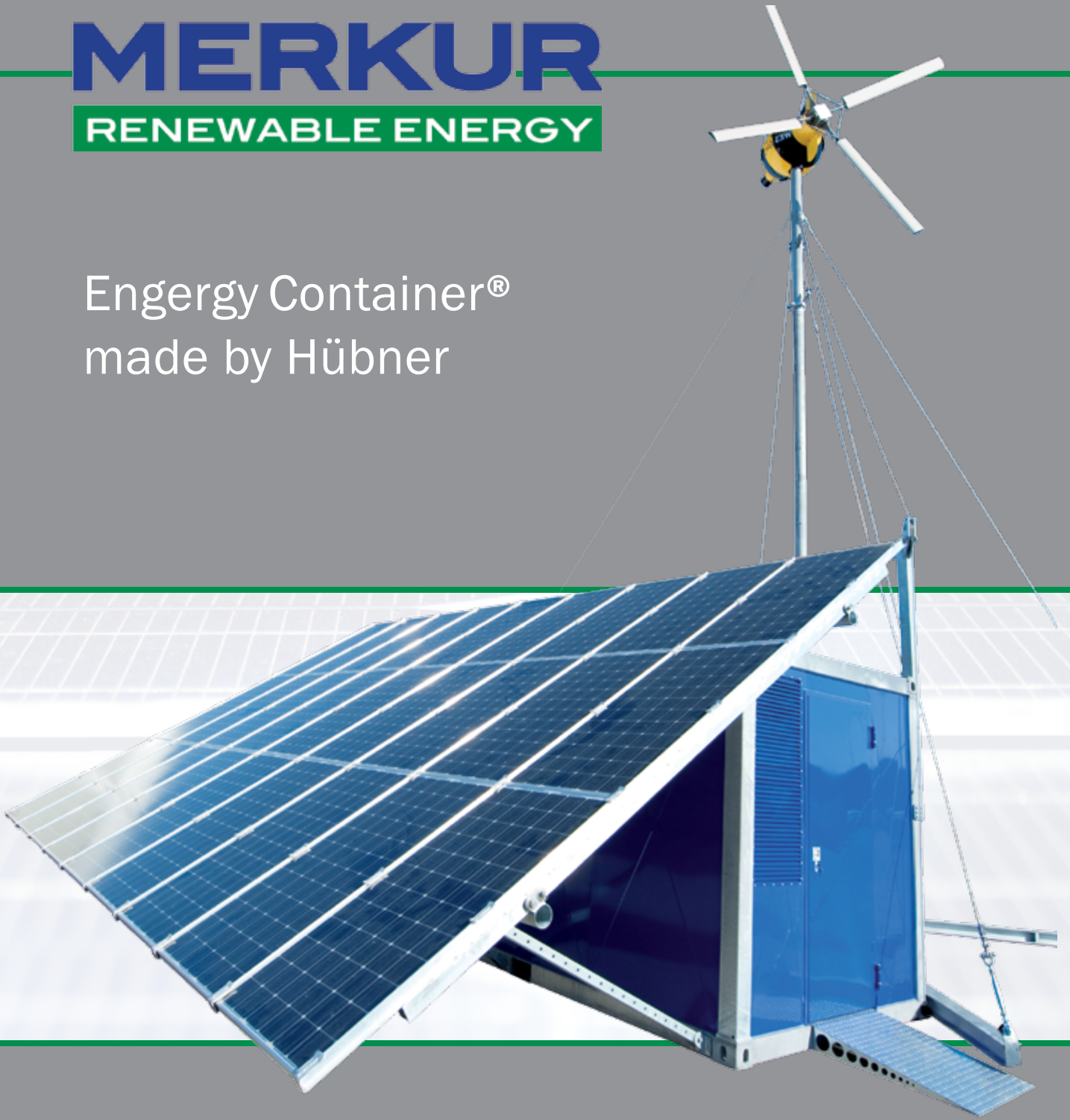


# MERKUR

RENEWABLE ENERGY

Energy Container<sup>®</sup>  
made by Hübner



**MERKUR**<sup>®</sup>  
GERMAN TECHNOLOGY

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# Wind and Solar Systems



Ulrich Scheller  
Export Manager

For over 100 years – since the time of Werner von Siemens – German Technology is renowned for outstanding innovation and technical leadership. **MERKUR**® Ueberseehandel GmbH is committed to this long tradition.

Under **MERKUR**® German Technology we develop and produce warranted, durable high quality products in the following segments:

- Electrotechnology
- **DUPROLUX**® Lighting
- Metering
- Power Distribution
- Climatisation
- Renewable Energy

**MERKUR**® clients worldwide can rely on our vast experience. We offer authorised distributors competitive prices better allowing them to compete in the market. We also successfully cooperate with contractors who are bidding for public utility tenders.

**MERKUR**® is a reliable partner with a tradition of providing individually tailored products and solutions in accordance with customers' needs. Contact us and we gladly assist you with more details about our products and services. Get in touch with us!

A handwritten signature in black ink, appearing to read 'Ulrich Scheller'.

Export Manager

# The Concept of MERKUR Energy Container®



## **MERKUR Energy Container®** made by Hübner

With the hybrid Energy Container® made by Johannes Hübner, **MERKUR** is setting new standards for mobile energy provision through rapid, independent energy production with minimal fuel consumption.

In generating electricity, an innovative 24 kVA “multi-channel inverter” and a higher-level energy management system regulate the different sources of energy according to priority, taking into consideration the respective actual power requirements and weather conditions (solar/wind). This approach is designed to utilise the

diesel generator unit as little as possible and guarantee operations over a period of several months without requiring maintenance or service work.

Excess power is stored in a 52 kWh battery. Options include combining and equipping the container with a drinking water purification system (seawater desalination equipment), an air-conditioning unit and/or a cogeneration unit (CHP).

In the future, the **MERKUR** mobile hybrid Energy Container made by Hübner will be built in series to meet various levels of requirements and different power ranges. Tailor-made solutions are also possible.

# The Innovative Hybrid System

## The Innovative Hybrid System

Today, the mobile container concept is unique; it generates a total power output up to 20 kVA (24 kVA peak) using the following hybrid power source components:

- 5 kW wind turbine (achieves nominal power at 11 m/s wind speed)
- 8 kWp solar system
- 16 kW independent utility diesel generator unit
- 52 kWh battery

For transportation all components are stored in the container.

## The Superior Technology

### ■ Mobility

20-ft. Container transportable by truck, ship or airplane to any location of the world.

### ■ Autarky

Fully autarky operating system for save energy far away from grid supply system.

### ■ Fast

Immediate operation availability by the diesel generator, fast installation of the additional regenerative energy equipment. The whole equipment is "on bord".

### ■ Safe

Three energy sources and 24 batteries provide a continues power supply.

### ■ Economical of costs

renewable energy + intelligent management control = reduced fuel costs.

# The Applications

## Energy at any location, installed in one day

The container is designed for deployment in the following applications:

- To provide an immediate power supply in disaster areas
- To provide emergency power for hospitals
- To provide power for telecommunications systems
- To provide power for mountain rescue stations
- To provide power for pipeline service stations
- To provide power for underground and open cast mining operations
- To cover peak power demands
- To support the power supply for local communities, police stations, hotel resorts
- To provide power in difficult-to-access and isolated building sites

In catastrophes like floods or earthquakes, rapid aid and reliable energy supplies are required. Teams from all over the world race to the scene of the incident. However, the success of their mission depends ultimately on the availability of energy. Medical equipment for humanitarian missions or mobile hospitals requires as much energy as treatment plants for drinking water and saltwater desalination plants. Volunteers have to deal with important tasks. So it's good if a permanent and flexible energy system is available quickly and reliably. However, a reliable energy source is also needed in far less dramatic situations. How do miners get a warm shower in remote regions? Where do workers get the power for their machinery on inaccessible building sites? The new Hübner Energy-Container® provides a valuable service in these cases and all other uncommon applications.



### Disaster Areas

Fast and effective energy provision for humanitarian operations and catastrophes.



### Provision of Medical Care

Mobile or stationary, medical equipment and sufficient light: secure energy provision saves lives.



### Remote Building Sites

Anyone willing to develop impassable terrain will require reliable and mobile energy provision on-site.



### Communication

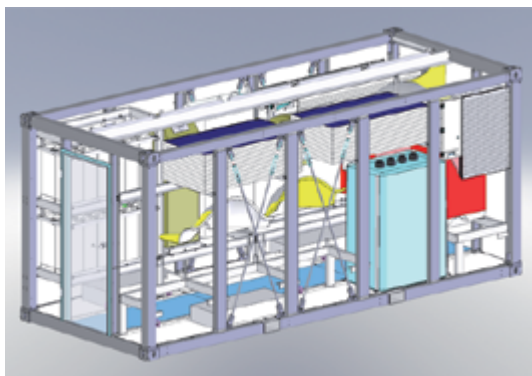
Ground stations for satellite communication in temporary locations.



# The Components

## EnergyContainer® Type JHG-EC-16/5/5-24:

- Reliable, tried-and-tested individual components. Integrated
- compactly into the EnergyContainer®, simple and safely
- transported, rapidly installed Container



### Steel container

Due to the optimal spatial design, all components can be safely stowed during transportation of the 20-foot container.

## Solar Photovoltaic System / JH-327

- 24 monocrystalline solar modules each with 327 Wp, 96 cells/module
- Total output: 7.848 Wp
- Voltage / current from 3 modules connected in series and 9 parallel: UDC = 115; I = 45A

- Dimensions: 20-foot container (L6058 x W2438 x H2591 mm)
- Total weight / transport weight approx. 12,600 kg
- Installation space requirements (approx. L8000 x B11000 x H14300 mm / 12000 mm hub height)
- Operating temperature range: -10 to +45 °C



### Photovoltaic System

The solar collector produces up to 5,500 kWh of regenerative energy per year with 27 high-performance modules.

- Frame with adjustable angle of inclination (manual)
- Operating temperature range: -40 – +75 °C

Power feed to MPP tracker and PV input of the multi-channel inverter

# The Components



## WESpe Wind Turbine

Four rotary blades rotate at up to 12 metres in height on the three-part mast for up to 10,000 kWh a year.

## WESpe Wind Turbine

- Guyed three-part mast; max. hub height: 12 m; erected with motorised winch
- Wind turbine, 4 blade rotor, downwind turbine, yawing by aerodynamic force
- Blade angle 10°
- Rated power at rated wind speed 5.0 kW / 11 m/s
- Johannes Hübner permanent magnetic synchronous generator, 400 VAC, 540 VDC
- Double-stage spur gearing
- Reliable brake system via generator-braking by connection with resistors and short circuit
- Mechanical pitch-system, braking at over-speed by centrifugal force



## Diesel Generator

With a performance of 16 kW, the diesel generator ensures reliable provision – even if there is no wind or sun.

## Diesel Generator Unit

- Yanmar diesel engine, Typ 4TN88-GGE  
Electronic speed control
- Fuel specifications in line with DIN EN 590
- Synchronous alternator with self-excitation and voltage regulation, Typ Mecc Alte Eco28
- Rated power 16 kW / 1,500 rpm
- Voltage 3 x 400 VAC +/- 1 % / 50 Hz

Grid operation via 24 kVA multi-channel inverter.



# The Components



## Multi-channel Inverter

An intelligent energy management control system controls the optimal and fuel-efficient combination of energy production, storage and use.

## Multi-channel Inverter with Energy Management System

Featuring a rated output of 24 kVA, the bidirectional multi-channel inverter is equipped with three inputs for solar power, the diesel unit and the wind turbine as well as input/outputs for a battery charger, consumers and electrical grid. An energy management system ensures the regenerative sources are utilised to an optimum, consequently reducing the consumption of fuel to a minimum. The clever consumer controller represents a real innovation. Utilising three priority levels, the energy management system adapts consumption according to the availability of the regenerative sources of energy. For example, a water pump is activated only when the sun shines brightly or the wind blows strongly.

- Inverter: BI 24,000 VA / 3 x 400 V
- MPPT solar input 80 A (incorporated)
- Linear DC/DC regulator for the wind turbine
- Communication package WIFI, GPRS/GSM, includes software and user licence



## Battery System

24 batteries save additional energy for particularly high demand and for use during the night and when there is no wind.

## Battery System

Maintenance-free battery bank storage system for off-grid installation and storing excess power

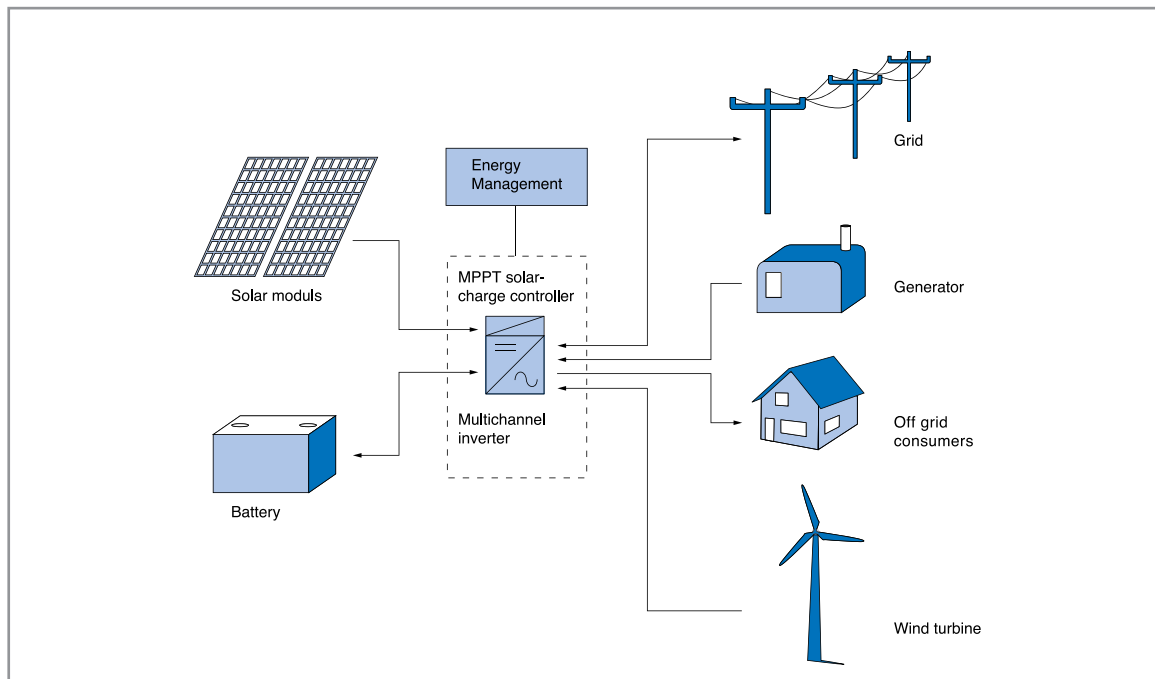
- Back-up battery, lead gel, 24 cell, each 2.25 V
- Rated voltage: 48 V (52-58 V on average)
- Capacity: 1200 Ah
- Energy storage capacity: 52 kWh

## Fuel Storage and Container Ventilation

- 1 heating oil tank, with 1,000 litres storage capacity for diesel primary energy
- Gross energy content: 9,300 kWh
- Net energy content: 3,000 kWh
- The container is forced-ventilated.

# The Energy Performance

## Block Diagram of MERKUR Energy Container® made by Hübner / Hybrid Network



### Energy Performance Calculation

(example)

It is possible to carry out certain advanced energy performance approximations based on wind and solar maps that are available worldwide. A calculation of a location close to the Hübner Giessen facility (Vogelsberg) results in the following values:

- Solar energy per annum:  
Approx. 5,500 kWh/year
- Wind energy per annum:  
Approx. 10,000 kWh/year
- EnergyContainer® yield:  
Approx. 29,500 kWh/year
- Regenerative share:  
Approx. 53 %
- CO<sub>2</sub> savings: Approx.  
5,000 kg/year

# Long Supply

## Supplied for longer

The fields of application for the Hübner EnergyContainer® are virtually limitless. Wherever there is a suitable place for a container with the standard dimensions of approximately 6 x 2.5 x 2.5 metres, a complete system for reliable energy provision can be installed in a short

period of construction. The support by regenerative energy sources such as the sun and wind save valuable fuel, meaning that, depending on the place of use, the EnergyContainer® can provide energy for months without the need for maintenance or fuel replenishment.



### Example: Disaster Areas

Immediate supply of power in disaster areas. Boiled water or warm meals for 500 people. Energy supply: approx. 1,5 months



### Example: Emergency Supply

Emergency power supply for hospitals. Power supply to operating theatres for 15 hours daily. Energy supply: approx. 4 months



### Example: Building Sites

Service at pipeline stations. Power supply for building teams (10 workers) for light, TV, cooking. Energy supply: approx. 5 months



### Example: Events

Daily acoustics with 15,000 W. Four-hour concerts (3x/week). Energy supply: approx. 12 months

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