

RUUKKI® SOLAR POWER PACKAGE

TECHNICAL BROCHURE

RUUKKI
LIVING. WORKING. MOVING.

Produce your own electricity with Ruukki solar power packages

The Ruukki solar power package is an easy and convenient solution for producing your very own electricity. Once the system is installed, you will have practically free electricity from a pure and renewable limitless energy source – solar radiation. You do not have to worry about electricity prices or their increases anymore.

The systems are designed for a general power grid connection. Grid connected systems give priority to solar energy, but in case it is not sufficient then electricity is imported from the grid. Vice versa, whenever solar electricity production exceeds the immediate usage, the excess electricity will be exported to the general grid.

The set-up is as follows. Solar panels, also called PV modules, are placed on the roof-top onto a special racking system. The solar panels can be fitted on any kind of roof type or surface. The module array is then connected with cables to the power central of the house via a solar inverter. The inverter converts direct current (DC) into alternative current (AC), which is used to run normal household appliances and systems. Altogether, the system produces regular electricity automatically whenever the sun shines.

All needed parts are included in the ready-to-operate system. A qualified roofing installer and electrician will set it up for you quickly. We have tested and perfected the system so that a long lifetime and virtually maintenance-free operation is guaranteed. It is time to tap on to a free energy source and enjoy the sustainable free energy always as the sun shines.



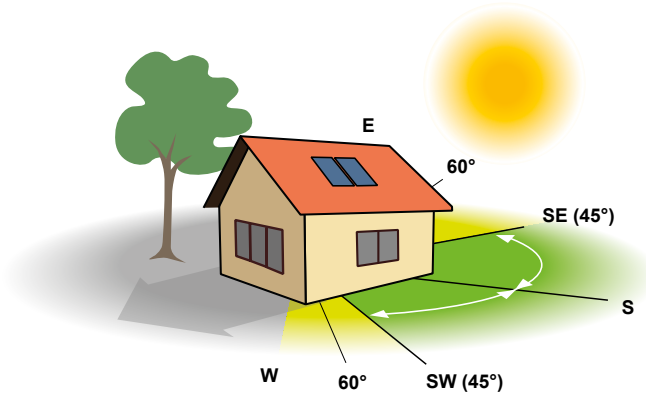
Fig 1. Schematics of a grid-connected solar power system. Roof-top solar panels convert sunlight into electricity. The serial-connected solar panels are connected to an inverter, which converts direct current into alternative current, which is used to run household appliances. The inverter is then connected to the main switchboard from which it is either directed into the household network or to the general grid. There is a safety switch between the inverter and the switchboard, in order to enable PV system shut-off from the grid.

Introduction to solar power

- **Electricity production**

Solar power systems produce household electricity during daylight hours. Production is high during the sunny months from April to September. System sizes are defined by their nominal peak power; energy yield is then dependent on sunshine. If a 6 kilowatt peak system is exposed to solar radiation optimally for 100 hours, then the energy or electricity yield would be about 600 kilowatt hours. In southern Finland, an optimally aligned system is able to produce about 900 kWh annually of electricity for each installed 1 kilowatt peak of solar panels.

	Ruukki solar power package 2000	Ruukki solar power package 4000	Ruukki solar power package 6000
Nominal power (kWp)	2 kW	4 kW	6 kW
Number of solar panels	8	16	24
Standard field array	2x4	2x8	3x8
Area required on roof	3.3 x 4.2 m	3.3 x 8.3 m	5.0 x 8.3 m
Total area of panels	12.9 m ²	25.8 m ²	38.7 m ²



- **Solar panel alignment**

The energy yield of the solar panels is dependent on their orientation towards the sun. Any alignment between southeast and southwest at an inclination angle from 20 to 60 degrees gives a high energy yield. The best orientation is 40 degrees south. Since the panels are connected usually in a series, there should also not be any permanent shadows on the panels, since they weaken the power of the whole array.

Delivery content

All Ruukki solar power packages contain solar panels, roof top fixing rails and roof foot sets, cables and connectors, a high-efficiency inverter and appropriate safety equipment. The detailed package contents are shown below.



Tuote	Solar power package 2kW	Solar power package 4kW	Solar power package 6kW
Solar panels	8	16	24
Roof-fixing rails and panel clips	8	16	24
Roof foot sets (four foots/set)	5	9	14
Connectors	4	8	8
Solar cable*	40	100	100
Grounding parts on-roof	1	1	1
1-phase inverter	1	1	0
3-phase inverter	0	0	1

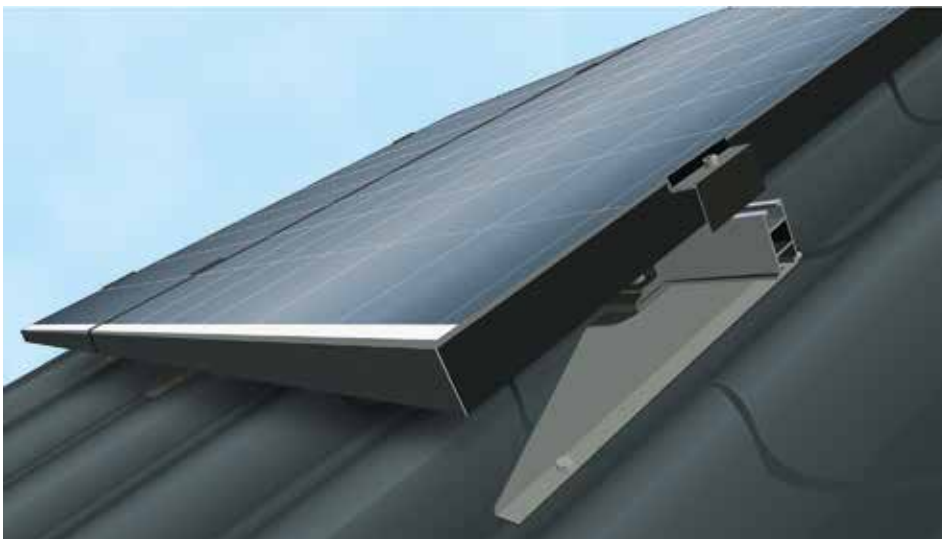
*) Unit in meters (m)

Solar panels and racking system

The solar panels in Ruukki solar power packages are multi-crystalline photovoltaic modules. Panels have an anti-reflective surface (highly transparent solar glass), which enhances the power performance. The modules are built to withstand even the toughest climatic conditions. The packages have been designed so that they are easy to install.

Technical information

Output [Wp]	240-260
Module efficiency	Up to 16%
Dimensions [mm]	1639 x 983 x 40
Weight	18.5 kg
Operating temperature	-40 ... +85C
Connections	Fast coupling
Frames	Anodized aluminum
Additional features	<ul style="list-style-type: none">• Resistance to Salt Corrosion and Humidity• highly Strengthened Design• IP-67 Rated Junction Box



The racking system is designed for quick and firm installation. Roof feet are selected according to roof type and fastened by fixing them to the roof structures. Mounting rails are then placed on the roof feet and tightened with a special clamp. Panels are then attached on to the fixing rails with easy-to-fix patented clips. The racking system is modular, so that each module holds a vertically-aligned series of four solar panels. Modules can be extended horizontally and vertically to form a coherent roof top array of solar modules.

Inverter and wiring

The inverter converts the direct current (DC) produced by the solar panels into alternative current (AC), in order to be able to use the produced electricity in normal appliances. At the same time, the inverter is monitoring system performance and it is equipped with a number of safety systems.

The Ruukki package includes an efficient top-of-the-line inverter. These components provide the solar power system with high performance, robust enclosure, ease of installation and a quick return on investment. The inverters have up to 98% efficiency.

The Ruukki solar power packages 2 kW and 4 kW come with a single-phased string inverter and the 6 kW package with a 3-phase inverter. The inverters have built in safety equipment and it comes with a clear illuminated monitor for system performance follow-up.



Technical information and features of the inverter

High energy harvesting	<ul style="list-style-type: none">• Reduced losses due to mismatch and high harvesting even in case of shadow conditions• High efficiency• Wide input voltage range (up to 1000V)• MPPT circuit, suitable for two DC-input pairs*)• Fast and precise MPP tracking algorithm
High Reliability	<ul style="list-style-type: none">• Distributed production for high immunity to single failure• Natural Convection Cooling• IP65 environmental protection rating• Natural Convection Cooling
Fast installation	<ul style="list-style-type: none">• Easy mounting system• Multi-country selection• Very light and compact design
Flexible PV plant planning	<ul style="list-style-type: none">• Wide input voltage range• High flexibility during configuration and installation

*) Maximum power point tracking

Safety notices

• NOTICE!

- Use the system only for its intended purpose. Install all provided safety accessories to ensure safe operation during the system lifetime and make sure that the system is properly maintained and used. Safety switch must be installed after the inverter in every installation.
- **Before ordering and installing the system, do at least the following things:**
 - The solar panel arrays are relatively large sized, make sure that there is sufficient free space on the roof to place the field. The array should be placed as close as possible to the best orientation to south, and inclination of 40 degrees. No objects, such as trees, chimneys or lead-ins should cause shadows on the panel field. The power output of the system will be limited if there are shadows over any of the panels.

- Make the necessary agreements with the owner of the local electricity grid and the buyer of the excess electricity before ordering and installing the system. Also apply for all required building permits before the installation.
 - Please fill out the "Object survey" form and send it to the sales representative. Make sure that all requested information is filled in and correct. Any misinformation given in the form may result in sub-optimal designs and cause setbacks in installation. It is recommended to consult a sales representative (Ruukki's or retailer's) to find out the information required (system configuration, panel alignment, etc.)
- **Important notice**
- Use only professional installers in every step of the project. Roof-top and electrical installation works has to be done by qualified professionals with knowledge of local regulations. Every component must be installed according to the separate detailed instructions.



WARNING!

Pay attention to the work safety while working on the roof. Use safety rope and safety harness. Always use special purpose tools for lifting the panels to the roof. Only qualified installers should be used.



WARNING!

Risk of serious injury. Follow the instructions during the system installation and use.



WARNING!

Risk of damaging the products. Misuse may damage the components, devices, building, or persons.



WARNING!

While working with electrical devices, special attention must be paid to safety at work. Risk of serious injury due to electrical shocks, if not handled properly.



WARNING!

Too large amount of snow may cause damage to the panels and / or prevent the operation of the panels.



WARNING!

The panels should not be installed under too heavy winds. Negligent panel installation may cause a risk for panels to fall under heavy wind conditions.



READ INSTRUCTIONS!

Read the installation, operating and maintenance instructions carefully.



WARNING!

Professional installers must be used.

**Ruukki provides its customers
with energy-efficient steel
solutions for better living,
working and moving.**

**This publication is accurate to the best of our knowledge and
understanding. Although every effort has been made to ensure
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