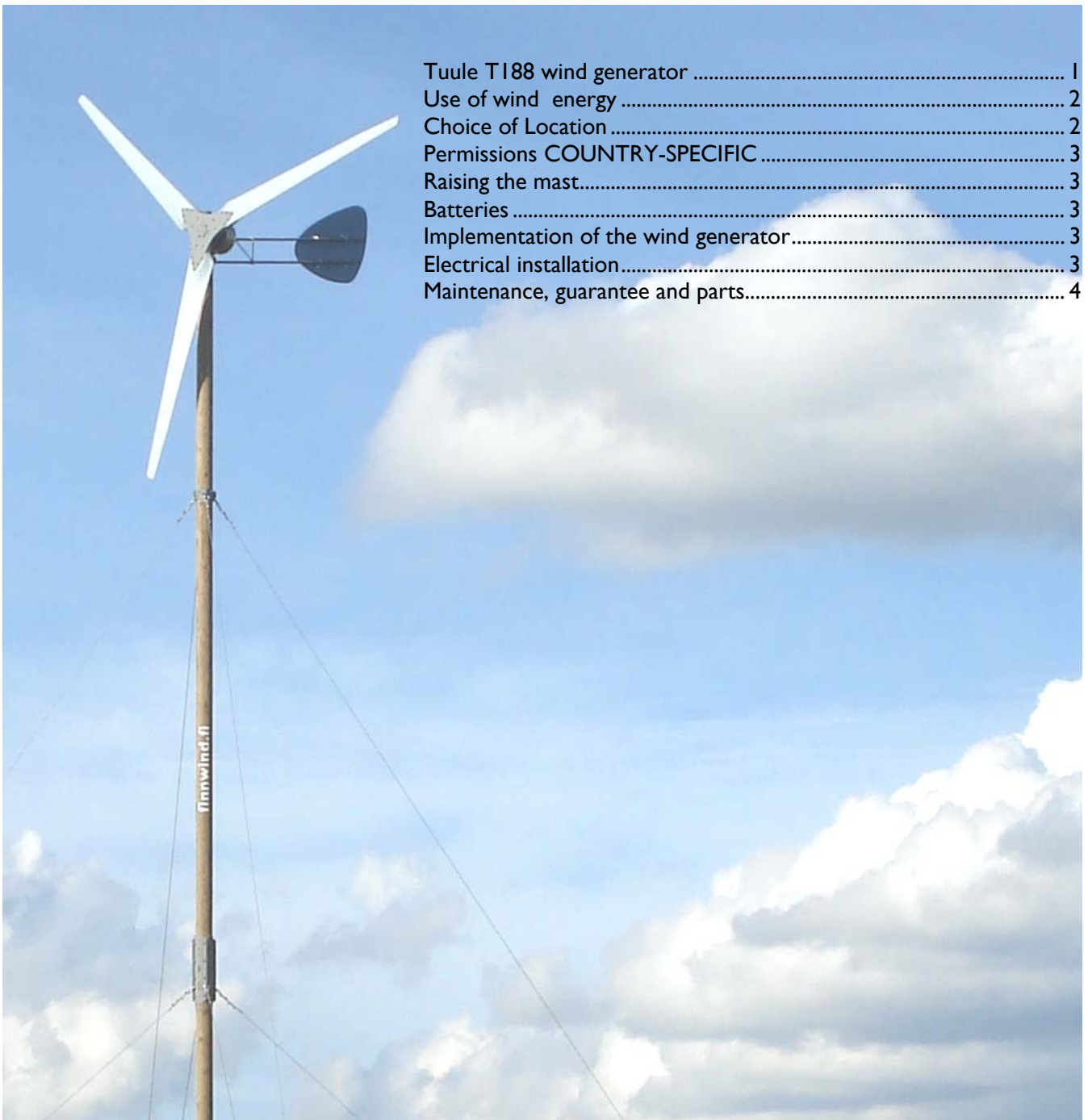


# Tuule T188 wind generator

## Wind generator implementation, use, maintenance and safety



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## Use of wind energy

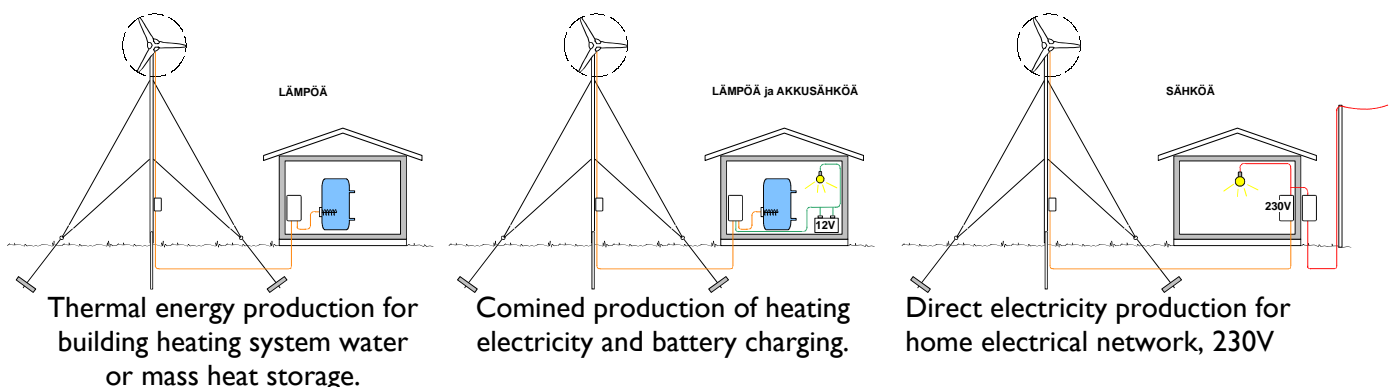
The Tuule T188 wind generator was designed as a supplementary domestic source of thermal energy. The wind generator can be used either for heating, using a heat resistor, for direct energy production or for combined heating and battery charging. The size of the Tuule T188 has been chosen to meet the heating needs of a medium-sized family home. Battery power can be used in 12V systems or converted to mains power (for lighting, Television and domestic appliances) by using the power inverter.

In direct energy production, power for appliances is taken primarily from the wind generator. As consumption exceeds the generator's production, power supply is continued seamlessly from the local grid.

What will the energy be used for?

Typical uses of energy produced with small-scale wind generators in Finland:

- Thermal energy production for building heating system water or mass heat storage
- Thermal energy production for warm water supply
- Battery charging and resultant electricity use in 12V or 230V systems
- Direct electricity production for home electrical network, 230V



## Choice of Location

The basic requirement for wind energy is a good, windy location. The generator can be located up to 250m from the place of use without significant loss during power transfer. As even minute increases in wind speed have a significant effect on the production of energy, the choice of location is crucial to the success of the project.

Ordinary ground cable can be used for transferring the energy. Wind most commonly blows from the southwest and west; therefore these directions, both in front of as well as behind the wind generator, must remain open. Forrest near the rear of the wind generator will cause the air current to rise before it reaches its target.

Lifting the wind generator higher is a quick way of yielding more energy. The placing and height of the wind generator must of course take into consideration the neighbouring area and possible local regulations. There must be enough space to raise and lower the mast (preferably in a western-eastern direction, allowing the lift in a slight wind).

The gearless wind generator's blades produce a swishing sound at high wind speeds. If you are used to a silent garden atmosphere, it is advisable to place the generator at least 50 metres from the building.

## Permissions COUNTRY-SPECIFIC

Before starting your project, make sure you are aware of the permissions required in your country and region for installing and utilising a wind generator.

As wind generators are raised high, they are also visible from afar. It is advisable to consult your neighbours, even if local permissions don't require this. Colour also affects the visibility of your wind generator; light gray blends into the back ground whereas pure white though cheerful and light, is very striking.

## Raising the mast

The wind generator's mast is a four-way guyed, salt-impregnated wooden column. Cement pouring is not required for laying a foundation, though an excavator is needed for a few hours.. The standard height of the mast is 18 metres, but other heights are available. The mast is raised with the help of a mast raising pole and a hand winch, making the process controlled and safe. Installation of a wind generator of this size doesn't require an expensive crane truck.

## Batteries

The wind generator can also charge batteries. The perfect sized battery depends largely on prospective usage (eg. whether constant energy is needed, and whether it's required daily or for just for weekends). At its smallest, the battery can be a 100 Ah lead battery. When needed, the battery capacity can be scaled up to several hundreds of ampere hours or even, for weekend use, to 1000 Ah.

## Implementation of the wind generator

The Tuule T188 wind generator is supplied as a complete package, with the main parts of assemblage kept separate to facilitate handling without the need of a crane. The main stages of installation are:

- Foundation laying. Burying the rigging anchors and mast foundation in the ground. An excavator is needed for a few hours. Cement trucks and cranes are not needed.
- Testing the height and position of the mast location
- Attaching the machinery to the mast
- Attaching the rotor to the machinery
- Raising the wind generator
- Electrical installation

Implementing and testing the wind generator including drawing the cable from the edge of the building to the regulator unit, attaching the regulator unit to the wall and a drawing the cable from the regulator unit to the heating resistance unit.

## Electrical installation

The wind generator produces 0...400 V of three-phase alternating current. Electrical installation must be done by a professional electrician (coupling of the slip ring unit and electrical cabinet).

12V system connections are permitted in Finland, but it is highly recommended that even these are done by a qualified electrician. A 12V system incorrectly or carelessly coupled to the battery can be dangerous. A large current caused by an electrical short cut can cause severe burns. Make sure you are aware of the regulations of your country.

**The high voltage produced by the generator is lethal. Altering the coupling without the necessary expertise is explicitly forbidden. Any connections other than common electrical plug-ins, are to be carried out by a professional electrician.**



## Maintenance, guarantee and parts

The wind generator is gearless and uses only high quality Western materials for its main bearings. There are very few expendable components in a gearless wind generator. However, as with all other machines and devices, a wind generator must receive regular maintenance. Please refer to the usage and maintenance instruction manual for the appropriate maintenance procedures. The wind generator owner should carry out a visual inspection of the generator each year. This inspection should include checking the tension of the rigging wires and the proper operation of the regulator unit.

The generator should also receive a more thorough service inspection every 5 years. The central parts of the inspection are: the rotor, the bearings, the storm protection mechanism and the general condition of the electrical cabinet. This service inspection may be left to Finnwind Ltd. to carry out, or the customer may conduct it according to the usage and maintenance instruction manual. Please note that Finnwind Ltd. offers a 5 year guarantee only to wind generators regularly inspected and maintained according to the installation and maintenance instructions of the manufacturer. When carried out by Finnwind Ltd., the maintenance inspection takes one mechanic about 3-4 hours. The manufacturer will make available original or compatible parts for at least 10 years.