

9kW Multi Wind-Lens Turbine Specification (3kW WL turbine x 3 units)

* WL : Wind-Lens

Type name: RW9K-M-JA-04

Destination: For authentication testing at Hibiki-nada

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Revision history

No.	Contents	Edited Date	Editor	Authorizer
4				
3				
2				
1				
0		2017/03/03	Nishimura	

1. Specification

1.1. Wind turbine system (3 WL turbine units)

Type name	RW9K-M-JA-04
Type	Diffuser turbine, horizontal axis, downwind, 3 units multi rotor
Rated power(Rated speed)	9kW @10.5m/s
Cut-in wind speed	3m/s
Cut-out wind speed	15m/s
Rotor diameter (unit)	2.78m
Wind-lens diameter (unit)	3.64m
Main body weight	1270kgf approx.
Main body width	8.58m
Blade	3 blades (×3), fixed angle & made by CFRP, partially GFRP
Pitch system	Fixed
Diffuser type	CiiB7.5%
Generator	Outer-rotor, multipolar & coreless (Rated speed of 325rpm)
Yaw system	Passive yaw (Free yaw)
Brake	Electric stall control brake
Survival wind speed	60m/s (3 seconds average)

1.2. Control devices (for each turbine unit)

Brake unit type	RW-BKR-01 (3 units)
Max. Input voltage	350V (DC after rectification)
Max. Input current	50A (DC after rectification)
Max. Input power	4kW
Max. Output voltage	350V (DC after rectification)

PCS type	CEPT-W1XA4P5 (3 units)
(DC input section)	
Max. Allowable input voltage	DC450V
Operable voltage range	DC60V~DC450V
Max. Output control range	DC80V~DC450V
Rated input voltage	DC280V
Allowable input current	DC28.5A
Number of input circuits	1 circuit
(AC output section)	
Electrical system	1 phase 3 wire type(Output phase number: 1 phase 2 wire type)
Rated voltage · frequency	AC202V 50/60Hz
Rated output current	22.5A

Rated output	4.5kW
Driving force factor	≥ 0.95
Efficiency	$\geq 96\%$ / 280V
Output current distortion ratio	Comprehension $\leq 5\%$, Each order $\leq 3\%$

1.3. Tower (present experiment at Hibiki-nada)

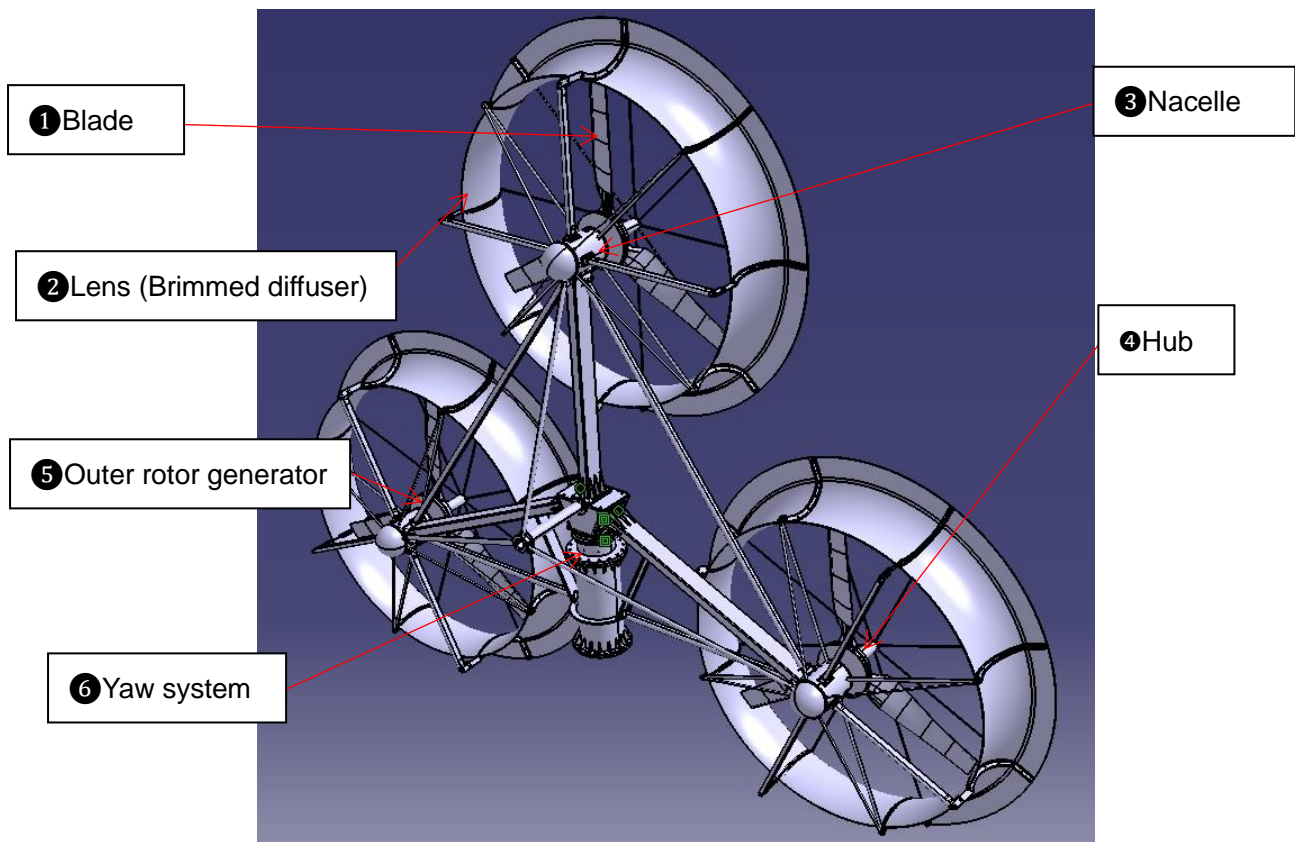
Type	Truss tower (6m)+ Monopole steel tower (6m)
Definition of the center height or hub height (center of gravity for 3 turbines system)	13.5m
Upper end height of turbine system	17.7m
Total weight of tower (6m steel monopole tower)	2,420kgf approx.
Anti-rust treatment	Hot-dip galvanized

1.4. Installation equipment (excluding body & tower)

Control box	Size: (Width 340 × Depth 253 × Height 83) mm × 3	Weight: 21kg approx.
Dump resistor box	Size: (Width 450 × Depth 150 × Height 650) mm	Weight: 30kg approx.
Electric brake box	Size [*] : (Width 207 × Depth 163 × Height 320) mm	Weight [*] : 6kg approx.
PCS	Size: (Width 680 × Depth 200 × Height 420) mm × 3	Weight: 111kg approx.

※It does not include fitting bands.

2. Name of parts



The following ⑦ ~ ⑨ are separately specified.

⑦ Control box

⑧ Dump box

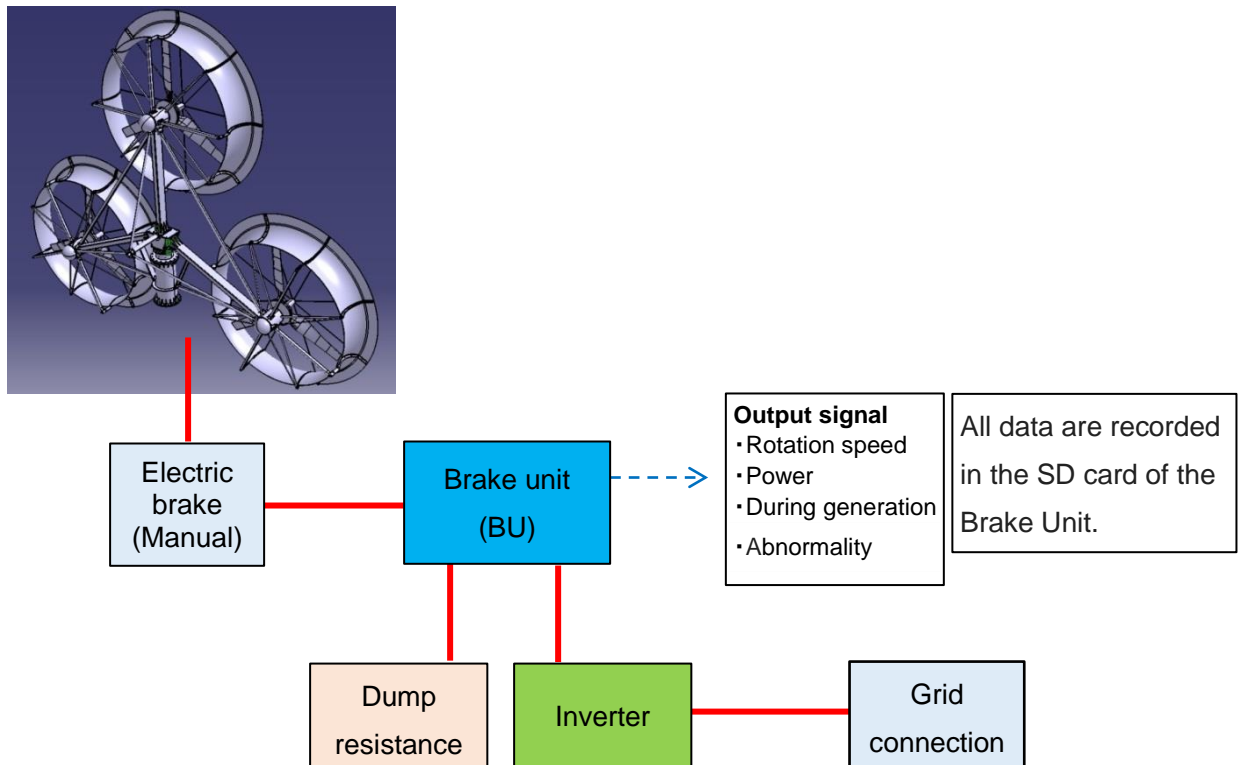
⑨ Foundation (Reinforcing concrete type)

3. Wind-lens turbine system diagram

The figure below shows the system overview of the 9kW Multi WL turbine.

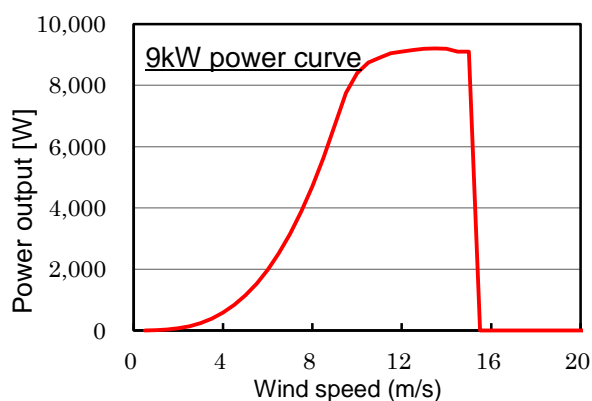
The power generated by the synchronous generator is converted from AC to DC at the BU and connected to the PCS. When the generated voltages reach the threshold value, the power is released as braking power by the dump control. When the input voltage, input power, rotor speed, or generator temperature exceeds the threshold value, the wind turbine is stopped (under slowly turning) by the electric brake. This stopped state is canceled after the specified time elapses and the operation state is

restored. If the wind turbine rotation is reliably stopped, such as during maintenance, the rotation could be stopped with the manual electric brake.



4. Theoretical power curve and expected power generation

The figure below shows the theoretical output curve of the present 9kW Multi Wind-Lens turbine. The table below shows the estimated annual power output.



Average wind speed	Estimated annual power output*
3 m/s	3,153kWh
4 m/s	6,386kWh
5 m/s	11,352kWh
6 m/s	17,029kWh

*Considering system availability, self-consumption, and etc., the estimated power output efficiency is 80% compared to that for wind tunnel experiment.