



wm15S

WM
wind matic®

Money's in the air

The forces of nature are far beyond human control, however, some of them we are able to control and transform into energy. From natural sources we derive, among other things, lighting and heating, and those are the factors which keep the whole economy working.

In some states water power forms the basis for natural energy. In other states, like California for instance, wind power is the natural energy source.

Actually, the California wind means that millions of kilowatt hours are floating about in the air, so really, it is only a question

of harnessing them.

The advanced Wind Matic windmill renders this possible through an investment which is not only financially profitable, but also an extremely solid way to save energy money. In areas which are particularly wind-swept it would be almost unwise not to utilize the wind energy.

Wind Matic WM 15 S means a safe investment in the future

Here are some facts which speak for investing in windmills

Wind power: The investment. It would be an understatement to say that wind power represents a favorable investment opportunity. In fact, thanks to several factors, wind power is one of the most attractive investment opportunities ever offered to the private investor.

Wind power is »pre-sold«. Federal and state law require utility companies to pur-

chase all the power that wind generation can produce. That means that every single watt of wind-produced electricity is guaranteed a market! Better still, the utility companies are required to purchase wind-generated power at the »highest avoided cost« – that is, the maximum rate they would have to pay for conventionally-produced power.

Here are some facts which speak for investing in Wind Matic

Wind Matic A/S has more than 10 years experience in development and production of windmills and is the Danish company which has the best knowledge in this field. The Wind Matic windmill occupies a prominent position because of

the advanced technology and design of the windmill and because the components used are of high quality. All factors which ensure a reliable, effective operation and a very long life, including very little maintenance.

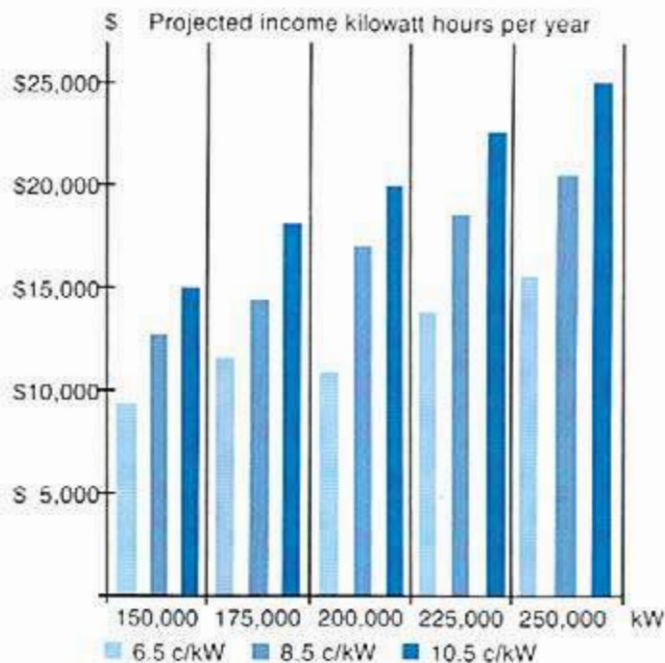
wm15S is the result of many years of research and development

The Wind Matic 15 S has been developed on the basis of the WM 14 S.

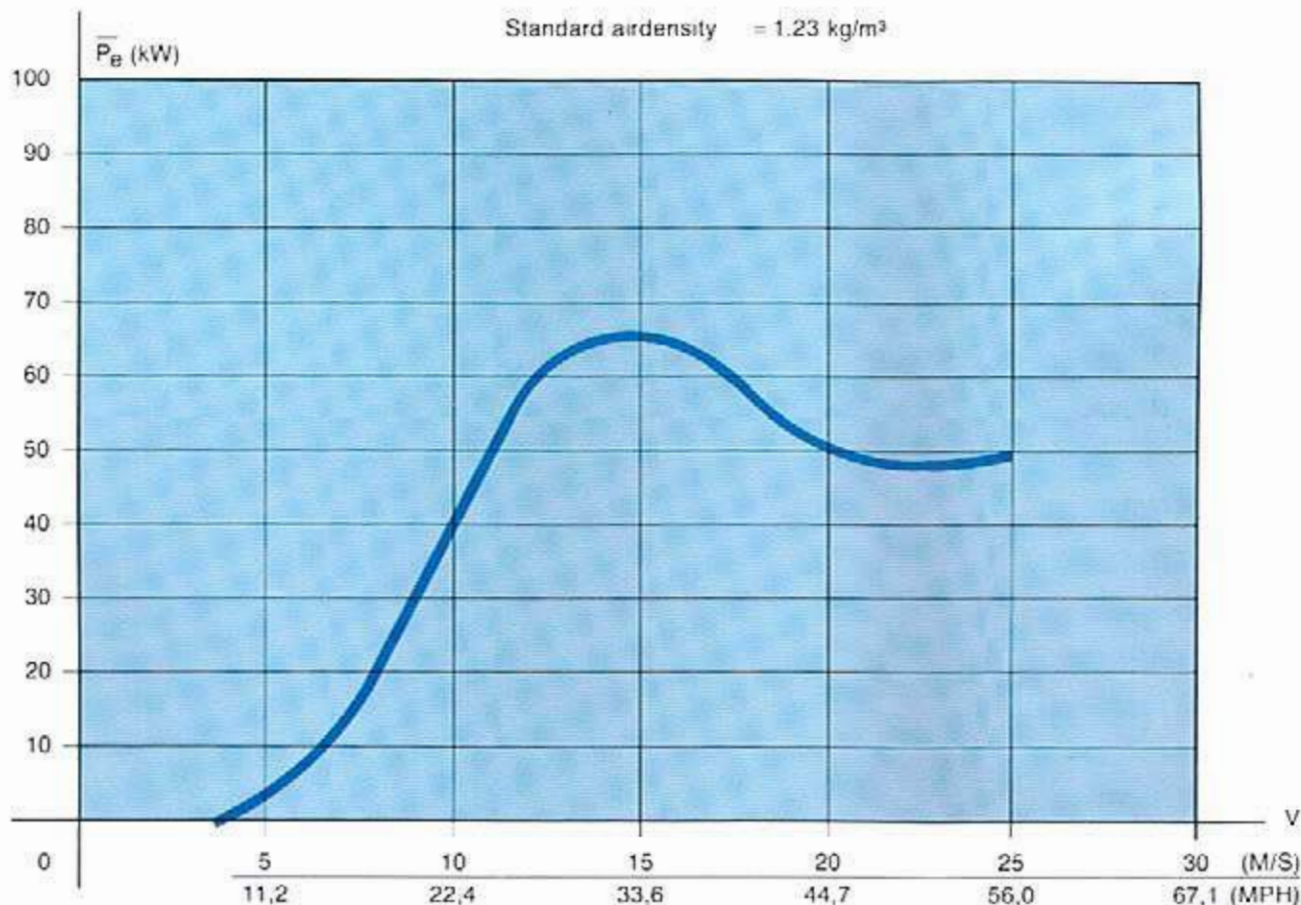
The Wind Matic 15 S was the first improvement in our S series, constructed with the purpose of improving power output. The WM 15 S is equipped with advanced computer steering, based on micro-processor technology.

The annual energy yield of the windmill is dependent on the wind conditions of the site in question and of course the placing of the windmill.

The power of the WM 15 S can be read from the power curve below. (Power Curve measured by an impartial authority »Test Plant for Smaller Windmills, Riso«).

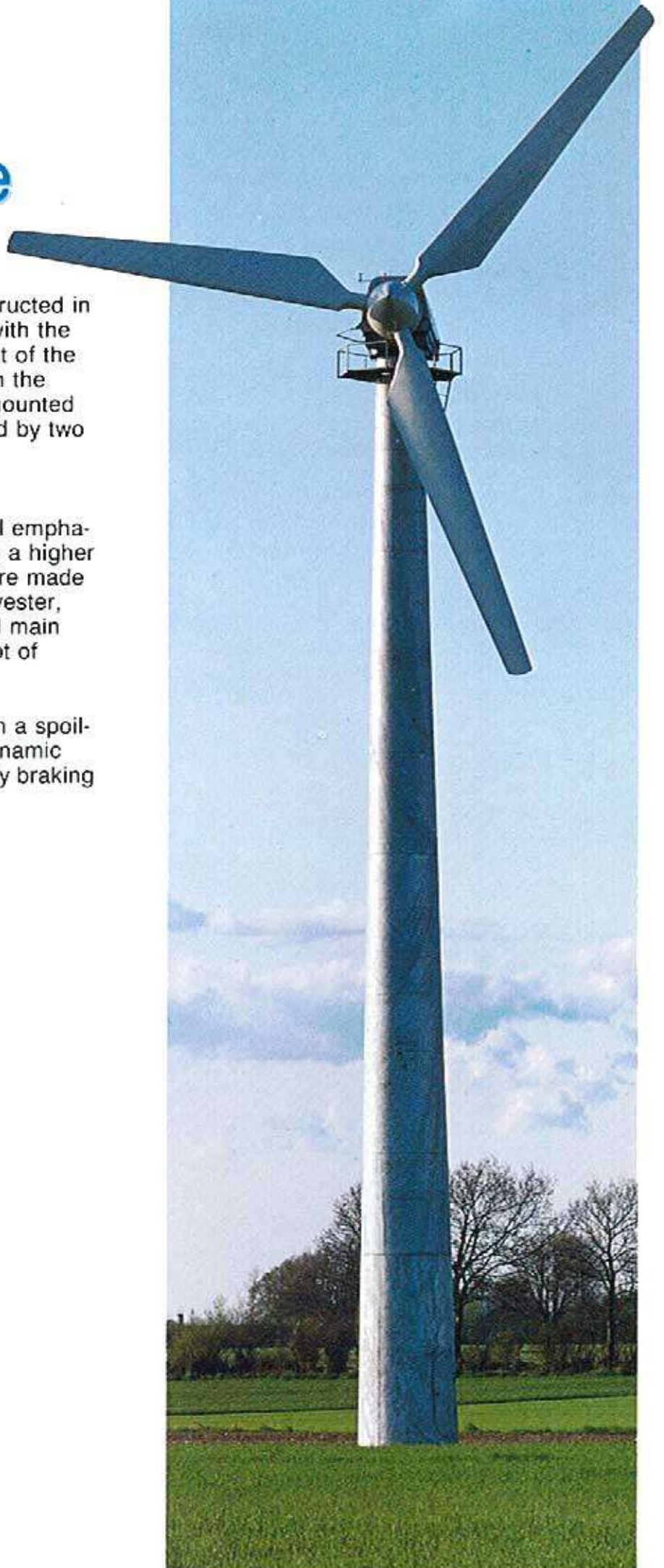


Power Curve WM 15 S USA



Strong and reliable

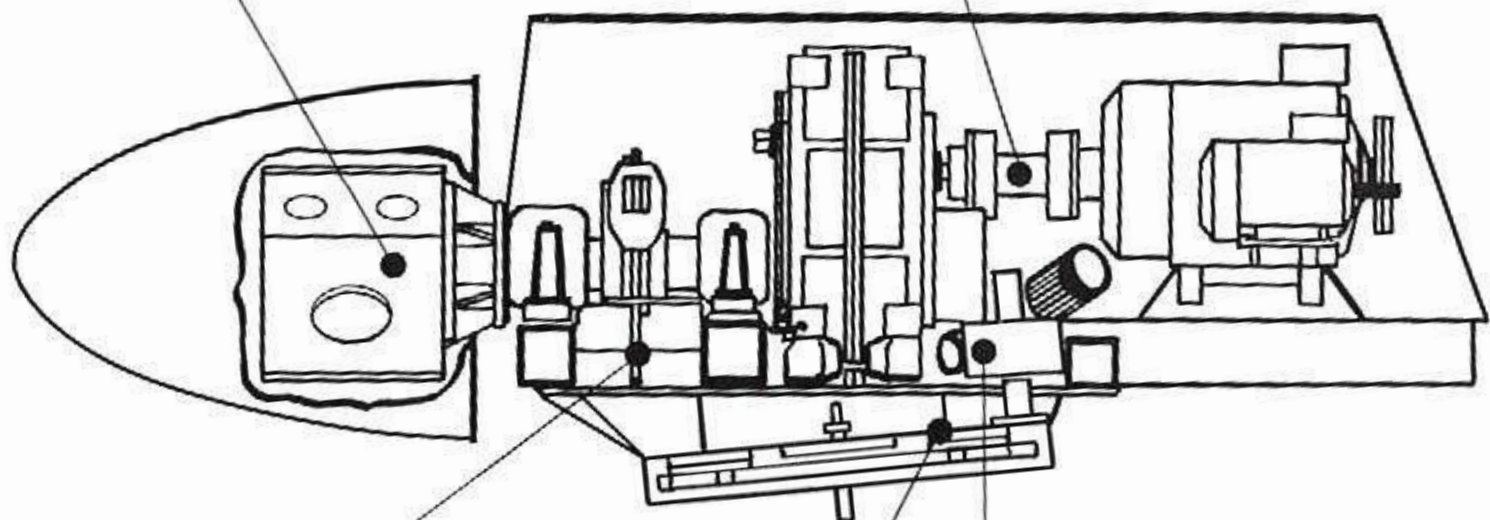
- 1) The turbine has been constructed in a way which provides you with the possibility of fine adjustment of the tip angle in accordance with the conditions. The turbine is mounted on a forged shaft, supported by two heavy-duty, spherical roller bearings.
- 2) When designing the aerofoil emphasis was placed on obtaining a higher power output. The blades are made of fiberglass reinforced Polyester, built up around a reinforced main beam with an imbedded root of heat-treated SG-iron.
- 3) Each blade is equipped with a spoiler type independent aerodynamic brake, providing a secondary braking system.



Sturdy quality down to details

The hub is a welded, heavy-duty construction, bolted to the flange on the main shaft.

Between the gearbox and the generator a flexible coupling, free of maintenance, is mounted.



The windmill is equipped with an operation brake on the slowrevolving shaft. A fact which means that the gearbox will not be exposed to large mechanical loads when breaking.

The yawing system functions by means of a yaw motor and a yaw gear which keeps the windmill oriented to the wind direction. The yaw motor is controlled by means of wind vane signals.

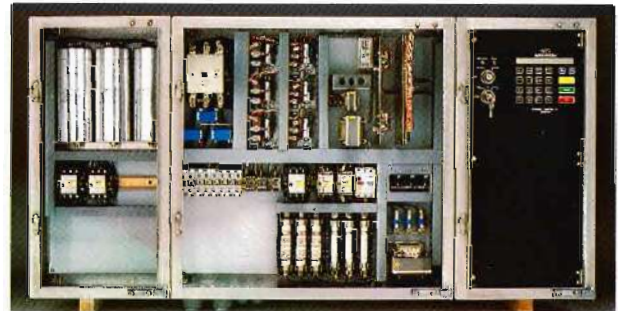
The nacelle rotates on four self-greasing Oilon blocks, mounted between the cabin and the yaw gear wheel.

WM 15 S has built-in electronic supervision, providing maximum security

The control system of the WM 15 S is based on advanced microprocessor technology.

The system supervises and controls both the grid and the windmill and will bring the windmill to an immediate halt if any irregularity should arise:

1. Abnormal variations in grid frequency and grid voltage.
2. Overspeed on main and/or generator shaft.
3. Transmission error between large and small generator.
4. Breaking of phase between large and small generator.
5. Thermal overload of generators (temperatures measured on two levels).
6. Thermal overload of yaw motor.
7. Thermal overload of gearbox.
8. Abnormal vibrations.
9. Max. yawing period exceeded.
10. Level too low in brake fluid reservoir.
11. Oil level too low in gearbox.
12. Worn brake blocks.
13. Abnormal twisting of cables (automatic un-twisting).



14. Wind speed higher than cut-out speed.

When the points stated in 13 and 14 are corrected, the computer control will re-start the windmill automatically. Thyristor control from the computer ensures a careful, soft connection to the grid.

A display on the control panel indicates any irregularity by the windmill operation or by the grid. Also, other factors such as wind speed, electric power, and the RPM, will appear from the display. This control system also gives you the possibility of connecting a computer for central supervision.

Technical specifications WM 15 S

| | | | | | |
|----------------------------|---|---|---------------------------------|--|---|
| CONNECTION TO MAINS | | AERODYNAMIC BRAKES | | Small generator | |
| Voltage | 480 V | Type | spoilers centrifugally | Rated electrical power | 13 kW |
| Frequency | 60 Hz | Releasing | | Rated RPM | 1230 RPM |
| PERFORMANCE | | NACELLE | | Large generator | |
| Cut-in wind speed | 3.5 m/s | Cover material | aluminium | Rated electrical power | 66 kW |
| Wind speed for max. power | 15 m/s | Chassis material | hot dip galvanized steel | Rated RPM | 1212 RPM |
| Cut-out wind speed | 25 m/s | Dimensions (length x width x height) | | CONNECTION BETWEEN LARGE AND SMALL GENERATOR | |
| Design wind speed | 50 m/s | 2690 x 1325 x 1320 mm | | Type | V-belt transmission |
| Max. electric power | 66 kW | 3990 kg | | Gear ratio | 1:1.42 |
| TURBINE | | Mass (excl. turbine) | | YAWING SYSTEM | |
| Type | 3 blades, stall regulated up wind turbine | 15.5 m | | Type | yaw gear wheel with external teeth and oilon bearings |
| Diameter | 15.5 m | MAIN BEARINGS | | Operation | |
| Direction of rotation | counterclockwise | Type | spherical roller bearings | on/off electrical control of yawing motor from wind vane signals | |
| RPM | 40-41/57-58 RPM | Number | 2 | 0.8°/sec. | |
| Tilt angle | 5° | OPERATION BRAKE | | Yawing period | |
| Cone angle | 0° | Type | disc brake | CONTROL SYSTEM | |
| Mass (incl. hub) | 1180 kg | Location | turbine shaft | Type | electrical, based on micro-processors |
| BLADES | | Operation | hydraulic | control, supervising, connection of generators | |
| Blade suspension | selfsupported reinforced fiber-glass Polyester with steel root reinforced fiber-glass Polyester | GEARBOX | | b.m.o. thyristors | |
| Beam material | | Type | oil lubricated, hollow shaft | | |
| Shell material | | Number of stages | 3 | | |
| Aerofoil | | Gear ratio | 1:20.83 | | |
| Pitch | | Rated power | 130 kW (DIN) | | |
| Length | 7.45 m | COUPLING | | Function | |
| | | Type | flexible rubber coupling | | |
| | | GENERATORS | | | |
| | | Type | asynchronous with squirrel cage | | |

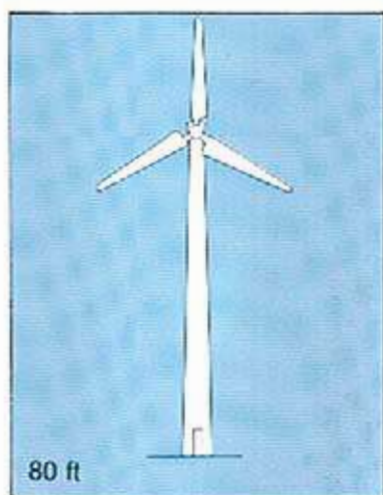
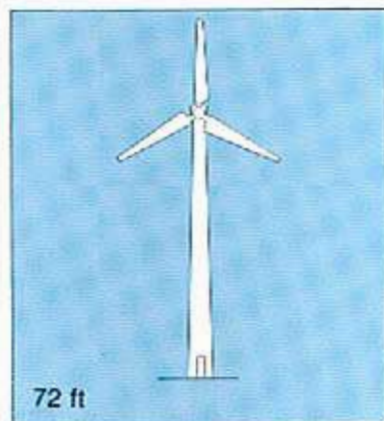
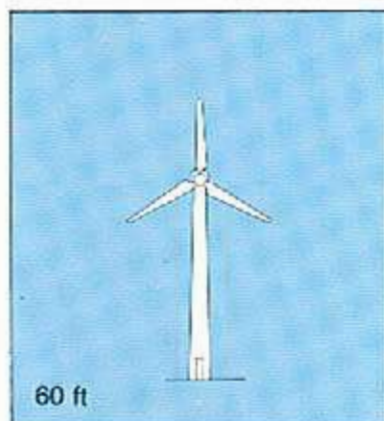
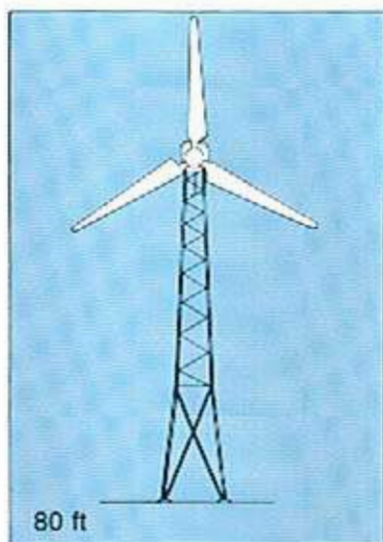
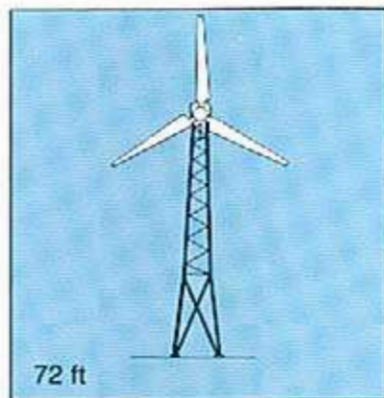
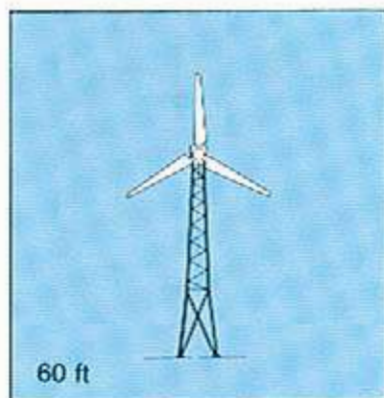
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Six various types of towers

You can choose between a steel lattice tower or a tube tower and each of these types gives you the choice between three different heights – 60, 72 or 80 ft.

Which height of tower chosen depends on the conditions of the site in question.

The steel lattice tower is solidly constructed of hot dip galvanized round iron and the tube tower is hot dip galvanized milled tank plates.



There is always a Wind Matic windmill which fits

Irrespective of energy needs there is always a Wind Matic windmill which fits – and remember, the Wind Matic windmills are all fully developed products from the

professional Danish Windmill Company.
– You can depend on the Wind Matic windmill.