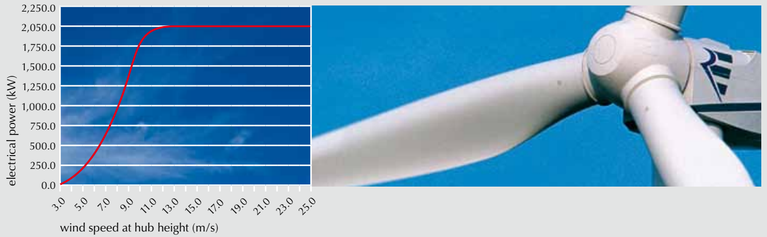
The reliable 2-megawatt power plant with 92 meter rotor diameter

The variable speed generator, converter system, and pitch control of the well established and successful 1.5MW MD series laid the foundation for the windpower plants of the MM series. The second generation of these high-performance power plants offers 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.

Thanks to its innovative, detailed design, 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 meters and is available with hub heights between 68.5 and 100 meters. It has been specifically optimized for use in regions with low to medium wind speeds.



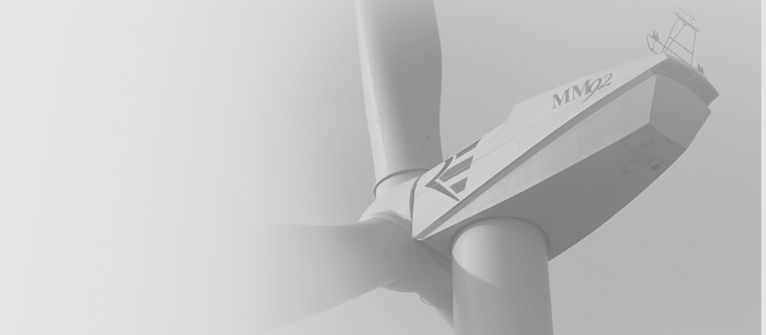
Powerful, economical, reliable

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

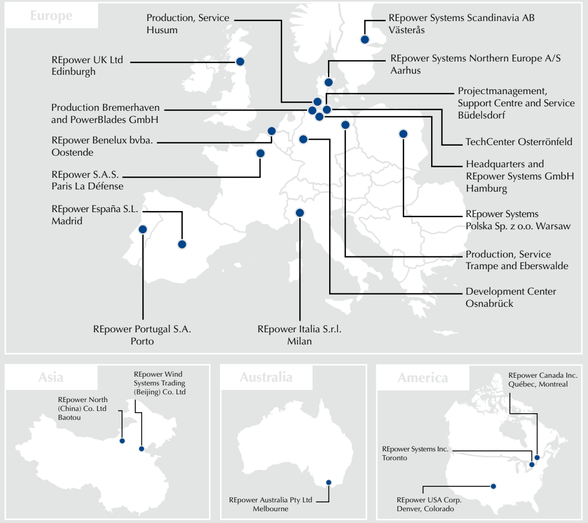
Our permanent monitoring system monitors your power plants 24 hours a day, 365 days a year, ensuring the quickest possible response times of our local service teams. We also offer integrated service packs (ISPs) that allow you to calculate long-term operating costs.

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

For more information, please refer to our brochures or contact our sales team.



The REpower sales teams are always there for you.



Please visit our website: at **www.repower.de ► About us ► Locations** you can find the addresses of all our company sites.

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MM92

The reliable 2-megawatt power plant with 92 meter rotor diameter

MM92

Technical Data

Design data

Rated power	2,050 kW
Cut-in speed	3.0 m/s
Rated wind speed	12.5 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 m²
Rotor speed	7.8 –15.0 rpm (+12.5%)

Rotor blade

Length	45.2 m
Type	GRP sandwich construction; manufactured in Infusion-process

Yaw system

Type	Double-row externally geared four-point bearing
Drive system	Gear motors
Stabilization	Disc brakes

Gear system

Type	Combined planetary/spur wheel gearbox
Transmission ratio	i = approx. 120.0 (50 Hz) i = approx. 96.0 (60 Hz)

Electrical system

Generator type	Double-fed asynchronous generator, 4-pole (50 Hz) 6-pole (60 Hz)
Rated power	2,050 kW
Rated voltage	690 V (50 Hz) 575 V (60 Hz)
Rated speed	900–1,800 rpm (50 Hz) 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

Sound power level

LWA, 95%	104.2 dB (A)

Tower

Type	Steel tube
Hub height	68.5/80/100 m

Foundation

Reinforced concrete foundation with foundation insert, adjusted to 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

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 optimized for power flow

Gear system
- Combined planetary/spur wheel gearbox
- Dimensioned according to REpower gear regulations, meeting the most stringent requirements regarding service life and smooth running
- optimized efficiency
- Elastomer bearing of torque multiplier for structure-born sound insulation
- Low temperature level due to effective oil cooling system
- Excellent 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

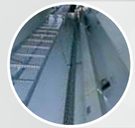
Lightning protection
- Lightning protection concept conforming to IEC regulations with internal and external lightning protection
- External lightning protection system with blade receptors and lightning rod at the weather mast
- Reliable protection of bearings due to defined lightning conduits
- GFC 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

Generator and converter
- Yield-optimized 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
- optimized temperature level in generator, even at high outside temperatures

Yaw
- 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 stabilize the nacelle
- Minimum load on drives due to low friction at four-point bearing and release of brakes during tracking

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

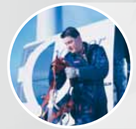
Rotor hub
- Low deformation due to compact design adjusted to power flow
- optimized integration into pitch drive
- Generously dimensioned spinner allowing access to the hub in all weather



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-optimized door opening

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



Serviceability
- Ample space in nacelle for ergonomically optimized and reliable service
- Hub easily accessible in all weather 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 safely dismantled