



CATALOGUE 2008
ELECTROSOLAR

Global Warming cause - Greenhouse Effect

As everyone knows the traditional power sources are the largest contributor to air pollution. This pollution has severe health and environmental effects and contributes to visibility problems in scenic areas.

Global warming is causing a rise in sea levels, and this leads to a loss of coastal wetlands, erosion of shorelines, and increased flooding in coastal areas. Local and regional climate shifts can also have severe impacts on ecosystems and agriculture. The greenhouse effect and global warming continued at such levels that they resulted in worldwide catastrophe and disaster, including multiple hurricanes, tornadoes, tidal waves, floods and the beginning of the next Ice Age.

The fuels are no neverending. Rising prices for oil hurts economy and peoples budgets. Gas became a tool of politics. Nations starts to worry about their energetically future. This same time billions of Giga Watts of power comes to Earth from the sun.

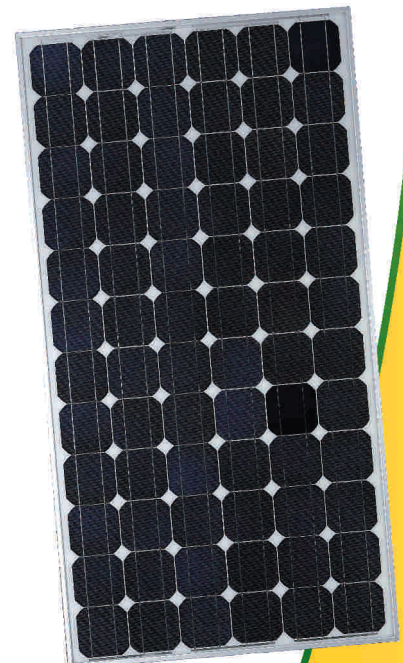
ORVALDI ElectroSolar systems also known as photovoltaic (PV). While they're operating, ORVALDI Electrosolar systems produce no air pollution, find out more about PV and air pollution. ElectroSolar power produces no greenhouse gases, so it can to reduce global warming, hazardous waste, or noise, and they require no transportable fuels. Because of these benefits, PV can play an important role in mitigating environmental problems. Compared with electricity generated from fossil fuels, each kilowatt of PV-produced electricity offsets up to 830 pounds of oxides of nitrogen, 1,500 pounds of sulfur dioxide, and 217,000 pounds of carbon dioxide, every year, according to a report from the National Renewable Energy Laboratory (Herig 2000).





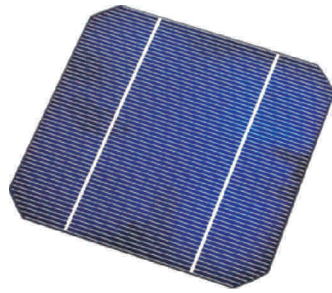
ORVALDI Electrosolar or Photovoltaics, or PV for short, is a technology in which light is converted into electrical power. A solar cell is a kind of semiconductor device that takes advantage of the photovoltaic effect, in which electricity is produced when the semiconductor's PN junction is irradiated. Photons in sunlight hit the solar panel and are absorbed by semiconducting materials, such as silicon. Electrons (negatively charged) are knocked loose from their atoms, allowing them to flow through the material to produce electricity. The complementary positive charges that are also created (like bubbles) are called holes and flow in the direction opposite of the electrons in a silicon solar panel. The electrons that are set free pulled through the electric field and into the N-area. The holes produced move in the other direction, into the P-area. This whole process is called the photovoltaic effect. When the outside circuit is closed, electricity flows.

All solar cells require a light absorbing material contained within the cell structure to absorb photons and generate electrons via the photovoltaic effect. The materials used in solar cells tend to have the property of preferentially absorbing the wavelengths of solar light that reach the earth surface; however, some solar cells are optimized for light absorption beyond Earth's atmosphere as well. Light absorbing materials can often be used in multiple physical configurations to take advantage of different light absorption and charge separation mechanisms. Many currently available solar cells are configured as bulk materials that are subsequently cut into wafers and treated in a „top-down“ method of synthesis (silicon being the most prevalent bulk material). Other materials are configured as thin-films (inorganic layers, organic dyes, and organic polymers) that are deposited on supporting substrates, while a third group are configured as nanocrystals and used as quantum dots (electron-confined nanoparticles) embedded in a supporting matrix in a „bottom-up“ approach. Silicon remains the only material that is well-researched in both bulk and thin-film configurations.



ORVALDI Electrosolar

Type 5" Monocrystalline Cells

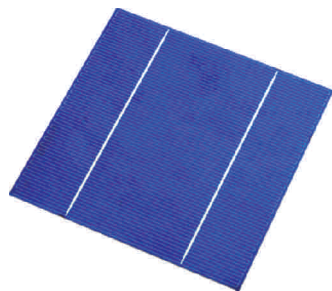


Dimension	125mm x 125mm \pm 0.5 mm
Thickness (Si)	210 μ m \pm 40 μ m
Front Side	Silicon nitride anti-reflection coating 1.5mm silver busbar
Back Side	Full surface aluminum back-surface-field 4.5mm (silver/aluminum) continuous soldering pads

Model	Effeciency	Power	Maximum PowerCurrent	Maximum PowerVoltage	Short CircuitCurrent	Open CircuitVoltage
	Eff (%)	Ppm (W)	Ipm (A)	Vpm (V)	Isc (A)	Voc (V)
TS-125-I3	13-14	1.92-2.08	4.11	0.481	4.7	0.6
TS-125-M1	14-14.5	2.08-2.14	4.23	0.486	4.76	0.6
TS-125-M2	14.5-14.75	2.14-2.18	4.28	0.489	4.82	0.602
TS-125-M3	14.75-15	2.18-2.22	4.33	0.492	4.87	0.602
TS-125-M4	15-15.25	2.22-2.25	4.39	0.495	4.92	0.604
TS-125-M5	15.25-15.5	2.25-2.28	4.45	0.498	4.96	0.604
TS-125-E1	15.5-16	2.28-2.38	4.56	0.503	5.06	0.606
TS-125-E2	16-16.5	2.38-2.45	4.67	0.509	5.16	0.611
TS-125-E3	16.5-17	2.45-2.51	4.77	0.515	5.24	0.613
TS-125-E4	17-18	2.51-2.62	5	0.526	5.45	0.618

* Under standard test condition : 1000W/m², AM 1.5, 25°C

Type 5" Multicrystalline Cells

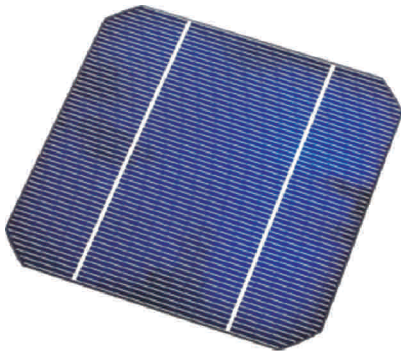


Dimension	125mm x 125mm \pm 0.5 mm
Thickness (Si)	210 μ m \pm 40 μ m
Front Side	Silicon nitride anti-reflection coating 1.5mm silver busbar
Back Side	Full surface aluminum back-surface-field 4.5mm (silver/aluminum) continuous soldering pads

Model	Effeciency	Power	Maximum PowerCurrent	Maximum PowerVoltage	Short CircuitCurrent	Open CircuitVoltage
	Eff (%)	Ppm (W)	Ipm (A)	Vpm (V)	Isc (A)	Voc (V)
TM-125-I3	13-14	2.03-2.19	4.36	0.474	4.83	0.596
TM-125-M1	14-14.5	2.19-2.26	4.48	0.48	4.92	0.6
TM-125-M2	14.5-14.75	2.26-2.29	4.54	0.483	4.98	0.602
TM-125-M3	14.75-15	2.29-2.34	4.60	0.487	5.05	0.604
TM-125-M4	15-15.25	2.34-2.38	4.66	0.49	5.06	0.606
TM-125-M5	15.25-15.5	2.38-2.41	4.72	0.493	5.12	0.608
TM-125-E1	15.5-15.75	2.41-2.45	4.78	0.496	5.18	0.609
TM-125-E2	17.75-16	2.45-2.5	4.84	0.499	5.23	0.611
TM-125-E3	16-16.5	2.5-2.58	4.96	0.505	5.32	0.613
TM-125-E4	16.5-17	2.58-2.65	5.07	0.511	5.4	0.615

* Under standard test condition : 1000W/m², AM 1.5, 25°C

Type 6" Monocrystalline Cells

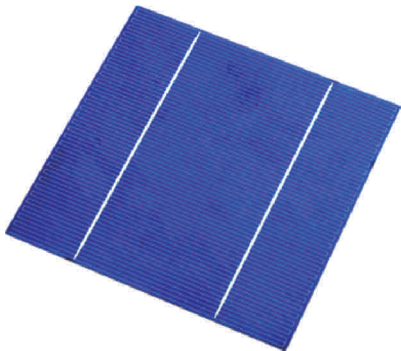


Dimension	156 mm x 156mm \pm 0.5 mm
Thickness (Si)	210 μ m \pm 40 μ m
Front Side	Silicon nitride anti-reflection coating 1.5 mm silver busbar
Back Side	Full surface aluminum back-surface-field 4.5 mm (silver/aluminum) continuous soldering pads

Model	Efficiency	Power	Maximum PowerCurrent	Maximum PowerVoltage	Short CircuitCurrent	Open CircuitVoltage
	Eff (%)	Ppm (W)	Ipm (A)	Vpm (V)	Isc (A)	Voc (V)
TS-156-I1	14-15	3.34-3.58	7.18	0.483	8.1	0.609
TS-156-M4	15-15.25	3.58-3.64	7.37	0.488	8.18	0.613
TS-156-M5	15.25-15.5	3.64-3.7	7.45	0.492	8.21	0.614
TS-156-E1	15.5-15.75	3.7-3.76	7.52	0.495	8.24	0.615
TS-156-E2	15.75-16	3.76-3.82	7.6	0.498	8.27	0.616
TS-156-E3	16-16.25	3.82-3.88	7.68	0.501	8.29	0.616
TS-156-E4	16.25-16.5	3.88-3.94	7.75	0.504	8.32	0.617
TS-156-E5	16.5-16.75	3.94-3.97	7.83	0.508	8.35	0.618
TS-156-E6	16.75-17	4-4.05	7.91	0.511	8.38	0.619
TS-156-E7	17-17.25	4.05-4.12	7.99	0.514	8.41	0.62
TS-156-ET	>17.25	>4.12	>8.05	>0.517	>8.43	>0.62

* Under standard test condition : 1000W/m², AM 1.5, 25°C

Type 6" Multicrystalline Cells



Dimension	156 mm x 156mm \pm 0.5 mm
Thickness (Si)	210 μ m \pm 40 μ m
Front Side	Silicon nitride anti-reflection coating 1.5 mm silver busbar
Back Side	Full surface aluminum back-surface-field 4.5 mm (silver/aluminum) continuous soldering pads

Model	Efficiency	Power	Maximum PowerCurrent	Maximum PowerVoltage	Short CircuitCurrent	Open CircuitVoltage
	Eff (%)	Ppm (W)	Ipm (A)	Vpm (V)	Isc (A)	Voc (V)
TM-156-I3	13-14	3.16-3.4	6.89	0.476	7.59	0.596
TM-156-M1	14-14.5	3.4-3.52	7.13	0.485	7.76	0.599
TM-156-M2	14.5-14.75	3.52-3.58	7.25	0.49	7.84	0.602
TM-156-M3	14.75-15	3.58-3.65	7.33	0.493	7.9	0.604
TM-156-M4	15-15.25	3.65-3.71	7.41	0.496	7.97	0.606
TM-156-M5	15.25-15.5	3.71-3.77	7.49	0.499	8.03	0.608
TM-156-E1	15.5-15.75	3.77-3.83	7.51	0.502	8.07	0.61
TM-156-E2	15.75-16	3.83-3.89	7.54	0.505	8.11	0.612
TM-156-ET	>16	>3.89	>7.56	>0.507	>8.13	>0.612

* Under standard test condition : 1000W/m², AM 1.5, 25°C

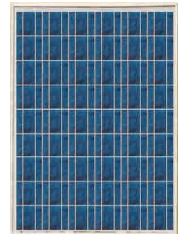
ORVALDI Electrosolar



PPV-085M5
Multi-crystal



PPV-085M5
Mono-crystal



PPV-196M6
Multi-crystal

ELECTRICAL CHARACTERISTICS

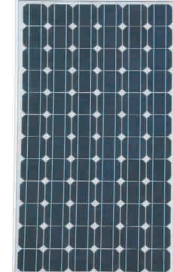
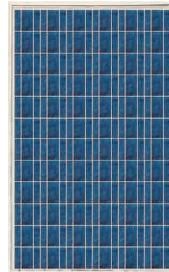
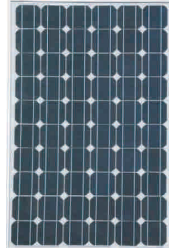
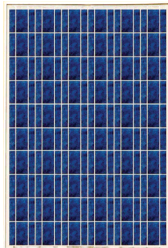
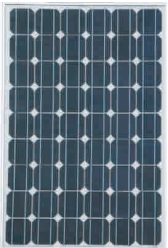
Maximum power (Pmax)	175W	182W	196W
Voltage @ Pmax (Vpm)	37.0V	23.95V	26.67V
Current @ Pmax (Ipm)	4.73A	7.6A	7.36A
Open circuit voltage (Voc)	43.9V	29.32V	32.5V
Short circuit current (Isc)	5.1A	8.15A	7.86A
Output tolerance	+/- 5%	+/- 5%	+/- 5%
Maximum system voltage	1000 Vdc	1000 Vdc	1000 Vdc
Series fuse rating	10A	10A	10A
Application	DC 24V system	DC 24V system	DC 24V system
system Cell	5" Mono-crystalline silicon	6" Mono-crystalline silicon	6" Multi-crystalline silicon
No. of cells and connections	72 PCS in series (6 x 12)	48 PCS in series (6 x 8)	54 PCS in series (6 x 9)
Efficiency of module	13.7 %	13.9 %	13.4 %
Temperature coefficient of Pmax	-0.37 %/°C	-0.37 %/°C	-0.38 %/°C
Temperature coefficient of Voc	-0.34 %/°C	-0.34 %/°C	-0.32 %/°C
Temperature coefficient of Isc	+0.09 %/°C	+0.09 %/°C	+0.08 %/°C
Dimension (WxLxH)	1575 x 807 x 50 mm	1315 x 993 x 50 mm	1473 x 993 x 50 mm
Weight	Approx. 17Kg	Approx. 15Kg	Approx. 18Kg

* Measured at STC (Standard Test Condition; 1000W/m² irradiance, AM 1.5G and 25°C)

1. Electrical insulation test.
2. Outdoor exposure test.
3. Hot-spot endurance test.
4. UV-exposure test.
5. Thermal cycling.
6. Humidity freeze.
7. Damp heat test.
8. Robustness of terminations test.
9. Wet leakage current test.
10. Mechanical load test.
11. Hail impact test.
12. Bypass diode thermal test.

MECHANICAL CHARACTERISTIC

Construction	Front: high transmission low-iron tempered glass, 3.2mm Back: PVF/PET/P
Junction box	IP65, weatherproof
Bypass diodes	2 diodes to avoid power decreasing by shade
Output cable	4mm ² cable with polarized weatherproof connectors Negative 900mm, P
Frame	Clear anodized aluminum, AL6063-T5



PPV-204S6
Mono-crystal

PPV-216M6
Multi-crystal

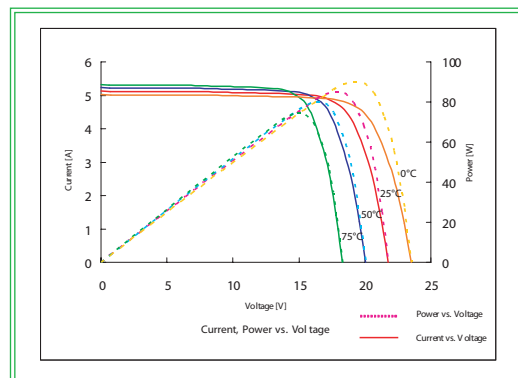
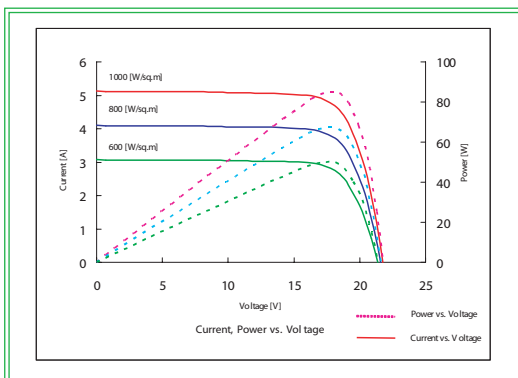
PPV-227S6
Mono-crystal

PPV-260M6
Multi-crystal

PPV-272S6
Mono-crystal

204W	216W	227W	260W	272W
26.94V	29.6V	29.93V	35.5V	35.9V
7.58A	7.29A	7.59A	7.32A	7.57A
32.98V	36.1V	36.6V	43.3V	43.97V
8.15A	7.86A	8.15A	7.86A	8.15A
+/- 5%	+/- 5%	+/- 5%	+/- 5%	+/- 5%
1000 Vdc	1000 Vdc	1000 Vdc	1000 Vdc	1000 Vdc
10A	10A	10A	10A	10A
DC 24V system	DC 24V system	DC 24V system	DC 24V system	DC 24V system
6" Mono-crystalline silicon	6" Multi-crystalline silicon	6" Mono-crystalline silicon	6" Multi-crystalline silicon	6" Mono-crystalline silicon
54 PCS in series (6 x 9)	60 PCS in series (6 x 10)	60 PCS in series (6 x 10)	72 PCS in series (6 x 12)	72 PCS in series (6 x 12)
13.9 %	13.3 %	14 %	13.4 %	14 %
-0.37 %/°C	-0.38 %/°C	-0.37 %/°C	-0.38 %/°C	-0.37 %/°C
-0.34 %/°C	-0.32 %/°C	-0.34 %/°C	-0.32 %/°C	-0.34 %/°C
+0.09 %/°C	+0.08 %/°C	+0.09 %/°C	+0.08 %/°C	+0.09 %/°C
1473 x 993 x 50 mm	1631 x 993 x 50 mm	1631 x 993 x 50 mm	1947 x 993 x 50 mm	1947 x 993 x 50 mm
Approx. 18Kg	Approx. 24Kg	Approx. 24Kg	Approx. 28Kg	Approx. 28Kg

I-V CURVES



PVF Encapsulates: EVA

Positive 900mm

ABSOLUTE MAXIMUM RATINGS

Operating temperature	-40 to +90°C
Storage temperature	-40 to +90°C

ORVALDI Electrosolar Inverter DC/AC

Orvaldi Solar Power is the most advanced solar inverter for grid connected PV-plants.

Solar Power is designed base on following principles:

- high converting efficiency,
- boosting system efficiency via MPPT,
- low cost,
- easy installation and maintenance,
- user friendly,
- long-life usage.

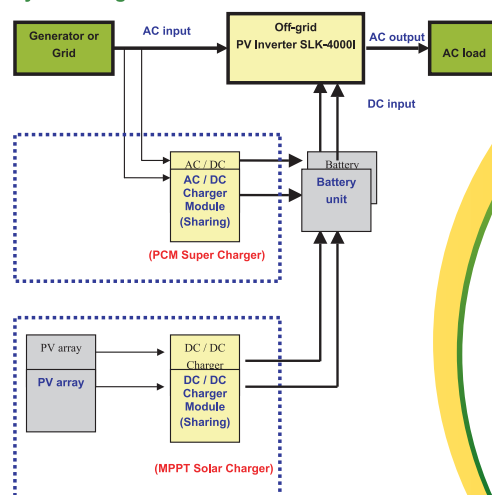


With 3 different input voltage ranges allow customer to have flexible choice for different applications. 96,5% high converting efficiency and up to 99% high MPPT efficiency are both above average market standard.

Orvaldi Solar Power is designed to be user friendly and with easy installation to reduce installation costs. User can easily monitor the system status from the remote control display LCD panel. IP-65 enclosure protect against severe outdoor installation environment. USB and RS232 communication ports are available for remote monitoring and control. With RS 485 and SNMP card for future expansion.

A solar cell or photovoltaic cell is a device that converts light energy into electrical energy. Solar cells are often electrically connected and encapsulated as a module. Solar cells are also usually connected in series in modules, creating an additive voltage. Connecting cells in parallel will yield a higher current. Modules are then interconnected, in series or parallel, or both, to create an array with the desired peak DC voltage and current.

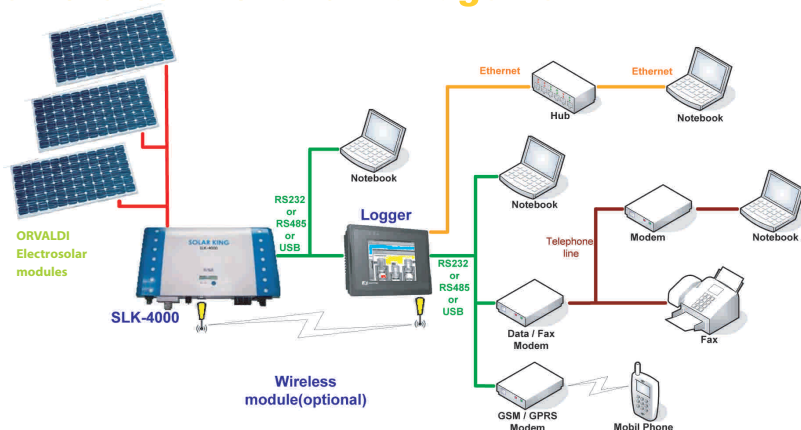
System diagram



Remote control and management



UPS - Power Protection Company



Model	SLK-1500		SLK-2000		SLK-3000	SLK-4000
Input Data						
Maximum Input power	1875W		2500W		3750W	5000W
Max. input voltage	500VDC					
Maximum PV open voltage	360~400V					
Nominal DC voltage	150V to 500V +/-5%					
MPPT voltage range	100 +/-5%					
System start-up voltage	100 +/-5% ~ 500 -5% +0%V					
Initial feeding voltage	150V +/-5%					
Max. input current	7.5ADC		10ADC		15ADC	20ADC
Full rating working range	250V to 500V					
Shutdown voltage	80V typical					
DC voltage ripple	< 10%					
DC insulation resistance	> 8M ohm					
DC switch	ON/OFF 20A					
DC connector	Tyco-contact (1 pair)					
Attached DC connector	Tyco-contact (1 pair)-cable type					Tyco-contact (3 pair)
Output Data						
Nominal output power	1500W		2000W		3000W ⁷	4000W
Maximum output power	1650W		2200W		3300W ⁸	4400W
Operational voltage range ¹			198V, minimum		256V, minimum	
Operational normal voltage	230Vac					
Operational frequency range						
Nominal output current	6.6A		8.7A		13A	17.4A
O/P current distortion ⁴	THD<5%,each harmonics< 3%					
Power Factor	> 0.99					
DC current injection	<0.5% of rated inverter output current					
Output Data						
Internal power consumption	< 7W					
Standby power (at night)	< 0.1W					
Minimum conversion efficiency (DC/AC)	> 90% Under input voltage >210V,load>20%					
Maximum Conversion Efficiency (DC/AC) ⁵	> 94%		> 96%			
European Efficiency	> 93%		> 95%			
GFCI threshold ⁶	See ground fault current detection					
Ground current detection range	0 ~ 500mA					
Ground current detection frequency	0 ~ 700Hz					
Protection degree	IP 65 or IP43					
Operation temperature	-25 to 55° C					
Humidity	0 to 95%, non-condensing					
Heat Dissipation	Convection					
Acoustic noise level	< 40dB, A-weighted, frequency up to 20kHz					
Altitude	Up to 3000m without power derating, 5° C derated for each additional 500m					
Physical : W x D x H (mm)	380x300x133		380x300x133		380x300x143	550 x 300 x 133
Physical : Weight (kg)	14		14		14	21
Shipping : W x D x H (mm)	495x465x285		495x465x285		495x465x285	665 x 465 x 285
Shipping :Weight (kg)	16		16		16	23

The relation of input DC voltage and output power is shown in figure. Once input V is less than 250V, the relation of I/P V and load % is : $Load\% = 0.4 \times V_i$

1.VDE0126-1-1, it is -20%/ +15%

2.Based on the limit of VDE0126-1-1

3.Based on limit of IEEE1547

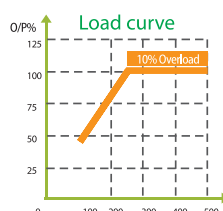
4.Under utility voltage THD<3%, reference IEEE1547, EN61000-3-2

5.under input voltage>= 400V, full rated output power, 25°C ambient

6.According to VDE0126-1-1 requirement

7.Based on the output voltage is higher than 200Vac

8.Based on the output voltage is higher than 220Vac



ORVALDI also offers:

ORVALDI 6000/10000 6-12-18-24 kVA on-line 10-20-30-40 kVA on-line

- Simple Parallel Installation
- Full-time Digital Signal Processor Control
- Dual Input Loops
- Programmable Frequency Converter
- LCD/LED Mimic Panel
- Smart ECO Mode
- Easy-to-Set User Personalization
- Super Compact Convertible(Rack/Tower) Design
- Power Range and Runtime Scalability
- Optional Galvanic Isolation Transformer
- Optional Hot Swappable Battery



ORVALDI 1000/2000/3000 rack mount/tower on-line

- Tower/Rack Convertible Design
- Unity Input Power Factor
- Double Conversion On-Line Ted
- Complete Protection Circuitry
- Easy Swappable Battery
- User Friendly Display
- Matching Batter Cabinet
- Smart Battery Management
- Customer Options Slot
- Optional Automatic and Manual Bypass



ORVALDI RT 1000/1500/2000/3000 sinusoida

- AVR Boost and Buck
- Pure Sine Wave Output
- User Friendly LCD Display
- Advanced Battery Management
- Nearly Zero Transfer Time
- Toroidal Transformer Technology
- 97% High Efficiency in Normal Mode
- Easy Swappable Battery
- Additional battery stings
- Easy connection for external battery
- string via Battery Connector
- Double input voltage correction
- Plug-and-Play USB/RS232 Interface



ORVALDI JP 1000/1500/2000/3000 sinusoida

- AVR Boost and Buck
- Pure Sine Wave Output
- User Friendly LCD Display
- Advanced Battery Management
- Nearly Zero Transfer Time
- 97% High Efficiency in Normal Mode
- Easy Swappable Battery
- Double input voltage correction
- Plug-and-Play USB/RS232 Interface



ORVALDI 500/700 sinus

- Line Interactive
- with Boost and Buck AVR
- Fully microprocessor controlled
- Lighting and surge protection
- Smart USB communication
- Overload and short circuit protection
- Advanced Battery
- Management ABM
- Hot Swappable battery
- Energy saving
- (UPS Sleep mode)
- Cold start DC Power on
- SNMP compatibility



ORVALDI 1000/1400/2000/3000 GE



Network & Server

- Line Interactive Design with Boost & Buck AVR -35%+25%
- RJ11 & (RJ45) option Jack for Internet Protection
- Cold Start Function
- High/Low Voltage Protection, Overload/Short Protection
- Beeping Alarm on Battery, Battery Low and Overload
- Communication Port for Smart UPS Monitoring and Controlling
- Two Colored LED display
- Frequency Selection Automatically
- USB Option Rs232
- SMD Design

ORVALDI 400EASY/520/620/820 GE/PL



PC & Workstation

New line of UPSs Orvaldi 400EASY and Orvaldi 520, 620, 620 BLACK/820GE/PL. UPS with outlets Schuko (GE) or French (PL) - used in Poland, Czech Rep., Slovakia, France. Orvaldi 400EASY has one such outlet, 520GE/PL, 620GE/PL and 820GE/PL 1xSchuko/PL i 1xIEC320.

This line PSS let protects not only computer, but HiFi, fiscal POS, Printer, scanner other. +/-20 % AVR (Automatic Voltage Regulation) protects against under and over voltage. With speed automatic breaker Orvaldi 400EASY-820GE/PL and 2 RJ11 for telephone/modem line protection is one of most sophisticated entry level UPS on market.

ORVALDI 620PL/820PL with RJ45 - NET PROTECTION. „Cold Start“ allow to start UPS without input voltage and let to supply valuable equipment. It can be connected to computer through RS232 (option USB).

ORVALDI 300PL



2in1 - surge protector & UPS

- Microprocessor control guarantees high reliability
- Green Power Function for energy saving
- Compact size, light weight
- Provides Modem/Phoneline Surge Protection RJ 45
- Provides Overload Protection
- Single-handed exchange of battery

ORVALDI ORV 8 HOME



- power splitter with 8 outputs and grounding indicator
- high end surge protector with LC filter
- Ethernet/ADSL line surge protector
- tel/modem line surge protector with splitter 1in/2out
- Coaxial line TV/Sat surge protector

ORVALDI POWER CENTER



- 5 outlets with MASTER and separate control and indication
- LED to indicate proper grounding and Surge Protection
- Splitter USB (1in/4out)
- Surge protection for ADSL/Ethernet
- Surge protection for tel/modem line
- High quality cable 2 m



ORVALDI SURGE PROTECTORS



ORV - 5 i ORV - 6

- Surge protection up to 140J
- Automatic breaker 10A
- Light indicator in switch to show input voltage and ready to work.
- 5 or 6 outlets and 3 meters cable.

ORV - 5 INTERNET, ORV - 6 INTERNET, ORV 8 INTERNET

- Surge protection up to 420J and Internet low voltage impulse up to 70J
- High frequency filter 50 dB EMI/RFI (ORV5int 10dB) with range 100kHz - 100MHz
- Automatic breaker 16 A (ORV5int 10A)
- 3 meters cable (ORV5int 1,8m)
- Child protection



**Sponsor
of YACHT TEAM
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UPS - Power Protection Company

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