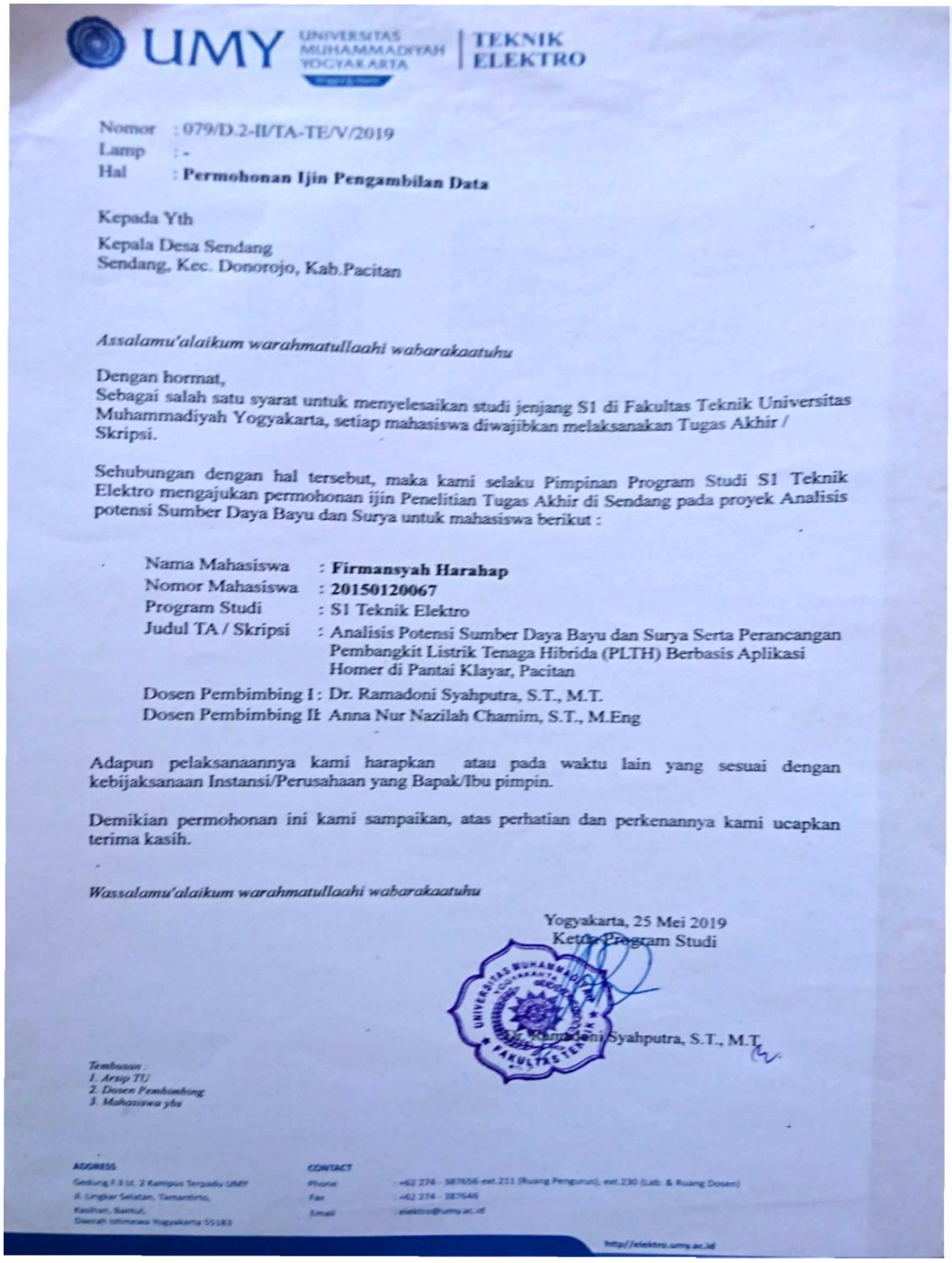
LAMPIRAN

Lampiran 1. Izin Penelitian

1. Surat permohonan izin pengambilan data dari Universitas Muhammadiyah Yogyakarta.



UMY UNIVERSITAS MUHAMMADIYAH YOGYAKARTA | TEKNIK ELEKTRO

Nomor : 079/D.2-II/TA-TE/V/2019
Lamp : -
Hal : **Permohonan Ijin Pengambilan Data**

Kepada Yth
Kepala Desa Sendang
Sendang, Kec. Donorojo, Kab.Pacitan

Assalamu'alaikum warahmatullaahi wabarakaatuhu

Dengan hormat,
Sebagai salah satu syarat untuk menyelesaikan studi jenjang S1 di Fakultas Teknik Universitas Muhammadiyah Yogyakarta, setiap mahasiswa diwajibkan melaksanakan Tugas Akhir / Skripsi.

Sehubungan dengan hal tersebut, maka kami selaku Pimpinan Program Studi S1 Teknik Elektro mengajukan permohonan ijin Penelitian Tugas Akhir di Sendang pada proyek Analisis potensi Sumber Daya Bayu dan Surya untuk mahasiswa berikut :

Nama Mahasiswa	: **Firmansyah Harahap**
Nomor Mahasiswa	: **20150120067**
Program Studi	: S1 Teknik Elektro
Judul TA / Skripsi	: Analisis Potensi Sumber Daya Bayu dan Surya Serta Perancangan Pembangkit Listrik Tenaga Hibrida (PLTH) Berbasis Aplikasi Homer di Pantai Klayar, Pacitan
Dosen Pembimbing I	: Dr. Ramadoni Syahputra, S.T., M.T.
Dosen Pembimbing II	: Anna Nur Nazilah Chamim, S.T., M.Eng

Adapun pelaksanaannya kami harapkan atau pada waktu lain yang sesuai dengan kebijaksanaan Instansi/Perusahaan yang Bapak/Ibu pimpin.

Demikian permohonan ini kami sampaikan, atas perhatian dan perkenannya kami ucapkan terima kasih.

Wassalamu'alaikum warahmatullaahi wabarakaatuhu

Yogyakarta, 25 Mei 2019
Ketua Program Studi

Dr. Ramadoni Syahputra, S.T., M.T.

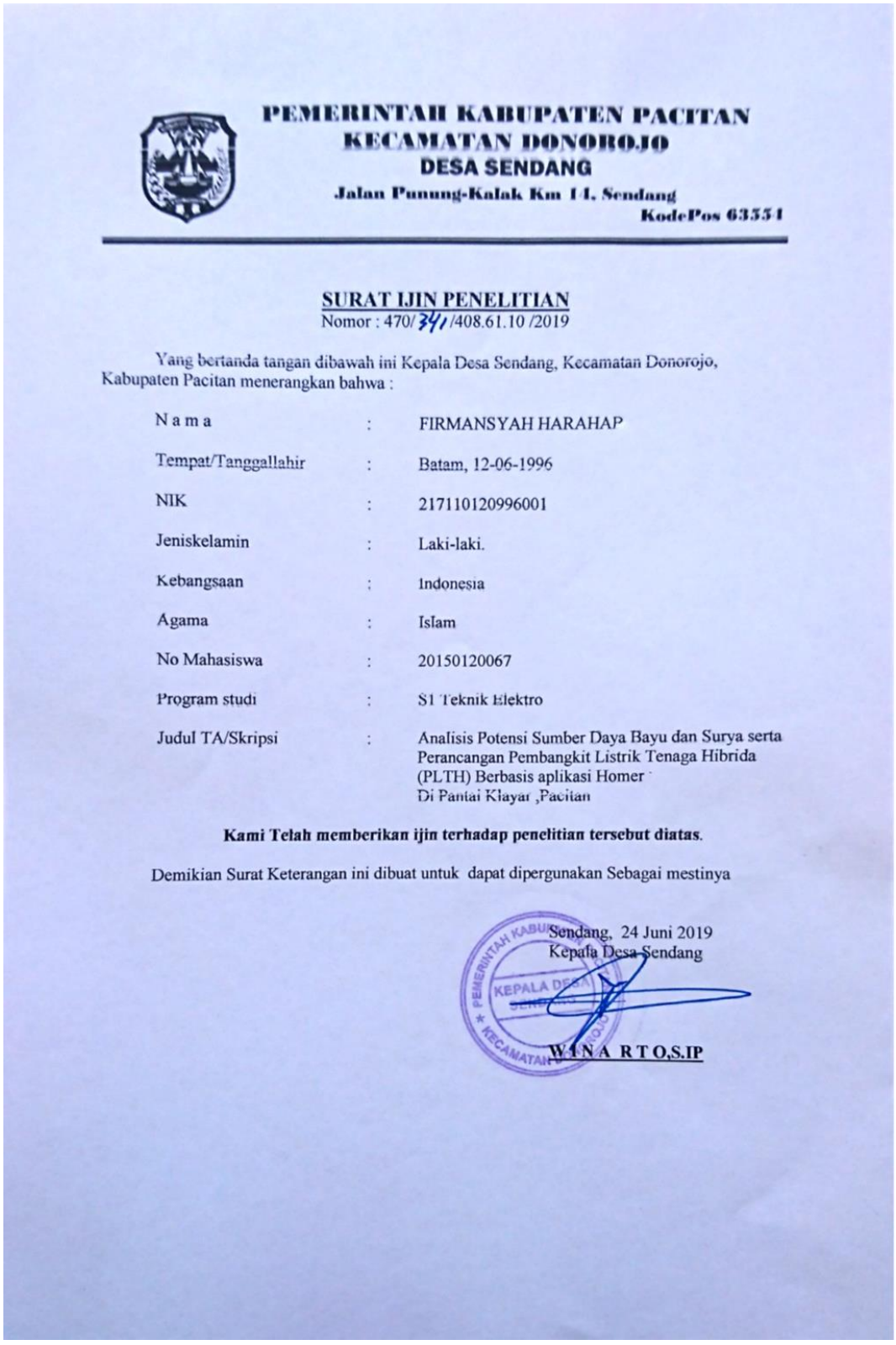
Tembusan :
1. Arsip TU
2. Dosen Pembimbing
3. Mahasiswa yhs

ADDRESS
Gedung F.3 Lt. 2 Kampus Terpadu UMY
Jl. Lingkar Selatan, Tamantirto,
Kasihan, Bantul,
Daerah Istimewa Yogyakarta 55183

CONTACT
Phone : +62 274 - 387656 ext.211 (Ruang Pengurus), ext.230 (Lab. & Ruang Dosen)
Fax : +62 274 - 387646
Email : elektro@umy.ac.id

http://elektro.umy.ac.id

2. Surat izin penelitian dari Kepala Desa Sendang, Kecamatan Donorojo, Kabupaten Pacitan, Provinsi Jawa Timur.



PEMERINTAH KABUPATEN PACITAN
KECAMATAN DONOROJO
DESA SENDANG
Jalan Punung-Kalak Km 14. Sendang
KodePos 63354

SURAT IJIN PENELITIAN
Nomor : 470/ 341 /408.61.10 /2019

Yang bertanda tangan dibawah ini Kepala Desa Sendang, Kecamatan Donorojo, Kabupaten Pacitan menerangkan bahwa :

N a m a	:	FIRMANSYAH HARAHAP
Tempat/Tanggallahir	:	Batam, 12-06-1996
NIK	:	217110120996001
Jeniskelamin	:	Laki-laki.
Kebangsaan	:	Indonesia
Agama	:	Islam
No Mahasiswa	:	20150120067
Program studi	:	S1 Teknik Elektro
Judul TA/Skripsi	:	Analisis Potensi Sumber Daya Bayu dan Surya serta Perancangan Pembangkit Listrik Tenaga Hibrida (PLTH) Berbasis aplikasi Homer Di Pantai Klayar ,Pacitan

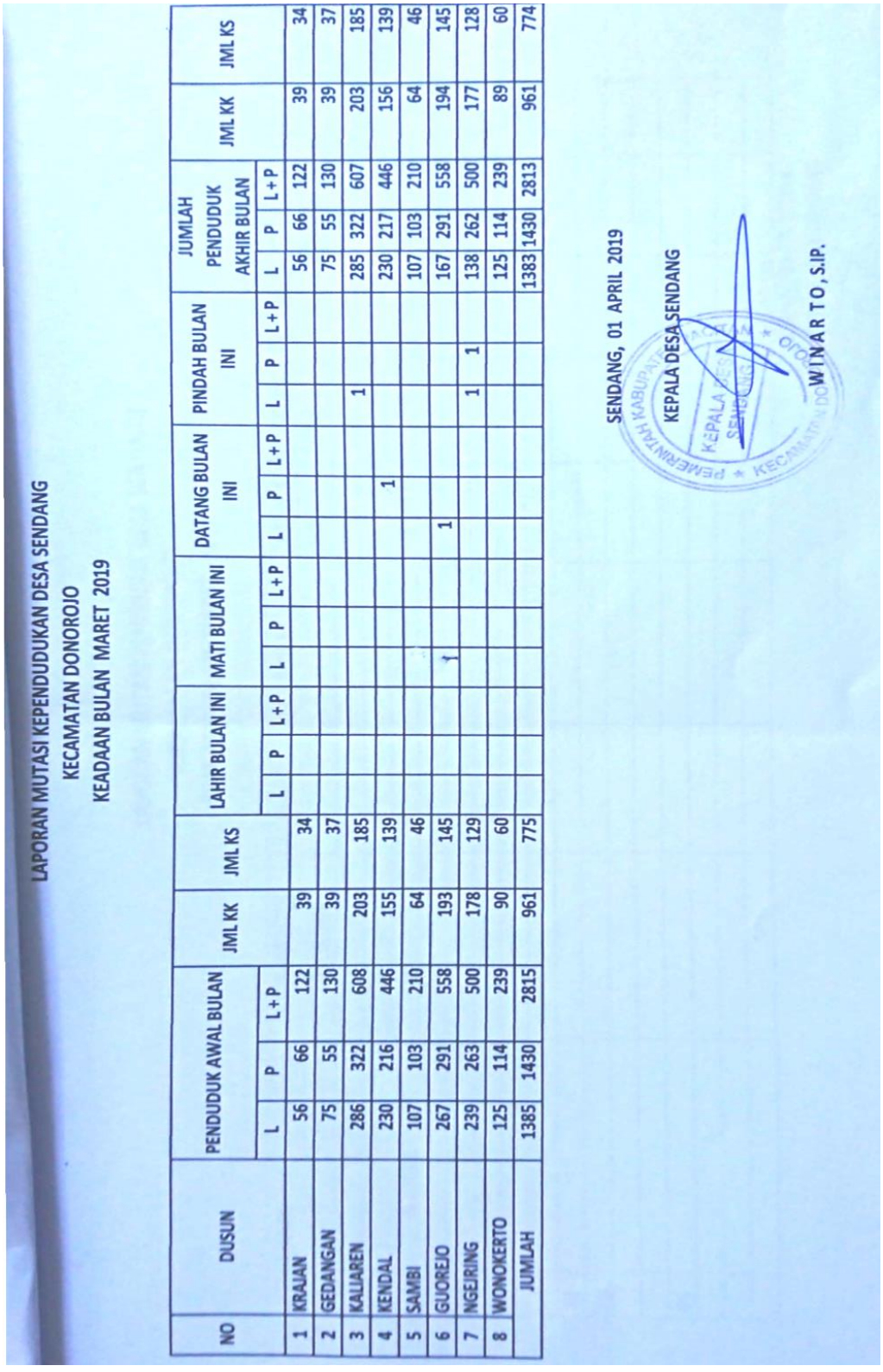
Kami Telah memberikan ijin terhadap penelitian tersebut diatas.

Demikian Surat Keterangan ini dibuat untuk dapat dipergunakan Sebagai mestinya

Sendang, 24 Juni 2019
Kepala Desa Sendang

W I N A R T O,S.IP

3. Data Kependudukan Desa Sendang, Kecamatan Donorojo, Kabupaten Pacitan, Provinsi Jawa Timur.



LAPORAN MUTASI KEPENDUDUKAN DESA SENDANG
KECAMATAN DONOROJO
KEADAAN BULAN MARET 2019

NO	DUSUN	PENDUDUK AWAL BULAN			JML KK	JML KS	LAHIR BULAN INI			MATI BULAN INI			DATANG BULAN INI			PINDAH BULAN INI			JUMLAH PENDUDUK AKHIR BULAN			JML KK	JML KS
		L	P	L+P			L	P	L+P	L	P	L+P	L	P	L+P	L	P	L+P	L	P	L+P		
1	KRAJAN	56	66	122	39	34													56	66	122	39	34
2	GEDANGAN	75	55	130	39	37													75	55	130	39	37
3	KAJIAREN	286	322	608	203	185										1			285	322	607	203	185
4	KENDAL	230	216	446	155	139								1					230	217	446	156	139
5	SAMBI	107	103	210	64	46													107	103	210	64	46
6	GUOREJO	267	291	558	193	145				1			1						167	291	558	194	145
7	NGEJRING	239	263	500	178	129										1	1		138	262	500	177	128
8	WONOKERTO	125	114	239	90	60													125	114	239	89	60
	JUMLAH	1385	1430	2815	961	775													1383	1430	2813	961	774

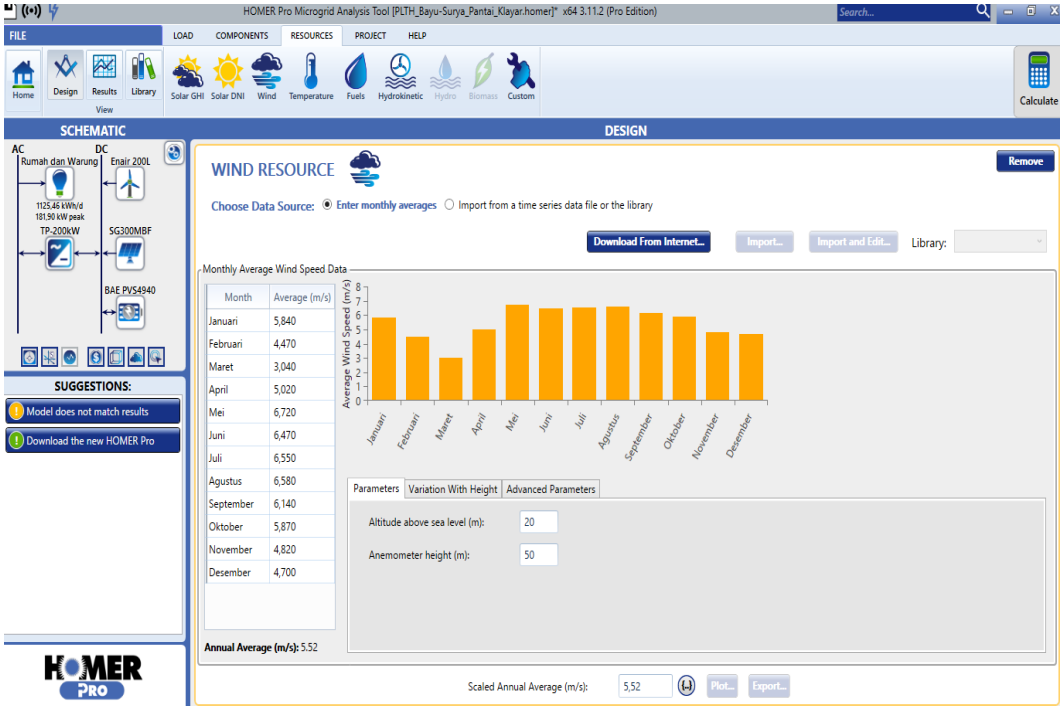
SENDANG, 01 APRIL 2019
KEPALA DESA SENDANG

W I N A R T O , S.IP.

Lampiran 2. Data Geografi

1. Peta Desa Sendang, Kecamatan Donorojo, Kabupaten Pacitan, Provinsi Jawa Timur.

2. Data Laju Angin Desa Sendang, Kecamatan Donorojo, Kabupaten Pacitan, Provinsi Jawa Timur.



3. Data Iradiasi Matahari Desa Sendang, Kecamatan Donorojo, Kabupaten Pacitan, Provinsi Jawa Timur

Lampiran 3. Data Konsumsi Energi

1. Rumah Tangga

No.	Waktu	Peralatan (W)												Jumlah (W)	
		KA-1	KA-2	K	L1-1	L1-2	L1-3	L2-1	L2-2	L2-3	MC	PN	S	T	1	140
1	00.00 - 01.00	55	55	90	0	0	0	0	0	23	0	0	0	0	223	31.220
2	01.00 - 02.00	55	55	90	0	0	0	0	0	23	0	0	0	0	223	31.220
3	02.00 - 03.00	55	55	90	0	0	0	0	0	23	0	0	0	0	223	31.220
4	03.00 - 04.00	55	55	90	0	0	0	0	0	23	0	0	0	0	223	31.220
5	04.00 - 05.00	0	0	90	14	14	14	0	0	23	0	0	0	0	155	21.700
6	05.00 - 06.00	0	0	90	14	14	14	0	0	0	0	400	0	35	567	79.380
7	06.00 - 07.00	0	0	90	0	0	0	0	0	0	0	0	0	35	125	17.500
8	07.00 - 08.00	0	0	90	0	0	0	0	0	0	0	0	0	0	90	12.600
9	08.00 - 09.00	0	0	90	0	0	0	0	0	0	360	0	0	0	450	63.000
10	09.00 - 10.00	0	0	90	0	0	0	0	0	0	0	0	0	0	90	12.600
11	10.00 - 11.00	55	0	90	0	0	0	0	0	0	0	0	350	35	530	74.200
12	11.00 - 12.00	55	0	90	0	0	0	0	0	0	0	0	0	35	180	25.200
13	12.00 - 13.00	55	0	90	0	0	0	0	0	0	0	0	0	35	180	25.200
14	13.00 - 14.00	55	0	90	0	0	0	0	0	0	0	0	0	35	180	25.200
15	14.00 - 15.00	55	0	90	0	0	0	0	0	0	0	0	0	35	180	25.200
16	15.00 - 16.00	55	0	90	0	0	0	0	0	0	0	0	0	35	180	25.200
17	16.00 - 17.00	0	0	90	0	0	0	0	0	0	0	0	0	0	90	12.600
18	17.00 - 18.00	0	0	90	0	0	0	0	0	0	0	0	0	0	90	12.600
19	18.00 - 19.00	55	55	90	14	14	14	23	23	23	0	400	0	0	711	99.540
20	19.00 - 20.00	55	55	90	14	14	14	23	23	23	0	0	0	35	346	48.440
21	20.00 - 21.00	55	55	90	14	14	14	23	23	23	0	0	0	35	346	48.440
22	21.00 - 22.00	55	55	90	14	14	14	23	23	23	0	0	0	35	346	48.440
23	22.00 - 23.00	55	55	90	14	14	14	0	0	23	0	0	0	0	265	37.100
24	23.00 - 24.00	55	55	90	0	0	0	0	0	23	0	0	0	0	223	31.220
Total (W)		880	550	2.160	98	98	98	92	92	253	360	800	350	385	6.216	870.240

Keterangan:
KA = Kipas Angin
K = Kulkas
L = Lampu
MC = Mesin Cuci
PN = Penanak Nasi
S = Setrika
T = Televisi

2. Warung Kuliner

No.	Waktu	Peralatan (W)				Jumlah (W)	
		KA	K	L	PN	1	75
1	00.00 - 01.00	0	90	14	0	104	7.800
2	01.00 - 02.00	0	90	14	0	104	7.800
3	02.00 - 03.00	0	90	14	0	104	7.800
4	03.00 - 04.00	0	90	14	0	104	7.800
5	04.00 - 05.00	0	90	14	0	104	7.800
6	05.00 - 06.00	0	90	14	0	104	7.800
7	06.00 - 07.00	0	90	0	400	490	36.750
8	07.00 - 08.00	0	90	0	0	90	6.750
9	08.00 - 09.00	0	90	0	0	90	6.750
10	09.00 - 10.00	0	90	0	0	90	6.750
11	10.00 - 11.00	0	90	0	0	90	6.750
12	11.00 - 12.00	55	90	0	400	545	40.875
13	12.00 - 13.00	55	90	0	0	145	10.875
14	13.00 - 14.00	55	90	0	0	145	10.875
15	14.00 - 15.00	55	90	0	0	145	10.875
16	15.00 - 16.00	55	90	0	0	145	10.875
17	16.00 - 17.00	0	90	0	0	90	6.750
18	17.00 - 18.00	0	90	0	0	90	6.750
19	18.00 - 19.00	0	90	14	0	104	7.800
20	19.00 - 20.00	0	90	14	0	104	7.800
21	20.00 - 21.00	0	90	14	0	104	7.800
22	21.00 - 22.00	0	90	14	0	104	7.800
23	22.00 - 23.00	0	90	14	0	104	7.800
24	23.00 - 24.00	0	90	14	0	104	7.800
Total (W)		275	2.160	168	800	3.403	255.225

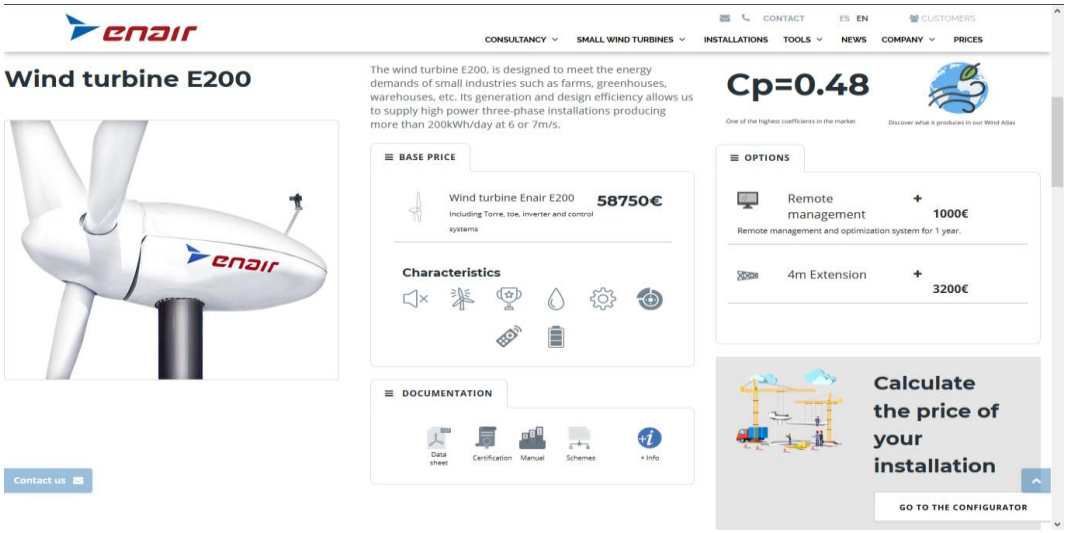
Keterangan:
KA = Kipas Angin
K = Kulkas
L = Lampu
PN = Penanak Nasi

3. Rumah Tangga dan Warung Kuliner

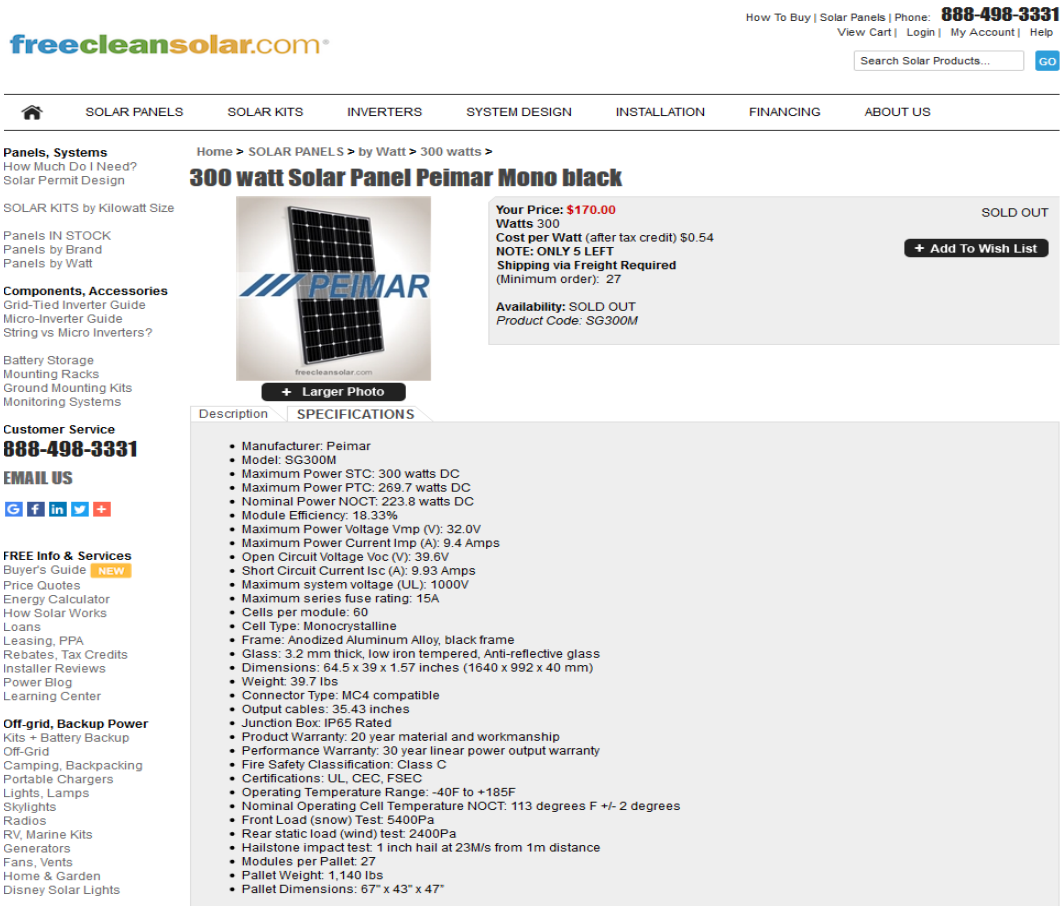
No.	Waktu	Jumlah (W)		
		RT	WK	Gabungan
1	00.00 - 01.00	31.220	7.800	39.020
2	01.00 - 02.00	31.220	7.800	39.020
3	02.00 - 03.00	31.220	7.800	39.020
4	03.00 - 04.00	31.220	7.800	39.020
5	04.00 - 05.00	21.700	7.800	29.500
6	05.00 - 06.00	79.380	7.800	87.180
7	06.00 - 07.00	17.500	36.750	54.250
8	07.00 - 08.00	12.600	6.750	19.350
9	08.00 - 09.00	63.000	6.750	69.750
10	09.00 - 10.00	12.600	6.750	19.350
11	10.00 - 11.00	74.200	6.750	80.950
12	11.00 - 12.00	25.200	40.875	66.075
13	12.00 - 13.00	25.200	10.875	36.075
14	13.00 - 14.00	25.200	10.875	36.075
15	14.00 - 15.00	25.200	10.875	36.075
16	15.00 - 16.00	25.200	10.875	36.075
17	16.00 - 17.00	12.600	6.750	19.350
18	17.00 - 18.00	12.600	6.750	19.350
19	18.00 - 19.00	99.540	7.800	107.340
20	19.00 - 20.00	48.440	7.800	56.240
21	20.00 - 21.00	48.440	7.800	56.240
22	21.00 - 22.00	48.440	7.800	56.240
23	22.00 - 23.00	37.100	7.800	44.900
24	23.00 - 24.00	31.220	7.800	39.020
Total (W)		870.240	255.225	1.125.465
Ketrangan:				
RT = Rumah Tangga				
WK = Warung Kuliner				

Lampiran 4. Harga Komponen

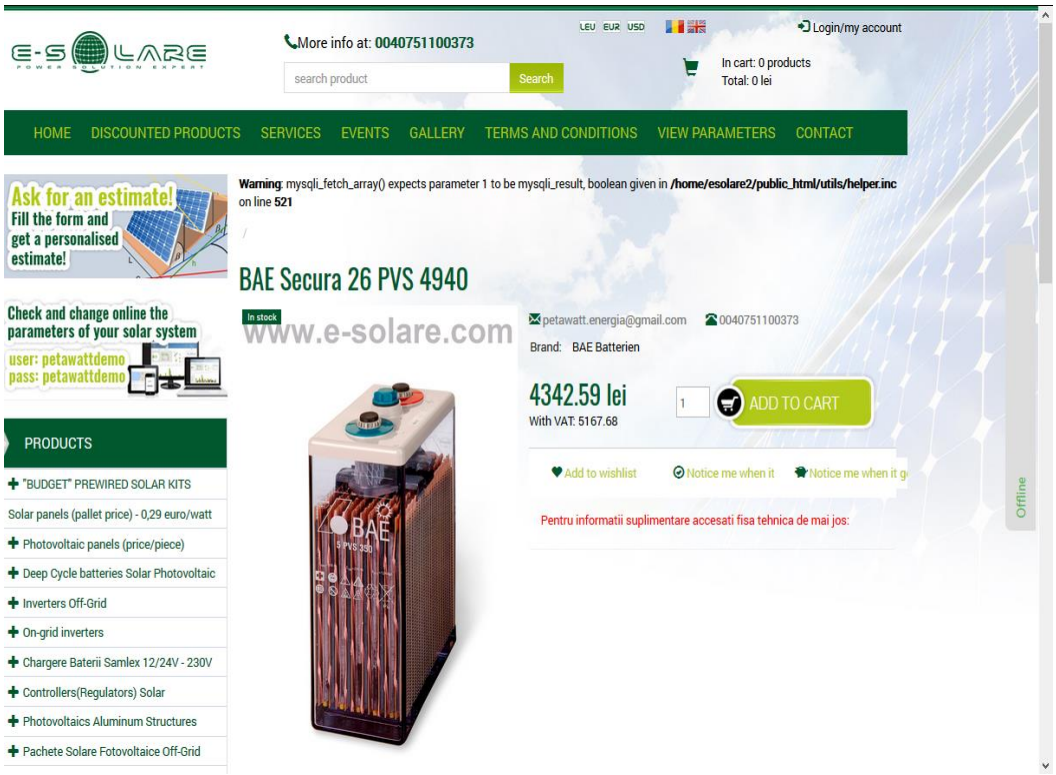
1. Harga Turbin Angin



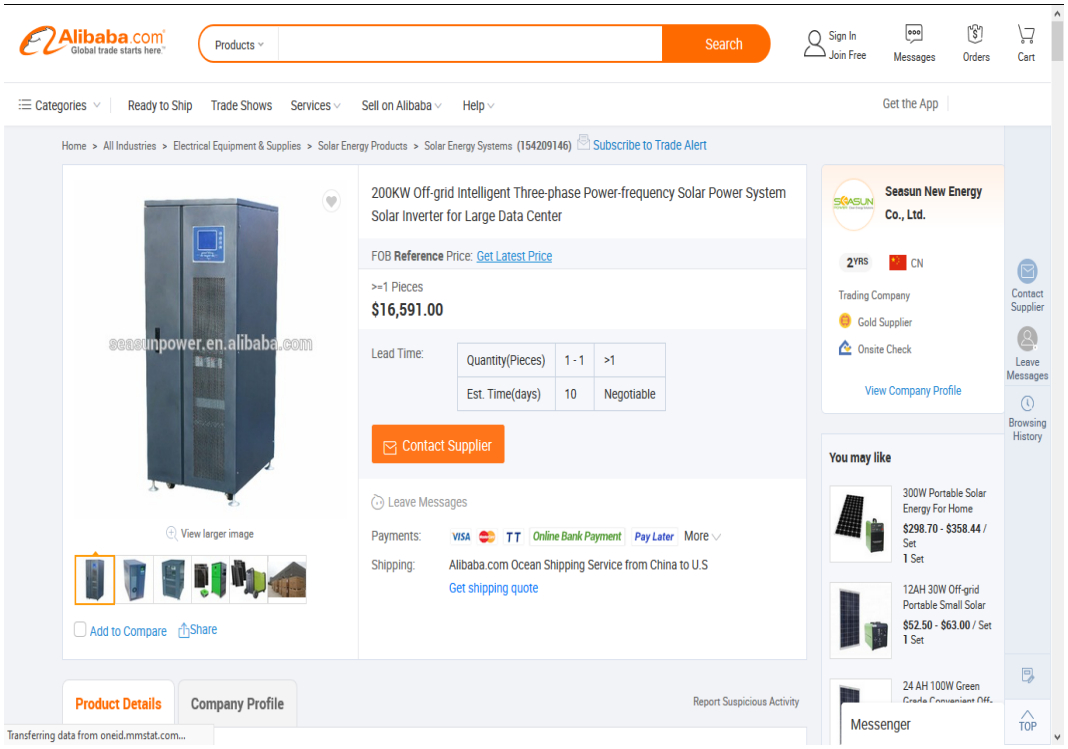
2. Harga Panel Surya



3. Harga Baterai

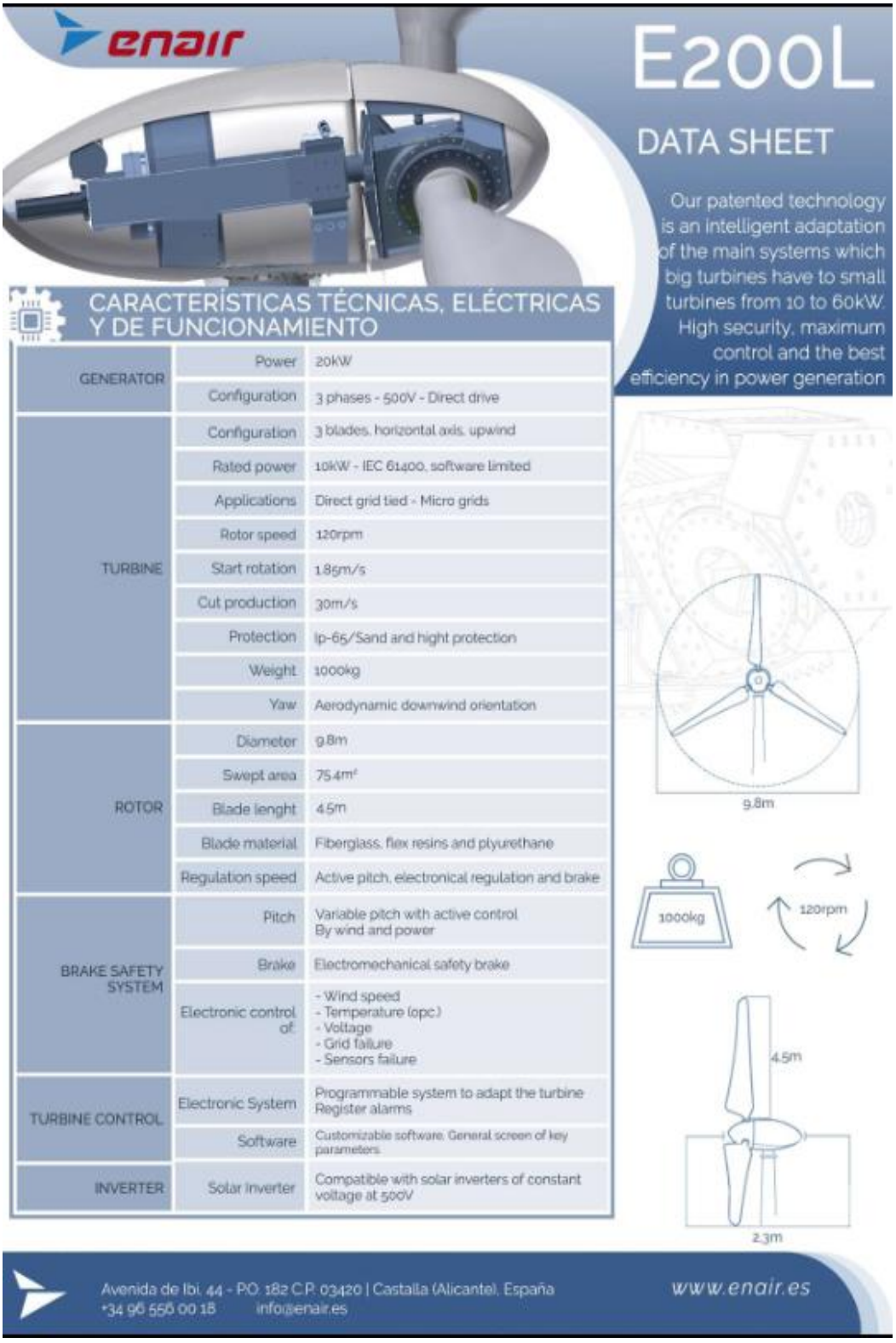


4. Harga Inverter



Lampiran 5. Spesifikasi Komponen

1. Spesifikasi Turbin Angin



enair

E200L Wind Turbine
DATA SHEET

THE HIGHEST TECHNOLOGY IN SMALL WIND TURBINES

ACTIVE PITCH CONTROL

Patented technology
Characteristics:
- Sturdiness
- High endurance
- Full angle pitch control
- Spring passive security, if any fault
- Hidraulic control

Scalable technology from 5 to 100kW of power
- Simple
- Very secure and fully controlled

ELECTRONIC CONTROL

Multi-program functions
Full control of:
- rpm
- Nm
- Hz
- V AC/DC voltage
- m/s

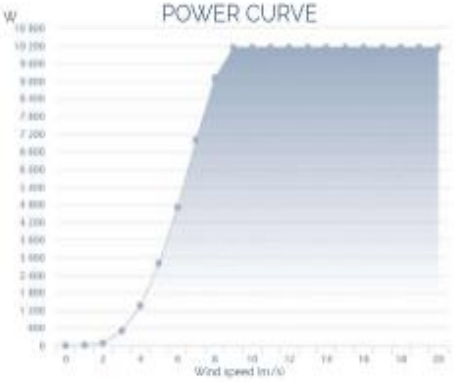
Reads all the turbine parameters, which let you decide the best actions in external controls to optimize your production and security.

The software enables diferent types of behaviours depending on the wind conditions to increase the eciency.

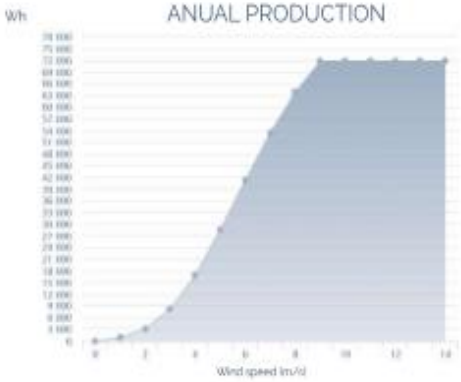
Service Life 25 years!!

CLASS I WIND TURBINE
IEC 61400-2/NVI-A

POWER CURVE



ANUAL PRODUCTION



ACTIVE PITCH AND PASSIVE PROTECTION

The active pitch control enables the position of the blade for production to vary for each engine rotation speed and wind speed from the beginning up to high wind speed.
The benets of mechanical simplicity and advanced electronics are combined to make a perfect tandem and maximize energy production.

THE CFD AND AERODYNAMIC DESIGNS

For the full wind turbine design it has been done a complex aerodynamic study based on the most modern techniques of computational uid dynamics.
In this case, the studies required a very hight computing capacity and expert knowledge because the conditions are complex due to the wind turbines operation conditions.

MONITORING SYSTEM

To say that our product is the best, it is necessary to prove it, so we have chosen to provide a complete monitoring system of various parameters of the wind turbine to left the user to check the production and it condition, even from the Internet, without being on site.

** This system is optional and customizable in several levels.

* The technical specifications described in this document are subject to modifications / changes without prior notice from the manufacturer. ** The images that appear in this document are not contractual.

Silent
The aerodynamic profile of the blades is based in the FX profile series, and its design is for magnimize production and minimize noise.

Efficiency
The control system allows to extract the power maximum available since the start of rotation and can adapt to any environment.

Greater safety than ever
3 security systems, active and passive: electromechanical active brake, aerodynamic and passive dock, which actin any condition.

Waterproof
The materials used are made with a tropicalization treatment to install in islands, deserts or aggressive environments.

High endurance
According to IEC 61400-2 the design of the wind turbine is classed as Class I, with safety factors in the critics components of an Fs = 9.

Ibi Avenue, 44 - P.O. 182 C.P. 03420 | Castalla (Alicante), Spain
+34 96 556 00 18 info@enair.es
www.enair.es

2. Spesifikasi Panel Surya

FULL BLACK LINE

SG290/300M (FB)

"MADE IN ITALY" MODULE

PEIMAR monocrystalline solar panels, produced using a combination of innovative production processes and advanced engineering techniques, provide customers with maximum output and super high performance (over 20% efficiency). This allows fewer panels to be used to generate more energy, ideal if space is restricted or environmental conditions are challenging. Modern design, using matching black cells, backsheet and frames and a very long lifespan ensure this monocrystalline are a great option.

*Thanks to the use of PERC cells, PEIMAR modules are able to reach even higher efficiences, as they facilitate the light imprisonment in close proximity to the rear surface and optimise the electron capture.

- POSITIVE POWER OUTPUT TOLERANCE
- MODULE FIRE PERFORMANCE: CLASS I
- ANTI-REFLECTIVE GLASS
- HAILSTORM RESISTANCE

CELLS

60 MONO

QTY: 60 CELLS
TYPE: MONO 5BB
PERC TECHNOLOGY
DIMENSION: 156x156 mm / 6x6"

FRAME

BACKSHEET

JUNCTION BOX

IP67

FULL BLACK LINE

ELECTRICAL CHARACTERISTICS (STC)*

	SG290M (FB)	SG300M (FB)
Nominal Output (Pmax)	290 W	300 W
Flash Test Power Tolerance	0/+5 W	0/+5 W
Voltage at Pmax (Vmp)	31.6 V	32 V
Current at Pmax (Imp)	9.18 A	9.4 A
Open Circuit Voltage (Voc)	39.5 V	40.2 V
Short Circuit Current (Isc)	9.55 A	9.71 A
Maximum System Voltage	1500 V	1500 V
Maximum Series Fuse Rating	15 A	15 A
Module Efficiency	17.83%	18.44%

MECHANICAL CHARACTERISTICS

Solar Cells	60 (6x10) monocrystalline PERC
Solar Cells Size	156x156 mm / 6x6"
Front Cover	3.2 mm / 0.12" thick, low iron tempered glass
Back Cover	TPT (Tedlar-PET-Tedlar)
Encapsulant	EVA (Ethylene vinyl acetate)
Frame	Anodized aluminium alloy, double wall
Frame finishing	Black
Backsheet finishing	Black
Diodes	3 Bypass diodes serviceable
Junction Box	IP67 rated
Connector	MC4 or compatible connector
Cables Length	900 mm / 35.4"
Cables Section	4.0 mm² / 0.006 in²
Dimensions	1640x992x40 mm / 64.5x39x1.57"
Weight	18 Kg / 39.7 lbs
Max. Load	Certified to 5400 Pa

TEMPERATURE CHARACTERISTICS

NOCT**	45±2 °C
Temperature Coefficient of Pmax	-0.42 %/°C
Temperature Coefficient of Voc	-0.32 %/°C
Temperature Coefficient of Isc	0.047 %/°C
Operating Temperature	-40 °C – +85°C

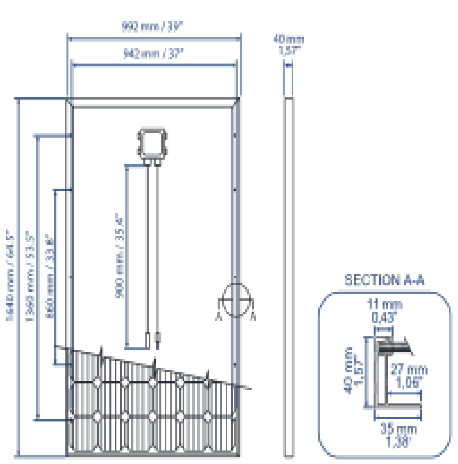
PACKAGING***

Pallet dimensions	1700x1200x1200 mm / 67x47x47"
Pieces per pallet	27
Weight	516 Kg / 1138 lbs

CERTIFICATIONS

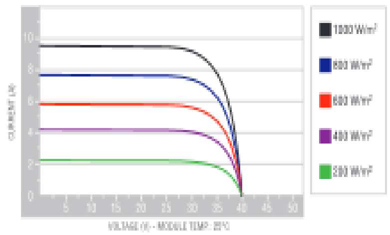
Fire Resistance Rating	Class C (for ULC/ORD C1703 01)
Module fire performance	Type 1 (for UL 1703)

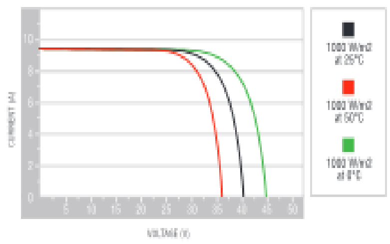
DIMENSIONS



CURRENT/VOLTAGE CHARACTERISTICS

Values apply to modules: SG300M (FB)





*STC: (Standard Test Condition) Irradiance 1000W/m²; Module Temperature 25°C; Air Mass 1.5

**NOCT: (Nominal Operation Cell Temperature) Sun 800W/m²; Air 20°C; Wind speed 1m/s

***Pallets can be stacked up to two

It is important to point out, that all technical specifications, information and figures contained in this datasheet are estimated values. Peimar reserves the right to change the technical specifications, information and figures contained in this document at any time without notice.

US_VFBS1_08/2018

available at SolarPanelStore.com

PEIMAR
ITALIAN PHOTOVOLTAIC MODULES

Via Creta 72, 25124 Brescia, ITALY • www.peimar.com • info@peimar.com

3. Spesifikasi Baterai

BAE *Secura PVS solar*

Technical Specification for Vented Lead-Acid Batteries (VLA)

1. Application

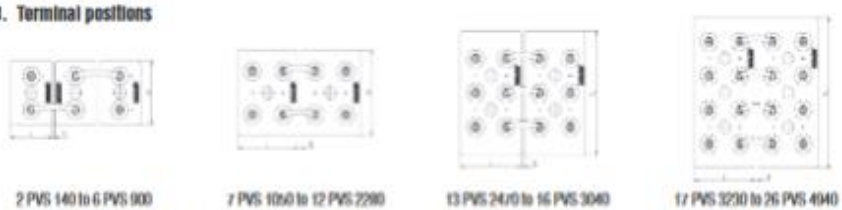
BAE *Secura PVS solar* batteries need only low maintenance and are used to store electric energy in medium and large solar photovoltaic installations.
Due to the robust tubular plate design BAE PVS batteries are excellent suited for highest requirements regarding cycling ability and long life-time.

2. Technical data (Reference temperature 20 °C)

Type	$C_{1\,h}$ Ah	$C_{10\,h}$ Ah	$C_{100\,h}$ Ah	$C_{120\,h}$ Ah	$C_{168\,h}$ Ah	$C_{240\,h}$ Ah	$C_{240\,h}$ Ah	R_i 1) mΩ	I_k 2) kA	Length (L) mm	Width (W) mm	Height (H) mm	Weight dry kg	Weight filled kg
U_n V/cell	1.67	1.80	1.80	1.80	1.80	1.80	1.80							
2 PVS 140	63	111	127	141	143	144	148	1.52	1.37	105	208	420	9.1	14.5
3 PVS 210	95	167	191	211	215	217	222	1.06	1.96	105	208	420	11.2	16.4
4 PVS 280	127	223	254	282	287	289	295	0.84	2.46	105	208	420	12.8	18.0
5 PVS 350	159	279	318	352	359	361	369	0.70	2.98	126	208	420	15.3	21.7
6 PVS 420	191	334	382	424	431	434	444	0.60	3.47	147	208	420	18.1	25.7
5 PVS 550	223	389	432	486	496	500	513	0.57	3.61	126	208	535	20.0	28.8
6 PVS 660	267	467	518	583	595	601	616	0.49	4.18	147	208	535	23.5	34.0
7 PVS 770	310	544	604	681	694	700	720	0.44	4.69	168	208	535	26.8	39.1
6 PVS 900	352	665	748	856	877	888	916	0.47	4.41	147	208	710	33.0	47.4
7 PVS 1050	415	777	872	993	1,020	1,033	1,065	0.36	5.66	215	193	710	42.1	61.5
8 PVS 1200	473	886	996	1,137	1,160	1,178	1,216	0.32	6.36	215	193	710	46.6	65.4
9 PVS 1350	522	992	1,116	1,274	1,300	1,320	1,365	0.33	6.20	215	235	710	51.4	75.4
10 PVS 1500	585	1,100	1,240	1,418	1,450	1,464	1,516	0.28	7.25	215	235	710	56.0	79.4
11 PVS 1650	635	1,210	1,362	1,555	1,590	1,608	1,665	0.28	7.36	215	277	710	61.0	89.6
12 PVS 1800	698	1,320	1,486	1,699	1,740	1,752	1,816	0.24	8.41	215	277	710	65.4	93.4
11 PVS 2090	790	1,470	1,636	1,836	1,870	1,884	1,941	0.24	8.38	215	277	855	72.7	105.9
12 PVS 2280	869	1,600	1,784	2,001	2,040	2,052	2,116	0.22	9.48	215	277	855	77.4	110.4
13 PVS 2470	978	1,740	1,938	2,174	2,210	2,232	2,292	0.16	13.03	215	400	815	90.8	137.8
14 PVS 2660	1,051	1,880	2,080	2,332	2,380	2,400	2,448	0.15	13.82	215	400	815	95.3	142.4
15 PVS 2850	1,123	2,010	2,220	2,498	2,550	2,568	2,640	0.14	14.43	215	400	815	100.2	146.9
16 PVS 3040	1,196	2,140	2,380	2,664	2,710	2,736	2,808	0.13	15.20	215	400	815	105.4	151.6
17 PVS 3230	1,280	2,290	2,540	2,858	2,910	2,940	3,000	0.12	16.91	215	490	815	117.7	175.1
18 PVS 3420	1,352	2,420	2,680	3,024	3,080	3,108	3,192	0.11	17.55	215	490	815	121.9	179.1
19 PVS 3610	1,425	2,560	2,840	3,189	3,250	3,276	3,360	0.11	18.36	215	490	815	126.8	183.6
20 PVS 3800	1,496	2,690	2,980	3,355	3,420	3,444	3,528	0.11	18.92	215	490	815	132.0	188.3
22 PVS 4180	1,635	2,950	3,280	3,686	3,750	3,780	3,888	0.10	19.92	215	580	815	145.4	213.9
24 PVS 4560	1,777	3,220	3,560	4,010	4,090	4,128	4,224	0.09	21.26	215	580	815	155.2	223.0
26 PVS 4940	1,917	3,480	3,860	4,341	4,420	4,464	4,584	0.09	22.49	215	580	815	165.0	232.0

1, 2) Internal resistance R_i and short circuit current I_k according to IEC 60896-11
Height (H) is the maximum height between container bottom and top of the bolts in assembled condition.
BAE *Secura PVS solar* batteries are also available as dry pre-charged version. They are filled with additional "IG", e.g. 4 PVS 280 IG.
All values given in the table correspond to 100 % DOD without voltage drop of connectors. Please consider item 7.

3. Terminal positions



2 PVS 140 to 6 PVS 900 | 7 PVS 1050 to 12 PVS 2280 | 13 PVS 2470 to 16 PVS 3040 | 17 PVS 3230 to 26 PVS 4940

Terminals are designed as female poles with brass inlay M10 for flexible insulated copper cables with cross-section 25, 35, 50, 70, 95 or 120 mm² or insulated solid copper connectors with cross-section 90, 150 or 300 mm².

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Technical Specification for BAE *SECURA PVS solar*

4. Design

Positive electrode	tubular-plate with a woven polyester gauntlet and solid grids in a corrosion-resistant PbSbSnSe-low antimony alloy
Negative electrode	grid-plate in a low antimony alloy with long-life expander material
Separation	microporous separator
Electrolyte	sulphuric acid with a density of 1.24 kg/l at 20 °C (68 °F)
Container	high impact, transparent SAN (Styrol-Acrylic-Nitrile), UL-94 rating: HB
Lid	high impact SAN in dark grey colour (colour may vary slightly from given image), UL-94 rating: HB
Plugs	labyrinth plugs for arresting aerosols, optional ceramic plugs or ceramic funnel plugs according to DIN 40740
Pole-bushing	100 % gas- and electrolyte-tight, sliding, plastic-coated "Panzerpol"
Kind of protection	IP 25 regarding EN 60529, touch protected according to VBG 4

5. Installation

BAE *SECURA PVS solar* batteries are designed for indoor applications.
For outdoor applications please contact BAE.

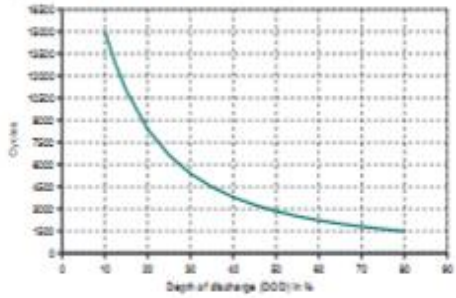
6. Maintenance

Every 6 months	check battery voltage, pilot cell voltages, temperatures
Every 12 months	check connections, record battery voltage, cell voltages and temperatures
Every 3 years	average water-refilling interval (depending on utilization and ambient temperature)

7. Operational data

Depth of discharge (DOD)	max. 80 % (U_e = 1.91 V/cell for discharge times >10 h; 1.74 V/cell for 1 h) deep discharges of more than 80 % DOD have to be avoided
Initial charge current (I or bulk phase)	unlimited, the minimal charge current has to be 5 A/100 Ah C_{10}
Charge voltage at cyclic operation	restricted from 2.30 V to 2.40 V per cell, operating instruction is to be observed
Float voltage/non cyclic voltage	2.23 V/cell
Adjustment of charge voltage	no adjustment necessary if battery temperature is between 10 °C and 30 °C (50 °F and 86 °F) in the monthly average, otherwise $\Delta U/\Delta T$ = -0.003 V/cell per K
Recharge to 100 %	within a period of 1 up to 4 weeks
IEC 61427 cycles	3,150 (A+B) at 40 °C (104 °F)
Battery temperature	-20 °C to 55 °C (-4 °F to 131 °F), recommended temperature range 10 °C to 30 °C (50 °F to 86 °F)
Self-discharge	approx. 3 % per month at 20 °C (68 °F)

8. Number of cycles as function of Depth of discharge



9. Transport

Batteries are not subject to ADR (road transport), if the conditions of Special Provision 598 (Chapter 3.3) are observed.
These cells/batteries are dangerous goods on sea transport. Declaration and packaging must comply with the requirements of IMDG-Codes.

10. Standards

Test standards	IEC 60896-11, IEC 61427
Safety standard, ventilation	EN 50272-2

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4. Spesifikasi Inverter

Product Description | Product Recommended | Certifications | Our advantage | Company Information | Pr

Rated capacity	10kW	20kW	30kW	40kW	60kW	80kW	100kW	150kW	200kW
Operation mode and principle	PWN (pulse width modulation)based on DSP accurate control technology and double built-in MCUs complete isolation of the output power supply								
AC input phase number	three-phase + N+G								
AC input voltage	AC 220V/AC 382V±20%								
AC input frequency	50hz/60hz±5%								
DC voltage	DC 192V/DC 220V/DC 240V/DC 384V(16 to 32 pieces of 12V batteries)								
Floating battery	13.6V of each battery*battery quantity (13.6V*16 batteries=217.6)								
Cut-off voltage	10.8v of each battery *battery quantity (10.8V*16 batteries=172.8V)								
Phase number	three-phase +N+G								
AC output voltage	AC 220V/AC 380V±1% (steady load)								
AC output frequency	50hz/60hz±5% (main supply) 50hz±0.01%								
Efficiency	≥95% (load:100%)								
output waveform	sine wave								
THD	linear load:<3%.non-linear load:<5%								
Dynamic load voltage transient	<±5%(jump from 0 to 100%)								
Instant recovery time	<10ms								
time of switching between the battery and the mains supply	3s-5s								
Unbalanced voltage	<±3% <±1% (balanced load voltage)|								
Overload capacity	120%,20s;>150%,100ms								
Operation efficiency	≥95% (load: 100%)								
Computer communication interface	RS232/RS485(SNMP remote monitoring network adapter)								
Operating temperature	-10-40℃								
Relative humidity	0-90% (no condensation)								
Noise	40-50dB				50-60dB			60-70dB	