REpower Systems




# MM92

The 2-megawatt power plant
with 92 metre rotor diameter



# MM92

## Technical data

**Design data**

| | |
|---|---|
| Rated power | 2,000 kW |
| Cut-in speed | 3.0 m/s |
| Rated wind speed | 11.2 m/s |
| Cut-out speed | 24.0 m/s |
| Wind zone | up to DIBt 3 |
| Type class | up to IEC IIa |

**Rotor**

| | |
|---|---|
| Diameter | 92.5 m |
| Rotor area | 6,720 $m^2$ |
| Rotor speed | 7.8 – 15.0 rpm (+12.5 %) |

**Rotor blade**

| | |
|---|---|
| Length | 45.2 m |
| Type | GFC shell construction |

**Yaw system**

| | |
|---|---|
| Type | Double-row externally geared four-point bearing |
| Drive system | Gear motors |
| Stabilisation | Disc brake |

**Gear system**

| | |
|---|---|
| Type | combined planetary/spur wheel gearbox |
| Transmission ratio | i = approx. 120.0 |

**Electrical system**

| | |
|---|---|
| Generator type | Double-fed asynchronous generator, 4-pole |
| Rated power | 2,000 kW |
| Rated voltage | 690 V (50 Hz)<br>575 V (60 Hz) |
| Rated speed | 900 – 1,800 rpm (50 Hz)<br>720 – 1,440 rpm (60 Hz) |
| Generator protection class | IP 54 |
| Converter type | Pulse width-modulated IGBTs |

**Power control**

| | |
|---|---|
| Principle | Electrical blade angle adjustment – pitch and speed control |

**Tower**

| | |
|---|---|
| Type | Steel tube |
| Hub height | 68.5 / 78.5 / 80 / 100 m |

**Foundation**

Reinforced concrete foundation with foundation insert, adjusted on site conditions

**Safety system**

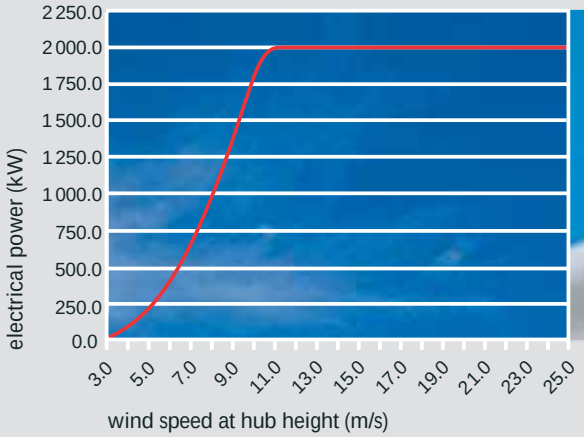
- Individually adjustable blades (electrically controlled) – fail-safe system
- Extensive redundant temperature and speed sensing system
- Fully integrated lightning protection
- Shielded cables and power rails protecting people and machinery
- Rotor holding brake with soft-brake function

# The 2-megawatt power plant with 92 metre rotor diameter

The wind power plants of the MM series are based on the well-established technology driven concept of the 1.5 megawatt MD series with variable speed generator and converter system and electrical single-blade adjustment. The second generation of these high-performance power plants offer the same high reliability and maximum power output as previous models. Due to the leading technology and innovative solutions developed by REpower, the company's wind turbines can be fully integrated into the existing power grid.

Due to the excellent design in every detail, the MM series offers you excellent returns over the entire service life of the equipment.

The MM92 has a swept rotor area of 6,720 square metres and is available with hub heights between 68.5 and 100 metres. It has been specifically optimised for use in regions of low to medium wind speeds.





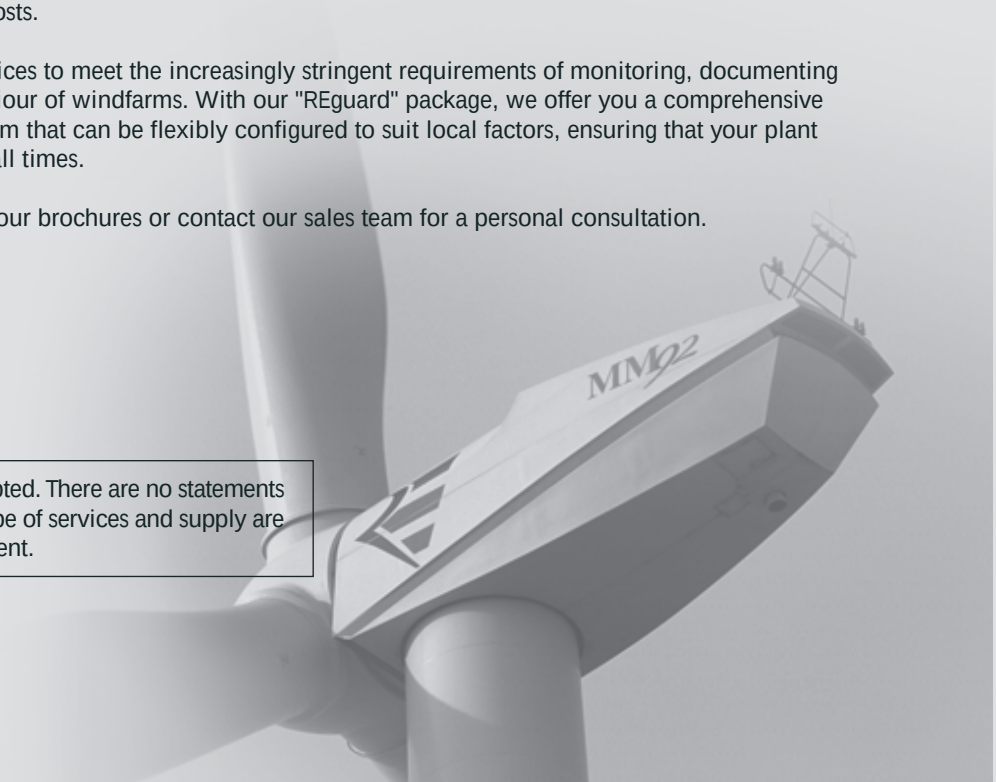

# Powerful, economical and long term reliability

By choosing REpower turbines, you are opting for power plant technology of the highest quality. To ensure that your investment retains its value, we offer you a comprehensive after-sales service.

Our permanent monitoring system monitors your power plants 365 days a year, 24 hours a day, ensuring the shortest possible response times of our locally based service team. We also offer you integrated service packs (ISPs) that allow you to set your long-term operating costs.

We are constantly upgrading our services to meet the increasingly stringent requirements of monitoring, documenting and optimising the operational behaviour of windfarms. With our "REguard" package, we offer you a comprehensive modular windfarm management system that can be flexibly configured to suit local factors, ensuring that your plant is operated in an efficient manner at all times.

For more information, please refer to our brochures or contact our sales team for a personal consultation.




Subject to alteration and errors excepted. There are no statements as to consistence or guarantees. Scope of services and supply are determined exclusive by an agreement.



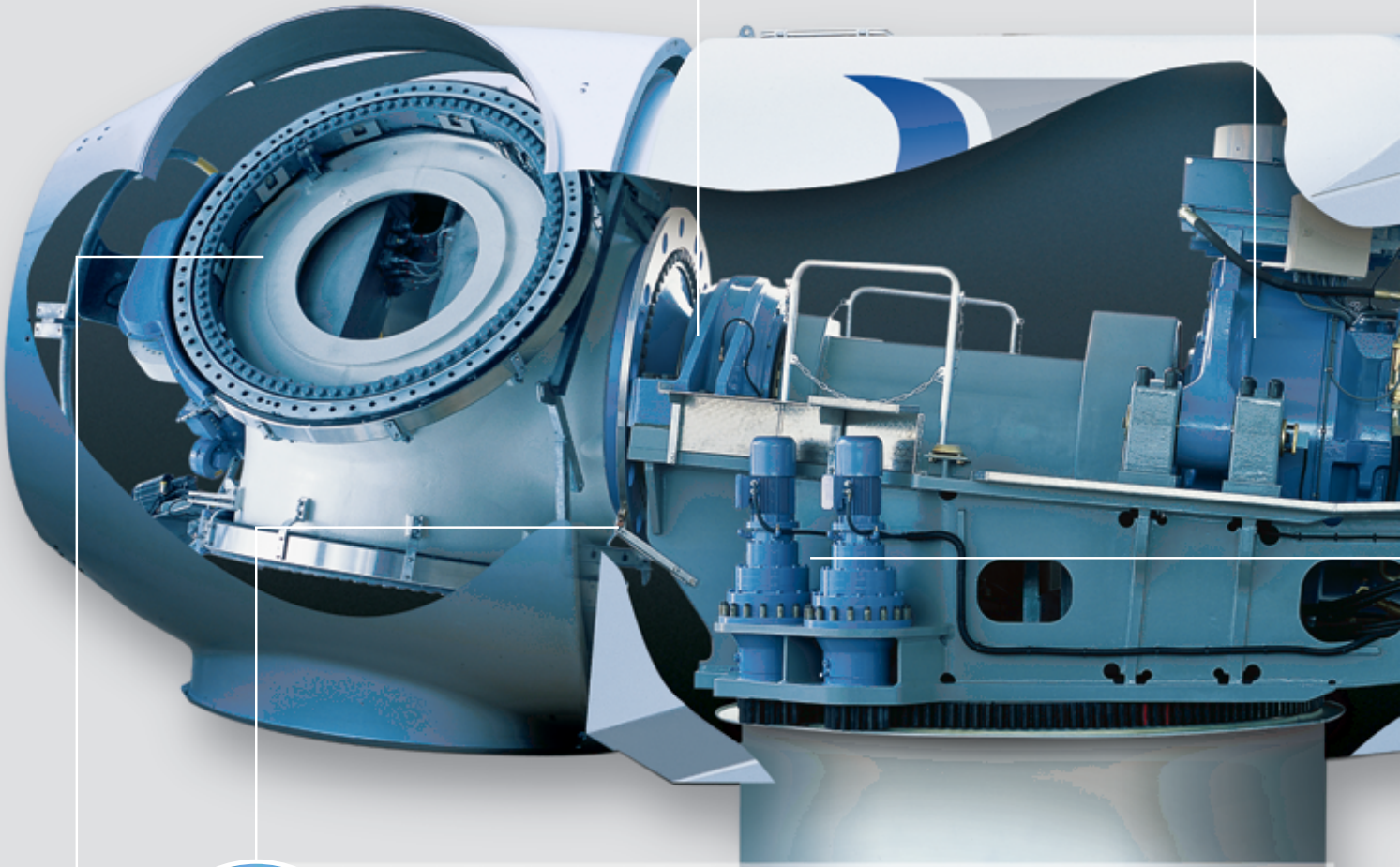
**Rotor bearing and shaft**

- High-performance spherical roller bearing with adjusted bearing housing and permanent lubrication for prolonged service life
- Rotor shaft forged from heat-treated steel and optimised for power flow



**Gear system**

- Combined planetary/spur wheel gear
  most stringent requirements regarding
  bearing of torque multiplier for structu
  cooling system
- Excellent oil quality





**Lightning protection**

- Lightning protection concept conforming to IEC regulations with internal and external lightning protection
- External lightning protection system with blade receptors and lightning rod at the weather mast
- Reliable protection of bearings due to defined lightning conduits
- GFC coupling for the galvanic insulation of the generator system from the gear system
- Over-voltage arrester protecting the electric system
- Reliable protection of the generator by means of insulated bearing bushings



**Pitch system**

- Virtually maintenance-free electronic system
- High-quality, generously dimensioned blade bearing with permanent track lubrication
- Protected against the elements by means of integrated deflector in the spinner
- Maximum reliability via redundant blade angle detection by means of two separate measuring systems
- Fail-safe design with separate control and regulation systems for each rotor blade

**Rotor hub**

- Low deformation due to compact design adjusted to power flow
- Optimised integration into pitch drive
- Generously dimensioned spinner allowing access to the hub in all weather



**Environment**

- No leakage of lubricants at hub or nacelle, due to
  - labyrinth packing in spinner
  - coaming edges in nacelle panelling and
  - grease pan below azimuth gearing
- Closed central lubrication system of blade bearings
- Shielding of all relevant cables and use of power rails to protect workers and machine

y/spur wheel gearbox ■ Dimensioned according to REpower gear regulations, meeting the rements regarding service life and smooth running ■ Optimised efficiency ■ Elastomer ultiplier for structure-borne sound insulation ■ Low temperature level due to effective oil xcellent oil quality due to three-stage oil filter system



**Holding brake**
- Secure holding of rotor due to generously dimensioned disc brake
- Soft-brake function reducing stress to the gearbox





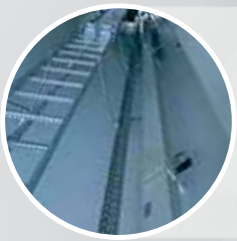
**Generator and converter**
- Yield-optimised variable speed range
- Low conversion loss and high total efficiency as converter output is limited to maximum 20 % of the overall output
- Fully enclosed generator with air/air heat exchanger
- Optimised temperature level in generator, even at high outside temperatures

ction



**Azimuth**
- Externally geared four-point bearing, driven by generously dimensioned high-quality gear motors
- Holding brakes with fail-safe function implemented with hydraulic pressure accumulator release the drives in idle mode and stabilise the nacelle
- Minimum load on drives due to low friction at four-point bearing and release of brakes during tracking

bility
ntrol



**Power rail**
- Prevention of electrical interference in the plant
- Compliance with VDE regulations
- Best possible protection in the event of a short circuit or fire

**Tube tower**
- Characteristic frequency of the tower is above rotating frequency of the rotor (rigid design) and ensures minimum stress in tower and machine
- No restrictions regarding speed range of unit, as there is no risk of frequency interference
- Excellent component safety due to elbow flanges and load-optimised door opening



**Serviceability**
- Ample space in nacelle for ergonomically optimised and reliable service
- Hub easily accessible in all weathers without having to leave the nacelle
- Excellent accessibility of all components
- Guards mounted over all rotating components ensure safe servicing
- If necessary, virtually all components of the plant can be easily and safety dismantled

# The REpower sales teams are always there for you.


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| | MM82 | MM92 | 5M |
|---|---|---|---|
| Rated power | 2,000 kW | 2,000 kW | 5,000 kW |
| Rotor diameter | 82.0 m | 92.5 m | 126.0 m |


03/2007
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