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HYBRID POWER SYSTEMS
for TELECOM applications

HYBRID POWER SYSTEM WITH AC GENSET

PRAMAC has developed a new solution that allow coupling a traditional AC constant speed diesel genset with an energy storage system. If required can be also possible integrate solar power supply and/or electrical grid.

At the heart of the system there is the **HYBRID MODULE,** which integrate power electronics and batteries in a single cabinet.

The system can be configured to have different voltage outputs such as -48VDC, 230/400VAC or both of them according to customer needs.

The power electronics have last-generation technology to control and manage the energy storage system and the BTS power supply.

The energy storage system is proposed with Lithium batteries.

Thanks to the clever plug-in system it is possible use this solution for new-made installations or to hybridize and retrofit existing standard AC diesel generators.
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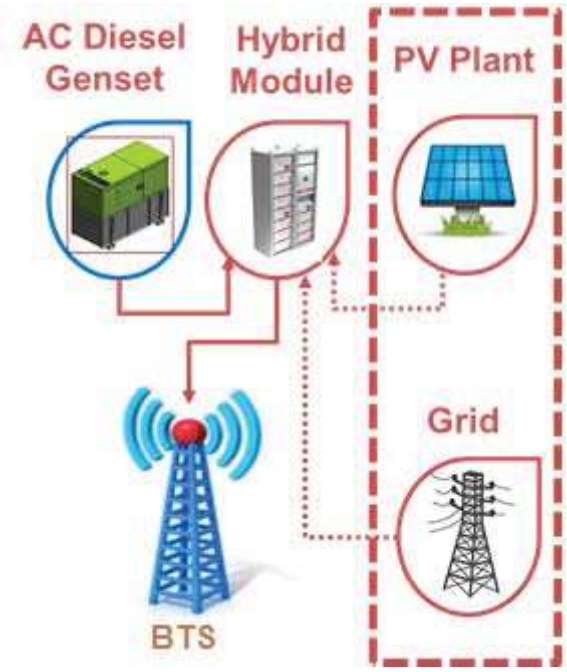


HYBRID MODULE FOR TELECOM

Being available wherever you are is the standard of today.

To make this possible in remote locations BTS (*Base Transceiver Stations*) are often powered by diesel generators.

That means running times of 24 hours a day, seven days a week, and hence fuel consumption and emissions round the clock.

This puts strain on resource usage and on the generators themselves as these often run continuously in unfavorable load ranges.

The Hybrid Module, especially for off-grid solutions, regulates the operation of the diesel generator with the automatic start/stop function as well as supplying the BTS with electricity.

This is because when the generator is switched on, it not only supplies power to the BTS but also to the Hybrid Module’s batteries.

In this way, the generator operates in an efficient power range and the Hybrid Module can pass the stored energy onto the BTS when the generator is turned off.

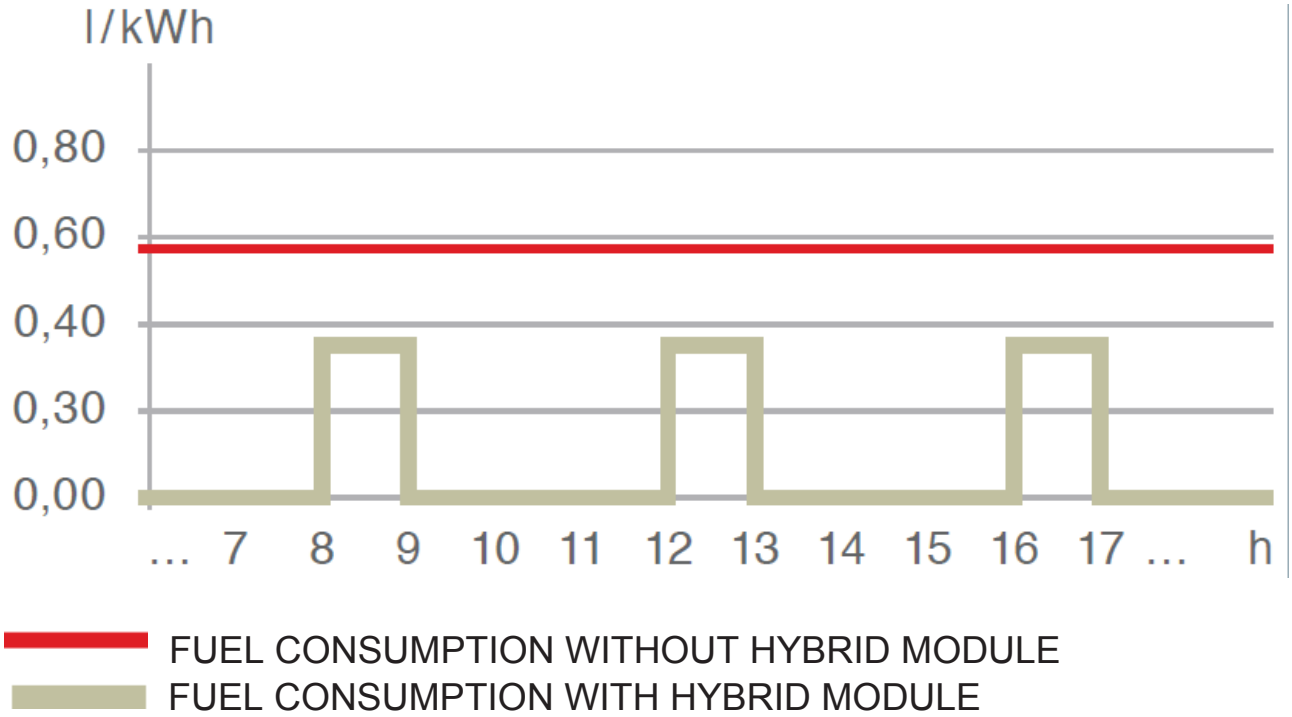
The results are savings and efficiency all along the line

HYBRID MODULE ADVANTAGES

FUEL SAVINGS AND LOWER EXHASUT EMISSIONS

Short running times in the optimum load range lead to reduced fuel consumption per generated kWh and to long phases without the use of the generator.
Without **HYBRID MODULE** the generator runs continuously when loads are low and inefficiency is high.
With the use of a hybrid solution however, the generator can be switched off for hours at a time.
That spares the generator and saves on emissions too.

FUEL CONSUMPTION FIGURES

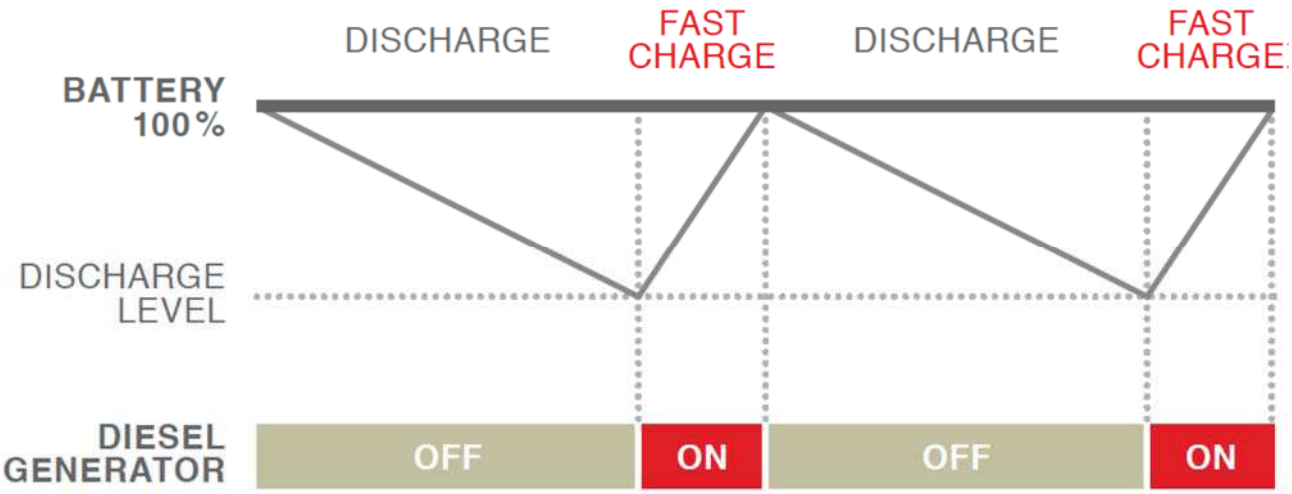


HYBRID MODULE MEANS HIGHER EFFICENCY

When the generator is on, it feeds the BTS and simultaneously charges the battery while operating in the most efficient, cost effective range.

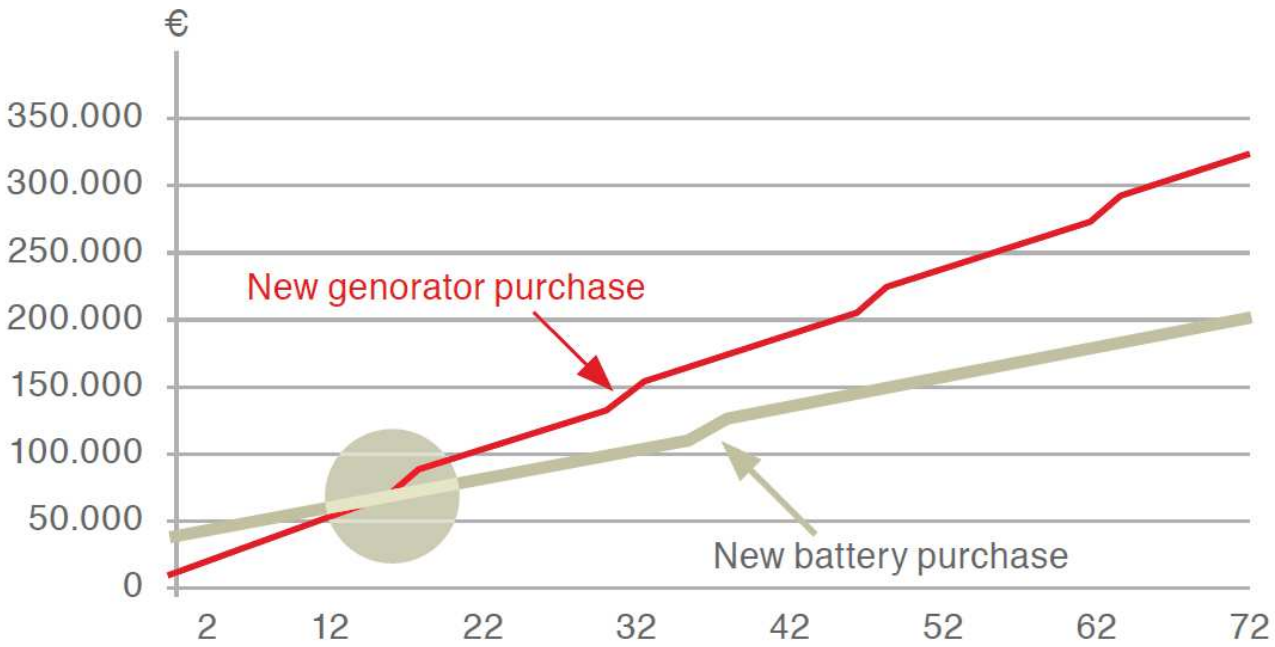
When the battery is charged, the generator switches off and the battery provides the energy.

Charging takes place significantly quicker than discharging the battery, shortening the generator's running time from, for example, 24 to 6 hours.



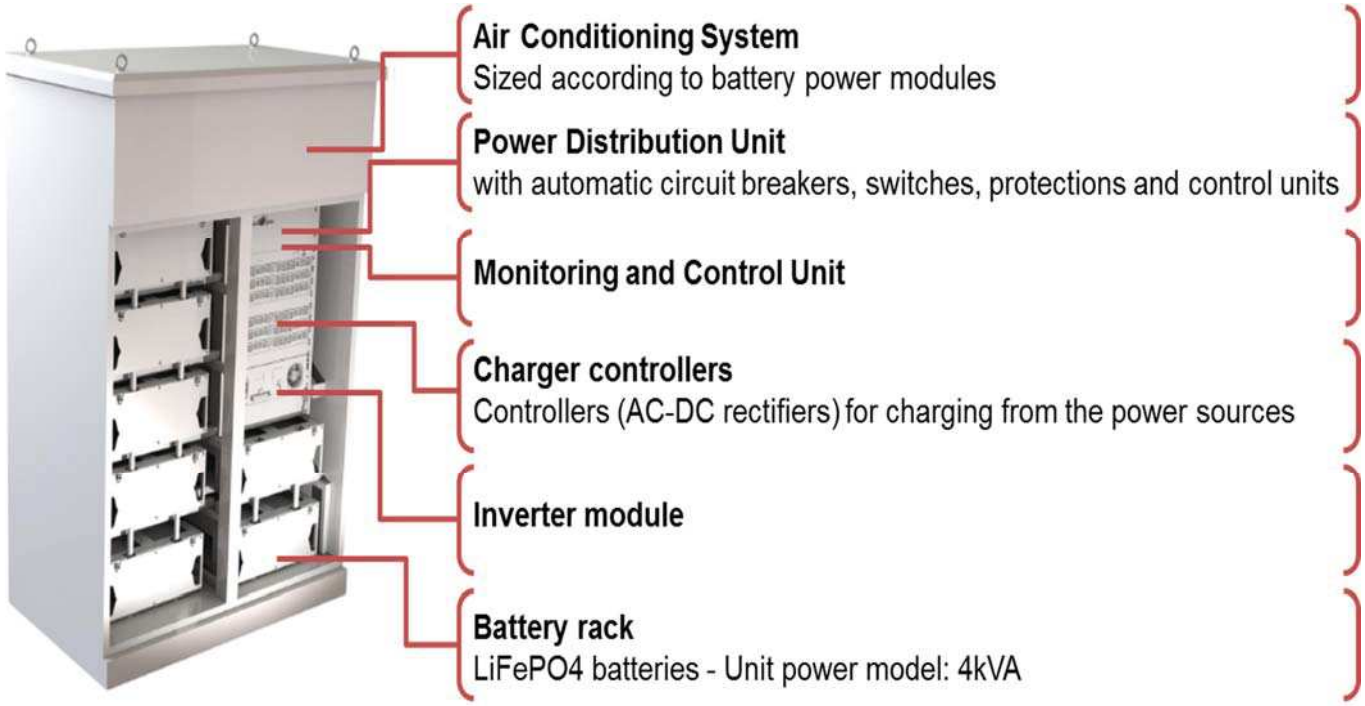
HYBRID MODULE MEANS FAST PAY-BACK

In several cases just after one year, the **HYBRID MODULE** pays for itself. Because in addition to fuel savings, the maintenance intervals also become longer due to reduced running times and the life of the generator is enlarged too.



HYBRID MODULE

System architecture



The Hybrid Module combines effectively the power from different energy sources like diesel genset, renewables and/or grid.

The power supply to the load is every time through the batteries which store the energy generated from the power sources.

The Hybrid Module can be equipped with modular PV charge controllers to allow addictional connection of PV modules that shorten the genset running time even more and make the solutions greener.

HYBRID MODULE PROGRAM

In order to standardize the basic proposal for Telecom business as BTS power supply it has been defined two sizes that cover two different average load range.

It refers to a system configuration which combine diesel generator set and energy storage system with 48VDC output, which is large demand for remote located BTS in the Telecom business. Other configuration can be proposed according to customer needs.

BTS with average load up to 3kWe

- Generating set: 14kWe Prime Power (GSW22Y – GSW22P)
- HYBRID MODULE: HM 12-250-48
  - ✓ 12kWe Power electronics
  - ✓ 250Ah LiFePO4
  - ✓ 48VDC voltage output

BTS with average load from 3kWe up to 7kWe

- Generating set: 24kWe Prime Power (GSW30Y – GSW30P)
- HYBRID MODULE: HM 24-500-48
  - ✓ 24kWe Power electronics
  - ✓ 500Ah LiFePO448VDC voltage output

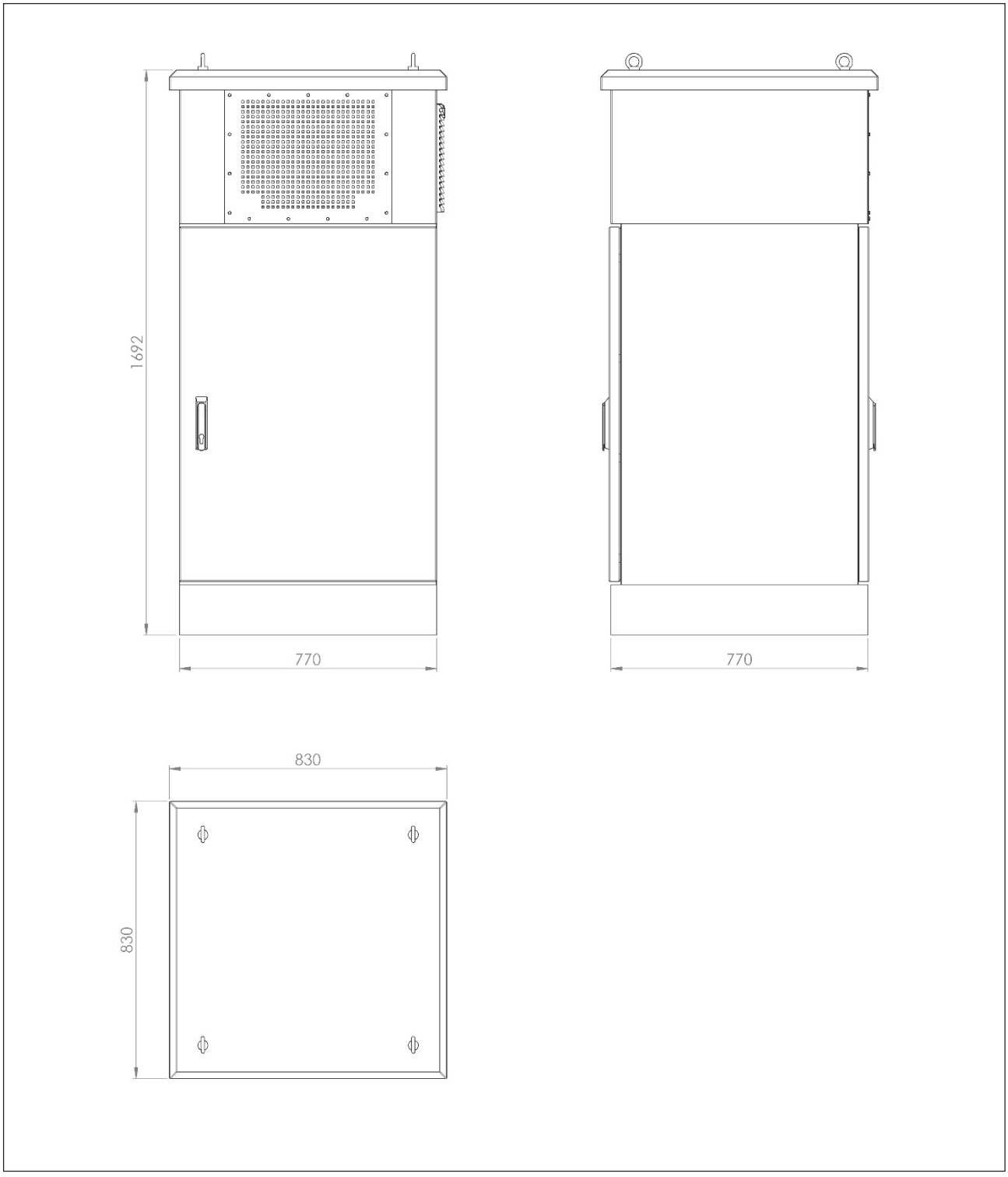
Hybrid Module
HM 12-250-48

HM 12-250-48
TECHNICAL DATA SHEET

Power rectifier	
Continuous power @ 25°C	12 kW
Peak Power 5 sec. @ 25°C	13 kW
Output voltage	38-58VDC
Input Voltage Range	400/230VAC Three Phase (±2%)
Input Frequency	45-66Hz ±0.05%
Efficiency	96%
THD	-
Batteries	
Type	Li-Ion (LiFePo4)
Nominal capacity	12kWh (9,6kWh @ 80% DoD)
Nominal voltage	48VDC
Voltage range	44…58VDC
Number of Cycles	6000 (80% DOD @ 25°C)
Max. Discharge / Charge	1.5C (360 A) / 1C (240 A)
Expected System Lifetime	15 years
Protections	Temperature, Voltage and Current
Solar Converter	
Maximum Solar Power (@STC)	On request
Recommended MPPT Voltage (Isolated MPPT Inputs)	-
Input Voltage Range	-
Efficiency	-
Power Connectors	
AC Power Outputs	-
AC Genset Power Input	Clamps
DC Solar Power Input	Clamps
Genset Auxiliary Contacts	Clamps
Communications	
Remote Access	3G (UMTS/HSPA+) 2G (GPRS/EDGE)
Local Access	CAN, Ethernet
Environment	
Operating Temperature	-20 to +45°C with Air-conditioning
Enclosure Protection	IP54
Mounting Localization	Outdoor
Mechanical	
Dimensions (WxDxH)	830x830x1770mm
Lifting Points	4

HM 12-250-48

Dimensional drawing



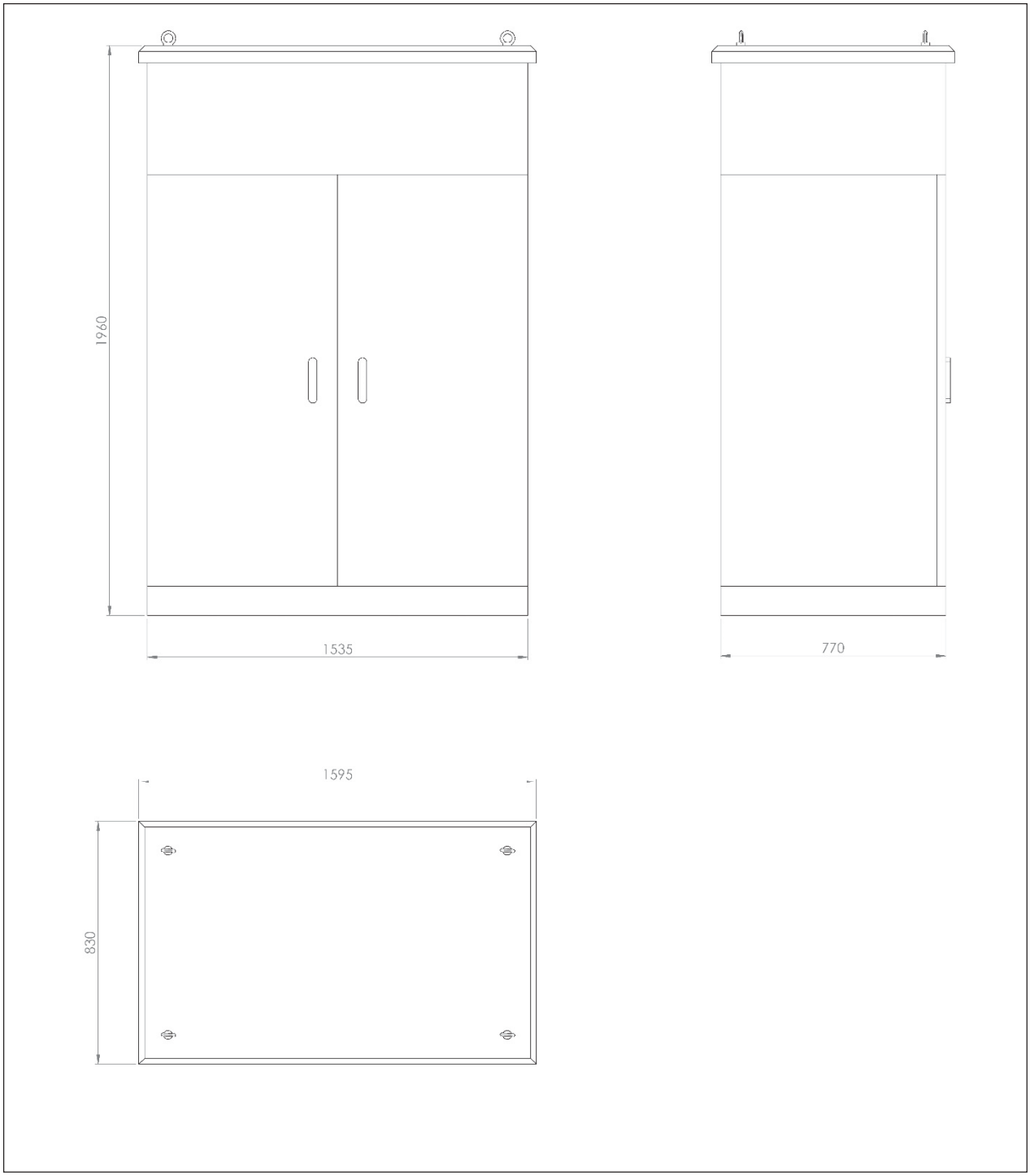
Hybrid Module
HM 24-500-48

HM 24-500-48
TECHNICAL DATA SHEET

Power rectifier	
Continuous power @ 25°C	24 kW
Peak Power 5 sec. @ 25°C	26 kW
Output voltage	38-58VDC
Input Voltage Range	400/230VAC Three Phase (±2%)
Input Frequency	45-66Hz ±0.05%
Efficiency	96%
THD	-
Batteries	
Type	Li-Ion (LiFePo4)
Nominal capacity	24kWh (19,2kWh @ 80% DoD)
Nominal voltage	48VDC
Voltage range	44…58VDC
Number of Cycles	6000 (80% DOD @ 25°C)
Max. Discharge / Charge	1.5C (720 A) / 1C (480 A)
Expected System Lifetime	15 years
Protections	Temperature, Voltage and Current
Solar Converter	
Maximum Solar Power (@STC)	On request
Recommended MPPT Voltage (Isolated MPPT Inputs)	-
Input Voltage Range	-
Efficiency	-
Power Connectors	
AC Power Outputs	-
AC Genset Power Input	Clamps
DC Solar Power Input	Clamps
Genset Auxiliary Contacts	Clamps
Communications	
Remote Access	3G (UMTS/HSPA+) 2G (GPRS/EDGE)
Local Access	CAN, Ethernet
Environment	
Operating Temperature	-20 to +45°C with Airconditioning
Enclosure Protection	IP54
Mounting Localization	Outdoor
Mechanical	
Dimensions (WxDxH)	1370x830x1950mm
Lifting Points	4

HM 24-500-48

Dimensional drawing

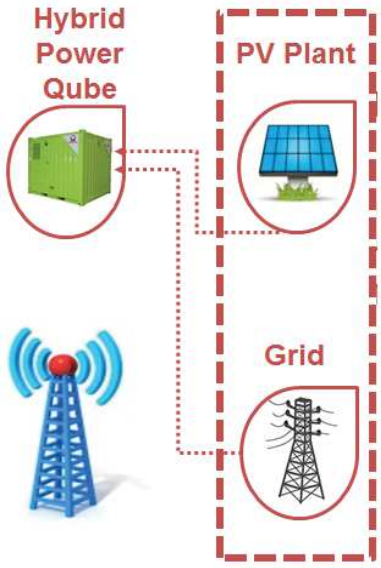


HYBRID POWER QUBE

All-in-one design which allow have single robust and vandal proof enclosure
Ideal solution for remote and outdoor installations.

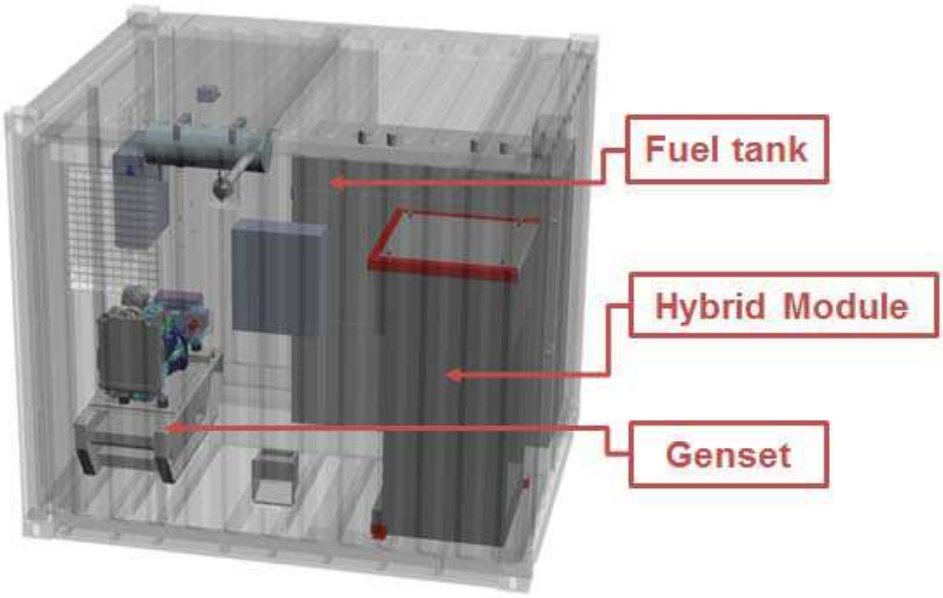
HYBRID POWER QUBE

HYBRID POWER QUBE



HYBRID POWER QUBE is a complete system integrating diesel genset and hybrid module fit inside a 10” container:

- ✓ AC diesel generator, open type
- ✓ Hybrid Module (Power electronics + batteries)
- ✓ 1500l double wall fuel tank
- ✓ Automatic lube oil top-up system (option)



HYBRID POWER QUBE PROGRAM

Following the sizes for Hybrid Module there available two main models of Hybrid Power Qube:

HPQ22Y-250Li

- Generating set:
  GSW22Y 400/230V 50Hz (14kWe PRP)
- HYBRID MODULE:
  HM 12-250-48
- Fuel tank
  Double wall 1500lt

Overall Dimensions (LxWxH): 2990x2438x2590

HPQ30Y-500Li

- Generating set:
  GSW30Y 400/230V 50Hz (24kWe PRP)
- HYBRID MODULE:
  HM 24-500-48
- Fuel tank:
  Double wall 1500lt

Overall Dimensions (LxWxH): 2990x2438x2590

Top quality design and finishing

Easy and fast load connection

Top quality insulation

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ENERGY GENERATION