CMCA®

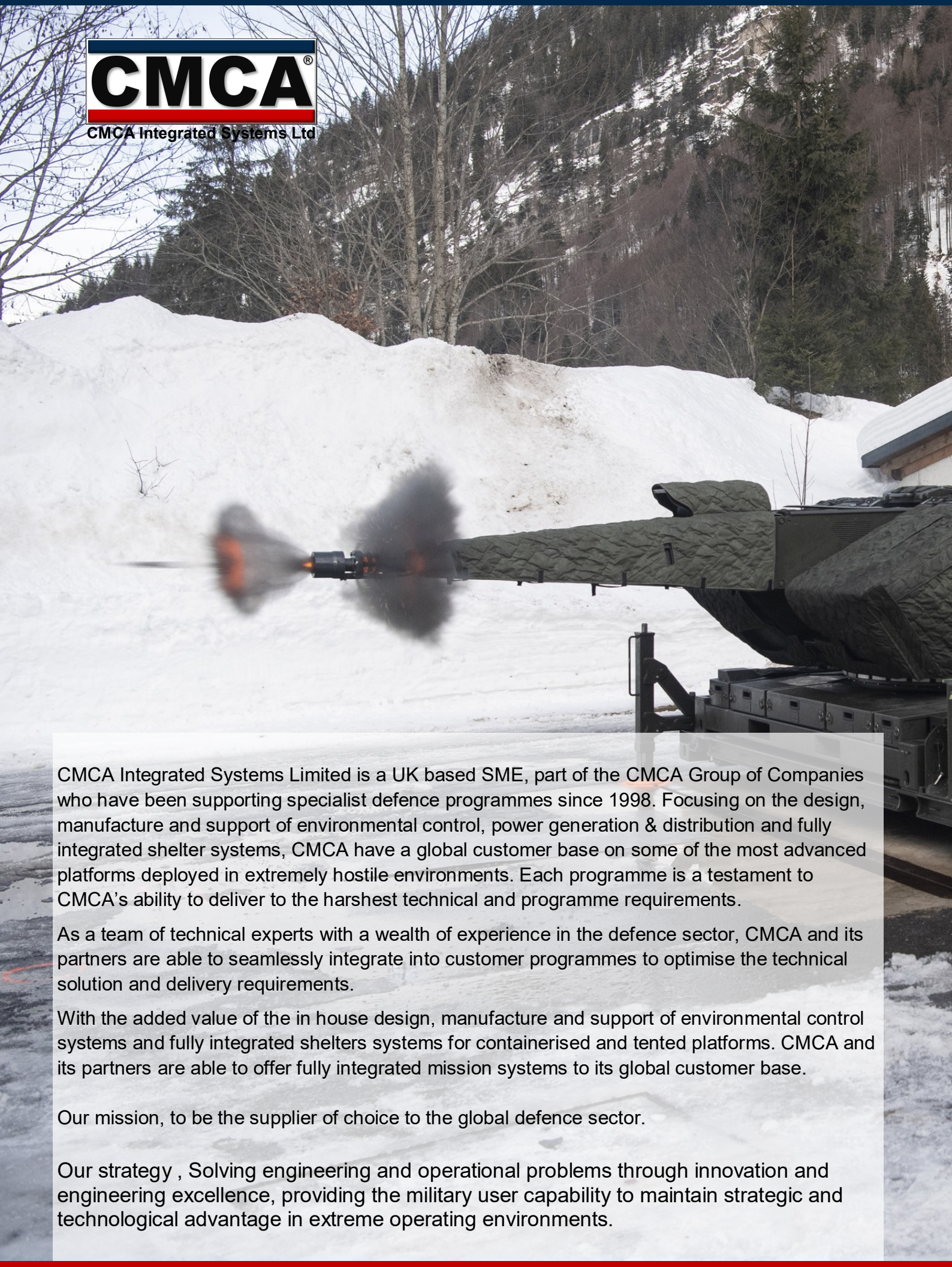
INTEGRATED SYSTEMS

Military Portable Hybrid Power Solutions,

Redefining Battlefield Power.

CMCA®

CMCA Integrated Systems Ltd



CMCA Integrated Systems Limited is a UK based SME, part of the CMCA Group of Companies who have been supporting specialist defence programmes since 1998. Focusing on the design, manufacture and support of environmental control, power generation & distribution and fully integrated shelter systems, CMCA have a global customer base on some of the most advanced platforms deployed in extremely hostile environments. Each programme is a testament to CMCA's ability to deliver to the harshest technical and programme requirements.

As a team of technical experts with a wealth of experience in the defence sector, CMCA and its partners are able to seamlessly integrate into customer programmes to optimise the technical solution and delivery requirements.

With the added value of the in house design, manufacture and support of environmental control systems and fully integrated shelters systems for containerised and tented platforms. CMCA and its partners are able to offer fully integrated mission systems to its global customer base.

Our mission, to be the supplier of choice to the global defence sector.

Our strategy , Solving engineering and operational problems through innovation and engineering excellence, providing the military user capability to maintain strategic and technological advantage in extreme operating environments.


A-MPG-008-RAD-010

CMCA Integrated Systems Ltd

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Turn Key Hybrid Power Solutions

CMCA Integrated Systems' military portable hybrid power solutions provide a turn key, rapidly deployable AC and DC hybrid power capability, comprising of a modular solution including diesel power generation, solar power generator, high capacity energy storage and intelligent . Offered in a common unrivalled form factor with AC & DC synchronisation allowing for a consolidated and standardised architecture with common integration to vehicles, trailers and reduced burden and cost on the logistical supply chains, supporting scalable power up to 10kVA AC & DC:

Frame Form Factor 1 - L470mm x W370mm x H450mm

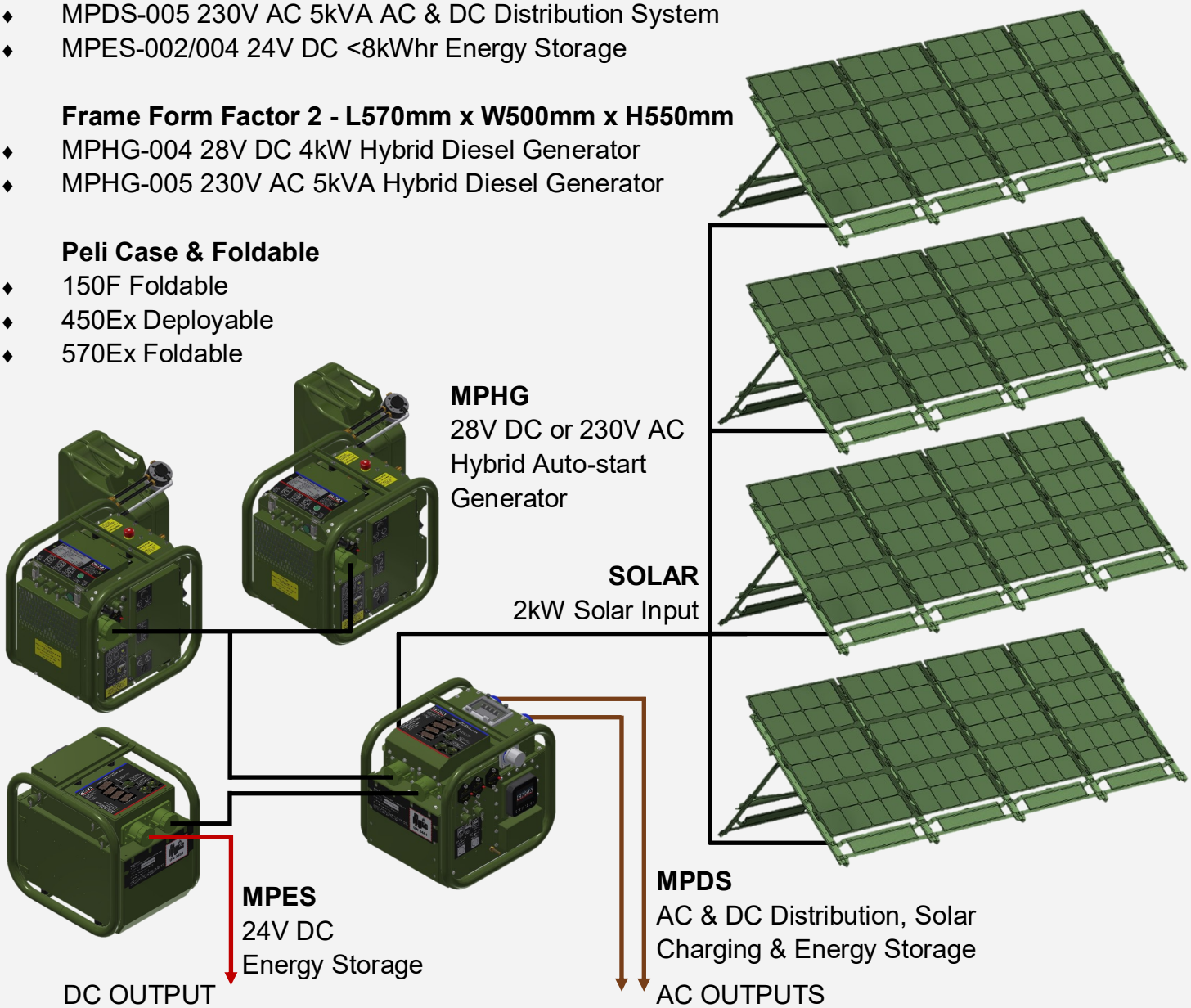
- MPHG-002 MK 2 28V DC 2.5kW Hybrid Diesel Generator
- MPHG-003 MK 2 230V AC 3kVA Hybrid Diesel Generator
- MPDS-003 230V AC 3kVA & 24V <4kWhr Energy Storage & AC & DC Distribution System
- MPDS-005 230V AC 5kVA AC & DC Distribution System
- MPES-002/004 24V DC <8kWhr Energy Storage

Frame Form Factor 2 - L570mm x W500mm x H550mm

- MPHG-004 28V DC 4kW Hybrid Diesel Generator
- MPHG-005 230V AC 5kVA Hybrid Diesel Generator

Peli Case & Foldable

- 150F Foldable
- 450Ex Deployable
- 570Ex Foldable



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Saving Fuel From Base To Battlefield

Each component within the <10kW modular power grid can operate independently to support a wide range of applications from man portable radar and weapons systems, to deployable command posts and vehicle charging systems, or collectively to offer intelligent power and distribution, delivering a significant reduction in fuel consumption and emissions, resulting in leaner, lighter and longer deployments with reduced support requirements and also reducing through life cost in consumables, maintenance and repairs.

CMCA's scalable plug and play hybrid power system results in fuel and cost savings even before the mission has deployed. The unrivalled form factor allows multiple systems to be transported and deployed in a smaller space envelope to competitor and legacy systems, the scalability eliminates the need to transport larger, heavier generators which consume more fuel and often need dedicated transport such as trailers, HGV or as airlifted underslung loads.

Load tracking variable speed generators, coupled with high density energy storage batteries and rapidly deployable solar arrays ensure maximum fuel efficiency, multi layer redundancy and extended silent watch capability, supported by immediate power on demand generators to autonomous start in the event of battery depletion and sudden load surges, continuously monitoring the power demand and automatically stopping the generators.

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Reduce Risk, Reduce Cost

CMCA's man portable hybrid solutions offer a significant reduction in logistical support needs, reducing the risk to life through the reduced resupply requirements and reducing the cost to support and sustain power generation in a forward position. Where the hybrid architecture is employed fuel savings of 70% can be achieved compared to an equivalent diesel only power generation system.

The MPHG generators utilise high efficiency mechanical diesel engines and offer variable speed where possible to match the engine speed to the power demand, reducing fuel consumption and wear on critical engine components. The engines are suitable for military and low quality fuels without additional treatments or ancillaries.

A low cost of ownership is delivered through the use of high quality, reliable components which are explicitly configured and built for a military environment. The 6T battery employed in the MPDS and MPES supports a life span of 1000 cycles compared to 100-200 of conventional deep cycle batteries. Further cost efficiencies are achieved through high component commonality, the MPHG-002 MK2 and MPHG-003 MK2 utilise 95% of the same components, including enclosure, engine, and battery pack. This high commonality also offers the user to reconfigure generators to either offer AC or DC by only changing three line replaceable units for a change of mission profile with minimal cost and time delays.

MPHG MK2 Common Architecture
[90% Complete] with three variable LRU's to configure between AC and DC.

MPHG 28V DC
DC Stator
DC Control Box
DC Power Interface

MPHG 230V AC
AC Stator
AC Control Box
AC Power Interface

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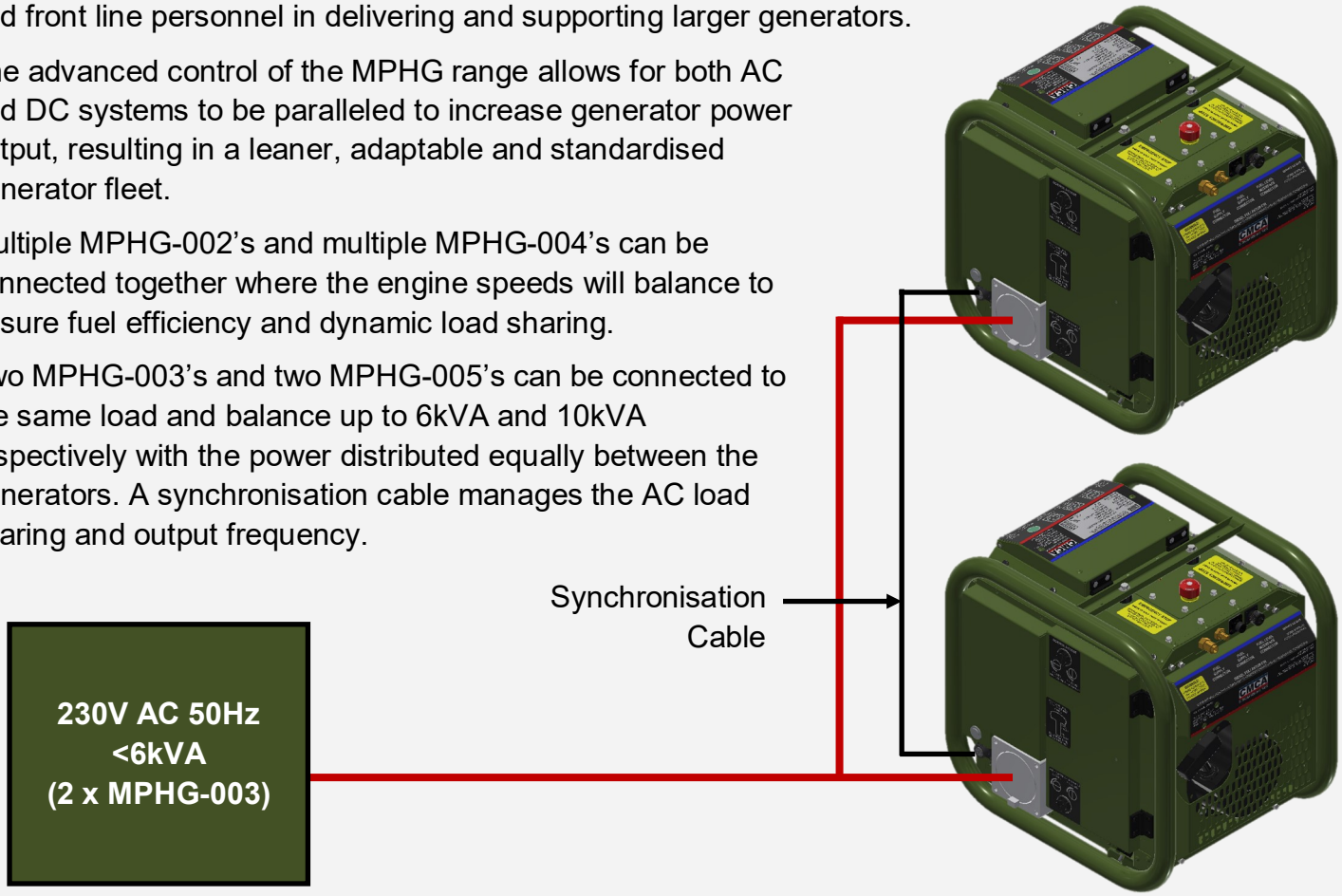
Modular & Scalable

Working with governments and prime contractors for over two decades as an original equipment manufacturer of military environmental control and integrated shelter systems, CMCA have built up a wealth of knowledge and experience in real-time mission power profiles, understanding that generators are often rated for the worst case scenario which may never actually be experienced. This overrating increases procurement, maintenance and fuel cost as well as burdening logistics and front line personnel in delivering and supporting larger generators.

The advanced control of the MPHG range allows for both AC and DC systems to be paralleled to increase generator power output, resulting in a leaner, adaptable and standardised generator fleet.

Multiple MPHG-002's and multiple MPHG-004's can be connected together where the engine speeds will balance to ensure fuel efficiency and dynamic load sharing.

Two MPHG-003's and two MPHG-005's can be connected to the same load and balance up to 6kVA and 10kVA respectively with the power distributed equally between the generators. A synchronisation cable manages the AC load sharing and output frequency.



Nom. Power / Voltage	1kW/ kVA	2kW/ kVA	3kW/ kVA	4kW/ kVA	5kW/ kVA	6kW/ kVA	7kW/ kVA	8kW/ kVA	9kW/ kVA	10kW/ kVA
28V DC	MPHG-002									
			MPHG-002 + MPHG-002 + (unlimited)							
	MPHG-004									
					MPHG-004+MPHG-004 + (unlimited)					
230/110V AC	MPHG-003									
	MPHG-003 + MPHG-003									
	MPHG-005									
						MPHG-005 + MPHG-005				

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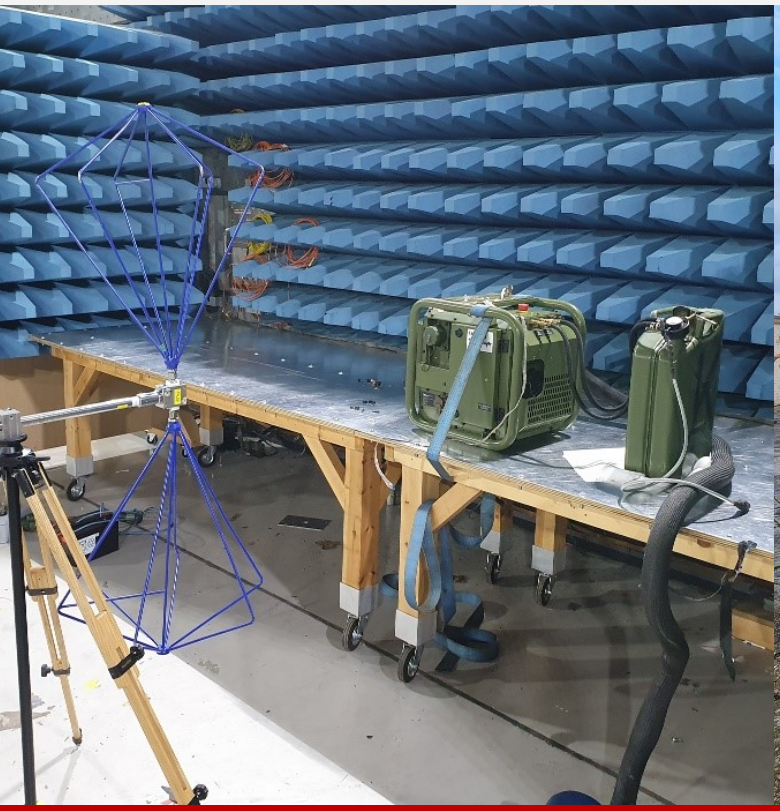
High Quality Mission Power

CMCA Integrated Systems' range of man portable hybrid power systems are being utilised by allied nations around the world in a range of technically complex platforms. The high quality output supports sensitive electronic loads and with a minimal EMC signature designed to Def Stan 59 411 Land Class A.

The MPHG-002 MK2 28V DC 2.5kW and MPHG-004 4kW 28V DC diesel generators utilise high performance permanent magnet generators with the inclusion of a 24V AGM battery pack smoothing the output and handling stepped loads and power surges.

The variable engine speed tracks the system voltage, incrementally slowing the engine down to maintain the output voltage across a constant and variable load range, reducing fuel consumption and system noise whilst maintaining a stable output voltage and current. In the event of a sudden load surge the engine speed is instantaneously increased to deliver the required power.

The MPHG-003 3kW AC and the MPHG-005 5kW AC utilise advanced permanent magnet alternator and true sine wave inverters to deliver high quality smooth power with high efficiency in a lightweight, compact space envelope. Offering the ability to load share to with a second MPHG generator to increase the power output across a standardised fleet of smaller generators.



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Unrivalled Form Factor

The MPHG, MPDS & MPES range benefits from an common unrivalled form factor, allowing the users to configure an efficient power architecture within a standardised logistical platform.

This compact and lightweight profile has been adopted into a range of vehicle-based systems around the world due to the ease of integration and minimal space allocation. The man-portability allows the generators to be deployed with ease from a range of vehicle platforms with confidence, following rigorous testing to Def Stan 00 35 for drop, topple, shock and vibration for tracked and wheeled vehicles.

Competitor 2kW Diesel Generator Compared To The CMCA MPHG-002.

On & off road shock & vibration for wheeled & tracked vehicles to Def Stan 00 35.

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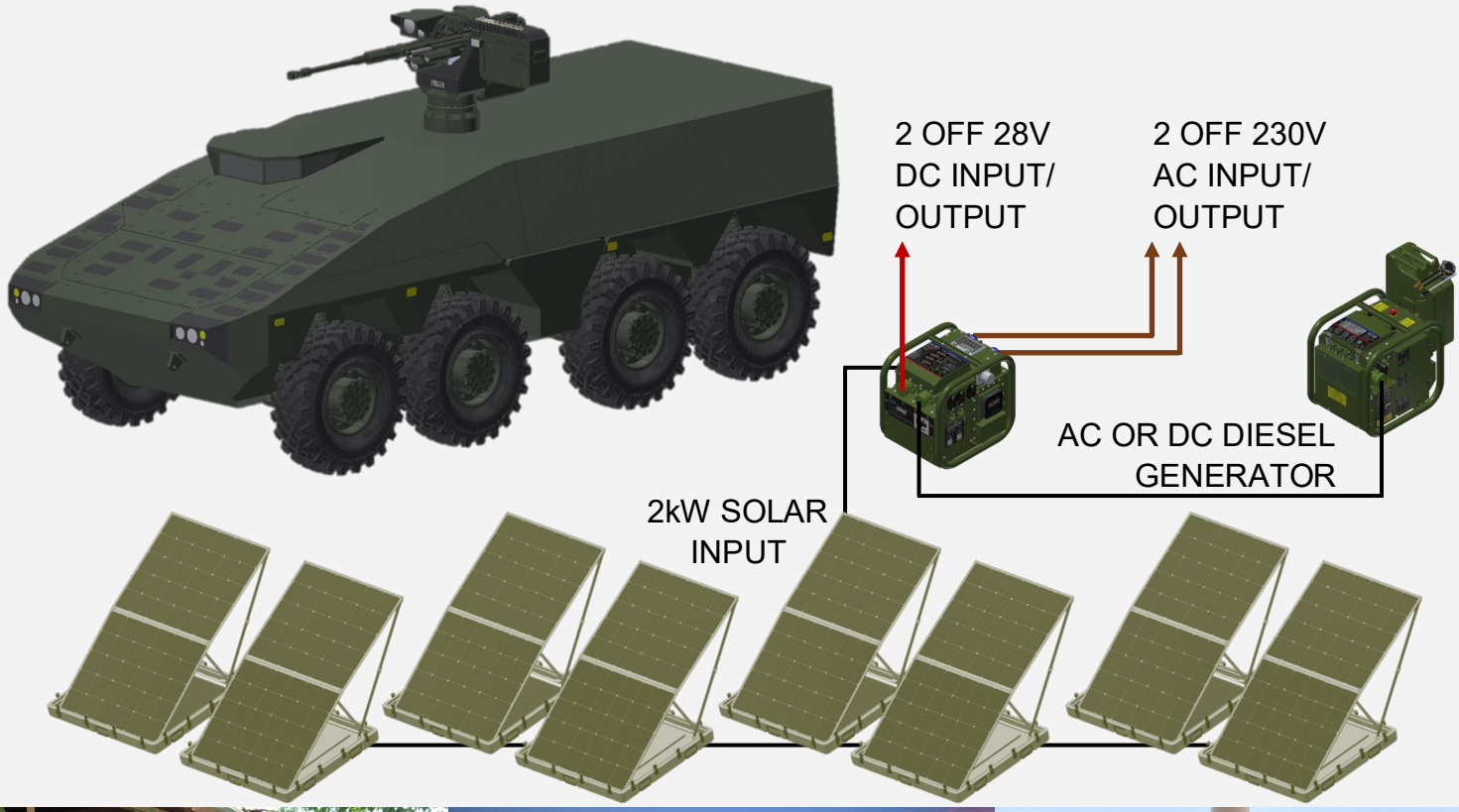
Exportable Hybrid Power

CMCA's modular hybrid power architecture supports man-portable applications as well as vehicle-integrated and deployable platforms.

The MPHG, MPDS and MPES range provide ruggedised, reliable power in a form factor suitable for most vehicle-based platforms. The scalability of the range allows equipment to be tailored to the exacting mission requirements, whether that is endurance or silence, in a common compact space envelope.

Capable of providing stand-alone power to the vehicle and deployable mission system, or integrated with the vehicle drive powertrain to export power to the mission equipment. The MPDS acts as a distribution interface, accepting the vehicle 28V DC power from the vehicle and delivering 230V AC and 28V DC power to the mission equipment. This system is adaptable and fully configurable to include additional power generation, solar power and additional energy storage to maximise silent run capability.



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Full Electric Deployable Power

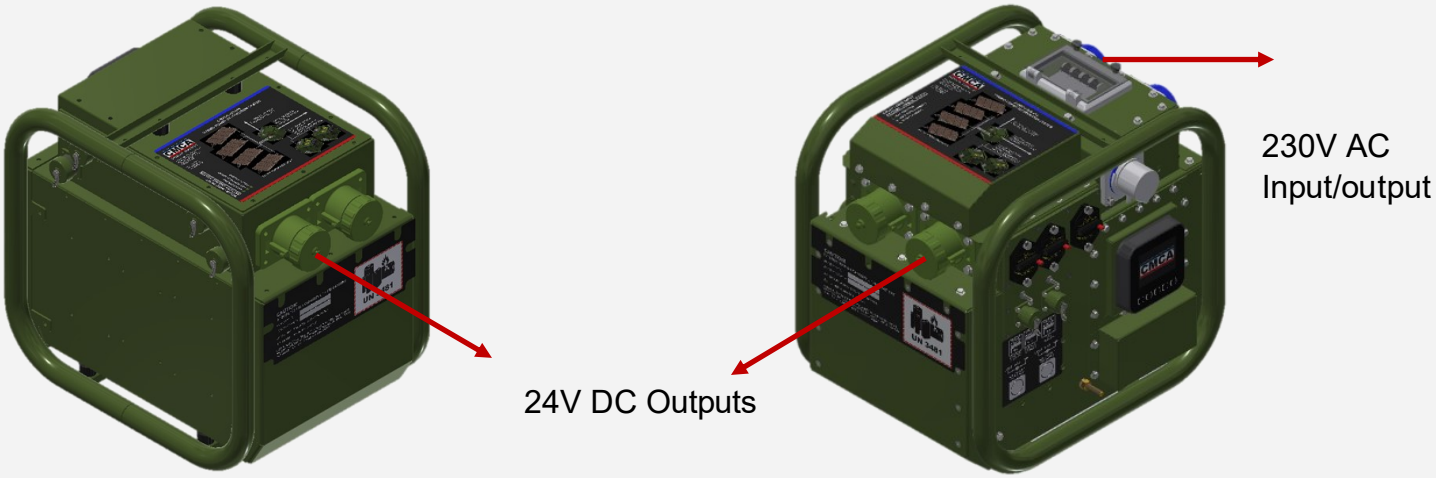
The MPDS and MPES hybrid power systems utilise an integrated high capacity 24V military 6T battery to offer man portable energy storage and full electric power. The 6T battery is becoming an industry standard for vehicle systems for cranking and storage, the cost of ownership and integration is significantly reduced through a harmonious fleet.

The MPES provides a nominal 8.4kWhr of stored energy as a pure 24V DC power source and the MPDS provides a nominal 4.2kWhr of stored energy with 24V DC and 230V AC power outlets.

Both systems can be charged via generators, vehicles, external charger or solar panels with an integrated MPPT solar charge controller. Each system also offers a digital human interface for power monitoring and control functionality including external start/stop commands.

Where the MPES and MPDS full support a UPS [uninterrupted power supply] function, they are best suited for man portable, silent power.

As the MPDS and MPES utilise a common frame to the MPHG generators, the systems can be swapped out with no vehicle/logistics modification, allowing for a transitional asset to full electric power.



Vehicle Jump Start

As the primary function of the 6T battery was vehicle cranking, the MPES and MPDS can be utilised as man portable power packs in the recovery of stricken vehicles. Providing a rapid jump starting capability for unmanned and manned vehicles including armoured heavy vehicles.

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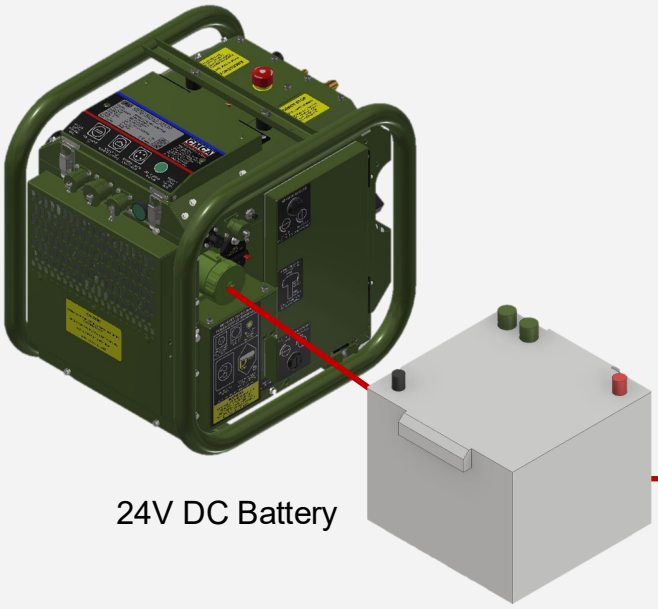
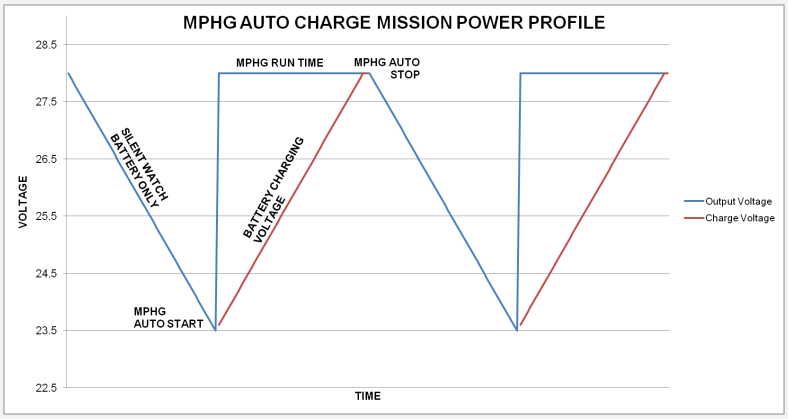
Hybrid Power Architecture - Basic System

The MPHG range of generators employ a number of intelligent control sub systems to optimise power delivery and fuel efficiency. Utilising already efficient engines with power tracking engine speed regulation to reduce fuel usage and extend deployment capability, the MPHG generators support a range of hybrid power architectures.

The simplest hybrid power system utilises the MPHG and energy storage where the primary power is delivered through the 24V battery for clean, silent power, whether this is a vehicle integrated battery or a man-portable system. When the battery state of charge decreases, the MPHG will automatically start and recharge the energy storage to an optimised state of charge then automatically stop and continue to monitor the state of charge, autonomously continuing the start and stop cycling until manually stopped. This basic architecture, when coupled with high capacity batteries reduces the generator run time, reducing fuel usage by up to 50% and supports silent watch capability.





24V DC Battery

28V DC Load

UGV Range Extender

The MPHG auto charge capability provides drop in hybridisation of electric vehicles within a compact and fully dismountable space envelope, fully qualified for wheeled and tracked vehicles to Def Stan 00 35.

The generator autonomously starts and stops to provide the vehicle drive batteries charge without the need for modifications to the vehicles battery management system, further extending range and capability.

The MPDS supports AC & DC power distribution from unmanned vehicle systems, turning the vehicle power train into remote power generation and energy storage.

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Hybrid Power Architecture - Intermediate

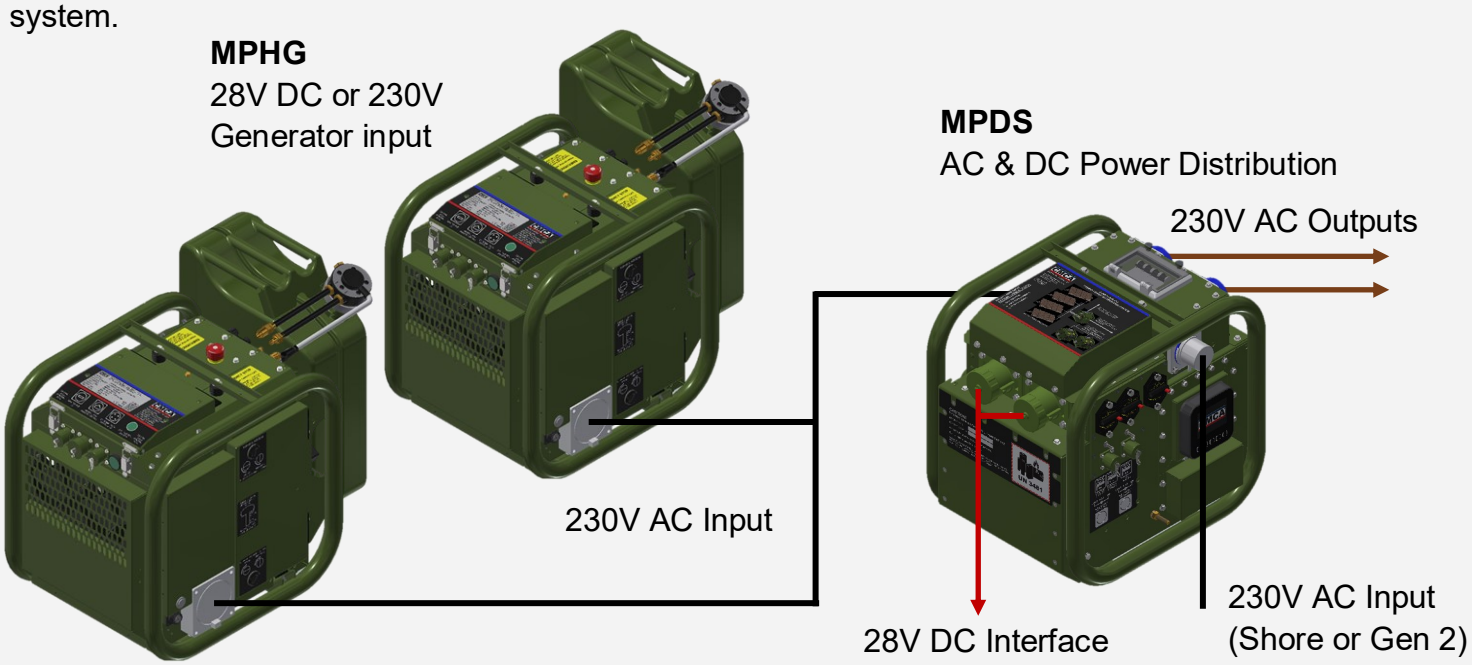
A more intelligent hybrid power system utilises a power distribution module such as CMCA's MPDS. The MPDS is an advanced power management and distribution solution, available in 3kVA & 5kVA inverter capability.

The MPDS-003 providing 110V/230V 50Hz/60Hz 3kVA inverter capacity, utilises integrated energy storage from a single high capacity Mil Spec 6T battery, providing up to 4kWhr of stored energy, power conversion and AC & DC power distribution in a single, man-portable ruggedised package.

The MPDS-005 provides 110V/230V 50Hz/60Hz 5kVA and utilises external energy storage to maintain man-portability and flexibility. A single MPES energy storage unit provides >8kWhr of stored energy, with the ability to parallel multiple MPES systems for increased energy storage and prolonged silent watch, electric (non-generator) only power.

The MPDS can also be used as a man portable, high capacity uninterrupted power supply with an automatic transfer from generator/shore supply to deliver power from the integrated batteries in less than 20 milliseconds, providing continuous, clean power to mission critical equipment. The MPDS-003 and MPDS-005 with MPES, support high feed-through currents and manage surge loads, such as air conditioner compressor starting current and other surge loads, allowing the generators to be scaled for continuous operation as opposed to oversized for the worst case load scenario. Providing greater procurement, logistical and fuel cost savings.

The MPDS provides intelligent scalability, increased efficiency and redundancy. When connected to the AC or DC MPHG generator set in standby, the MPDS will deliver silent power from the integrated battery for both AC and DC loads and send a start and stop command to the generator when the batteries require charging or when a sudden load surge is introduced. Furthermore, with two AC and DC inputs, two generators can be connected, one running continuously and the second in standby, or both in standby awaiting an autonomous start command from the power management control system.



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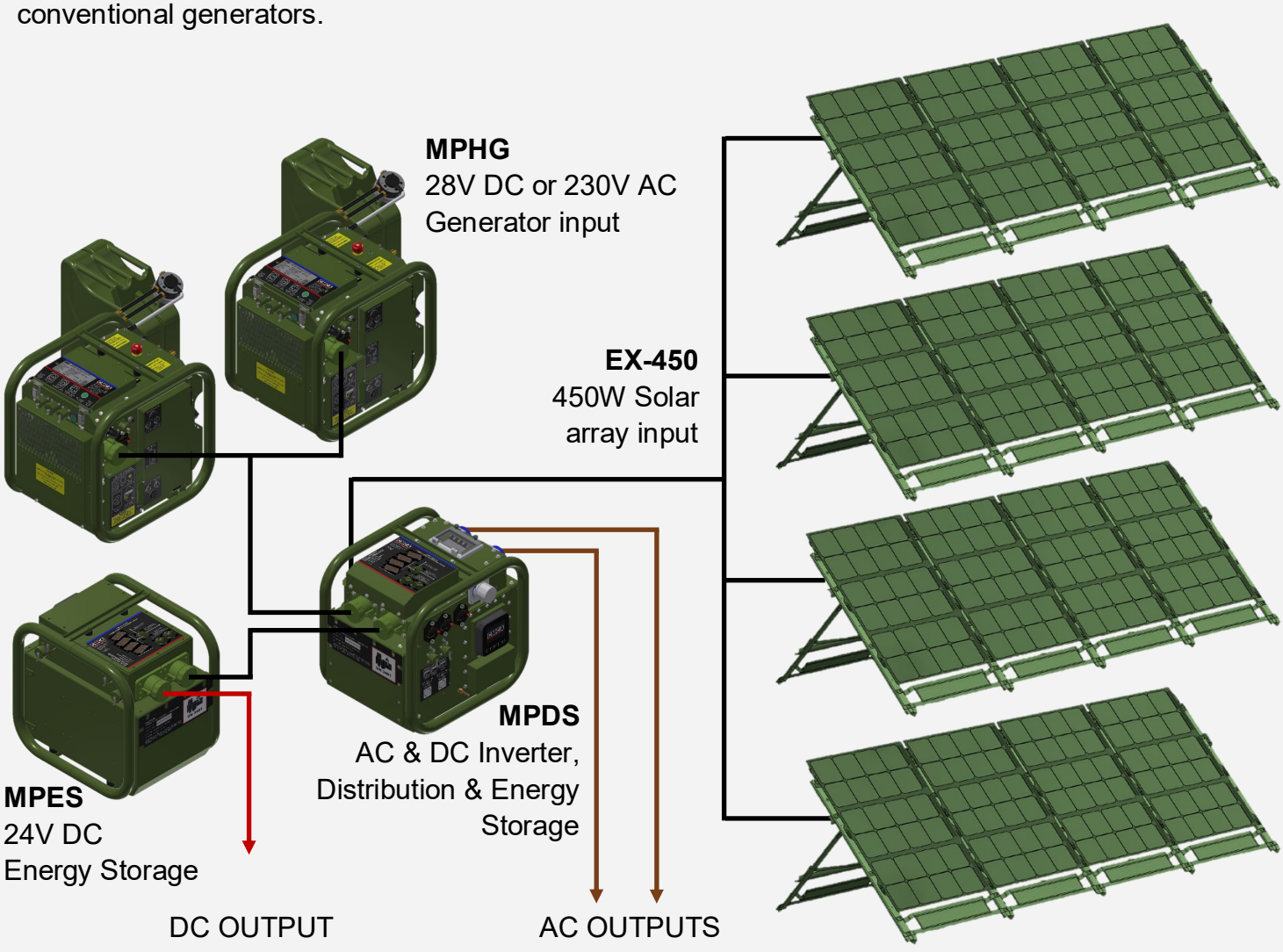
Hybrid Power Architecture - Advanced

A fully integrated and advanced hybrid power solution utilises the MPHG generators, MPDS power management and distribution system, MPDS energy storage system and ruggedised solar panels to further reduce fuel consumption, extend silent watch time and extend mission endurance on minimal logistical and fuel support.

The optimised deployable hybrid power solution consisting of diesel generators, energy storage and solar generators through an intelligent power management and distribution system, providing multi-layer redundancy in a modular, scalable and compact footprint.

This modular, scalable power solution reduces equipment type, standardises integration, training and support as well as through-life costs through fuel savings. The system offers 100% commonality on serviceable components within the MPHG-002 & MPHG-003 generators and 60% commonality with the larger MPHG-004 & MPHG-005 generators.

The advanced hybrid power system, as illustrated, can be set up and dismantled by a single operator in less than 15 minutes and offers up to 70% fuel and emissions savings compared to conventional generators.



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Remote Control & Communication

The MPHG generators and MPDS utilise a digital human interface with LED screen to provide clear, informative system feedback and instructions through clearly defined text and illustrations for set up and operation.

With a dimmable display for night-time operations and hinged protective cover for complete blackout and environmental protection, providing a rugged, informative and intelligent human interface.

The interface provides real time status including starter battery voltage, auxiliary battery voltage when connected to an external battery pack, oil pressure fault and fuel level (when connected to the digital jerry can interface).

All user control inputs and outputs, including fuel level, battery charge, input & output power can be monitored and controlled remotely via Modbus TCP on integrated control systems in vehicles, shelters or via a remote hand-held panel. This allows the generator to be deployed away from a tactical position to maintain a low acoustic and thermal profile, whilst maintaining full control capability from a distance.

Cold temperature saturation and start testing

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MPHG Generator Technical Specification

Model No:	MPHG-002	MPHG-003	MPHG-004	MPHG-005
Part No:	A-MPHG-002-009 (MK2) A-MPHG-002-010	A-MPHG-003-010	A-MPHG-004-010 A-MPHG-004-011	A-MPHG-005-010
NSN No:	6115994017207 (Mk2) 6115994722579	6115992267764	Pending	Pending
Power Output:	28V DC 2kW (MK2 2.5kW)	230V AC 50Hz 3kVA	28V DC 4kW	230V AC 50Hz 5kVA
Parallel Capability:	Unlimited*	Two off MPHG-003 = 6kVA.	Unlimited*	Two off MPHG-005 = 10kVA.
Power Interface:	NATO/STANAG 4074 socket, D38999 18 way socket, 5V USB socket, DC charge socket	230V socket to suit user requirements, 5V USB socket, DC charge socket	NATO/STANAG 4074 socket, 5V USB socket, DC charge socket	2 off 230V sockets to suit user requirements, 5V USB socket, DC charge socket
Power Protection:	Manual reset 80A (MK2 90A)	Manual reset 13A	Manual reset 160A	Manual reset 22A
Human Interface:	Ruggedised Digital interface with 4.3” LED Screen and command buttons.			
Remote Comm’s Interface:	Modbus TCP over RS485 via Ruggedised RJ45 socket. Hand-held/wall mounted master interface available. External 5V Auto Start/Stop Socket.			
Fuel:	Diesel, AVTUR. External fuel source. Intelligent 20L jerry can fuel sender available.			
Engine Spec:	Single Cylinder, Air Cooled, Auto Variable Speed			
Starting Method:	Manual Recoil Start, Electric Start, Auto Start/Stop Battery Charge, Auto 5V Start/Stop	Manual Recoil Start, Electric Start From Internal Battery, Auto 5V Start/Stop	Manual Recoil Start, Electric Start, Auto Start/Stop Battery Charge, Auto 5V Start/Stop	Manual Recoil Start, Electric Start From Internal Battery, Auto 5V Start/Stop
Operating Modes:	Continuous Power On Demand, Auto Start/Stop Battery Charging, Standby (Remote Command or External Auto Start/Stop)			
Dimensions:	Length: 470mm, Width: 370mm, Height: 450mm		Length: 570mm, Width: 500mm, Height: 550mm	
Dry Weight:	50kG	60Kg	90Kg	100Kg
EMC:	Def Stan 59 411 LC A	Pending	Pending	Pending
Temperature Range:	-20°C to +55°C stand-alone -35°C to +55°C with auxiliary battery		-35°C to +55°C stand-alone	
Acoustic Profile:	70dBA to 75dBA @7m*			

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MPDS - MPES Technical Specification

Model No:	MPDS-003	MPDS-005	MPES
Part No:	A-MPDS-003-009 (2.7kWhr) A-MPDS-003-010 (2.7kWhr) A-MPDS-003-011 (4.2kWhr) A-MPDS-003-012 (4.2kWhr)	A-MPDS-005-010	A-MPES-005-010 A-MPES-008-010
NSN No:	6115992176376 6115998472772 6115999764314 6115991886537	Pending	Pending
Voltage:	28V DC & 110/230V AC 50Hz/60Hz		24V DC
Power:	230V AC 3kVA Inverter Integrated energy storage: LiFePO4 - <2.7kWhr Li ion - <4.2kWhr	230V AC 5kVA DC to AC Inverter External energy storage (MPES)	LiFePO4 - <5.4kWhr Li ion - <8.4kWhr
Parallel:	Up to 6 systems in parallel		Up to 16 systems in parallel
Power Interface:	2 off NATO 2 pole/STANAG 4074 sockets 2 off 230V AC Input sockets - County/Programme specific 2 off 230V AC Output sockets - County/Programme specific		2 off NATO 2 pole/ STANAG 4074 sockets
Power Protection:	Manual reset 80A DC per socket Manual reset 13A AC per input socket Manual 13A AC per output socket	Manual reset 80A DC per socket Manual reset 25A AC per input socket Manual 25A AC per output socket	Manual reset 150A DC per socket
Solar Interface:	Integrated MPPT 24V 2kW charge output via four PV sockets.	Integrated MPPT 24V 4.8kW charge output via 8 PV sockets.	-
Human	Ruggedised Digital interface with 3.5” LED Screen and command buttons.		
Dimensions:	Length: 470mm, Width: 370mm, Height: 450mm		
Dry Weight:	50-55Kg Dependent upon battery type*		
Temperature:	-40°C to +55°C		

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Solar Array Technical Specification

Model No:	Endurance 150F	Expedition 450	Expedition 570
Part No:	A-PV-015-010	A-PV-045-010	A-PV-045-010
Rated Power (Pmax):	155W	450W	570W
Vmp:	17.3V	51.39V	65.5V
Imp:	9.04A	8.77A	8.7A
Voc:	21.6V	63.82V	79.6V
Isc:	9.89A	9.04A	9.0V
Dimensions (Packaged):	Length: 390mm, Width: 205mm, Height: 38.1mm	Length: 2000mm, Width: 432mm, Height: 280mm	Length: 1093mm, Width: 975mm, Height: 172mm
Weight:	3.2Kg	34Kg	40kg
Deployment time	< 5 minutes		

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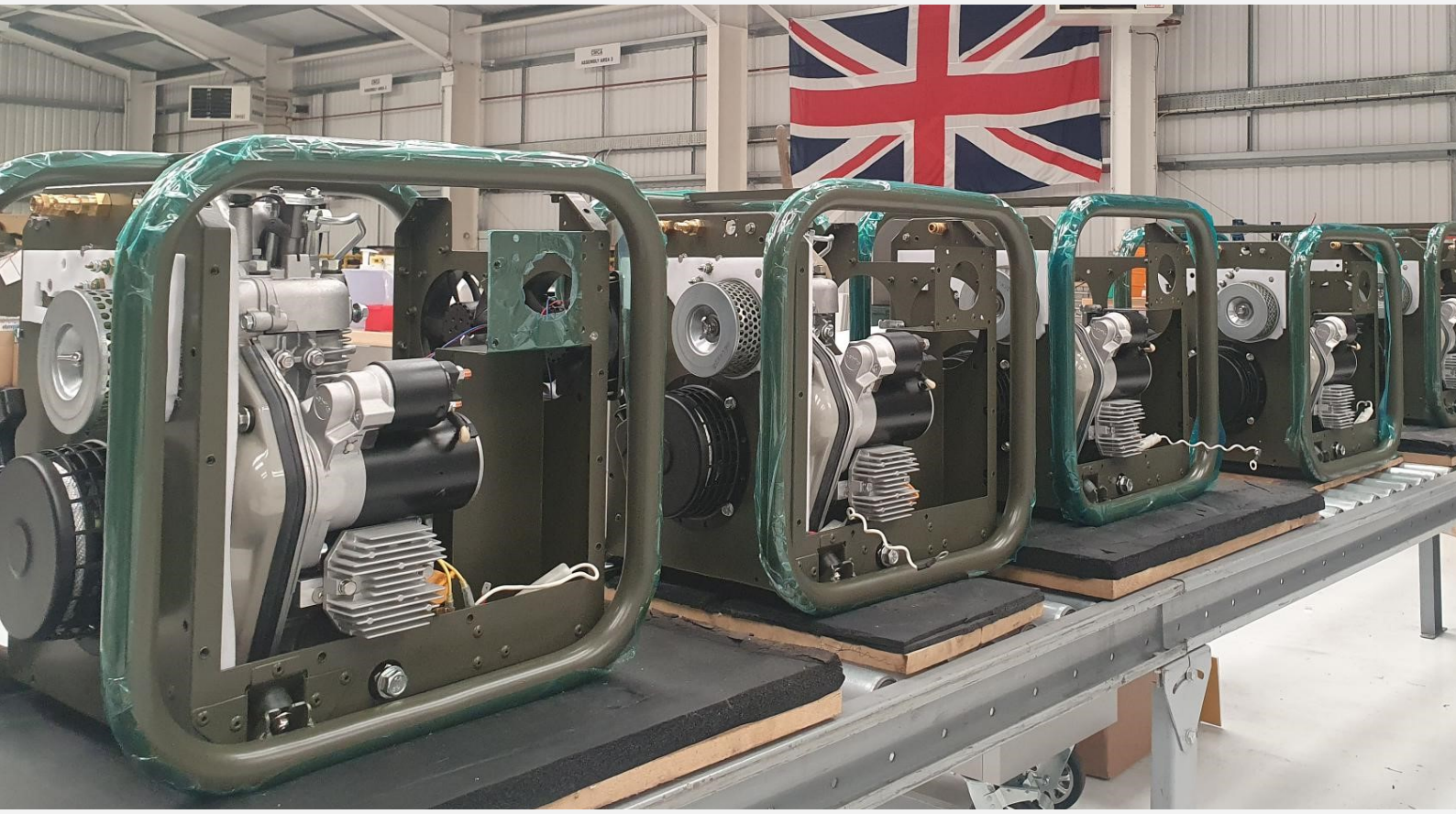

CMCA Integrated Systems and its carefully selected global partners provide sales, manufacturing and integration capability as well as through-life technical support anywhere in the world.

Enquires sent to **info@cmca.ltd.uk** will be shared with the local partner to best support the requirement. Translated brochures are available upon request.

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