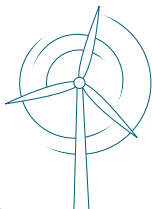




N80 / 2500
N90 / 2300

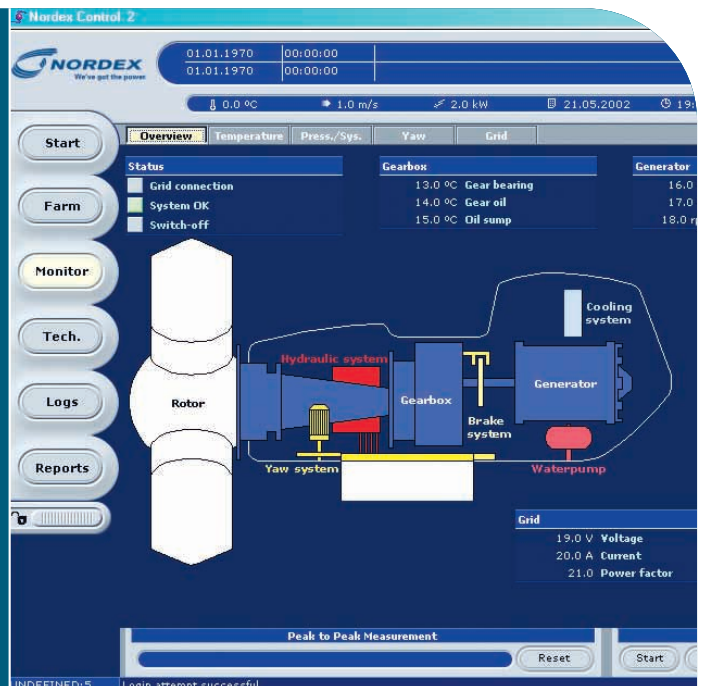


High performance—
today and tomorrow.





Visualisation of a turbine in the control system Nordex Control 2.



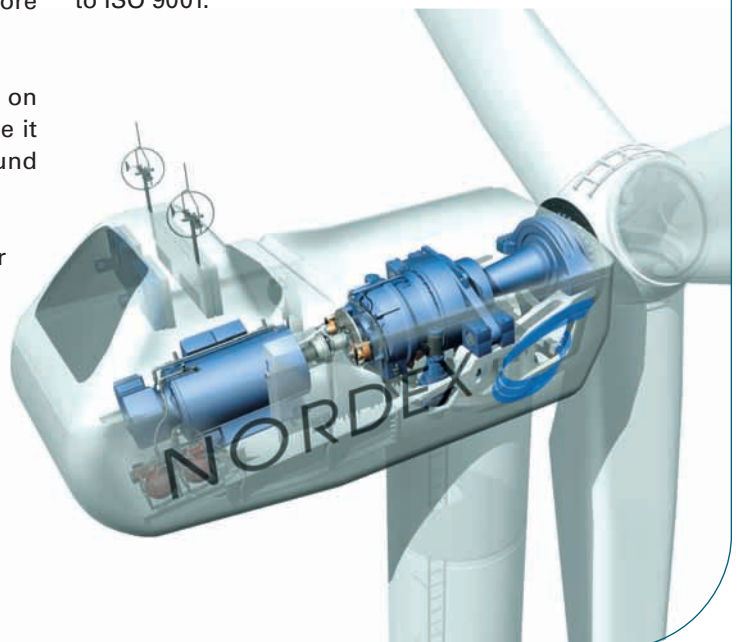
THE N80/2500 AND N90/2300: TWO WIND TURBINES FOR THE HIGHEST ENERGY YIELD.

With the N80/2500 and the N90/2300 you are entering new, hitherto unknown dimensions: a rotor diameter of 80 metres or 90 metres and a rated power of 2.5 MW and 2.3 MW respectively make the N80/2500 and N90/2300 the first choice when it comes to value for money. No matter whether they are positioned inland, at the coast or in the offshore area, these turbines produce optimal yields.

Our know-how in the megawatt class, acquired on the basis of practical operation since 1995, made it possible for us to develop the N80/2500 und N90/2300 successfully.

The IEC-1a-certified N80/2500 suits perfectly for high-wind regions. The N90/2300 is especially suitable for lower wind locations. Thanks to the pitch control, the machines are able to optimise the energy yield at all wind speeds.

The N80/2500 and N90/2300 are supplied with Nordex Control 2. Nordex Control 2 controls and visualises all relevant data and, as a Web-based system, it sets new standards in ease of use. All our wind turbines are designed for a service life of at least 20 years and are manufactured according to ISO 9001.





Remote monitoring in Rostock.

Your benefits at a glance:

- Location-specific control for individual turbines or wind farms
- Security due to redundant systems
- 24-hour remote monitoring
- Autonomous safety systems (emergency off in the event of power failure)

RELIABILITY, SERVICE, ENVIRONMENTAL SUSTAINABILITY: NORDEX ALWAYS OFFERS THAT BIT MORE.

The turbines are easy to maintain due to

- having no rotating hydraulics in the hub.
- maintenance-free pitch drives.
- easily accessible control cabinets.
- a user-friendly rotor lock, and elastomer bearings in the drive chain that are easy to check and monitor.
- controls at the bottom of the tower and in the nacelle and the wide range of remote query possibilities for the control system and converter.

They are reliable

- as resonances are avoided or minimised by design measures.
- as all components are supplied by renowned certified manufacturers, thus guaranteeing their quality.
- as we use well-proven technology based on long experience.

They are environmentally-friendly due to

- the absence of a rotating hydraulic system.
- the enclosed grease and oil collecting pans.
- the hydraulics with all lines in the area of the oil pan – meaning that no oil can pollute the environment.

They are noise-friendly due to

- the helical gearing of all gearwheels which reduces the noise level within the gearbox.
- the generator, gearbox and many other components being attached in such a way that vibrations are either not transmitted or are damped. In this way, noises are immediately reduced at source.



THE N80/2500 AND N90/2300: THE FINER DETAILS AT A GLANCE.

Rotor

The rotor consists of three rotor blades made of glass-fibre-reinforced polyester, the hub, the pitch bearings, and drives to change the pitch angle of the rotor blades.

Drive chain

The drive train consists of the rotor shaft, the gearbox, an elastic cardanic coupling and the generator.

Gearbox

The gearbox is designed as a two-stage planetary gearbox with a one-stage spur gear. The gearbox is cooled by means of an oil-water-air cooling circuit with stepped cooling capacity. The bearings and tooth engagements are kept continuously lubricated with cooled oil.

Generator

The generator is a double-fed asynchronous machine. The generator is kept in its optimum temperature range by means of a cooling circuit.

Cooling and filtration

The gearbox, generator and converter of the N80/2500 and N90/2300 have cooling systems which are independent from each other. The cooling system for the generator and converter is based on a water circuit. This ensures optimum operating conditions in all types of weather.

Braking system

The three redundant and independently controlled rotor blades can be set at full right angles to the rotation direction for aerodynamic braking. In addition, the hydraulic disc brake provides support in the event of an emergency stop.

Hydraulic system

The hydraulic system provides the oil pressure for the operation of different components: the yaw brakes, rotor brake and nacelle roof.

Nacelle

The nacelle consists of the cast machine frame and the nacelle housing. The nacelle housing is made of high-quality glass-fibre-reinforced polyester (GRP). The roof of the nacelle is opened hydraulically.

Yaw system

The wind direction is continuously monitored by two redundant wind direction sensors on the nacelle. If the permissible deviation is exceeded, the yaw angle of the nacelle is actively adjusted by means of two geared motors.

Tower

The tubular steel tower is designed and certified as a modular tower. The requirements of EN 50308 in particular have been taken into account in the design of the tower interiors (access ladder, platforms, safety equipment). The transformer can be installed either inside or outside the tower.



Control and grid connection

The wind turbine has two anemometers. One anemometer is used for controlling the turbine, the second for monitoring the first. All operational data can be monitored and checked on a control screen located in the switch cabinet. The data and signals are transmitted via ISDN for remote monitoring. At the click of the mouse, the operator can download all key data for the turbine from the Internet. The necessary communications software and hardware is supplied by Nordex.

Lightning protection

Lightning and overvoltage protection of the entire wind turbine is based on the lightning protection concept and is in accordance with DIN EN 62305.

FACTS AND FIGURES.

	N80/2500	N90/2300		N80/2500	N90/2300
Rotor			Yaw system		
Number of rotor blades	3	3	Bearing	Ball bearing	Ball bearing
Rotor speed	10.8 to 18.9 rpm	9.6 to 16.8 rpm	Brake	Hydraulic disc brake	Hydraulic disc brake
Rotor diameter	80 m	90 m	Drive	Two asynchronous motors with an integrated brake	
Swept area	5,026 m ²	6,362 m ²	Speed	Approx. 0.5 %/s	Approx. 0.5 %/s
Power regulation	Pitch	Pitch	Control system		
Cut-in wind speed	Approx. 3 m/s	Approx. 3 m/s	Type	PLC, Remote Field Controller (RFC)	
Cut-out wind speed	25 m/s	25 m/s	Grid connection	Via IGBT converter	Via IGBT converter
Rated power	From approx. 15 m/s	From approx. 13 m/s	Scope of monitoring	Remote monitoring of more than 300 different parameters, e.g. temperature, hydraulic pressure, pitch parameters, wind speed and direction	
Survival wind speed	70 m/s–IEC type class 1	59.5 m/s–IEC type class 2	Recording	Production data, event lists with filter function, long and short-term trends	
Pitch-regulation	Individual pitch	Individual pitch	Visualisation	Panel PC in control cabinet and Web-based access possible from any PC, adapter for laptop at the bottom of tower and in nacelle	
Weight	Approx. 52,000 kg	Approx. 55,000 kg	Brakes		
Rotor blades			Primary	Rotor blade pitch	Rotor blade pitch
Length	38.8 m	43.8 m	Secondary	Hydraulic disc brake	Hydraulic disc brake
Material	GRP	GRP	Tower		
Weight	Approx. 9,000 kg	Approx. 10,200 kg	Type	Modular tubular steel tower Lattice: hot-dip galvanised	
Gearbox			Hub heights	Tubular tower 60 m, certificate IEC 1a Tubular tower 70 m, certificate IEC 1a Tubular tower 80 m, certificate IEC 1a, DIBt 3, NVN 1a	Tubular tower 70 m, certificate IEC 2a Tubular tower 80 m, certificate DIBt 3, IEC 2a, GL 2 Tubular tower 100 m, certificate DIBt 2, IEC 3a Lattice tower 105 m, certificate DIBt 2
Type	Planetary gearbox	Planetary gearbox			
Gear ratio	1 : 68.7	1 : 77.44			
Weight	Approx. 18,500 kg	Approx. 18,500 kg			
Oil quantity	360 l	360 l			
Oil change	Semi-annual check, change as required				
Rotor shaft bearing	Cylindrical roller bearing	Cylindrical roller bearing			
Generator					
Power	2,500 kW	2,300 kW			
Voltage	660 V	660 V			
Type	Asynchronous double-fed, liquid-cooled				
Speed	740–1,300 rpm	740–1,300 rpm			
Insulation class	IP 54	IP 54			
Weight	Approx. 10,000 kg	Approx. 10,000 kg			

POWER CURVE N80/2500

Wind speed [m/s]	Power [kW]	Power coefficient Cp
4	15	0,076
5	121	0,314
6	251	0,377
7	433	0,410
8	667	0,423
9	974	0,434
10	1319	0,428
11	1675	0,409
12	2004	0,377
13	2281	0,337
14	2463	0,292
15	2500	0,241
16	2500	0,198
17	2500	0,165
18	2500	0,139
19	2500	0,118
20	2500	0,102
21	2500	0,088
22	2500	0,076
23	2500	0,067
24	2500	0,059
25	2500	0,052

Rounded values based on measurements of DEWI and aerodynamic calculations

POWER CURVE N90/2300

Wind speed [m/s]	Power [kW]	Power coefficient Cp
4	35	0,140
5	175	0,359
6	352	0,418
7	580	0,434
8	870	0,436
9	1237	0,435
10	1623	0,417
11	2012	0,388
12	2230	0,331
13	2300	0,269
14	2300	0,215
15	2300	0,175
16	2300	0,144
17	2300	0,120
18	2300	0,101
19	2300	0,086
20	2300	0,074
21	2300	0,064
22	2300	0,055
23	2300	0,049
24	2300	0,043
25	2300	0,038

Rounded values based on measurements of Risø National laboratory and aerodynamic calculations



WE ARE REPRESENTED WITH OFFICES AND SUBSIDIARIES WORLDWIDE.

Nordex AG

Bornbarch 2
22848 Norderstedt
Germany
Phone: +49 40 30030 1000
Fax: +49 40 30030 1101
E-mail: info@nordex-online.com

Sales Nordex Energy GmbH

Bornbarch 9
22848 Norderstedt
Germany
Phone: +49 40 30030 1490
Fax: +49 40 30030 1491
E-mail: info@nordex-online.com

Service Nordex Energy GmbH

Bornbarch 2
22848 Norderstedt
Germany
Phone: +49 40 30030 1209
Fax: +49 40 30030 1301
E-mail: info@nordex-online.com

Nordex Energy GmbH

Erich-Schlesinger-Straße 50
18059 Rostock, Germany
Phone: +49 381 6663 3300
Fax: +49 381 6663 3339
E-mail: info@nordex-online.com

Nordex Energy GmbH

C. F. Tietgens Vej 10
6000 Kolding, Denmark
Phone: +45 75 73 44 00
Fax: +45 75 73 41 47
E-mail: denmark@nordex-online.com

Nordex Sverige AB

Kungsängsvägen 21
75323 Uppsala, Sweden
Phone: +46 18 185 900
Fax: +46 18 185 927
E-mail: info@nordex-online.com

Nordex Energy GmbH Benelux

It Reidlân 79
8502 CE Joure, Netherlands
Phone: +31 513 41 23 54
Fax: +31 513 41 85 88
E-mail: info@nordex-online.com

Nordex Energy Ibérica S.A.

Calle Ausiàs Marc, 23 pral.
08010 Barcelona, Spain
Sales Office:
Pso. de la Castellana, 23 2º-A
28046 Madrid, Spain
Phone: +34 91 7000356
Fax: +34 91 3199388
E-mail: spain@nordex-online.com

Nordex Polska Sp. z o.o

Al. Jana Pawła II 80 m.C22
00-175 Warszawa, Poland
Phone: +48 22 636 52 77
Fax: +48 22 637 30 01
E-mail: info@nordex-online.com

Nordex Energy GmbH

c/o Thomas Annegg
Schöffelgasse 4/6
1180 Wien, Austria
Phone: +43 1 615 39 38 10
Fax: +43 1 615 39 38 20
E-mail: info@nordex-online.com

Nordex Italia S.r.l.

Viale Città d'Europa 679
00144 Roma, Italy
Phone: +39 06 83 46 30 01
Fax: +39 06 83 46 30 60
E-mail: info@nordex-online.com

Nordex UK Ltd.

Suite 4, Egerton House
The Towers Business Park
Didsbury M20 2DX
United Kingdom
Phone: +44 161 445 99 00
Fax: +44 161 445 99 88
E-mail: uk@nordex-online.com

Nordex France S.A.S.

1, Rue de la Procession
93217 La Plaine Saint-Denis, France
Phone: +33 155 93 43 43
Fax: +33 155 93 43 40
E-mail: france@nordex-online.com

Nordex China

Room 808
First Shanghai Center, No. 39
Liangmaqiao Road
Chaoyang District
Beijing 100125, P. R. China
Phone: +86 10 84 53 51 88
Fax: +86 10 84 53 51 58
E-mail: china@nordex-online.com

Nordex USA, Inc.

300 South Wacker Drive, Suite 1500
Chicago, Illinois 60606, USA
Phone: +1 312 386 4100
Fax: +1 312 386 4101
E-mail: nordexUSA@nordex-online.com

