AEOLOS
wind turbine

OWNER'S MANUAL

Aeolos wind turbine
SINCE 1986

Aeolos-H 500W

TABLE OF CONTENTS

Important safety instructions:

——Read these instructions in their entirety before assembling, installing or operating your wind generator, and you will see the follow icons bellow:

: IMPORTANT	Indicates instruction or advice that is critical for correct assembly or operation. Damage to equipment may result if not heeded.
: TIP	Indicates instruction or advice that may simplify or ease task or operation.
: WARNING	Indicates risk of severe injury or death or possible severe damage to equipment proceed with caution and follow instructions.

1) SAVE THESE INSTRUCTIONS. This manual contains important instructions that must be followed during assembly, installation and maintenance.
2) Read, understand and respect all warnings.
3) Do not install Aeolos on a windy day,Or in a region where the gusts speed could exceed 20m/s.
4) If unusual noise or operation is experienced, turn off machine and contact authorized service personnel.
5) During assembly and installation properly torque all fasteners.
6) Properly complete the Warranty Registration Card.
7) The generator must be installed in accordance with these manual and local and national building codes. Failure to comply with these manual and local codes may affect and possibly void your warranty.
8) Rotating blades are a serious mechanical hazard. So when installing no one can come into contact with the blades.

Section I: Aeolos-H 5-Year Limited Warranty

1.1.Hardware Warranty

Aeolos Wind Energy ,Ltd (Aeolos) will repair or replace free of charge any part or parts of the Aeolos Wind Turbine determined by to be defective in materials and/or workmanship under normal authorized use consistent with product instructions for a period of five years from the date the original purchaser("Customer")receives the Wind Turbine ("Start Date"). This warranty extends only to the original purchaser. The Customer's sole and exclusive remedy and the entire liability of Aeolos , its suppliers and affiliates under the warranty is, at Aeolos option, either
(i)To replace the Wind Turbine with new or reconditioned Wind Turbine;
(ii)To correct the reported problem;
(iii)To refund the purchase price of the Wind Turbine.
Repaired or replaced products are warranted for the remainder of the original warranty period.

1.2 Restrictions

Problems with the Wind Turbine Products can be due to improper use, improper maintenance, non-Aeolos additions or modifications or other problems not due to defects in Aeolos's workmanship or materials. No warranty will apply if the Wind Turbine
(I)has been altered or modified except by Aeolos;
(II)has not been installed, operated, repaired, or maintained in accordance with instructions supplied by Aeolos;
(III)has been exposed to winds exceeding 44.4 mph (20 m/s)
(IV)has been subjected to abnormal physical, thermal or electrical stress, misuse, negligence, or accident.
If Aeolos's repair facility determines that the problem with the Wind Turbine is not due to a defect in Aeolos's workmanship or materials, then the party requesting warranty service will be responsible for the costs of all necessary repairs and expenses incurred by Aeolos.

1.3 Warranty Claims & Return Procedures

In order to be eligible for service under this warranty, the Customer must submit a service request for Wind Turbine covered by this warranty within the warranty period by contacting Aeolos in writing or via telephone and obtaining a Return Authorization ("RA") number. This RA must be obtained before returning any product under this warranty. Notification must include a description of the alleged defect, the manner in which the Wind Turbine was used, the serial number, and the original purchase date in addition to the name, address, and telephone number of the party requesting warranty service. Within 3 business days of the date of Notification, Aeolos will provide the Customer with an RA number and the location

to which the Customer must return the defective Wind Turbine. Any Wind Turbine requiring warranty shall be transported at the expense and risk of the party requiring warranty service, including but not limited to proper packaging of the Product. The Customer must return the entire Wind Turbine kit within 30 days after issuance of the RA number. Aeolos will be under no obligation to accept any returned Wind Turbine that does not have a valid RA number. Customer's failure to return the Wind Turbine within 30 days of its receipt of an RA number may result in cancellation of the RA. All parts that Aeolos replaces shall become Aeolos's property on the date Aeolos ships the repaired Wind Turbine or part back to the Customer. Aeolos will use all reasonable efforts within five days of receipt of the defective Wind Turbine to repair or replace such Wind Turbine. If a warranty claim is invalid for any reason, the Customer will be charged at Aeolos's then-current rates for services performed and will be charged for all necessary repairs and expense incurred by Aeolos.

1.4 Disclaimer

Except for the expressed warranty set forth above, Aeolos disclaims all other expressed and implied warranties, including the implied warranties or fitness for a particular purpose, merchantability and non-infringement. No other warranty, expressed or implied, whether or not similar in nature to any other warranty provided herein, shall exist with respect to the product sold under the provisions of these terms and conditions. Aeolos expressly disclaims all liability for bodily injuries or death that may occur, directly or indirectly, by use of the product by any person. All other warranties are expressly waived by the customer.

1.5 Limitation of Liability

Under no circumstances will Aeolos or its affiliates or suppliers be liable or responsible for any loss of use, interruption of business, lost profits, lost data, or indirect, special, incidental, or consequential damages of any kind regardless of the form of action, whether in contract, tort (including negligence), strict liability or otherwise, resulting from the defect, repair, replacement, shipment or otherwise, even if Aeolos or its affiliate or supplier has been advised of the possibility of such damage.

(Note: some states and provinces do not allow the exclusion or limitation of incidental or consequential damages, so these limitations may not apply to you.)

Neither Aeolos nor its affiliates or suppliers will be held liable or responsible for any damage or loss to any items or products connected to, powered by or otherwise attached to the hardware. The total cumulative liability to Customer, from all causes of action and all theories of liability, will be limited to and will not exceed the purchase price of the Product paid by Customer. This warranty gives the Customer specific legal rights and the Customer may also have other legal rights that vary from state to state or province to province.)

Section II Technical Specifications:

2.1 Main Technology Parameter

Model	Aeolos-H 500
Weight	19.7Kg
Rotator Diameter	1.7m
Start up Wind Speed	2m/s
Kilowatt Hours/Years	5256kW.H(Rated)
Maximum Wind Speed	20m/s
Rated Wind Speed	8m/s
Certifications	CE
Operating Temperature Range	14º F (-10º C) to 104º F (40º C)

Tab. 2.1 Main technology parameter

2.2 Tower Loads

Shaft Thrust: 52 lb @ 100 mph wind speed (230 N @ 45 m/s)

Section II Turbine assembly

3.1 Packing list and Torque Specification

3.1.1 Packing list

Your Aeolos Turbine is delivered partially assembled. Assembly requires mounting the blades on the blade hub, securing the hub to the turbine body and installing the nosecone on the blade hub. When receive the Aeolos bale, please make sure all those parts below looks good and are on right quantity.

Fig 3.1 All the Parts Deserved

No.	Name	Quantity
1	Generator	1
2	Blade	3
3	Controller	1
4	Hub	1
5	Nosecone	1
6	Hex. Socket head cap screws (M8×30), with a spring washer (8), a plain washer (8), a nylock nut (M8)	9
7	Hex. socket head cap screws (M8×40)	1
8	Hex. Head Bolts	4
9	Hex. Nut(M14), with a spring washer (8), a plain washer (8)	1

Table3.1: Bill of Parts

3.1.2 Torque Specifications

No.	Where used	Name and specification	Recommended torque
1	Blade to hub	M8×30 Blots	14N.m
2	Hub to generator	M14, Hex. Nut	68N.m
3	Nosecone securing	M8×40 Hex. Socket head cap screws	8N.m
4	Yam clamp bolts	M8	22N.m

3.2 Blade assembling

Step1: Start the assembly by mounting a blade to the hub as shown in Fig3.2. The fasters used here is item 6 in Fig3.1, fasten them properly according to its recommended torque in tab3.2.

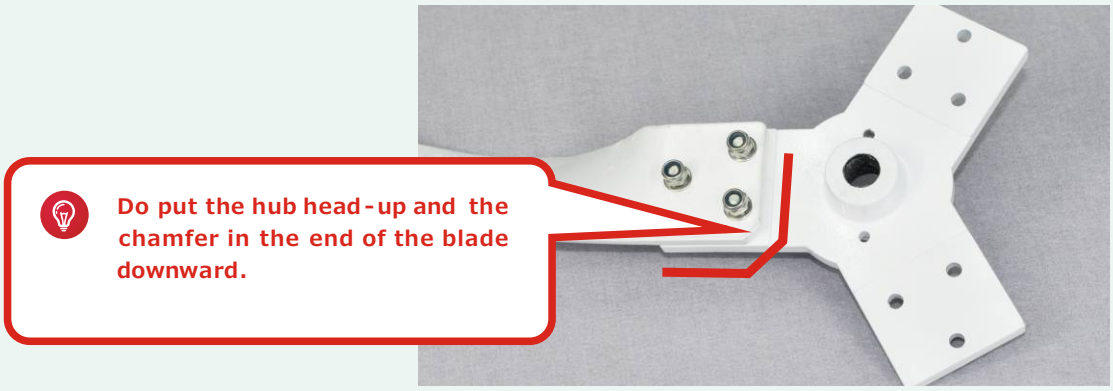

Fig 3.2 mounting a blade to the hub

Step 2: Repeat for the remaining two blades, and the whole one putting together now is identified as rotator (Fig 3.3) in the next articles.

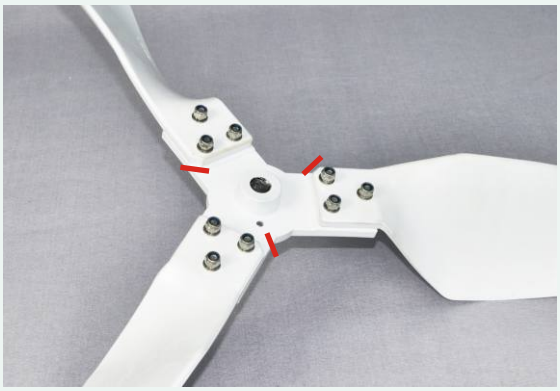

Fig 3.3 the Rotor

Step 3: Assemble the rotor onto the generator as shown in Fig 3.4, the fasteners used here is item 9 in Fig 3.1, fasten them properly according to its recommended torque in table 3.2

Fig 3.4 Assemble the rotor onto the generator

Step4: Assembling the nosecone onto the generator as shown in fig 3.5, the fasteners used here is item 7 in figure 3.1, fasten them properly according to its Recommended torque in table II, a socket head wrench(for M8 screw) shall be used here.

Fig 3.5 Assemble the Nosecone onto the generator

Step5: wiring the connector of the generator (fig 6) and the load by a cable going through the tower, as shown in fig3.6.,and then fasten the Yam clamp bolts(item 8 in figure 3.1)

Fig 3.6 Cable connector of the generator

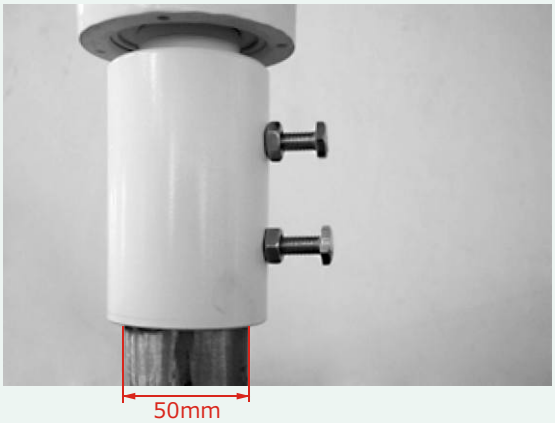

Fig 3.7 Fasten the Yam clamp bolts

With all of this above finished, The Aeolos-H 500 Wind Generator stand out.

Section IV Electrical Section

4.1 Summary

Aeolos intelligent wind solar street lamp MPPT (Max. Power point tracing) power management controller is a senior management which could make full use of wind and solar resource, especially in the place where lake of energy resource. This system may help manage and use non-polluting power and ensure the safety. The controller may collect and store the power in Maximum generated from the wind and solar generator. It has a high efficiency of power inverting even weak electricity can be stored. This controller provides powerful controlling function as follows:

1. To provide Maximum wind Power Point Tracking (MPPT). (independent control) 1 branch
2. To provide Maximum solar Power Point Tracking (MPPT). (independent control) 1 branch
3. To provide time-controlled output branch. (Hardware reusable) 3 branches
4. To provide light-controlled output branch. (Hardware reusable) 3 branches
5. Reverse protection for inputs (including solar, wind energy input)
6. Power limitation for inputs (including solar, wind input)
7. Current limitation for outputs (for 3 branches, protecting independently)
8. Reverse protection for battery inputs (connected reversely will not cause damage)
9. Battery overcharge protection, over discharge protection, adopt safe charge management system which can repair the battery and prolong the battery life
10. Automatic unloading function for generator, manual soft-unloading function, the unique unloading control technology could protect Rotator from damage cause by inertia, and extend the mechanical life of fan.
11. According to requirement, electricity supply switching function can be provided, automatically switch to the grid when the battery is exhausted and keep output stable and effective.
12. RS485 communication interface is provided for management.

4.2 Input &output interface

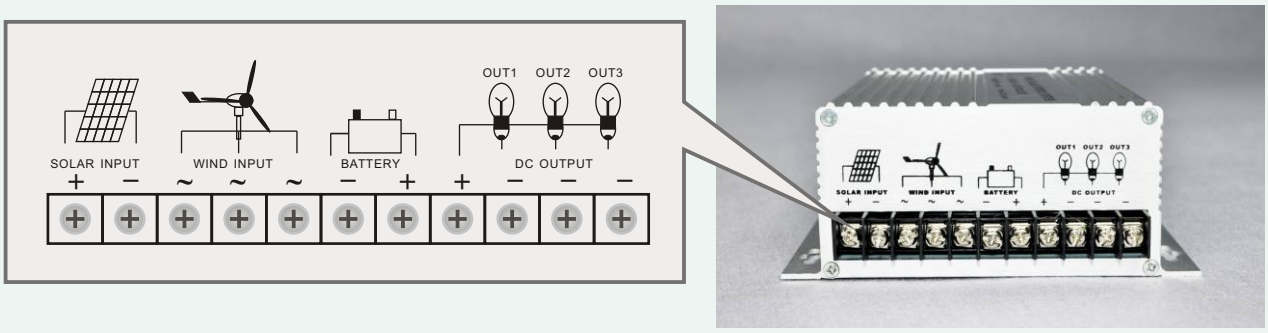

Fig 3.7 Fasten the Yam clamp bolts

SOLAR INPUT: solar power voltage input, input voltage<50V, input current<=20A.
WIND INPUT: 3-phase AC voltage input, input voltage<50V, input current <=20A.
BAT INPUT: battery input, battery voltage 24V (note the battery polarity).
[OUT+ OUT1-]: light/time-controlled control branch “output1”, sustained output current is 30A; peak current is 80A, with over-current and short-circuit protection.
[OUT+ OUT2-]: light/time-controlled control branch “output2”, sustained output current is 30A; peak current is 80A, with over-current and short-circuit protection.
[OUT+ OUT3-]: light/time-controlled control branch “output3”, sustained output current is 30A; Peak current is 80A, with over-current and short-circuit protection.

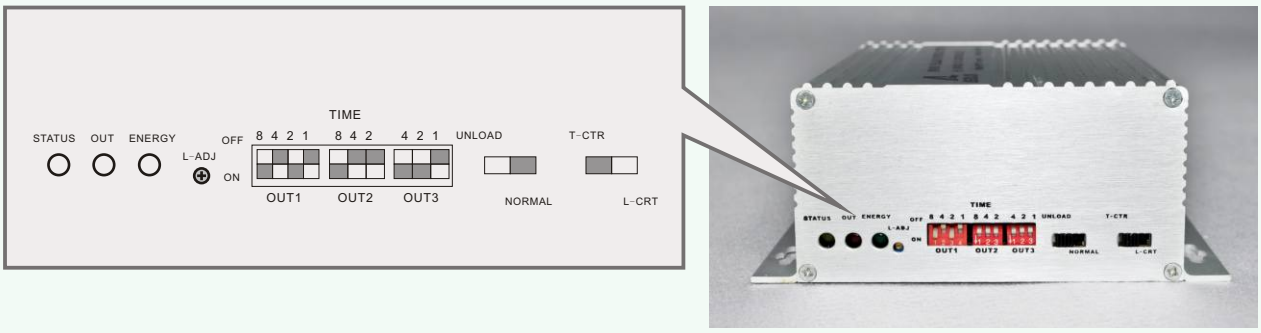

Fig4.2 Control Panel

STATUS: general status of equipment
All off----Normal
All on----The battery over voltage
Slow flashing----The battery under voltage
Quick flashing---- Output over current or short-circuit fault. (This state enjoys priority)

OUT: output control indicate light
All off----All the 3 branch circuits are working
On for 1s while off for 0.5s----2 branch circuits are working
On for 0.5s while off for 1s----1 branch circuit is working

ENERGY: indicating wind/solar input power
The more quickly this lights flash, the more power the battery get.
The flash cycle of it 0.5HZ-100HZ corresponding to the power from 1W-500W
All on if higher than 500W

TIME: the adjustment and timing terminal of the time-controlled output. There are 3 groups of DIP switch terminals in the control panel, from left to right are out1 (timing 1-15h) for branch circuit 1, out2 (timing 0-14h) for branch circuit 2, out3 (timing 0-7h) for branch circuit 3.Take DIP switch out1 for example, the four numbers at the top of it are 8, 4, 2 and 1, it means if you turn on anyone of them, the branch circuits out1 will be timed the corresponding period to work. If all the switches are“on”, then the timing period is the sum of them. So, on the control panel, the length of timing period are summarized as the table shown below:

Name	Mini. Length(hour) for timing	Max. Length(hour) for timing
OUT1	1	15
OUT2	2	14
OUT3	1	7

Tab 4.1

Out2 and out3 can be set to 0, which means there is no output power through the corresponding branch circuit.

If all the 10 DIP switches are “off”, the system enters the model to adjust the point of lighting up (It is indentified as correction model in the next articles), coordinate with the status of the three indicator lights, the threshold value of lighting on shall be corrected.

L_ADJ: a terminal for light control output adjusting.(Lighting up will be delayed if being rotated clockwise brought forward if rotated anticlockwise)
In the 24V Photovoltaic system, the output voltage which can indicator the brightness is generally 7V.By this knob, threshold value of light-dependent control output voltage shall be calibrated in calibration mode.
UNLOAD and NORMAL: The terminals of manually discharge and automatically discharge of the generator.
UNLOAD: enter the manually discharge mode of the generator. The bake of the generator begin to work which takes 5 minutes to finish discharging.

Please turn into UNLOAD mode when the generator is set up or is repaired.

NORMAL: when the generator begins to work, it must be set to this mode.
T_CTR: time-dependent control terminal, setting to this mode means all the output end will be controlled by time.
L_CTR: light-dependent control terminal, setting to this mode means all the output end will be controlled by light

4.3 Function of Controller

4.3.1 Threshold calibrating mode of Brightness

Switching all the DIP switches of OUT1 to "OFF" means enter the Threshold Calibrating Mode of Brightness mode coordinate with the three indicators light. Brightness Threshold can be adjusted.
Connect the solar-cell panel to the corresponding input terminal, then flashing of the indicated lights shall be seen when rotating the L_ADJ. The following table shows the states of calibrating:

No.	Yellow	Red	Green	Status
1	On	Off	Off	Threshold voltage>PV voltage
2	Off	Off	On	Threshold voltage<PV voltage
3	On	On	Off	Threshold voltage<=(PV voltage+0.5V)
4	Off	On	On	Threshold voltage<=(PV voltage-0.5V)
5	Flashing	On	Flashing	(Threshold voltage-PV voltage)<0.5V calibration complete

Tab4.2 Brightness threshold calibrating

You can cover the solar-cell panel to simulate darkness in daytime. The degreeless relative to the actual condition.
Brightness threshold is precisely calibrated in status No.5.
Brightness threshold is roughly calibrated in status No.3 or No.4.
In the 24V Photovoltaic system, the output voltage can indicator the brightness is generally 7V. So if necessary, you can apply 7V voltage on the solar input terminal.

During the normal work, do not set all the DIP switches to "off".

4.3.2 Output control

4.3.2.1 Time-controlled output control

If the photovoltaic voltage is lower than threshold voltage (setting by L_CTR) in 30s, according to the corresponding setting of timing ,the three time-controlled terminals will (the three DIP switch groups, OUT1, OUT2, OUT3) on or off ,During the output period.

The output shall be interrupted base on certain situations listing in the table below:

No.	Note of situation
1	Output overflowed. When being in this situation, output shall be break off for 60s, then trying to continue. Continuous circulate this procedure.
2	The batteries are under voltage. Output halts.
3	Threshold calibrating in the period being to output. Output halts.
4	Enabled the function of battery power management, output is being restricted.

Battery Power Management is a function to deploy power in accordance with time slot and requirement. It is effective to either time or light dependent control strategy.

The working characteristic is as follows:

When the battery voltage >26V, all the three output branches keep working according to the period fixed by OUT1.

When arriving the point, the three output branches stop outputting.

When the battery voltage <26V, whether the three output branches outputting or not is in accordance with its corresponding setting respectively.

This function especially adapts to the streetlamp control systems which installed in the area even with low wind or solar energy. Reasonable combinations of the three output branches shall extend the lighting period as long as possible.

A referenced application is shown below:

If a lamp supports multimode, we can keep lighting during a night divided by periods and power. Generally, keep normal lighting on rated power during 7:00-0:00, half power or 1/3 power during 00:00-04:00, 1/4 power during 04:00 - 7:00, which performs according with the need , lengthens the lighting period as well.

4.3.2.2 Light-controlled Output Control

If the Photovoltaic output voltage is lower than its threshold value for 30s, the 3 output branches shall work at the same time. On the contrary, the 3 output branches shall turn off automatically. Turning off will be carried on according to the following conditions list in the table during its working:

No.	Note of situation
1	The output is over current: Output halt for 60s, then try continuing. Keep circulating this process.
2	The batteries is under voltage: stop outputting.
3	Threshold calibrating in the outputting period: Output halts.
4	Enabled the function of battery power management: Output is being restricted.

As the battery voltage is higher than 23V, the 3 output branches keep outputting at the same pace. On the contrary, branch "OUT1" shall work alone.

4.4. Unloading control

4.4.1 Unloading manually

Once the "UNLOAD" and "NORMAL" switch is set to "UNLOAD", the controller shall execute the unloading process according to the PWM mode. It takes 5s to finish the whole unload procedure. In case of something special, for example, if by any chance, the input voltage exceeds 40V, the completely unloading procedure shall be executed in 0.5s. This function is effective for the generator.

4.4.2 Unloading automatically

This process shall be executed automatically base on full charging of batteries, or the charging voltage exceed 40V.Once the batteries have filled, this process makes the battery voltage higher than or equal to input voltage, ensure the batteries not be charged any more.If by any chance, the input voltage exceeds 40V, the process shall weaken it below 40V certainly.(This function performance as a protector and controller while the batteries being disconnected.)

4.5 Maximum Power Point Tracking (MPPT)

Both Solar and wind energy inputs support this function independently.
MPPT shall be internal executed, when the input voltage of 24V solar energy system the exceed 18V; the process will lead the system to the power-product peak automatically, ensure the maximum of power transformation being stored into the batteries. If the input current exceeds 20A, dropping the current below 20A shall be execute prior in order to guarantee the safety of system.

On the other hand, if the input voltage generated by the turbine, vary among 11V to 6V, the battery shall be charged within every 1/3 time interval, MPPT shall not be executed until the input voltage exceed11V that ensure charging in lower voltage, at the same time, the turbine will not lose speed for load even stop rotating.

4.6 Charging management

If there is power transform into the preservation of the battery, a high effective, recoverable charging method shall be executed. After a long period of using, the batteries are likely to meet the problems such as vulcanization, polarization. A way of trickle charging to remove the vulcanization and vulcanization on the battery plate is executed here, which prolongs the life of batteries.

Aeolos Wind Energy Congratulations on your purchase!

Dear Aeolos Wind Turbine Owner,
Thank you for your purchase of Aeolos wind turbine. You have purchased one of the most advanced battery charging wind turbines in the world! We believe you will find it easy to install and are confident you will experience years of dependable service from it.

Before going any further, please complete the **Warranty Registration Card** or **Warranty Service Card**. and return it by E-Mail or letter. **(Note: Aeolos Wind Energy does not sell or distribute your personal information to any third party. We understand and respect your privacy.)**

If you have any questions or comments, we would like to hear from you. Please call during working hours (Monday-Friday 8:00am to 5:00pm London Standard Time).
Our number is +44 207 493 6167. Or E-mail us: support@windturbinestar.com
Again, welcome to our family and thank you for investing in the future of wind energy with Aeolos.
Sincerely

Note1: Warranty Register Card for the generator's first run

Warranty Register Card	
Client Name	
Model Number	
Installation Date	
Installation location	
Other Requirements	Show us three photos of the working generator's appearance by return

Warranty Service Card		
Client Name		
Model Number		
Installation Date		
Installation Location		
Application Procedure	Tel. Number	
	Email	
Problem Description		
Total Work Period		
Other Requirements	Show us some Photos of the generator's current state by return	