

# wt3000df and wt3000fc

## Optimal energy harvest at low wind conditions

AMSC's Windtec Solutions include wind turbine designs that enable our partners to launch best-in-class wind turbines quickly, effectively and profitably. The wt3000df (doubly-fed) and wt3000fc (full-scale conversion) models have been designed to offer the lowest possible cost of energy and highest reliability, providing customers with significant advantages on the global wind market. The wt3000 design provides high efficiency, grid code compliance and real-time monitoring.

### High efficiency over entire speed range

The wt3000's optimized integrated electric systems and blade designs result in some of the most efficient power curves in the industry today. The wt3000df features a doubly-fed, three-phase induction generator. The wt3000fc uses a permanent magnet synchronous generator (PMSG), electrical excited synchronous generator or asynchronous generator with a full-scale converter system. The IGBT-based converter with advanced power electronics ensures that the generator works with high efficiency over the entire speed range.

All 3 MW wind turbine models use a state-of-the-art electrical pitch system design. They are available in 50 Hz or 60 Hz and for various climate conditions, in different hub heights, different rotor diameter and blade types to meet various type classes.

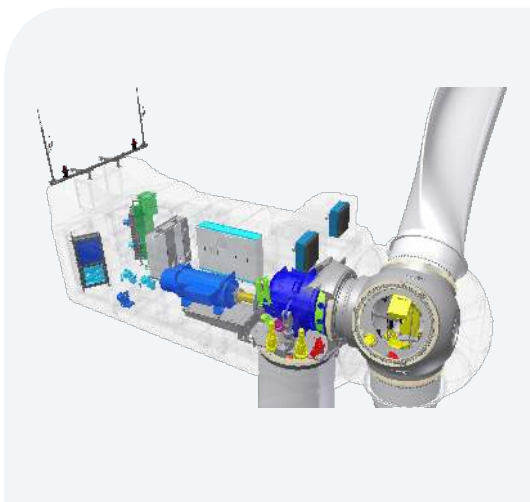
### Compliance with GL guidelines and international grid codes

All wt3000 wind turbines fulfill and are certified for the most recent GL guideline (2010) as well as the most demanding international grid code requirements like low voltage ride-through (LVRT).

### Integrated real-time control, monitoring, alarm handling and analysis

AMSC's fully integrated software solutions allow for intelligent measurement, turbine control and analysis of monitoring and performance data.

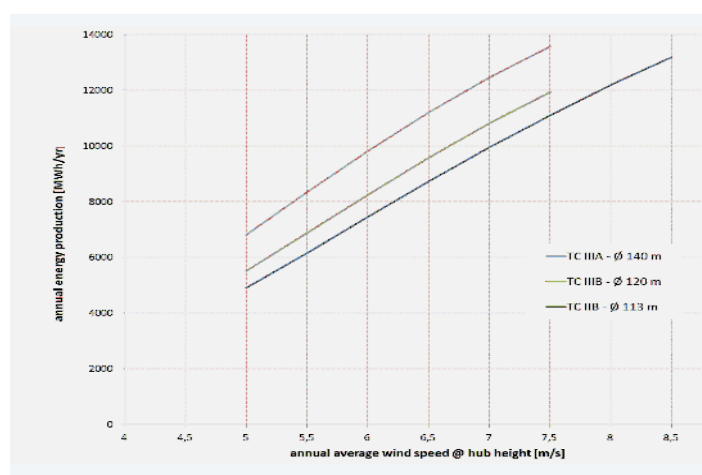
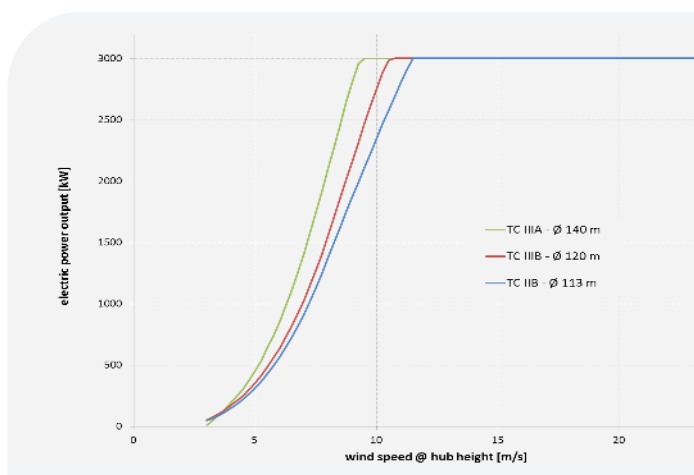
wtSCADA and wtDatacenter provide a harmonized system with supervisory control and data acquisition to actively monitor, analyze and operate entire wind farms. For service and commissioning work, wtCommissioner provides an all-in-one solution in a single software suite. An advanced condition monitoring system, wtCMS, provides detailed and comprehensive analysis tools essential for predictive and preventive maintenance while wtWPC is AMSC'S wind park controller solution allowing operation and control of an entire wind farm. Finally, WindSight™ is a globally accessible data repository and analysis platform for key performance metrics monitoring and sophisticated analytics.



- Available for licensing including technology transfer and local supply chain development
- Customized wind turbine designs
- Reliable operation
- Excellent component supply chain and localization support
- Blueprints available for rotor blade technology transfer
- Available for both onshore and offshore

The wt3000df and wt3000fc are fully designed by AMSC®. They are currently in the process of being certified by Germanischer Lloyd. Comprehensive certification support is available.





## GENERAL

	TC IIB		TC IIIB		TC IIIA	
Type:	wt3000df	wt3000fc	wt3000df	wt3000fc	wt3000df	wt3000fc
Grid frequency:	50 Hz / 60 Hz		50 Hz / 60 Hz		50 Hz / 60 Hz	
Tilt angle rotor axis:	4.5°		4.5°		4.5°	
Hub height:	90 m / 100 m / 110 m / or upon request		90 m / 100 m / 110 m / or upon request		100 m / 110 m / or upon request	
Hub / mainframe material:	cast iron		cast iron		cast iron	
Type of tower construction:	tubular steel, concrete, hybrid		tubular steel, concrete, hybrid		tubular steel, concrete, hybrid	
Rotor diameter:	113 m		120 m		140 m	
Lightning conductor:	integrated		integrated		integrated	

## OPERATING DATA

Cut-in wind speed:	3 m/s	3 m/s	3 m/s
Rated wind speed:	12 m/s	11 m/s	10 m/s
Cut-out wind speed:	25 m/s	20 m/s	20 m/s

## GENERATOR AND POWER ELECTRONICS

Generator type:	double-fed induction	synchronous/asynchronous	double-fed induction	synchronous/asynchronous	double-fed induction	synchronous/asynchronous
Rated power:	3000 kW		3000 kW		3000 kW	
Cooling:	water cooling		water cooling		water cooling	
Converter type:	converter 4-quadrant		converter 4-quadrant		converter 4-quadrant	
Generator rated power:	± 0.95 at 690V ph-ph		± 0.95 at 690V ph-ph		± 0.95 at 690V ph-ph	

## DRIVE TRAIN SPECIFICATION

Drive train type:	main bearing unit - gear box	main bearing unit - gear box	main bearing unit - gear box
Type of gearing:	planetary / parallel shaft gear	planetary / parallel shaft gear	planetary / parallel shaft gear
Gear lubrication:	forced lubrication	forced lubrication	forced lubrication
Connection gear / generator:	flexible coupling	flexible coupling	flexible coupling

## BRAKING SYSTEM

Operational brake:	individual blade pitching	individual blade pitching	individual blade pitching
Type of construction:	gear / servomotor	gear / servomotor	gear / servomotor
Mechanical brake:	active disc brake	active disc brake	active disc brake

## YAW SYSTEM

Type of yaw bearing:	single row ball bearing	single row ball bearing	single row ball bearing
Drive unit:	gear motor	gear motor	gear motor
Brake:	active brake plus motor brake	active brake plus motor brake	active brake plus motor brake

## AMBIENT TEMPERATURE RANGE

Normal climate:	Normal operation:	-10°C to +40°C	-10°C to +40°C	-10°C to +40°C
	Normal survival:	-20°C to +50°C	-20°C to +50°C	-20°C to +50°C
Cold climate:	Cold operation:	-30°C to +40°C	-30°C to +40°C	-30°C to +40°C
	Cold survival:	-40°C to +50°C	-40°C to +50°C	-40°C to +50°C
Hot climate:	Hot operation:	0°C to +50°C	0°C to +50°C	0°C to +50°C
	Hot survival:	-5°C to +50°C	-5°C to +50°C	-5°C to +50°C