



HYBRID POWER SOLUTIONS

GDN 19" 5U Hybrid | GDN 19" 6U Hybrid

GDN 19" 5U Hybrid | GDN 19" 6U Hybrid

19/23" rack-mount or indoor/outdoor cabinetized

-48VDC | 400A | 24.4kW

Hybrid power systems combine two or more energy conversion, fuel and storage devices, that when integrated, overcome limitations inherent in either.



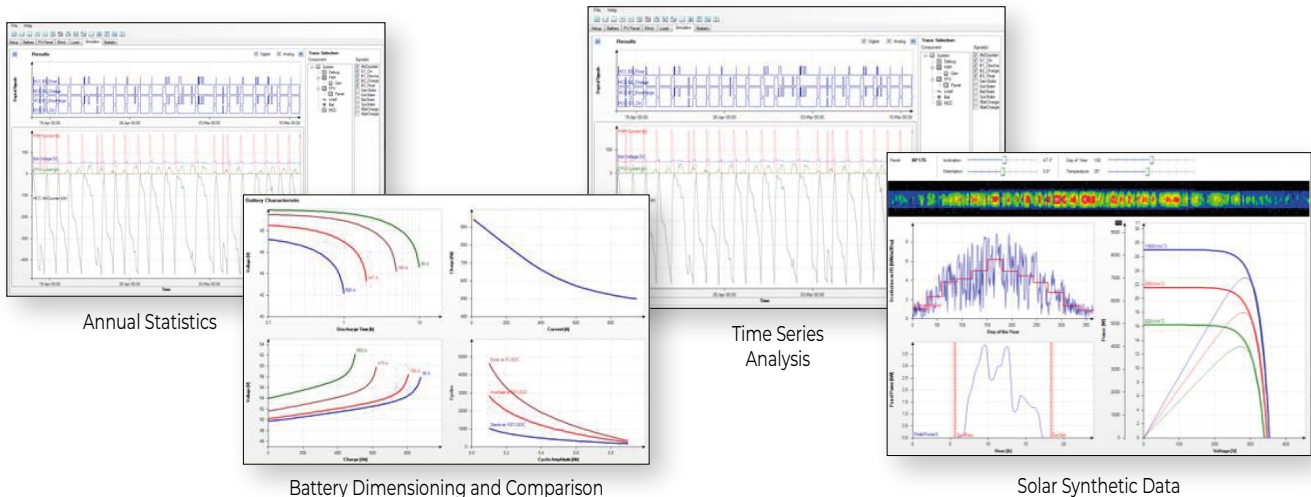
- UNIPOWER Hybrid solutions are designed to minimize power system life-cycle costs and carbon footprint.
- Power conversion components deliver leading efficiencies and maximum energy harvest from renewable resources using MPPT algorithms.
- Hybrid Bus Architecture delivers available power from renewable resources supplemented by diesel generator or grid supply when necessary.
- Sophisticated controller logic monitors and maximizes battery life-cycle and minimizes generator runtime to provide best Total Cost of Ownership (TCO).
- Total site management and data logging provides detailed local and remote statistics.

FEATURES

- High efficiency rectifiers and converters
- Hybrid Bus Architecture
- Flexible, Modular, Integrated solutions
- Grid connect, off-grid and renewable ready
- Maximum Power Point Tracking

SITE DESIGN AND MODELING












UNIPOWER's comprehensive array of modeling and dimensioning tools allows the optimum Hybrid solution to be accurately specified based on power consumption, geographic location, financial and O&M data to suit a given CapEx/OpEx/ROI requirement.



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HYBRID SOLUTIONS

Application / Hybrid Type		AC Grid	Diesel Generator	Cyclic Batteries	Solar	Description
Off-Grid / Grid-off (Unreliable Grid)	Cyclic	 (unreliable / intermittent)				Deep Cyclic Battery solution deployable on Greenfield or existing sites reduces generator run-time and saves fuel.
	RE / Cyclic					Deep Cyclic battery, with partial solar renewable resources increases battery life-cycle and further reduces generator run-time and fuel consumption.
	Pure RE / Cyclic					100% autonomous solar renewable site. Zero carbon emissions.
On-Grid	RE Enhanced			 (standby)		Grid connect supplemented by solar renewable resources to reduce carbon emissions.

SOLUTION OVERVIEW

Off-grid diesel generator powered sites, running continuously, cause glazing and carbon build-up in the generator engine and typically operate at an inefficient load range resulting in high fuel consumption.

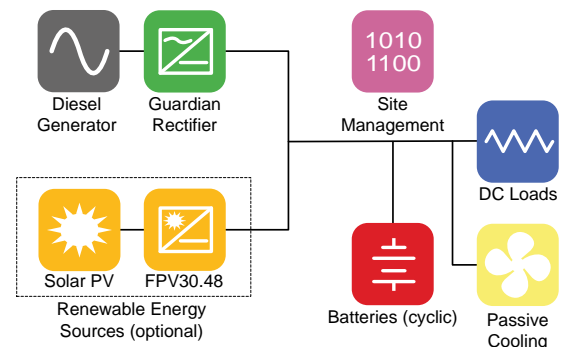
The UNIPOWER hybrid solution, by adding deep cyclic batteries, significantly reduces generator runtime and fuel consumption operational expenditure due to less frequent maintenance intervals. Cyclic batteries also provides a degree of operational redundancy in the event of generator failure as the batteries are only ever discharged to a limited capacity on any given cycle, thus eradicating the need for a second generator.

Through the use of temperature hardened rectifiers and resilient batteries, the traditional requirement for air-conditioners can be traded in for a passive Heat Exchanger (HEX) or direct fan filter (DFC) cooling solution, both of which use significantly less energy. This energy saving equates to a lower total cost of ownership.

Battery and generator management is handled through the UNIPOWER system controller, which, through the setting of battery type and capacity, ensures optimal site management and maximum lifetime of the battery and generator.

The flexibility to expand using solar converters allows prioritized renewable energy to be integrated into the modular system design.

Deployable using a wide range of existing indoor and outdoor power systems, the UNIPOWER Hybrid Solution is the latest in a series of energy optimization innovations that UNIPOWER is driving to help reduce total cost of ownership, while at the same time improving the environmental performance of mobile network growth worldwide.



SYSTEM COMPONENTS

Energy Resources and Storage



Deep Cyclic Batteries, with the capability to perform a large number of discharge and recharge cycles, are used to reduce the operating time of the diesel generator and improve operating fuel consumption. Batteries also store excess PV energy for deferred use. UNIPOWER carefully selects batteries designed for cyclic applications that provide a high rate recharge acceptance, high round-trip efficiency and high temperature resistance.



Solar Photovoltaic (PV) panels supply renewable energy to the site. Featuring low operating costs and carbon free energy production these resources provide a valuable energy source for remote sites or carbon conscious clients.

Management and Data Logging



Hybrid Controller HCX Advanced & Cyclic Controller HLX provide the essential function of managing battery and generator cycling through intelligent software controls; additionally HCX ensures maximum energy harvest of renewable energy sources. Fuel information from the generator is collected alongside battery and power data in order to provide complete statistics on the status and performance of the site. Site data is provided via alarm relays and a remote Ethernet connection.



Power Conversion and Integration



UNIPOWER Guardian AC/DC Rectifiers, fed by a Diesel generator or AC Grid, provide >95% conversion efficiency. Guardian rectifiers incorporate resonant technology to reduce component stresses, providing increased system reliability. They feature a wide input operating voltage range to maximize power availability within demanding utility power environments.



UNIPOWER FPV30.48 Solar converters provide isolated power conversion for PV arrays. Maximum energy harvest from the valuable photovoltaic (PV) array is accomplished through high efficiency DC/DC power conversion (>95% peak) and Maximum Power Point Tracking (MPPT) algorithm.

A Hybrid Bus Architecture allows many modern UNIPOWER Indoor and outdoor power systems the addition of a hybrid controller and optional PV converters transforming them into a full hybrid solution.

UNIPOWER Outdoor Cabinets feature aluminum construction, providing protection and thermal management in a range of harsh outdoor environments. Cabinets include complete AC distribution and earth connection points and house the power system, DC distribution, system controller and provide space for mounting telecommunications equipment.

UNIPOWER Hybrid Systems are also available as rack or Indoor cabinet solutions as shown on the following pages.



Thermal Management: Low energy, passive cooling in the form of Direct Fan Cooling (DFC) provides extremely reliable thermal management for outdoor enclosures and shelters. Heat Exchangers (HEX) or AC and DC air conditioning are also offered in thermal solution portfolio.



SYSTEM SPECIFICATION & CAPABILITY GUIDE - 19" SUB-RACK

SYSTEM DESIGNATION	1-MS0031G	
OUTPUT		
System Voltage	-48VDC nominal 53.5VDC float	
Maximum Capacity @ 120VAC genset/mains (see below)	Load	254A
	Battery	254A discharge s/w controlled charge
Maximum Capacity @ 230VAC genset/mains (see below)	Load	400A
	Battery	400A discharge s/w controlled charge
No. Rectifier Slots	0 (pure solar), 4 or 8	
No. PV Converter Slots	0 (non solar), 4 or 8	
DC DISTRIBUTION		
Loads Circuits	up to 21 x 18mm (2A to 63A)	
Battery Circuits	1 to 6 x (80A, 100A or 125A)	
RECTIFIER INPUT (see individual datasheets for full specifications)		
Voltage (nominal)	1-phase 100-120/200-240VAC (L + N + PE) 3-phase 230/400VAC (L1 L2 L3 + N + PE)	
Frequency	47-63Hz	
Maximum Input Current (per rectifier)	15.7A @ 100-120VAC 17A @ 200-240VAC	
Power Factor	>0.98 (typical)	
PV CONVERTER INPUT (see datasheet for full specifications)		
Voltage (nominal MPPT)	130-345VDC	
Startup Voltage	120VDC	
Shutdown Voltage	>400VC	
Maximum Input Current (per converter)	17.6A	
MONITORING & CONTROL - HCX Advanced or HLX Controller		
Alarm Relays	4 standard, option for 10	
Local Interface	4 x 20 LCD, 4-key menu, USB / RS232, microSD card slot (4GB max), for data logging	
Remote Interface	Ethernet / Modem using PowCom Hybrid™ software package Ethernet port allows monitoring and control over a TCP/IP network. Web browser support + SNMPv3	
LED Indications	Green - System ON; Yellow - Message(s); Red LED - Alarm(s)	
Alarms	HCX & HLX	Low/High Voltage; High Load (Rectifier Capacity); Battery Capacity; Battery Symmetry; Generator/Mains Failure; Module Alarm; Urgent Module Alarm; Battery Fuse Failure; Load Breaker Failure; Battery/Load Disconnect; High/Low Battery Temperature; Temperature Probe Failure; High/Low AC Voltage; 16 x Additional User Definable; Fuel Level Low; GenSet; GenSet Battery Failure; GenSet Battery Discharged; GenSet Connection Interrupted; Distribution Surge Arrester Failure
	HCX only	Ground Fault; PV Surge Fail; PV Array Disconnected
External Digital I/O	2 x Inputs, 2 x Outputs (Open Collector)	
BATTERY MANAGEMENT		
Symmetry Inputs	6 or 12 (can be redefined as analog inputs up to 100VDC)	
Low Voltage Battery Disconnect (LVD)	1 x 400A Programmable	
Partial Load Disconnect (PLD)	1 or 2 x 125A or 200A Programmable (Optional)	
Temperature Compensated Charging	Programmable	
COMPLIANCE		
EMC	EN 300 386 ; EN61000-6-3 (Emission) ; EN61000-6-2 (Immunity)	
Safety	IEC60950-1:2005 2 Ed. +A1:2009	
ENVIRONMENTAL		
Operating Temperature	-40°C to +55°C	
Storage Temperature	-40°C to +85°C	

NOTE: 19" sub-rack systems can be mounted in suitable customer supplied indoor racks or cabinets. The can also be supplied pre-installed into UNIPOWER's PODS Outdoor Cabinets. See following pages for details.

SYSTEM SPECIFICATION & CAPABILITY GUIDE - 23" SUB-RACK

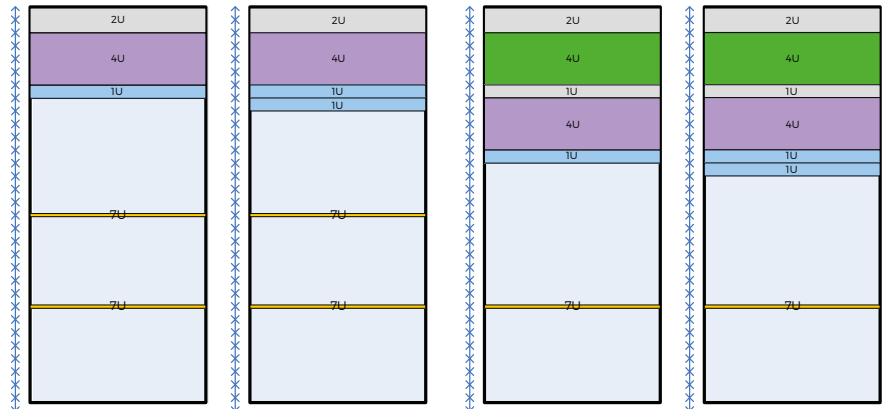
SYSTEM DESIGNATION	1-MS0032G	
OUTPUT		
System Voltage	-48VDC nominal 53.5VDC float	
Maximum Capacity @ 120VAC genset/mains (see below)	Load	318A
	Battery	318A discharge s/w controlled charge
Maximum Capacity @ 230VAC genset/mains (see below)	Load	400A
	Battery	400A discharge s/w controlled charge
No. Rectifier Slots	0 (pure solar), 5 or 10	
No. PV Converter Slots	0 (non solar), 5 or 10	
DC DISTRIBUTION		
Loads Circuits	up to 26 x 18mm (2A to 63A) additional 24 x 18mm with extension PDU (2A to 25A)	
Battery Circuits	1 to 6 x (80A, 100A or 125A)	
RECTIFIER INPUT (see individual datasheets for full specifications)		
Voltage (nominal)	1-phase 100-120/200-240VAC (L + N + PE) 3-phase 230/400VAC (L1 L2 L3 + N + PE)	
Frequency	47-63Hz	
Maximum Input Current (per rectifier)	15.7A @ 100-120VAC 17A @ 200-240VAC	
Power Factor	>0.98 (typical)	
PV CONVERTER INPUT (see datasheet for full specifications)		
Voltage (nominal MPPT)	130-345VDC	
Startup Voltage	120VDC	
Shutdown Voltage	>400VC	
Maximum Input Current (per converter)	17.6A	
MONITORING & CONTROL - HCX Advanced or HLX Controller		
Alarm Relays	4 standard, option for 10	
Local Interface	4 x 20 LCD, 4-key menu, USB / RS232, microSD card slot (4GB max.) for data logging	
Remote Interface	Ethernet / Modem using PowCom Hybrid™ software package Ethernet port allows monitoring and control over a TCP/IP network. Web browser support + SNMPv3	
LED Indications	Green - System ON; Yellow - Message(s); Red LED - Alarm(s)	
Alarms	HCX & HLX	Low/High Voltage; High Load (Rectifier Capacity); Battery Capacity; Battery Symmetry; Generator/Mains Failure; Module Alarm; Urgent Module Alarm; Battery Fuse Failure; Load Breaker Failure; Battery/Load Disconnect; High/Low Battery Temperature; Temperature Probe Failure; High/Low AC Voltage; 16 x Additional User Definable; Fuel Level Low; GenSet; GenSet Battery Failure; GenSet Battery Discharged; GenSet Connection Interrupted; Distribution Surge Arrester Failure
	HCX only	Ground Fault; PV Surge Fail; PV Array Disconnected
External Digital I/O	2 x Inputs, 2 x Outputs (Open Collector)	
BATTERY MANAGEMENT		
Symmetry Inputs	6 or 12 (can be redefined as analog inputs up to 100VDC)	
Low Voltage Battery Disconnect (LVD)	1 x 400A Programmable	
Partial Load Disconnect (PLD)	1 or 2 x 125A or 200A Programmable (Optional)	
Temperature Compensated Charging	Programmable	
COMPLIANCE		
EMC	EN 300 386 ; EN61000-6-3 (Emission) ; EN61000-6-2 (Immunity)	
Safety	IEC60950-1:2005 2 Ed. +A1:2009	
ENVIRONMENTAL		
Operating Temperature	-40°C to +55°C	
Storage Temperature	-40°C to +85°C	

NOTE: 23" sub-rack systems can be mounted in suitable customer supplied indoor racks or cabinets. They can also be supplied pre-installed into UNIPOWER's indoor cabinets or PODS Outdoor Cabinets. See following pages for details.

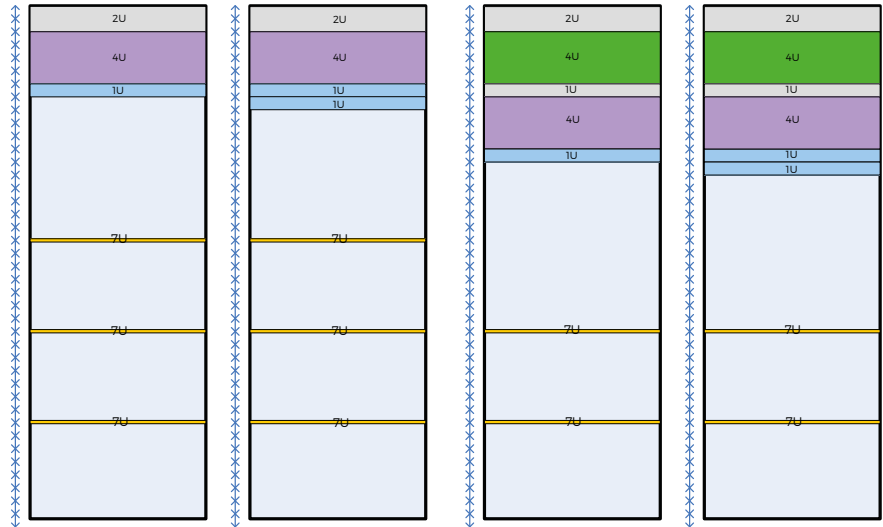
INDOOR FLOOR STANDING CABINET CONFIGURATIONS - 7U BATTERY SPACING



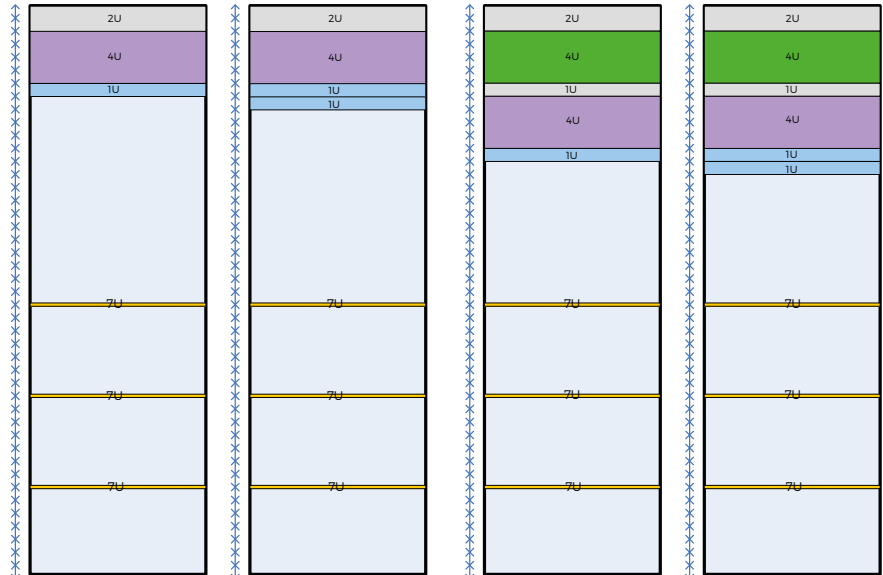
55.5"/1.4m x 23.6"/600mm x 23.6"/600mm - 30RU internal



70.9"/1.8m x 23.6"/600mm x 23.6"/600mm - 39RU internal



78.7"/2.0m x 23.6"/600mm x 23.6"/600mm - 43RU internal



NOTE: For applications requiring more battery strings than the desired cabinet additional battery cabinets are available.

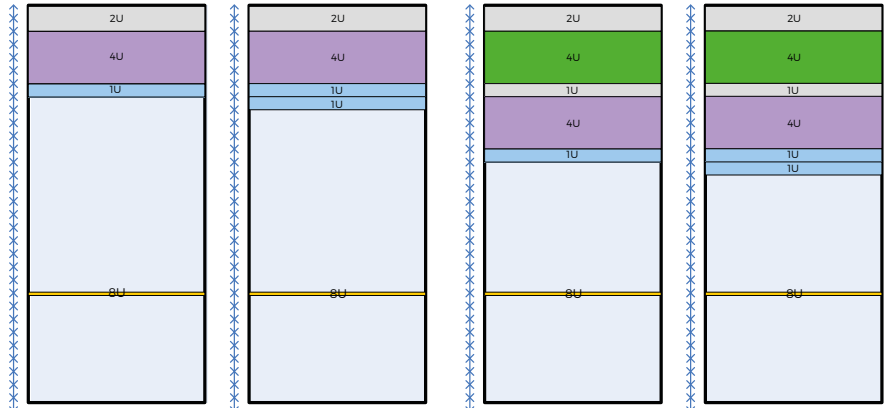
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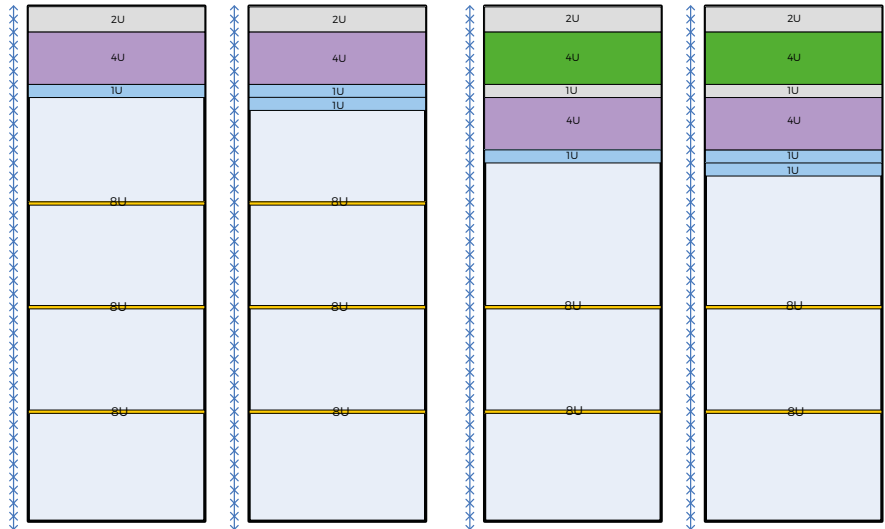
INDOOR FLOOR STANDING CABINET CONFIGURATIONS - 8U BATTERY SPACING



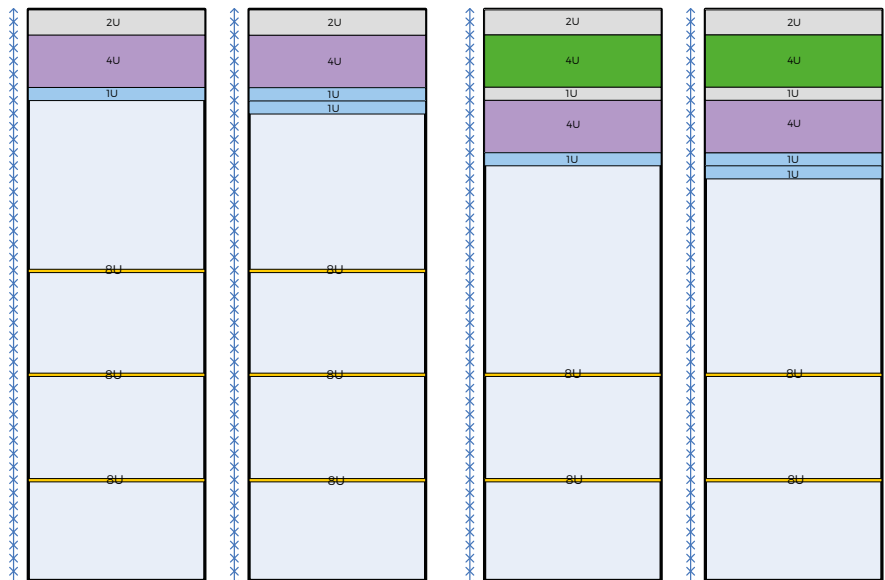
55.5"/1.4m x 23.6"/600mm x 23.6"/600mm - 30RU internal



70.9"/1.8m x 23.6"/600mm x 23.6"/600mm - 39RU internal



78.7"/2.0m x 23.6"/600mm x 23.6"/600mm - 43RU internal

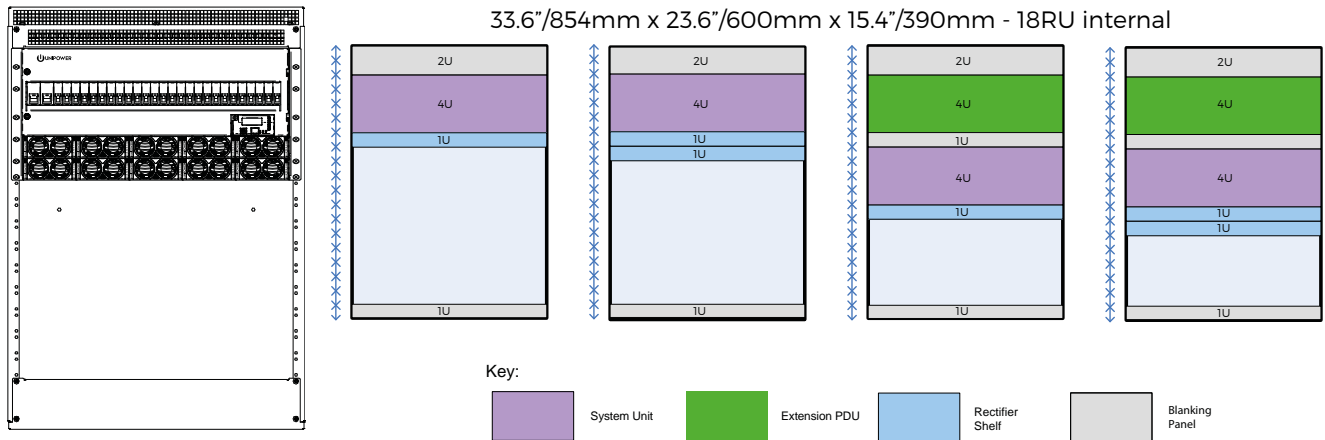


NOTE: For applications requiring more battery strings than the desired cabinet additional battery cabinets are available.

Key:



INDOOR WALL-MOUNT CABINET CONFIGURATIONS



NOTE: Due to the overall depth of 15.4" / 390mm, this cabinet will not accommodate large capacity (>60Ah typical) front terminal batteries. If larger batteries are going to be used a suitable battery cabinet will need to be supplied.

OUTDOOR CABINETS

PODS MIDI

This cabinet utilizes the light and compact design of the MIDI Outdoor Cabinet for simple network deployment. The low impact MIDI cabinet provides the ideal enclosure solution for all wireless, fiber, and transmission networks, and is easily transported through doorways, in elevators or in smaller vehicles.

The versatile MIDI outdoor enclosure system supports valuable network equipment, backup batteries, and power systems in a range of severe environmental conditions.

The MIDI Cabinet has a flexible and modular design matched with network equipment to provide a low impact solution.

See the [PODS MIDI datasheet](#) for more details.



PODS V3

The PODS V3 single wall outdoor enclosure series combines efficient cooling options with cost-efficient design, providing reliable cabinet solutions that save capital cost as well as running cost.

The closed loop heat exchanger and direct fan cooling solutions for environmental control operate independent of the power system controller, and ensure network integrity even in the most challenging conditions.

See the [PODS V3 datasheet](#) for more details.



ACCESSORIES

PV STRING COMBINER

The String Combiner Box provides multiple functions including solar energy collecting, switching control and power distribution, which helps to optimize the working efficiency of Hybrid Power System.

As a component of Hybrid Power System, PhotoVoltaic (PV) String Combiner can combine up to three PV strings to a single output and be provided with or without surge protection and with either standard MC4 or Amphenol connectors.

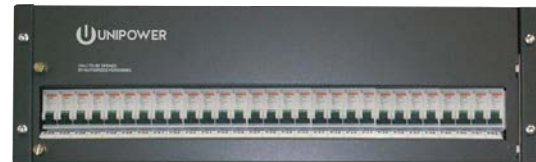
The enclosure provides IP55 protection and is suitable for most outdoor environments.

See the [PV String Combiner datasheet](#) for more details.



EXTENSION PDU

The extension PDU supports the extension of load MCBs up to 24 positions using the same type of 18mm breakers used in the main system module, the maximum DC capacity is 200A.



SLI15 INVERTERS

The SLI 15 inverter delivers 1500W at 120VAC or 230VAC for any equipment requiring AC power.

See the [SLI15 datasheet](#) for more details.



PowCom Hybrid™ Software

PowCom Hybrid™ is a Windows™ based communication program that is used to control and supervise UNIPOWER's Hybrid DC power systems. This software allows system control through a local or remote PC interface, and will automatically adjust its interface to the capabilities of the connected system.

Windows™ based communication allows for enhanced management capabilities and enables the system to be accessed from any location. The benefits include simple access of system status, alarm display, and battery function and condition.

PowCom Hybrid™ is tailored to ensure optimum use of the available energy sources.

HOW TO ORDER

Regardless of whether your needs are for 19" or 23" sub-racks or fully cabinetized indoor or outdoor solutions, site design and modelling is an important factor in specifying and configuring a hybrid power system to achieve the desired balance of CapEx/OpEx/ROI requirements.

To discuss your requirements and obtain a quotation for a system to meet your exact needs please contact UNIPOWER sales.