\begin{aligned} \text{Tahun 1 Nilai Kas} &= 168.915.996,5 \times 0.956 \\ &= 161.483.692,7 \end{aligned}$$

$$\begin{aligned} \text{Tahun 2 Nilai Kas} &= 168.915.996,5 \times 0.915 \\ &= 154.558.136,8 \end{aligned}$$

$$\begin{aligned} \text{Tahun 3 Nilai Kas} &= 168.915.996,5 \times 0.876 \\ &= 147.970.412,9 \end{aligned}$$

$$\begin{aligned} \text{Tahun 4 Nilai Kas} &= 168.915.996,5 \times 0.838 \\ &= 141.551.605,1 \end{aligned}$$

$$\begin{aligned} \text{Tahun 5 Nilai Kas} &= 168.915.996,5 \times 0.802 \\ &= 135.470.629,2 \end{aligned}$$

$$\begin{aligned} \text{Tahun 6 Nilai Kas} &= 168.915.996,5 \times 0.767 \\ &= 129.558.569,3 \end{aligned}$$

$$\begin{aligned} \text{Tahun 7 Nilai Kas} &= 168.915.996,5 \times 0.734 \\ &= 123.984.341,4 \end{aligned}$$

$$\begin{aligned} \text{Tahun 8 Nilai Kas} &= 168.915.996,5 \times 0.703 \\ &= 118.747.945,5 \end{aligned}$$

$$\begin{aligned} \text{Tahun 9 Nilai Kas} &= 168.915.996,5 \times 0.672 \\ &= 113.511.549,6 \end{aligned}$$

$$\begin{aligned} \text{Tahun 10 Nilai Kas} &= 168.915.996,5 \times 0.643 \\ &= 108.612.985,7 \end{aligned}$$

$$\begin{aligned} \text{Tahun 11 Nilai Kas} &= 168.915.996,5 \times 0.616 \\ &= 104.052.253,8 \end{aligned}$$

$$\begin{aligned}
\text{Tahun 12 Nilai Kas} &= 168.915.996,5 \times 0.589 \\
&= 99.491.521,94 \\
\text{Tahun 13 Nilai Kas} &= 168.915.996,5 \times 0.547 \\
&= 92.397.050,09 \\
\text{Tahun 14 Nilai Kas} &= 168.915.996,5 \times 0.539 \\
&= 91.045.722,11 \\
\text{Tahun 15 Nilai Kas} &= 168.915.996,5 \times 0.516 \\
&= 87.160.653,94 \\
\text{Tahun 16 Nilai Kas} &= 168.915.996,5 \times 0.494 \\
&= 83.444.502,27 \\
\text{Tahun 17 Nilai Kas} &= 168.915.996,5 \times 0.473 \\
&= 79.897.266,34 \\
\text{Tahun 18 Nilai Kas} &= 168.915.996,5 \times 0.452 \\
&= 76.350.030,42 \\
\text{Tahun 19 Nilai Kas} &= 168.915.996,5 \times 0.433 \\
&= 73.140.626,48 \\
\text{Tahun 20 Nilai Kas} &= 168.915.996,5 \times 0.414 \\
&= 69.931.222,55 \\
\text{Tahun 21 Nilai Kas} &= 168.915.996,5 \times 0.396 \\
&= 66.890.734,61 \\
\text{Tahun 22 Nilai Kas} &= 168.915.996,5 \times 0.379 \\
&= 64.019.162,67 \\
\text{Tahun 23 Nilai Kas} &= 168.915.996,5 \times 0.363 \\
&= 61.316.506,73 \\
\text{Tahun 24 Nilai Kas} &= 168.915.996,5 \times 0.347 \\
&= 58.613.850,79 \\
\text{Tahun 25 Nilai Kas} &= 168.915.996,5 \times 0.332 \\
&= 56.080.110,84
\end{aligned}$$

Lampiran 8

- Mengetahui Nilai NPV

$$NPV = \left(\frac{NCF^1}{(1+i^1)} + \frac{NCF^2}{(1+i^2)} + \frac{NCF^3}{(1+i^3)} + \dots + \frac{NCF^n}{(1+i^n)} \right) - \text{Biaya Investasi}$$

Keterangan :

NPV = Net present value

NCF¹ = Arus Kas Bersih

i = Tingkat Suku Bunga (4,5%)

n = Waktu Periode (Tahun)

$$\begin{aligned}
 NPV &= \left(\frac{168.915.996,5}{(1+0.045^1)} + \frac{168.915.996,5}{(1+0.045^2)} + \frac{168.915.996,5}{(1+0.045^3)} + \frac{168.915.996,5}{(1+0.045^4)} + \right. \\
 &\frac{168.915.996,5}{(1+0.045^5)} + \frac{168.915.996,5}{(1+0.045^6)} + \frac{168.915.996,5}{(1+0.045^7)} + \frac{168.915.996,50}{(1+0.045^8)} + \\
 &\frac{168.915.996,5}{(1+0.045^9)} + \frac{168.915.996,5}{(1+0.045^{10})} + \frac{168.915.996,5}{(1+0.045^{11})} + \frac{168.915.996,5}{(1+0.045^{12})} + \\
 &\frac{168.915.996,5}{(1+0.045^{13})} + \frac{168.915.996,5}{(1+0.045^{14})} + \frac{168.915.996,5}{(1+0.045^{15})} + \frac{168.915.996,5}{(1+0.045^{16})} + \\
 &\frac{168.915.996,5}{(1+0.045^{17})} + \frac{168.915.996,5}{(1+0.045^{18})} + \frac{168.915.996,5}{(1+0.045^{19})} + \frac{168.915.996,5}{(1+0.045^{20})} + \\
 &\frac{168.915.996,5}{(1+0.045^{21})} + \frac{168.915.996,5}{(1+0.045^{22})} + \frac{168.915.996,5}{(1+0.045^{23})} + \frac{168.915.996,5}{(1+0.045^{24})} + \\
 &\left. \frac{168.915.996,5}{(1+0.045^{25})} \right) - 2.234.014.063 \\
 &= 2.499.281.084 - 2.234.014.063 \\
 &= 265.267.020,8 \text{ ,-}
 \end{aligned}$$