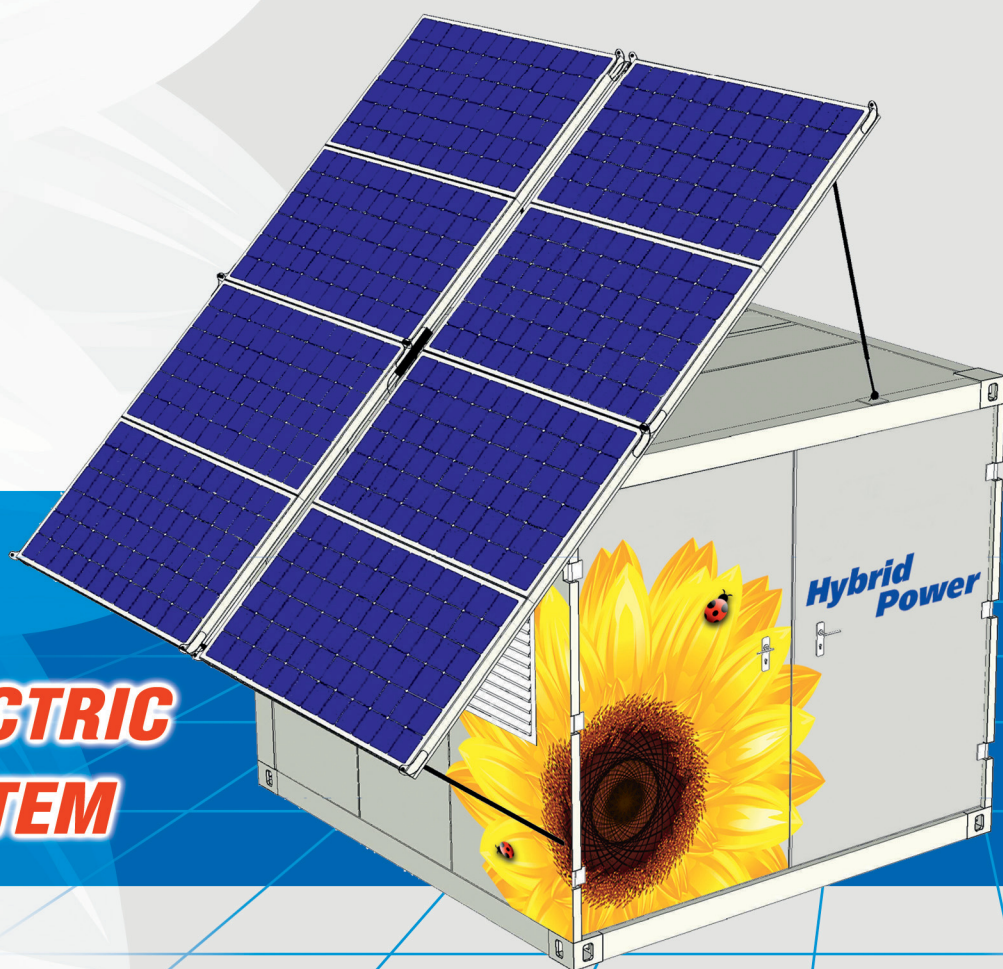
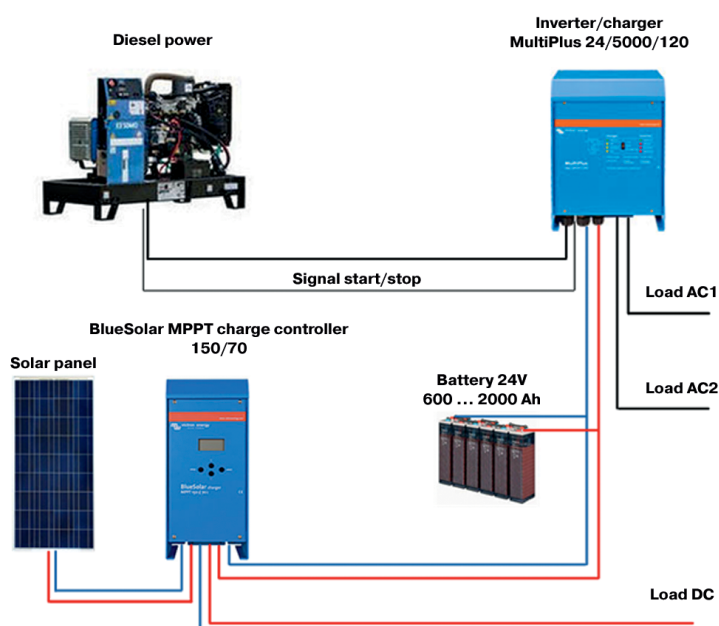
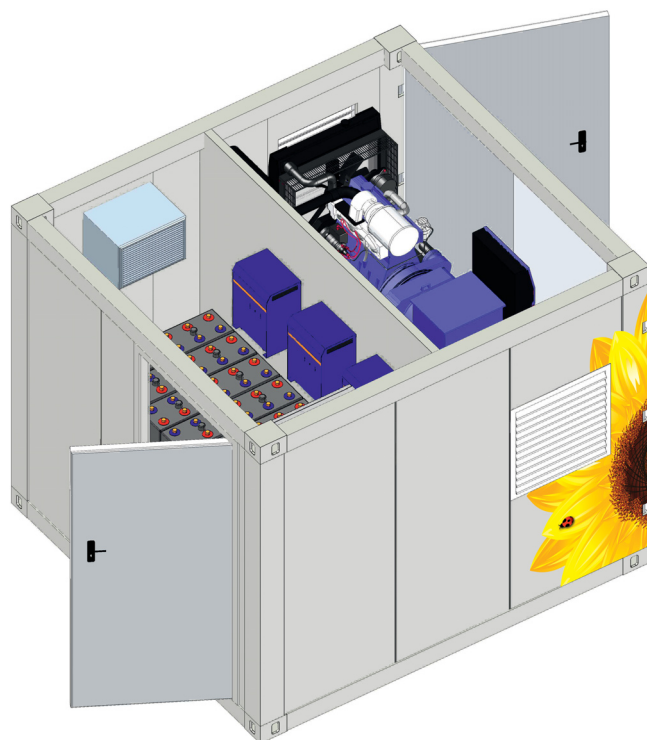




# **HYBRID ELECTRIC POWER SYSTEM**





**Thus, the advantages of using the proposed hybrid power system are:**

- Plug & Play configured system;
- 24/7 availability of AC power long time without service;
- "Silent" mode of operation by the batteries, that is especially important for objects located in residential areas, because power supply from the mains often disappears briefly (2-3 hours), and in such cases, the battery capacity is sufficient to support power supply to consumers before restoring the power supply from mains;
- Reduction of operating costs. Cyclic operating mode of Diesel generator set (only for the time necessary to charge the battery), increases the "service" interval, reduces the use of expensive fuel, reduces the delivery costs of fuel;
- Increasing of the life resource of Diesel generator set;
- Reduction of harmful emissions to the environment.

## Function

Proposed Hybrid System of Electricity supply consists of storage sources (accumulator batteries), electric energy production (electric stations, photovoltaic modules), control and management systems, that are combined into one complex and provide:

**«Island working mode».** Autonomous power supply for equipment at unattended remote objects, for example, such as telecommunication stations, offshore gas and oil pumping platforms, autonomous watering systems, military objects.

**«Reserve working mode».** Uninterrupted backup power supply of essential service at industrial enterprises, ground-based gas and oil pumping stations, banks, hospitals, homes, etc.

In addition, renewable energy sources may be connected to the main components of the hybrid system (the battery and power plants), such as photovoltaic modules, wind generators, small hydro, and other sources of electrical energy, which is consistent with the local geography, and other features of the location and operation of the object.

## Working method

Consumers receive power from accumulator batteries through DC/AC inverter, up to a certain maximum capacity of the battery, after which automatic startup of the power station begins. Power station charges the battery using the AC/DC charger, and simultaneously supplies power to consumers. After reaching the required level of battery charge power station is automatically turned to the reserve mode. Naturally, all the switching occur «unnoticed» for consumers.

The use of renewable energy sources increases the time of battery autonomous working time, also, if local conditions allow, you can do the opposite - the main source of energy will be, for example, photovoltaic module and battery and power stations will be "reserve", i.e. support power supply to consumers in the dark time.

## Main components of Hybrid system

The basic principles adopted in the design and completion of the proposed hybrid system – are the selection of high-quality equipment from leading European producers, clear calculation of power balance for conjugated elements that provides the reliability and durability of the system.

## Accumulator batteries

AGM type batteries are mainly used in the construction of systems "Reserve power supply". For the operation in "island" mode battery type OpzS and OpzV should be used. This type of battery has the highest number of cycles of the "charge-discharge", deep discharge is possible, practically no need for maintenance, low outgassing, long life. Also OpzV type batteries require no maintenance and the "refilling" of water over the lifetime.





## Diesel generator set. SDMO (France)



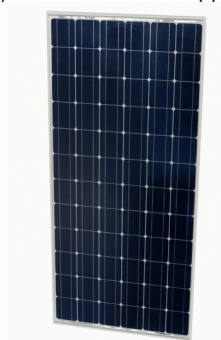
The leading European producer of power stations with diesel, petrol and gas-piston engines. To increase reliability of the system, reduce fuel consumption and increase the service interval, we have applied power stations with industrial class 1500 r/min diesel engines, with "antifreeze" cooling system. 20-year positive working experience of NTT Energy with SDMO Company allows confidently assume this equipment as the most reliable source of energy.

Alternatively, if the object has such possibility, power stations can be applied with gas-piston engines, working on natural or balloon gas.

Power station may be equipped with a system for remote monitoring of its state and/or remote control by Ethernet or through GPRS modem by mobile communication.

## Systems AC/DC VictronEnergy (Netherlands)

VictronEnergy company was founded in 1975 and operates in more than 60 countries worldwide. VictronEnergy was the first company to start producing professional quality components (inverters, battery chargers, etc.) for creating AC/DC systems. One of the innovative solutions used in our hybrid system - is a well-established series of combined inverter/chargers that have become the industry standard. In the main scope of delivery («Island» operating mode) MULTIPLUS 24/5000/120-50 models are applied, optionally («Reserve» operating mode) QUATTRO 24/5000/100 models are applied



## Photovoltaic modules

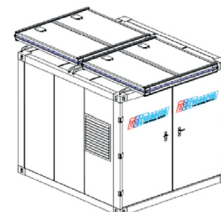
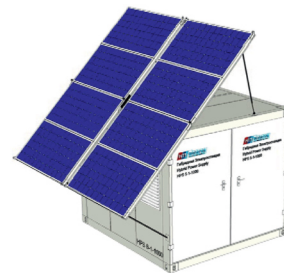
Designed to convert solar radiation energy to electrical energy. Modules produce direct current voltage, which is applied to charge of the battery through the "solar" charger unit type of MRRT Victron Energy (Netherlands), or can be converted to alternating current by using Solar Invertor, also production of Victron Energy (Netherlands). Hybrid installations HPS-5-1-600 and HPS 5-1-100,

as an option, provide special folding (for transportation) frame with fixed on it photovoltaic modules made of single-crystal silicon, that meet European quality standards, which helps to ensure a high level of generation of solar energy for our customers for over 25 years.

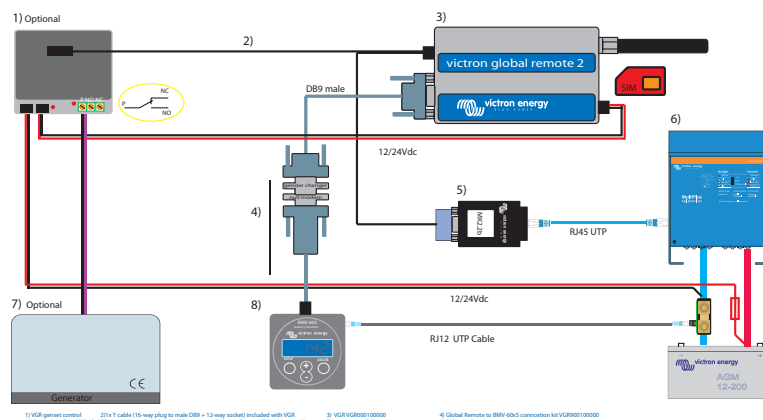
## Container

The whole system is assembled in one compact all-weather "vandal-proof" container and supplied complete. Container is transported freely by standard truck and is easy to install. The models HPS 5-1-600 and HPS 5-1-1000 have the frame with solar modules, that is folded on the roof of the container for easy transportation and after delivery to the place is fixed by provided mounts in the "unfolded" state.

Pre-configured systems may be delivered to the installation site and start working in less than an hour. Produced by NTT Energy Hybrid Power System have flexible and customizable to the features of object constructive, as well as the possibility to configure the system according to the requirements of the Customer.



## Remote monitoring of the system



## Simple and easy to use

The idea is simple: you can use it to get SMS alarms from a Multi, a Battery System, or both. When monitoring the usage of batteries, it can be extremely helpful to receive under and overvoltage alarms; whenever they occur. For this purpose, the Global Remote is perfect. A prepaid SIM-card (for example) in combination with the Global Remote is adequate for remotely monitoring your system.

## Two serial connections

It has one connection for a VE.Bus Multi/Quattro/Inverter unit/system. This connection needs a MK2 which is supplied with the VGR. The other connection is to connect a BMV-602 Battery Monitor. To connect it to a BMV-602 you will also need the BMV-602 Datalink. The BMV-602 Datalink is an accessory of the BMV-602 which needs to be purchased separately.

## Advanced usage: Monitoring historic data

Taking it one step further, an internet browser and -connection is all you need to view all of the data online. You can simply create an account on the website and add your modem(s). Subsequently you can configure the GPRS connection, which will enable you to monitor the historic data of several basic properties such as system voltages, power levels and status information. All of this data is graphed. These graphs are available in daily, weekly and monthly timeframes.

## Victron Remote Management

Victron Remote Management is the name of the system which consists of the VGR and the monitoring website.

To get a preview: please go to <http://www.victronenergy.com>, and login at 'Victron Remote Management' via the Login menu on the upper right of the page.

Username: demo@victronenergy.com

Password: vrmdemo

## Some examples of configuration for Hybrid Power Supply systems

Models: Hybrid Power Supply (HPS)	HPS-5-1-600	HPS-5-1-1000	HPS-5-1-1500	HPS-5-1-2000	HPS-10-1-1500	HPS-10-1-2000	HPS-15-1-2000	HPS-15-3-2000
Continuous output AC power (kVA)/Batteries bank (Ah)	5/600	5/1000	5/1500	5/2000	10/2000	10/2000	15/2000	15/2000
Peak power (short time overload possibility) (kVA)	10	10	10	10	20	20	22	30
Output voltage, VAC	1ph, 230	1ph, 230	1ph, 230	1ph, 230	1ph, 230	1ph, 230	1ph, 230	3ph, 400/230
Batteries: type by customer request AGM/OpzS/OpzV (Ah)	600	1000	1500	2000	1500	2000	2000	2000
24V 600Ah C10	+							
24V 1000Ah C10		+						
24V 1500Ah C10			+		+			
24V 2000Ah C10				+		+	+	+
Approx time (hours) of discharge batteries if no solar or mains support, until start of genset								
– 100% load	1,5	2,5	3,75	5	1,8	2,5	2	2
– 75% load	2	3,5	5	6,7	2,4	3,3	2,7	2,7
– 50% load	3	5	7,5	10	3,6	5	4	4
– 25% load	5	10	15	20	7,2	10	8	8
Invertor/batt. charger quantity	1	1	2	2	2	2	3	3
Model (Victron Energy): Multi Plus	24/5000/120							
Invertor parameters								
Continuous AC output power system 25°C (kVA/kW)	5/4,25	5/4,25	5/4,25	5/4,25	10/8,5	10/8,5	15/12,0	15/12,0
Continuous AC output power system 40°C (kW)	3,35	3,35	3,35	3,35	6,5	6,5	10	10
Charger parameters: max. charge current (A) 24V DC	120	120	240	240	240	240	360	360
AC/DC system control and monitor. by BP Panel2	+	+	+	+	+	+	+	+
Genset model SDMO (France)	K10M	K13M	K13M	K13M	K17M	K17M	T25KM	J33K
Genset power (kVA/kW)	9,9/9	13,5/12,3	13,5/12,3	13,5/12,3	17,2/15,6	17,2/15,6	25/22,7	33/26,4
Intencity	43 A/1 ph	58 A/1 ph	58 A/1 ph	58 A/1 ph	74 A/1 ph	74 A/1 ph	108 A/1 ph	47 A/3 ph
Diesel engine 1500 rpm., water cool	Kohler	Kohler	Kohler	Kohler	Kohler	Kohler	Mitsubishi	John Deere
Fuel tank	500	1000	1000	1000	1000	1000	1300	1300
Fuel consumption in 75% of load	2,5	3,7	3,7	3,7	4,6	4,6	6,0	5,0
Total autonomy time w/o stop in 75% of load	200	270	270	270	217	217	217	260
Control panel of genset	Automatic start/stop by signal sequence of batteries charging level/ auto battery charger, engine coolant heater/Emmergency controls							
Container: shell-wall thickness 1.5 mm, with anticorrosion painting, heat isolating by basalt fiber 50 mm, 2 rooms (1 for DG+1 for electronic and batteries), 2 big doors for installation equipment and entrance for personal, frames and places and for fix and lifting equipment and materials during transportation, vent windows and holes for technology work of equipment								
Dimensions of the system container L x W x H (m)	2,4 x 2,6 x 2,2							
Weight of the system container (kg)	3460	3830	4370	4890	4540	5020	5230	5270

## Options for request

1. Solar kit (1.1+1.2+1.4)	+	+
1.1. Solar modules Monocrystal 24V 200W	8x200W	
1.2. Solar MPPT-150/70	+	+
1.3. Solar invertors	request	
1.4. Frame and cables for panels installation	+	+
2. Quatros instead of Multi:	request	
3. Air conditionner for battery room*	request	
4. Batteries OpzS type or OpzV type	request	
5. Remote monitoring for AC/DC system and Genset	request	

The system could be configure in accordance of customer request.  
Please contact to the system manufacturer or local dealer

\*Need to count derating of power in case using these options

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