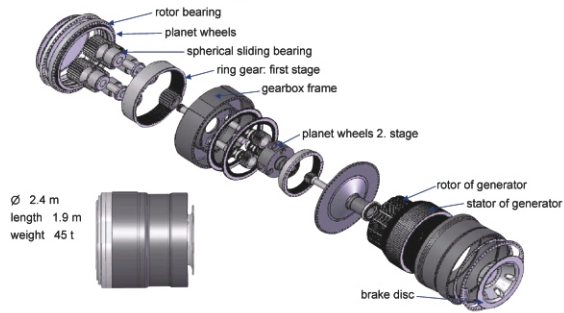


Construction SCD – Technology - concept of 3.0 MW Onshore-WEC



Design of Drive Chain

Wind farms specification

	Diameter	Nominal output
TC III	108 m	2.5 MW
TC II	100 m	3.0 MW
TC I	92 m	3.0 MW



	common	SCD	direct drive
operational experience	++	--	+
service performance	+	+	0
weight of converter	0	+	--
costs for WEC	0	+	--
failures	-	+	++
noise emission	+	-	0

Advantage and disadvantage of SCD

specification	2 blades rotor	3 blades rotor
specific energy output	-3 %	(+) ¹
noise emission	~ 2 dBA higher	(+) ²
visual impact	comparatively less	(+) ²
WEC costs	5-6 % less	-
construction costs	Lower costs, especially off-shore	-

1: can be compensated by increasing the diameter by 15%
2: not relevant on more than 50 % of the new installations

Advantage and Disadvantage (Why 2 Blades!!)



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MINGYANG WIND POWER
PERFORMANCE BY NATURE



New Generation Super Compact Drive Wind Energy Converter From onshore to offshore, multi-megawatt wind turbine

MingYang Wind Power Industry Group presents the next generation wind turbine generator. The Two Blade aerodyn Development and Marketing GmbH designed SCD (Super Compact Drive). The SCD is available in 2.5MW and 3.0MW deployments. Its compact integrated drive train out classes all competition. Integrating the major components of this SCD wind turbine generator allows Ming Yang to keep the weight low saving our customers installation costs and time.

Main Features:

- Light Weight:** The reduced weight of the nacelle simplifies transportation and installation of the SCD, and reduces cost of foundation materials in comparable equipment in 2.5-3.0MW machines.
- Reliable performance:** The lower rotational speed of the SCD reduces the overall risks of wear in the drive train. The integrated design reduces the number of moving parts to be maintained. Redundancy in the control devices helps avoid single points of failure keeping availability at ITS peak.
- Hermetic Encapsulation:** The SCD's hermetically sealed nacelle help protect vital turbine components from outside environmental concerns like humidity and dust particles.
- Compact configuration:** The SCD drive chain has combined the strengths of conventional turbines concept. The integral design of rotor bearing, gearbox and generator optimize the space of the nacelle.
- Rotor:** The two blade rotor design is one of the key components to SCD performance. This dual controlled independent hydraulic pitch system dynamically adjust to enhance machine output for maximum energy production. The same system helps protect the SCD machine from single point of failure and ensure maximum safety.
- Rotor Bearing and Gearbox:** The bearing and gearbox design was given careful consideration and precision engineering that would result in an arrangement that protects these components from the brutal dynamic loads normally eating away at the machines life.
- Generator and Converter:** The SCD's design employs Permanent Magnet technology integrated into the drive train assembly with all of the machines critical cooling system. This design maximizes cooling efficiency at all load levels. The generator is connected to the grid via full power converter, allowing the wind turbine generator to comply with all grid variabilities.
- Air treatment (applicable for 5.0/6.0MW offshore turbine):** An air treatment system is located at the tower bottom, which takes in ambient air and separates water and salt particles coming inside. An overpressure in nacelle is built up with the treated air and secures a controlled volume flow through the turbine. With a pressure difference monitoring system it is possible to eliminate any intrusion of untreated air. In addition, the temperature in the nacelle is adjusted by variation of the air flow.



SCD 2.5 / 3.0 MW Specifications

Description	Unit	Specification
Main Data		
Manufacture		MingYang
Rated Power	kW	2500 / 3000
Rotor Diameter	m	108 / 100 / 92
Cut-in Speed	m/s	3
Rated Wind Speed	m/s	11 / 13
Cut-out Speed (10 minutes mean value)	m/s	25
Extreme Wind Speed (3 seconds max value)	m/s	59.5 / 70
Survival Temperature	°C	-40 ~ +50 -20 ~ +50
Operation Temperature	°C	-30 ~ +40 -10 ~ +40
Design Life Time	years	20
Blades		
Manufacture/Type		MingYang
Number of Rotor Blade		2
Material		Glass - reinforced plastic
Blade Length	m	48.5 / 44.5
Sweep Area	m ²	7850 / 6644
Nominal Tip Speed	m/s	89.5 / 89.6
Gearbox		
Type		two - stage planetary gear
Nominal Gear Ratio		1 : 23.94
Rated Torque	kNm	1675 / 1707
Generator		
Type		synchronous, permanent magnet
Rated Power	kW	2630 / 3110
Rated Voltage	V	850
Insulation Level		F
Protection Level		IP54
Converter		
Type		IGBT- full power
Rated voltage	V	620
Rated Output Power	kVA	2750 / 3300
Power Factor (grid)		0.9 inductive - 0.9 capacitive
Rated Power Efficiency		97.5%
Braking System		
Main Braking System		Hydraulic single pitch
The Second Braking System		Hydraulic disk brake
Yaw System		
Yaw Drive		4 motors with coaxial planetary gear
Yaw Speed		0.5%/s
Control System		
Control Method		PLC + remote monitor and control
Lighting Protection		
Design Standards		IEC61400 - 24 Level I
Grounding Resistance	Ω	≤4
Tower		
Type		Tubular steel tower
Height	m	100 / 90 / 85 / 75

SCD 2.5 / 3.0 MW Dimensions and Weights

Main Components		
Description	Unit	Weight
Nacelle (exclude the hub)	kg	76000
Rotor (hub + blades)	kg	43200
Hub	kg	20000
Blades	kg	2×12600
Dimensions		
Transportation Dimension	mm	7978×2931×3895

