

THE "ORIGINAL" HYBRID GENERATOR SINCE 2007



WE ARE PROUD TO SERVE THE TELECOM INDUSTRY WORLDWIDE

AFRICA

GUINEA CONAKRY KENYA **MADAGASCAR MAURITANIA** MOROCCO MOZAMBIQUE **NIGERIA** SENEGAL **SOUTH AFRICA SOUTH SUDAN SUDAN** TANZANIA

ASIA & OCEANIA

BANGLADESH CAMBODIA INDONESIA MYANMAR PAPUA NEW GUINEA **PHILIPPINES SRI LANKA**

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HYBRID **POWER SOLUTIONS**

7 - 24 kW DC -48Vdc

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THE ASCOT GROUP

PROVIDING ENERGY SOLUTIONS SINCE 1986

ASCOT is an Italian manufacturing group operating internationally in the power energy sector mainly focused on the production of diesel generating sets, hybrid solutions & power plants, designed in accordance to customer's specifications at various climatic conditions.

Originally established in 1986, ASCOT has since expanded its presence in over 60 countries throughout Europe, Africa, Middle East, Asia, and the Americas.

The "Ascot brand" is associated worldwide with high quality and tailor-made generating sets, special power solutions and hybrid technologies. Ascot strives to maintain the highest standards of quality, manufacturing all products in Italy using 100% European components, manpower and standards.

TECHNICAL SERVICE CENTERS

A Centralized Service Center based in Italy coordinates the Node Service Centers located in strategic locations distributed globally.

Through those "nodes" a well-connected network of Ascot's Partner Service Centers is controlled and managed to ensure a specialized and high quality maintenance service for all Ascot products.

Ascot Service includes:

- On-Site Service Center
- On-Site Specialized Team
- On-Site Spare parts availability
- On-Site Training Courses
- Network of Technicians





MORE THAN 30 YEARS OF EXPERIENCE











The ASCOT Brand is certifed to act according to the IT01 system 100% Original Italian Quality (Registration n. IT01.IT/1857.058.V - www.madeinitaly.org).

All ASCOT's Products are certified to be:

A | DESIGNED AND MANUFACTURED ENTIRELY IN ITALY

- Based on company's own project and design
- Made with Italian/European components
- Complete work traceability in Italy

B | MADE WITH NATURAL QUALITY MATERIALS

- Quality, first choice materials
- Raw materials origin full traceability
- Natural materials or natural compounds

C | BUILT ACCORDING TO TRADITIONAL WORKING METHODS

- Use of company's specific workmanship
- Use of traditional workmanships techniques

D | MADE IN OBSERVANCE OF EMPLOYEES, HEALTH AND SAFETY STANDARDS

- Ethical treatment of employees
- Manufactured according with the Hygiene Healthcare and safety regulations

















TOWARDS ZERO

GHG EMISSIONS

SINCE 2007 WE ARE PROUD TO LEAD THE HYBRID GENERATORS REVOLUTION IN THE TELECOMMUNICATIONS INDUSTRY

The relentless race for growth in the telecomunications energy sector is the daily challenge faced by ASCOT Power Solutions Engineering division that constantly researches and develops new energy solutions to satisfy the evolving telecommunications industry needs.

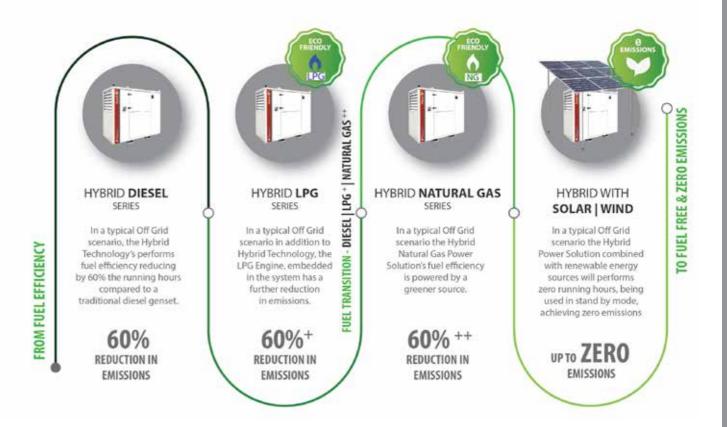
ASCOT has an extensive experience in the telecommunications sector having supplied thousands of generators in the international market to well-known Telecom companies.

ASCOT Hybrid Generators today represent the leading technology in the market with greater performance and reliability. It is also the expression of the ASCOT vision towards the Fuel Free Energy Transition path with a wide range of Hybrid Power Solutions from Diesel to LPG and Natural Gas Series and with the possibility of connection with renewable energy sources that enables ASCOT to achieve huge reductions in terms of fuel consumption and CO₂ emissions.

Successfully installed worldwide ASCOT has now made available the new HPU X SERIES with greater performance and more than 12 years of Hybrid Technology know-how.







Your Power Range towards ZERO GHG emissions



THE PROVEN HYBRID TECHNOLOGY FOR CELL SITES SUCCESSFULLY INSTALLED WORLDWIDE



HYBRID POWER SOLUTIONS

LEADING THE HYBRID TECHNOLOGY BEST IN CLASS FOR PERFORMANCE

The HPU X is a high efficiency hybrid generator, capable of achieving greater performance thanks to 12 years of proven worldwide experience.

The HPU X with variable speed engine and longlife deep cycle batteries guarantees fuel consumption savings up to 60% compared to a traditional genset. It is ready to be connected with renewable energy sources to further reduce fuel consumption and CO₂ emissions.

The HPU X is particularly useful for remote/rural off grid applications or in areas where the grid is available with frequent outages.

USAGE BENEFIT

- 99,9 % site up time;
- Retaining of Clients with high quality services;
- Real time on field data information;
- No Micro interruption / No break intervention;
- Up to 60% fuel savings compared with Genset;
- Up to zero Engine running hours with PV System;
- Up to zero CO₂ Emissions

















HIGH EFFICIENCY

DESIGN AND COMPONENTS

ENGINE VARIABLE SPEED, PMG TECHNOLOGY AND DEEP CYCLE BATTERIES ENGINEERED TO ACHIEVE THE BEST PERFORMANCE



The "All-in-One" Composition

All in one power solution housed in a sound & water proof canopy made by galvanised and e-coated sheet metal structure, the HPU X is composed of the following basic elements:

- DC GenSet with PMG Technology
- 2 Variable Speed Engine (Diesel | LPG | NG)
- 3 Integrated Fuel Tank with anti-siphoning system
- 4 Deep Cycle Batteries (PzS or Lithium Technology)
- 5 Hybrid Controller for complete system management
- 6 Sound & Water proof canopy up to 70 dBA @ 1m
- 2 Lifting points for easy transportation
- 8 Armoured lockable doors

Anti-Theft Devices



DC GENSET WITH VARIABLE SPEED ENGINE



A very efficient DC Generator coupled with a robust variable speed engine is the heart of the power system for which European components have been precisely chosen to ensure the maximum reliability and capability to operate in all types of extreme ambient conditions.

CONTROLLER WITH INTEGRATED HYBRID LOGIC



The Hybrid Power Unit Controller is a user-friendly interface between final user and the core of the system: the Hybrid Logic.

This enables the management of all components including any external renewable energy sources.

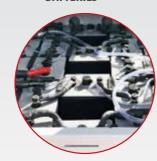
SOUND & WEATHERPROOF CANOPY UP TO 70 dBA @ 1m



The sound and weatherproof electrostatically-coated galvanized steel canopy provides durable protection for the hybrid in all types of ambient conditions.

Soundproofing is obtained through double skined panel filled with acoustic foam.

DEEP CYCLE PZS



Deep cycle batteries with PzS or Lithium technology designed in one compact block to maximize security.

SAND FILTERS



For desert applications a set of anti-sand filters are installed in the inlet/outlet ventilation system.



HYBRID

WORKING PRINCIPLE

THE TECHNOLOGY THAT ALLOWS HUGE SAVINGS IN TERMS OF FUEL CONSUMPTION, EMISSIONS AND OPEX

The Hybrid technology allows the storage into batteries of the excess of power produced by the DC GenSet when it is running (**ACTIVE MODE**) and to release it to the cell site while the DC GenSet is off (**SLEEPING MODE**) consequently achieving huge savings in terms of fuel consumption, emissions and operative costs.

That is why **Hybrid Generators run for limited hours per day** and represent today the most efficient energy system to supply power to Cell sites located in remote / rural areas or where the mains is not available or unstable during the day.

ADDITIONALS INPUT Control Panel With heapy and invited out of the control panel With heapy and invited out of the control panel With heapy and invited out of the control panel With heapy and invited out of the control panel With heapy and invited out of the control panel ASCOT DC Generator Fy PANEL Batteries Fuel Tank

ACTIVE MODE "ENGINE ON"

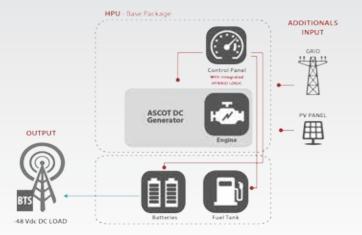
When the HPUX is in Active Mode, the Engine is "ON" to power the loads and stores the excess power into the



5,7 hours/24

* HPU X4 D's performances in OFF GRID scenario





SLEEPING MODE "ENGINE OFF"

When the batteries are fully charged the HPU X engine automatically switches to stand by mode and the site is powered by the batteries.

When the batteries are discharged at the set DoD (Depth of Discharge) the HPU switches to active mode.



* HPU X4 D's performances in OFF GRID scenario (3kW load)

THE ASCOT PMG GENERATOR

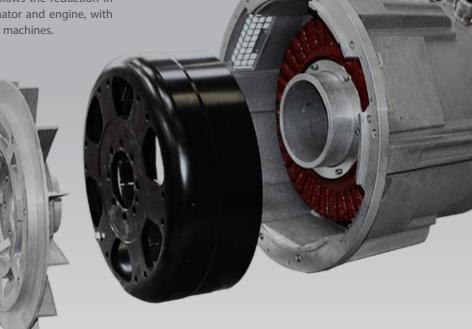
WITH THE BEST PERFORMANCE

The ASCOT PMG Generator represents the best efficiency solution with greater performance rather than the traditional one.

It is possible to run with variable speeds rather than syncronos ones to optimize engine output, fuel consumption and voltage output.

Moreover with high power density it allows the reduction in weight and dimensions, both for alternator and engine, with consequently more lighter and compact machines.

Compared with the traditional technology, the PMG Generator has a hugely improved reliability since it has no bearings, no electronic parts such as an AVR and no rotating diodes and windings.



THE SAFETY REDUNDANCY

POWER CONTINUITY EVEN IN CASE OF ABNORMAL OPERATION

To ensure the maximum reliability and redundancy the "Load" is in parallel with the DC Generator and Deep Cycle Batteries, this guarantees the continuity of power to the load as **NO ATS is required.**

IN CASE OF ENGINE FAILURE

The batteries are sized for 50% DoD. During normal use, only 50% is discharged, the remaining 50% is energy that is stored as a reserve.

In case of Engine failure or during maintenance, the batteries can carry the load for 40 hours, allowing technicians to reach the site in time without any loss of power.

IN CASE OF BATTERY FAILURE

In case of Battery failure, the DC Genset located at the top of the HPUX is designed to run as normal Genset for 24H/7 to power the load, allowing technicians to reach the site in time without any loss of power.

DC RESCUE ASSISTANT

In the **highly improbable** event of both Engine and Battery failure, The 5 kW DC-Rescue, a portable DC Diesel Generator with integrated fuel tank, easy to be carried, can support the site supplying power during the failure allowing the repair of the HPUX without any loss of power.



THE CORE HYBRID CONTROL LOGIC

100 % ASCOT ELECTRONIC DEVICE DESIGNED TO MANAGE AND PROTECT ALL THE COMPONENTS AND CONNECTIONS

The **Integrated Hybrid Control Logic** is the core of the system. As a result of the development of a **100% ASCOT electronic device** it allows the management of all the components: variable speed engine, alternator, batteries and also the renewable energy that might be connected.

The Hybrid logic represents a centralized control for a complete and comprehensive management of the equipment.

AUTOMATIC OPERATING MODE

The Hybrid Control Logic is designed to act automatically following the parameters set by the engineering division for optimal operation.

MANUAL OPERATING MODE

The manual mode allows to program engine, alternator, batteries, renewable energy sources parameters according to customer's needs.

The Hybrid Control Logic ASH - Card with a user friendly interface



MAIN FUNCTIONALITIES

1. Starts&Stops the Generator when the Deep Cycle Batteries reaches the set DoD Value;

010/

- **2.** Reads the Deep Cycle Batteries charging parameters "Current" as well as the internal temperature to guarantee the expected lifetime of the batteries and the number of the cycles for which the batteries are originally designed;
- **3.** Engine r.p.m. and alternator monitoring and protection;
- 4. Interacts with the renewable energy sources available and controls the alternative power source connected, selecting the most convenient.

HYBRID GENERATORS GUARANTEE SAVINGS IN TERMS OF FUEL CONSUMPTION, SERVICE INTERVALS & RUNNING HOURS WITH LONGER GENSET LIFE AND LOWER OPEX

UP TO 99,9% FUEL SAVINGS WITH PV PLANT

COMBINING THE HYBRID SYSTEM WITH GREEN ENERGY SOURCES WILL OPTIMIZE FUEL CONSUMPTION [Lt/DAY]

Adding sufficient PV Panels, the Hybrid Genset can be used as a stand-by to the Photovoltaic plant and in the mean time remaining an alternative back up in very remote sites.

FUEL CONSUMPTION* [LITERS / DAY]

CO 0/			64 lt/day		
60%				26 lt/day	
FUEL SAVINGS				21 lt/day	
liters / day	100	75	50	25	0

ENGINE RUNNING* [HOURS / DAY]

8 1 % REDUCTION IN RUNNING HOURS	24 II/uay			5,7 hours/day 4,6 hours/	/day
hours	24	18	12	6	0
				SERVICE I	NTERVAL*
7 times REDUCTION					50 running hours e a month
MAINTENANCE	once in 8 months	5			

*Typical performances of HPU X 4D in OFF GRID scenario with Lithium batteries refferred to a typical DC load of 3kW and compared with a traditional 15 kVA Genset.



HYBRID POWER UNIT + SOLAR 4,32 kWp





TECHNICAL DATA

DIESEL / LPG / NG -48 Vdc | 7 - 24 kW | 2000 - 3000 Ah

ACCESSORIES & OPTIONALS

- Web Based Remote & Control Management System (4G / 5G)
- Rectifier 6-24 kW -48 Vdc / 230 Vac, 50/60 Hz to connect with GRID
- Inverter 0.8 -10 kVA -48Vdc/230 Vac, 50/60 Hz
- Solar Charge controller + PV package (panels + metal structure)
- DC Distribution Panel
- Automatic Lube Oil Top Up system to avoid daily check of lube oil level



SERIES HPU X

HYBRID POWER UNIT







HYBRID GENERATORS | SERIES HPU X DIESEL | PzS or Lithium Batteries

MODEL	ENGINE BRAND	DC GENSET CAPACITY	OPERATING LOAD RANGE	DC GENSET TECHNOLOGY		TERIES Ah]	CANOPY
		[kW]	[kW]		PZS	LITHIUM*	
HPU X1 D	Perkins	7	0 - 2	PMG-178	320	4 x 77	Horizontal
HPU X1 D	Kubota	10	0 - 3	PMG-178	320	6 x 77	Vertical
HPU X2 D	Perkins	10	0 - 3	PMG-178	625	6 x 77	Horizontal
HPU X2 D	Kubota	10	0 - 3	PMG-178	625	6 x 77	Vertical
HPU X3 D	Deutz	12	0 - 5	PMG-306	980	8 x 77	Horizontal
HPU X4 D	Deutz	18	0 - 6	PMG-306	1240	10 x 77	Horizontal
HPU X5 D	Deutz	24	0 - 7	PMG-307	1550	12 x 77	Horizontal
HPU X6 D	Deutz	24	0 - 8	PMG-307	2000	14 x 77	Horizontal







PZS LI HYBRID GENERATORS | SERIES HPU X LPG** | PZS or Lithium Batteries

MODEL	ENGINE BRAND	DC GENSET CAPACITY	OPERATING LOAD RANGE	DC GENSET TECHNOLOGY		TERIES Ah]	CANOPY
		[kW]	[kW]		PZS	LITHIUM*	
HPU X1 L	Kubota	7	0 - 2	PMG-178	320	4 x 77	Vertical
HPU X2 L - ETL/UL COMPONENTS*	Kubota	10	0 - 3	PMG-178	625	6 x 77	Vertical
HPU X3 L - ETL/UL COMPONENTS*	Kubota	15	0 - 5	PMG-225	980	8 x 77	Vertical
HPU X4 L	Kubota	18	0 - 6	PMG-307	1240	10 x 77	Horizontal
HPU X5 L	Kubota	24	0 - 7	PMG-307	1550	12 x 77	Horizontal
HPU X6 L - cETLus CERTIFIED**	Kubota	20	0 - 7	Excited-24	-	16 x 77	Horizontal

*ETL/UL COMPONENTS

Manufactured with ETL/UL Component: Conforms to UL STD 2200, CSA C22.2#14:2018, CSA C22.2#100:2014, NFPA 30-37-54-58-70-70E. Meets EPA Emission Regulations for California & is tested and certified by Kubota.
Fuel tank is double wall UL 142 listed Meets EPA Emission Regulations & is tested and certified by Kubota.

** CETLus CERTIFIED
Complete System: ETL/UL Listed to meet UL STD 2200, CSA C22.2#14:2018, CSA C22.2#10:2014 and NFPA 30-37-54-58-70-70E.
Fuel tank is double wall UL 142 listed Meets EPA Emission Regulations & is tested and certified by Kubota.
INTERTEK ETL UL Listed Component: Conforms to UL STD 2200, CSA C22.2#14:2018, CSA C22.2#10:2014, NFPA 30-37-54-58-70-70E and is certified by IMADAL EDM Emissions Denulations for California & is tested and certified by Kubota.



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ACCESSORIES & OPTIONALS		
REMOTE MONITORING SYSTEM		
Web Base Remote Control Management System (3G modem)	o 3G / 4G modem	
Remote hosting in Ascot server	0	
N.8 free contacts for remote alarms	0	
ACCESSORIES TO CONNECT WITH AC SOURCE		
Rectifier to connect HPU X to external AC power: grid/AC genset	o 3G / 4G modem (-48 Vdc / 230 Vac , 50/60 Hz)	
ACCESSORIES TO CONVERT HPU DC POWER TO AC OUTPUT		
Inverter for small load (i.e. PC, phone, etc)	o 800VA	
Inverter charger to power AC load (i.e. Air Conditioning)	o 3 kVA / 5 kVA / 8 kVA / 10 kVA (- 48Vdc/230 Vac, 50/60 Hz)	
ACCESSORIES TO CONNECT WITH SOLAR PV SYSTEM		
Solar Charge controller & PV Panels to enhance HPU X performances	o 70 A o 3,24 kWp with N.12 x 270 kWp PV panel o 85 A o 4,32 kWp with N.16 x 270 kWp PV panel	
DC DISTRIBUTION PANELS		
DC Distribution Panel without LVD logic for separate Tenants	o 4x80 Amp CB	
DC Distribution Panel with LVLD logic for priority and non priority load	o up to 12 allocable CBs	
EXTENDED RANGE PACKAGE FOR OIL REFILLING (suggested to avoid	manual oil top up)	
utomatic Lube oil top up system o to extend the manual lube oil refill up to 100		
ANTI-THEFT DEVICES		
Steel Belt for starter battery	o	
Safety Cage for charging Batteries	0	
Armoured doors to prevent access with crow bar	o	
Integrated fuel tank	0	

^{*} All the HPU X with lithium batteries could be updated



^{**} Natural Gas range is available ONLY on demand

REMOTE CONTROL

COMPLETE SYSTEM MANAGEMENT

WITH REAL TIME WEB-BASED m2m TECHNOLOGY

The Ascot Remote Control is a Remote Management System (RMS) that monitors continuously all relevant parameters of the system and manages all the hybrid/generators spread out in the territory.

The information are collected by the modem and it is stored in the internal memory. Through a laptop or mobile device connected to the NET, you can monitor and manage all the data, including start, stop and reset functionalities, without installing a specific software.

The remote controller is transmitted to the web by a local area network (LAN) protocol/ RS485 or by 4/5G modem with dual sim. Data collected are trasmitted to the web and accessible in www. ascotremotecontrol. com portal which provides power monitor, control data analysis and management function across an entire network of sites.

- GPS POSITION
- REAL TIME ALARM COMMUNICATION
- REAL TIME USER FRIENDLY REPORTS
- TREND GRAPHS

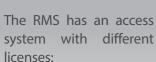
«THE REAL TIME USER FRIENDLY REPORT TO CHECK ALL PERFORMANCES OF SINGLE **OR MULTIPLE MACHINES»**











- Report User;
- Service User;
- Administrator (with unlimited functions).



All alarms, if occured,

are communicated in real-time to the web portal, selected e-mail addresses, and via SMS service.

Trend Graphs give the possibility to view trends in engine rpm and temp., battery level, output power and fuel level.



By the GPS antenna you can locate the hybrid/genset spread out in the territory.

STATUS

ALARMS

PERFORMANCE GRAPHS & REPORTS

This function generates the report performance for single or groups of machines. It is possible to select a range of dates (weeks or months): the report is based on daily average. Five different kinds of reports can be generated:

Performance Report

REMOTE CONTROL

- Alternative power source hours per day;
- Generators hours per day;
- Total hours on batteries per day;
- Average load on site;
- Power availability.

Fuel Report

- Fuel level start/end date;
- Daily average fuel consumed;
- Fuel consumed/refilled;
- Generators running hours;
- Energy delivery per day.
- Unexpected fuel consumed.

Status Report

- Total running hours;
- Time to lack of fuel;
- Service scheduler;
- Total hours of service delay;
- On line / Off line.



PERFORMANCES

REPORTS ON-THE-FLY



TECHNICAL SERVICE CENTERS

A Centralized Service Center, based in Italy, coordinates the Node Service Centers located in strategic locations distributed globally. Through those "nodes" a well-connected network of Ascot's Partner Service Centers are controlled and managed to ensure a specialized and high quality maintenance service for all Ascot products. Ascot's Service includes:

- On-Site Service Center
- On-Site Specialized Team
- On-Site Spare parts availabilities
- On-Site Training Courses
- Ready Network of Service Technicians

ON LINE SUPPORT 24/7

Ascot web platform allows the communication of a malfunction in real time 24/7 and it represents first aid to solve technical breakdowns or uncommon performances.

SPARE PARTS INTERNATIONAL DISTRIBUTION

Ascot ensures all products for a minimun numbers of years (depending on model and power solution). If the product is under Ascot Warranty Certificate the spare parts required will be provided by our network (as indicated in each contract).

SPECIALIZED TECHNICIANS FOR ON SITE ASSISTANCE

Ascot's aftersales team ("Ascot Flying Doctors") is composed of technicians ready to support our customers. They promptly solve technical problems in the field and are always in contact with the nearest Ascot Node Service Center.



LOCAL BRANCH

Casa Ascot and Showroom.



TECHNICAL TRAINING

Ascot Training courses are planned to transfer technical know-how to local technicians.



ASCOT SPARE PARTS

Original Ascot Spare Parts ensure the best performance for Ascot Power Solutions.

A correct maintenance ensures all performances indicated in the supply's contract.







"WE BRING ENERGY ENERGY IS OUR PASSION,

EVERYWHERE. PASSION IS OUR ENERGY."

Follow Us!









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Ascot GenSets are designed and manufactured by Ascot Industrial srI













