

POWERING A CLEANER FUTURE



Hydrogen Power Generators · Energy Storage Systems · Hybrid Power Systems



Committed to an emission free future

Blue Diamond is committed to being at the forefront of the energy transition and assisting in New Zealand’s commitment to net zero carbon emissions.



As such, we are heavily investing in alternative power solutions to the traditional diesel offerings. We believe there will need to be a variety of solutions available to achieve this goal particularly, in relation to reducing carbon emissions from powering construction sites. Blue Diamond aims to be at the forefront of these solutions which include hybrid generators, energy storage systems (ESS) and Hydrogen powered generators.

GEH2: Hydrogen power generator

GEH2: The zero- emission hydrogen power generator

Blue Diamond is proud to be the Australian Distributor for the GEH2 Hydrogen Power Generator



In search of innovative solutions for alternative engines that reduce CO2 emissions and our commitment to an environmental approach, Blue Diamond has partnered with French company EODev (Energy Observer Developments) to bring you an electro-hydrogen power generator - the GEH2[®]

The GEH2[®] was developed with the aim of easily integrating into all industries and environments. Companies like Europe's largest equipment rental company LOXAM have already embraced the use of this new technology.

After more than a year of tests and obtaining certifications, GEH2[®] electro-hydrogen unit enables electricity to be produced without pollution and emissions of CO2.

The combined use of a fuel cell and a Lithium Ion Iron Phosphate battery massively reduces noise emissions and provides instant start-up. This combination of power enables the GEH2[®] to deliver nearly 80 kW of electricity and its double hydrogen supply system allows continuous operation.

Depending on the power requirements, communication boxes allow several GEH2[®] to be parallelised but also to associate them with diesel, gas, etc, as well as with the network to produce electricity in 'peak shaving' mode while reducing CO2 emissions.

Very easy to use, the GEH2[®] is equipped with event-driven electrical outlets, standardised frequency and voltage levels (230V / 400V - 50Hz & 60Hz) as well as remote control and data acquisition.

GEH2: Hydrogen power generator

In case of grid failure, or simply when the grid does not exist, the GEH2® electro-hydrogen generator brings you the energy you need, without CO2 emissions or fine particles. With the GEH2 and its record-breaking energy density, you benefit from instant power from 100kVA to 1MVA in an optimized volume.

The ally of the energy transition... and of your sense of smell

No more noise and black fumes forcing you to wear earphones and anti-pollution mask. The GEH2 does not emit CO2, HC, NOx or other fine particles. Only hot water and filtered air. And with the heat dissipated by the fuel cell, you can realize cogeneration.

As we know, the energy transition will not happen overnight. That's why the GEH2 is also capable of connecting with diesel or gas generators, and even the grid. It is this flexibility in its implementation that makes the GEH2 the ideal partner for the supply of autonomous decarbonated energy.



Smart and connected power generator

Thanks to its on-board intelligence, the GEH2 informs you if the hydrogen level is low or if a maintenance operation is required. If you wish, it can even warn our technicians directly. Its 4G connection allows continuous online monitoring of your GEH2 fleet via the cloud (location, usage profile, hydrogen reserve status, etc).

To offer you greater flexibility in your work, a remote interface complements the unit's touchscreen interface. This means that control and data acquisition are always at your fingertips.



GEH2: Hydrogen power generator

→ Start decarbonizing your business today

Construction Sites

Events

EV charging

Telecom

Film shooting

Grid maintenance

Ports and airports

Isolated sites

Regulated areas

Peak shaving

Back-up

Kennards Hire first-to-market with Blue Diamond's GEH2[®] Electro-Hydrogen Generator



Iconic Australian family-owned equipment hire company, Kennards Hire, is accelerating the clean power transition for the hire and rental sector by purchasing two new EODEV GEH2[®] Electro-Hydrogen Generators. Kennards Hire is first in the Australian hire industry to offer such an alternative with clean energy, zero-emissions solution for large-scale projects. Through Kennards Hire, equipment rental products such as the GEH2[®] hydrogen power generator are now becoming a more viable sustainable solutions option on the path to Net Zero 2050.

GEH2: Hydrogen power generator

→ GEH2[®] facts and figures

The EODev GEH2[®] is a hydrogen fuel cell power generator designed to replace diesel or gas gensets in both mobile, prime and emergency stand-by applications. This cutting-edge generator is completely zero emission, only rejecting water and heat as by-products. No noise, no fumes, no CO2 or fine particules. Scalable, efficient and easy-to-use the GEH2[®] is equipped with the latest generation of hydrogen fuel cell from our partner Toyota, giving it an exceptional reliability and a record life span.

PERFORMANCES

Power output - ESP ISO rating	110 kVA / 88 kW
Power output - PRP ISO rating	100 kVA / 80 kW
Voltage output	3-phase 400 V/480 V
Frequency output	50 – 60 Hz
Operating temperature	5° F to 104° F <small>without derating</small>
Protection index	IP 43

MAIN COMPONENTS

Fuel cell brand	Toyota
Fuel cell type	PEM
Fuel cell efficiency	50 %
Battery type	LiFePO4
Battery capacity	44 kWh
External hydrogen expansion system included	

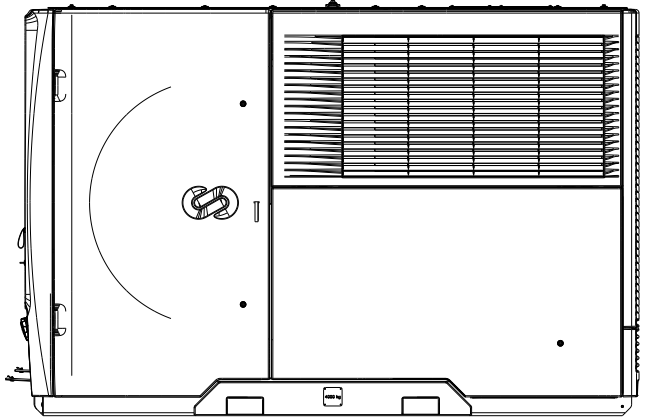
GEH2: Hydrogen power generator



Made in France

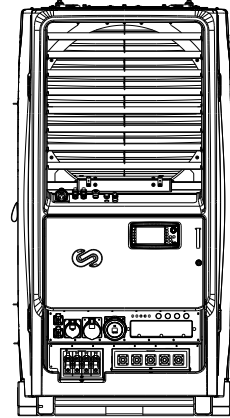
DIMENSIONS

Mass : 3 960 kg

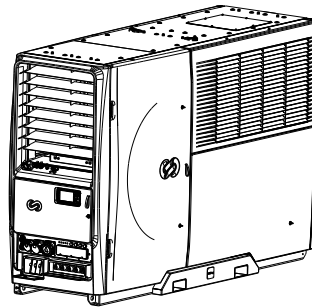
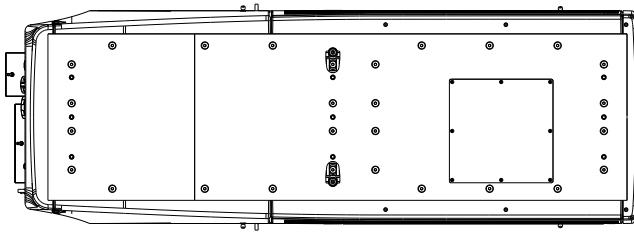


3350 mm | 131.9"

2200 mm | 86.7"



1150 mm | 45.3"



MAIN BENEFITS

NO CO₂

EASY-TO-USE

STACKABLE

LOW MAINTENANCE

NO NOX

RELIABLE

INSTANT START

HIGH EFFICIENCY

QUIET

SCALABLE

LOAD SHARING

REMOTE MONITORING

AMPD Battery Energy Storage System

The AMPD Enertainer



Ampd Energy is driven by its vision for an emission-free future for construction. Ampd Energy pioneered the use of battery energy storage systems (BESS) in urban construction with its flagship product, the “Enertainer”. The Enertainer electrifies construction sites and provides clean, quiet and fully automated energy delivery, allowing construction to transition away from fossil fuels.

Compared to fossil fuel generators, the Enertainer:

- reduces carbon footprint by up to 85%;
- is 32x quieter; - emits zero diesel fumes
- eliminates diesel handling and usage risks;
- has zero maintenance and refuelling downtime;
- and is economically justified for operational cost savings.

As an IoT enabled device, the Enertainer can be remotely monitored anytime and anywhere, providing a deep level of data-transparency for data-driven decision making.

To date, Ampd Energy has eliminated 10,000 tonnes of CO2/year and removed an equivalent of 20,000 cars worth of air pollution from our city's streets.



Electrifying Multiplex ‘The Grove’ in Western Australia with lithium-ion battery

Blue Diamond Machinery are proud to be first movers in the supply of commercial-scale batteries to construction sites in Western Australia. The Enertainer will offer Multiplex at ‘The Grove’ development, an 80 per cent cost saving on fuel and eliminate 100 per cent of diesel-produced emissions on site, by replacing the diesel power with clean power. For Multiplex, it has eliminated the need for noisy diesel power and with access to grid power, overall CO2 emissions will be cut by about 85 per cent.



AMPD Battery Energy Storage System

The Ampd Enertainer is an advanced energy storage system which provides diesel-free power for the next-generation of construction projects. Available in various configurations, the Ampd Enertainer is designed for the tough, dynamic and space-constrained needs of construction sites, without compromise.



Significant Cost Savings

Up to 75% lower all-inclusive OPEX¹ & lower total cost of ownership



Ultra Low Noise Footprint

32 times quieter¹, enabling use during noise sensitive hours



Minimise Carbon Footprint

Up to 85% carbon reduction¹ & zero direct NO_x, PM & SO₂ fumes



Enhance On-Site Safety

Eliminate diesel fire hazards & reduce on-site diesel storage quantity



Maximise Productivity

Zero recharging downtime and near-zero annual maintenance downtime



Internet Connected, 24/7

Connect to the Enertainer's IoT platform, anywhere & any time

¹Compared to generators of a similar capacity



70+ units

Delivered + on order

450,000+ hrs

Fleet-wide operational time

60+ projects

Powered by Enertainers

10

Repeat customers

10,000 tonnes

CO₂ eliminated per year, to date

20,000 cars

Air pollution impact

25

Unique customers

AMPD Battery Energy Storage System



Advanced Manufacturing Centre

Client: Science Park
Contractor: Gammon Construction
Contract sum: US\$610m
Application: Tower Crane, 24h, Semi-indoor



Murray Road 2

Client: Henderson Land
Contractor: Hip Hing Construction
Contract sum: US\$180m
Application: 64 Ton Tower Crane



Multi-welfare Complex (SS F506)

Client: ArchSD
Contractor: Shui On
Contract sum: US\$242m
Application: Tower Crane, Hybrid recharge, MiC project



Lamma HKE Gas & Steam Turbine Power Station Extension

Client: HKE
Contractor: Paul Y
Contract sum: Undisclosed
Application: Tower Crane



Kai Tak 6565 Residential

Client: Henderson
Contractor: Paul Y
Contract sum: Undisclosed
Application: Tower Crane + Hoist



Tin Wing Station residential

Client: MTR, SHKP
Contractor: Sanfield
Contract sum: Undisclosed
Application: Tower Crane

AMPD Battery Energy Storage System



Sky City

Client: New World, Airport
Contractor: NWC (Hip Seng)
Contract sum: Undisclosed
Application: Auto on/off, Tower Crane



TaiKoo Place Two

Client: Swire
Contractor: Hip Hing Construction
Contract sum: Undisclosed
Application: Tower Crane + Welder



Kai Tak Sports Park

Client: New World Development
Contractor: Hip Hing Construction
Contract sum: US\$3,800m
Application: Tower Crane



Shek Wu Hui Treatment Plant

Client: Drainage Services Department
Contractor: Chun Wo
Contract sum: US\$170m
Application: Welders



United Christian Hospital

Client: The Hospital Authority
Contractor: Build King - Hyundai JV
Contract sum: US\$1,200m
Application: Tower Crane, Welder



Siu Hong Residential Development

Client: SHKP
Contractor: Sanfield
Contract sum: Undisclosed
Application: Tower Crane

AMPD Battery Energy Storage System

Case Study

Gammon Construction deployed two Ampd Enertainers to power four tower cranes to build the Advanced Manufacturing Centre (“AMC”), a new flagship manufacturing facility by the Hong Kong Science and Technology Parks Corporation (HKSTP) in Hong Kong. The first unit was deployed in October 2019 with the second being added in May 2020, with both units replacing a total of four generators. Using only 70A of grid power to power four cranes, the Enertainers have enabled a significant cost and environmental reduction. In addition due to its quieter operation, the Enertainer improves noise levels in the local community while allowing for quiet operations at the site beyond normal working hours.



Site Setup

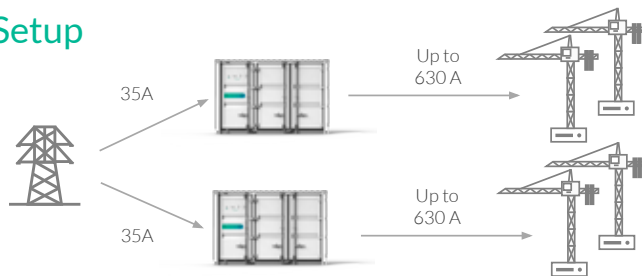


Figure 1. 'Block' diagram of the connection between the utility mains, Enertainers and the loads.



Results

- 78% lower OPEX costs¹
- 85% CO₂ footprint reduction² –almost 500 tonnes per year
- Zero direct PM emissions (99.99% less indirect)³
- Over 30 times quieter than a diesel generator

"The Enertainer worked perfectly from the very beginning. Not only did we vastly reduce our CO₂ emissions—a key focus for Gammon—but we did so with a lower OPEX. Even though this was the first time we deployed this technology, the performance data reporting system of the Enertainer gave us confidence. We are very excited about using this technology at other sites in future."

Andy Wong (Senior Innovation Manager), Gammon Construction

"From a site perspective, the Enertainer was a great fit for AMC. We put it through its paces and it responded to everything we threw at it. It was very simple to set up and operate with almost no downtime to site operations. We're particularly excited about the lower noise levels which will really help us get government approval to continue working at noise sensitive hours."

Sammy Lai (Director, Building Projects), Gammon Construction



Figure 2. Performance metrics for the Enertainer at the AMC project on 8 July 2020, one of the busiest days for the tower crane on the project.

¹ Assuming a wholesale market diesel price of HK\$5.50 (US\$0.71 per litre).

² Assuming an energy intensity of 0.51 kg_{CO2} per kWh (Source: Response to the Long-Term Decarbonisation Strategy Public Engagement, CLP (September 2019).

³ Assuming a Tier III generator and using Hong Kong's electricity grid



AMPD Battery Energy Storage System

Parameter		Specification	
Model		Enertainer M	Enertainer L
Maximum output current per phase	Peak (<1 minute)	455 A	795 A
	Continuous	380 A	665 A
Energy storage subsystem chemistry		Lithium-ion NMC	
Example applications		Tower cranes, material hoist, passenger hoists, welders, bar benders, grouting station	
Power conversion subsystem	Type	Heavy-duty, modular power conversion system	
	Input voltage range	320 – 440 VAC (3Ph + N + PE)	
	Maximum input current	80 A (standard)	
		50 A (with optional input leakage current reduction system)	
	Output voltage	380 – 415 VAC ± 1% (3Ph + N + PE)	
	Output frequency range	50 Hz ± 0.5 Hz	
Thermal management subsystem	Type	Industrial, wall-mounted recirculating air-conditioning system	
	Number of cooling units	2 units	
	Refrigerant type	R134a	
Mechanical	Dimensions (L x W x H) ²	3.21m (L) x 2.44m (W) x 2.6m (H) (10' container)	
	Net weight	7.85 tons	8.75 tons
	Fire extinguishing subsystem	Aerosol based, triggered by heat and/or smoke sensors	
	Ingress protection	IP54	
	Operating temperature range	0 to +45 °C external ambient temperature	
	Sound power level ³	85-89 dB(A) (32 times quieter vs. comparable diesel generator)	
	Connectivity	Cellular data, RS-485	
Expected Lifetime ⁴	10+ years		
Standards	UL, UN 38.3, CE, IEC, IEEE, ENA G99		

Recommended Combination & Input Requirement⁵

2 x mid-size tower cranes	Enertainer L	25 A
1 x large-size tower crane	Enertainer L	25 A
1 x mid-size tower crane + 1 x material/passenger hoist	Enertainer M	15 A
5 x welders	Enertainer M	40 A

Available Options

Input leakage current reduction system		Optional
Warranty and field engineering	5-year on-site warranty	Included
	8-Year extended on-site warranty	Optional
	Standard support plan	Included
	Premium (Gold) support plan	Optional
	Premium (Platinum) support plan	Optional
Remote access and data	Standard web monitoring interface	Included
	Premium web monitoring interface	Optional
	Data analytics package	Optional



¹In the interests of continual product improvement, specifications are subject to change without notice. Please contact us for the latest specifications.

²An additional 0.9 m clearance on all sides of the Enertainer should be provided for maintenance access.

³ISO 3746:2010 measurement methodology.

⁴Provided for guidance purpose. Life is defined as the ability of the Enertainer to provide the specified rated power. Actual life may vary and will depend on factors such as (but not limited to): (i) operating temperature; (ii) quality of maintenance of the system; (iii) frequency of use; and (iv) time duration spent at different battery states.

⁵Provided for guidance purposes. Actual grid input requirement will depend on factors such as (but not limited to): (i) actual equipment electrical requirements; (ii) utilisation/duty cycle; (iii) daily duration of availability of input power supply; (iv) state-of-health and age of the Enertainer; (v) duration of daily construction site operations.

AMPD - EV Charger container type

Clean Power for EV charges

The basic premise of EV charges often require more power available, whether off grid or on grid.

Blue Diamond's range of B-ESS and hydrogen generators provide a clean alternative to increasing the available power on or off grid.

Today: Gas Stations

Refuelling



Future: Anywhere

Recharging



AMPD

Concept



AMPD

Indicative Specifications

Max. Input (AC)	Feed power	60 kW AC (90A, 3ph, 380-415V)
Output	Maximum charging power	100 kW (DC) x 1 EV charger (includes 2 guns) * Combined: charge 2 vehicles simultaneously at up to 50 kW each gun
	Charging standard	CCS Combo 2 (IEC 62196-3)
Battery system	Nominal Capacity	300 kWh
	Enclosure protection rating	IP 54
	Dimensions (W x D x H)	3.05 x 2.40 x 2.60 m
	Operating temperature (ambient)	-20°C to +50°C
Weight	≤ 9 tons (includes all EV chargers)	
Network connection	4G LTE, Ethernet	
Communication protocol	OCPP 1.6-J	
Warranty	4 years	
Safety & Compliance	CE, UKCA, UL 9540A, UN 38.3	
Installation location	Indoor / Outdoor	
Compatible input source	PV energy system, DG, Grid, etc.	

In the interests of continual product improvement, specifications, and price are subject to change without notice. Please contact us for the latest specifications.

Powr2 Battery Energy Storage System

Powr2 Emission Free, Silent Power

• Sustainable Energy Storage Solutions

POWR2 is a manufacturer of rental-ready, reliable, safe, and emission-free portable power products. POWR2's portable power solutions help businesses run their operations on clean energy and meet their energy efficiency and sustainability goals. Innovative solutions from POWR2 drive profitability and sustainability with cutting-edge technology. POWR2 is headquartered in Bethel, CT, USA with distribution worldwide.

POWR2 POWRBANK energy storage can be used in combination with diesel or renewable power generators in temporary power applications to reduce CO2 emissions, fuel consumption, and noise.

POWR2 maximizes the use of battery power for the electrical load by automatically switching between diesel or renewable generators and POWRBANK stored energy. The result is seamless and sustainable energy for any event, construction site, remote location and beyond.



Features & Benefits

- Environmentally friendly; helps in meeting emissions regulations and sustainability goals
- Save on fuel, reducing both CO2 emissions and costs
- Increased reliability; manages variable loads and eliminates light load periods
- Delivers zero noise; ideal for projects where sound needs to be kept to a minimum
- Intelligent on board energy control module that communicates with the generator
- Flexible maneuverability options with forklift pockets, lift & drag skid and lifting ring
- Monitor and manage energy online



80% Carbon Offset

Reduce CO2 emissions by up to 80% when compared to running a diesel generator alone



Quick 4-Hour Charge Time

Full battery charge in around 4 hours when integrated with a diesel generator



20 Hours of Clean Energy

Full charge supplies up to 20 hours of clean silent energy in typical applications

Powr2 Battery Energy Storage System

Powr2 Emission Free, Silent Power Sample Applications



Office Trailers (Night Loads)

Keep construction security systems running uninterrupted all night long without unwanted noise and emissions.



Low Loads 24/7

Reduce up to 80% of fuel burn and prevent generator damage that results from low load periods.



Noise Ordinance

POWRBANK energy is discharged completely silently to keep power running while complying with city noise ordinances.



Live Events

Silent power provides a more enjoyable experience for both attendees and hosts, and prevents audio issues in live streams.



Remote Sites

Eliminate costly refueling and maintenance challenges by lowering fuel need and reducing service frequency.



Eco-Sensitive Sites

Lower your carbon footprint and make the easy transition to clean energy with significant reduction in CO2 emissions.

Powr2 Battery Energy Storage System

POWRBANK

The POWR2 **POWRBANK** is a rental ready energy storage system that integrates with diesel generators to optimize efficiency of power generation and consumption while reducing noise, emissions and fuel waste by minimizing engine run-time and maximizing use of stored energy.

With the onboard energy control module the POWR2 constantly monitors load levels and automatically switches between generator power and stored energy as necessary, only using the generator when necessary for higher loads.

ZERO EMISSIONS
SILENT POWER

Find out more at powr2.com



MODEL	P45.60/400
Volts	400
kVA	45
kWH	60
Phase	3

MODEL #		P45.60/400	
POWER	Output (stand alone)	Standby Rating 30 min (kVA) @ 25°C ¹	45
		Prime Rating (kW) @ 25°C / @ 40°C ¹	36 / 30
		Full Load Current	64.95A per phase
	Output (when external source available)	Maximum Load per Phase Before Generator Start Command (kW) ^{1,2}	10.2 (Immediate Start) 9 (5mins)
		Maximum Load (all phases) Before Generator Start Command (kW) ⁵	26.9 (2 hours)
	Combined System Output	Continuous Pass Through per phase (External Source Only) (A)	100
		Max Combined Output per phase (External Source + HES) (A) ¹	150
		Max Power Assist (kVA) ¹	25
	Input/Output	AC Input Voltage Range (V)	400 (320 - 460)
		AC Output Voltage - 50 Hz (V)	400
Input Connections		125A 400V & 16A 230V CEE-Forms, 400V BusBar	
Output Connections		125A 400V & 16A 230V CEE-Form & 400V BusBar	
	Protection	Overload, Overheat, Short Circuit, Earth Fault	
STORAGE	Type	LFP (Lithium Iron Phosphate)	
	Nominal Capacity @ 25°C (kWh)	54	
	Charge Time (hours) @ 25°C ³	3	
	Maximum System Efficiency @ 25°C	90%	
	Battery Management System	Industrial Grade Intelligent Passive BMS Optimised for HES Applications	
	Expected Cycle Life (To 80% Original Capacity)	6,000	
	Maintenance Charge Cycle	≤ 3 week	
CONTROL	Control Panel	ECM 7" Touch Screen Control Module	
	Temperature Control	Analogue Voltage Controlled Forced Air Cooling	
	Remote Generator Start	Dry Contact Relay	
	Remote Communication	3G/4G Dual SIM Modem/Router, Powr2 Portal	
ENVIRONMENTAL	Water/Ingress Protection Rating	IP55	
	Operating Temperature Range (°C) ⁴	-12 to +50	
	Sound Level (dBA) @ 0% / 100% Fan Speed	Acoustic Pressure @ 3m: 0 / 66	
MECHANICAL	Dimensions L x W x H (mm)	1140 x 1450 x 1730	
	Weight (kg)	1440	
	Lift Points	Forklift Pockets, Lift & Drag Skid, Lifting Ring	

¹ Depending on battery bank SoC ² Multiple start conditions available upon request for bespoke applications. ³ Charge time dependent on available power of external source and operating temperature. ⁴ When the internal battery temperature reaches below 2°C or above 45°C, the charge current is reduced to 0.06C to protect the batteries. ⁵ Without exceeding Max. Load per Phase

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Powr2 Battery Energy Storage System

POWRBANK

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With the onboard energy control module the POWRBANK constantly monitors load levels and automatically switches between generator power and stored energy as necessary, only using the generator when necessary for higher loads.

ZERO EMISSIONS
SILENT POWER

[Find out more at powr2.com](http://powr2.com)



MODEL	X90.120/400
Volts	400
kVA	90
kWh	128
Phase	3

MODEL #		X90.120/400	
POWER	Output (stand alone)	Standby Rating 30 min (kVA) @ 25°C ¹	90
		Prime Rating (kW) @ 25°C / @ 40°C ¹	72 / 60
		Full Load Current	129.90A
	Output (when external source available)	Maximum Load per Phase Before Generator Start Command (kW) ^{1,2}	20.4 (Immediate Start) 18 (5mins)
		Maximum Load (all phases) Before Generator Start Command (kW) ⁵	53.9 (2 hours)
	Combined System Output	Continuous Pass Through per phase (External Source Only) (A)	200
		Max Combined Output per phase (External Source + HES) (A) ¹	250
		Max Power Assist (kVA) ¹	55
	Input/Output	AC Input Voltage Range (V)	400 (320 - 460)
		AC Output Voltage - 50 Hz (V)	400
Input Connections		125A 400V & 16A 230V CEE-Forms, 400V BusBar	
Output Connections		125A 400V & 16A 230V CEE-Form, 400V BusBar	
Protection		Overload, Overheat, Short Circuit, Earth Fault	
STORAGE	Type	LFP (Lithium Iron Phosphate)	
	Nominal Capacity @ 25°C (kWh)	117.9	
	Charge Time (hours) @ 25°C ³	3h	
	Maximum System Efficiency @ 25°C	90%	
	Battery Management System	Industrial Grade Intelligent Passive BMS Optimised for HES Applications	
	Expected Cycle Life (To 80% Original Capacity)	6,000	
Maintenance Charge Cycle	≤ 4 week		
CONTROL	Control Panel	ECM 7" Touch Screen Control Module	
	Temperature Control	Analogue Voltage Controlled Forced Air Cooling	
	Remote Generator Start	Dry Contact Relay	
	Remote Communication	3G/4G Dual SIM Modem/Router, Powr2 Portal	
ENVIRONMENTAL	Water/Ingress Protection Rating	IP55	
	Operating Temperature Range (°C) ⁴	-12 to +50	
	Sound Level (dBA) @ 0% / 100% Fan Speed	Acoustic Pressure @ 3m: 0 / 66	
MECHANICAL	Dimensions L x W x H (mm)	2250 x 1300 x 2065	
	Weight (kg)	2800	
	Lift Points	Dual Rotable Lifting Ring (2 Point Lift), Forklift Pockets, Lift & Drag Skid	

¹ Depending on battery bank SoC ² Multiple start conditions only available with optional Powr2 Control Module. ³ Charge time dependent on available power of external source and operating temperature. ⁴ When the internal battery temperature reaches below 2°C or above 45°C, the charge current is reduced to 0.05C to protect the batteries. ⁵ Without exceeding Max. Load per Phase

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Hybrid Power Solution

With construction and mining industries making the transition into renewable energy sources, there is more demand for cleaner alternatives. Hybrid power systems provide stable, reliable energy for industries conscious of the environmental impact of conventional generators.

Hybrid generators provide an innovative and versatile solution to many challenges faced by the construction and mining industries. So, what is a hybrid generator? Here's everything you need to know:

Hybrid Generators

A hybrid generator combines two sources of energy to generate electricity through a battery-charged system and is usually integrated with a diesel generator. The generator will use renewable energy such as solar or wind to charge the battery and serve as the main power source. When the battery levels begin to run low, the diesel generator will step in immediately to generate electricity.

By minimising the run time of the diesel generator, users save on fuel consumption and servicing costs while lowering emission output. Without the need for continual operation from diesel generators, the battery-charged system will act as the main source of reliable, highly efficient power.

How Hybrid Generators Work

Run via a battery-charged system, hybrid generators use renewable sources of energy to generate power, using any excess energy to charge the batteries. This allows for a seamless current of energy for a range of applications.

Types of Renewable sources:

Hybrid generators produce and charge from a range of renewable sources, such as:

- Solar
- Wind
- Water

When battery charge levels are low, the diesel generator provides immediate backup power until battery levels are charged up again. This also means the frequency of charging may lessen if there is more exposure to renewable sources. In doing so, there is less demand for the diesel generator as the battery becomes the primary source of power. Depending on the size of the application, this could equate to reducing carbon emissions by several tonnes throughout an ongoing, long-term project.

The Advantages of Hybrid Generators

Hybrid generators are an eco-friendly alternative to generate power across construction and mining applications. Here are some of its advantages:

Lower carbon emissions:

Without the need to run a diesel generator continuously, hybrid generators drastically reduce the output of carbon emissions into the environment. Renewable energy improves air quality, noise emissions and overall site safety through a replenishable and environmentally friendly source of power.

Minimal noise output:

Hybrid generators include an integrated inverter in the system, meaning they are incredibly silent compared to diesel generators. When work sites are faced with strict noise regulations, a hybrid generator offers a sound solution.

Reduced fuel consumption:

Less run time from a diesel generator means less fuel consumption. When the diesel generator only serves as a backup source of power to replace the batteries, it cuts out the need for a continuous run time. Hybrid generators result in less fuel consumption, saving substantially on fuel costs.

Uninterrupted power supply:

A continuous power supply is a necessity for any long-term project. The battery system of hybrid generators ensures a constant flow of electricity compared to stand-alone diesel generators. Hybrid generators generate grid-like electricity for a range of large scale applications which means immediate power when you need it without any time delay.

Hybrid Power Solution - Construction

Whiteman Park Project - clean construction power



50kVA hybrid power system -
Less fuel, less CO2, lower emissions, less noise

Client had a 100kVA generator running 24/7 on a building site for a new train station at Whiteman Park - Perth. Blue Diamond Machinery did an audit and found that they only needed something much smaller. We replaced and installed a 50kVA hybrid generator running approx 1 hour a day. The 45kVA battery is powered by a 44kW rapid deployable solar. The site now runs 95% on battery and solar - helping to power a cleaner future!



BDM Solar

An Australian-designed ground mount, east-west (typically), modular solar solution designed to be safer, more cost effective and faster to deploy for offgrid, commercial and industrial, and large-scale solar power generation. Robust and redeployable, each BDM Solar array consists of up to 90 solar modules, mounted on 9 domed racks between 10 composite steel-concrete beams. It's optimised for the workhorse 540-550W module class of the utility-scale solar industry at just under 50 kWp per structure with plug-and-play wiring designed to interface with a variety of DC reticulation solutions. The self-ballasted feature enables rapid deployment supported by an additional beam anchoring solution for higher wind loads. The prefabricated nature of the solution reduces on-site cost, time and safety risk by confining the construction of the solar array from the field to the factory, with improved quality control measures and waste processing; the number of people on site is reduced by substituting manual labour activities with machines in the factory and in the field.



Why choose BDM Solar?



SAFER

No working at height and minimal manual handling significantly reduces risk of injury.

No need for work under the array when deployed.



FASTER deployment

Deployment team capable of deploying **1 MWp+ in 1 week**, scalable with parallel work teams.

Reduced ground penetration, limits the need for excessive equipment, ground preparation and labour for anchoring.

Pre-wired and Plug & Play.



LESS LABOUR for less time/shorter periods on site

Factory environment enables accelerated machine enabled assembly and loading, as well as factory based quality and reliability systems.

Deployment vehicles with spotting assist requires **only 3 people to deploy 1 MWp +** per week.

Sight oversight forms part of overarching project management and control, avoiding additional cost.



UP to 30% SAVINGS on cost of energy

Optimised supply chain and logistics.

Modular, standardised solar PV block and BoS.

Minimal soft costs and engineering.

Ballasted & minimally-ground penetrating (and civil works).

No moving parts post deployment, limiting O&M requirements.

Redeployable assets allowing for extended asset life even after the primary energy need is extinguished.



UP to 2x ENERGY per land area

Typically East-west topology, dense compact layout that enables the **same energy output in half the land** at certain latitudes.

The low tilt angle of the technology allows for maximum site energy density with array deployment in any orientation resulting in minor reductions in energy yield (<1%).



CIRCULAR LIFECYCLE

Factory assembly provides **more control** for waste processing.

Waste on site limited to the size of a carry on bag.

Self-ballasted nature with reduced ground penetration needs, simplifies site remediation required.

High energy density of modules limited light and rainfall ingress and thus vegetation growth.

Performance Characteristics

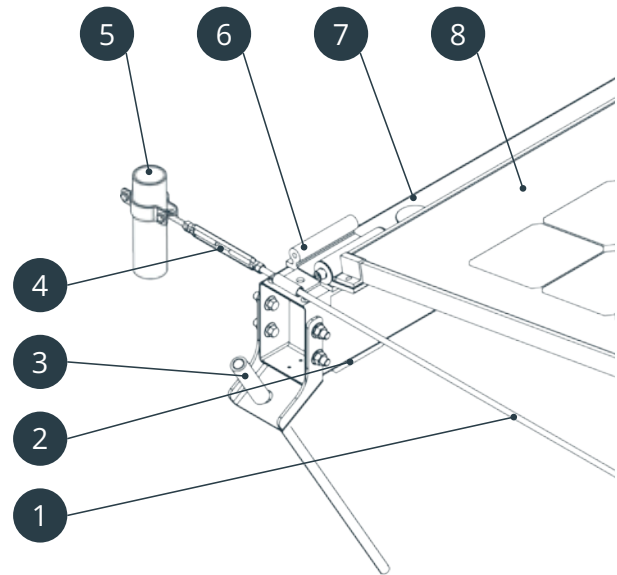
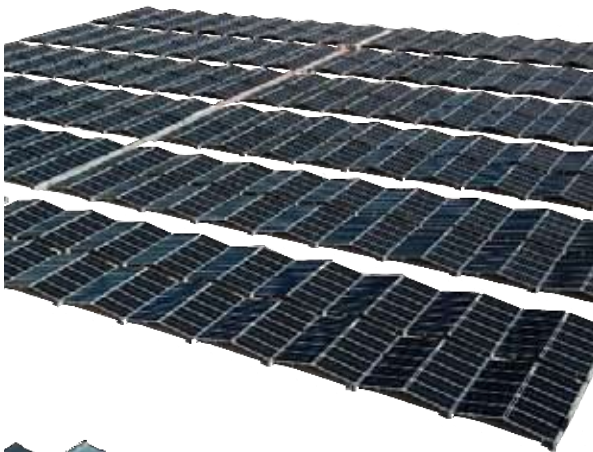
Type	Performance Characteristics
Wind Load	High Wind Region - 73 m/s or 174 mph (~ 3.4kPA, importance II ASCE 7-16) Low Wind Region - 41 m/s or 92 mph (~1.1 kPA, AS1170.2)*
Design life	25-30 years
Durability	All weather-proofing and UV resistant up to corrosion levels of C3 configurable up to C4 (specifically High Wind Region)
Warranty	10 years workmanship warranty to the 5B Maverick structure. Standard module warranties apply.

*High wind sites will likely use a combination of high wind region and low wind region **BDM Solar**, dependant on the local wind pressure interpretations and intended product design life, wind pressures provided assume a gust measurement of 0.2s at a height of 10m.

Deployment Characteristics

Deployment through an Ecosystem of Licenced Partners by an 8T all terrain forklift/telehandler. Estimated at least 1 MWp in 1 week with an onsite crew of 3 people.

Type	Deployment Characteristics
Ground Penetration	The solution is ballasted supported by beam anchors depending on wind loading requirements and lateral force resistance provided by shallow tether anchors
Redeployment	Re-deployable within or at the end of product life
Site Requirements	Deployment on ground up to 3° inclination in all directions (± 100 mm over 4 m)



Ground Mounting Example

- 1 Tether
- 2 Pads
- 3 Beam Anchor
- 4 Turnbuckle
- 5 Tether Anchor
- 6 Base Plate
- 7 Beam
- 8 PV Module

*Exact arrangement specified to application

Technical Characteristics

Type	Technical Characteristics
Power	48.6 kWp assuming 90 x 540 Wp modules arranged into 9 domes of 10 modules between 10 beams, modular scaling to multi-megawatt systems
Orientation	Fixed tilt modules to 10°, 45 modules facing east and 45 modules facing west (typically)
Modules	~545 Wp module class: Width 1133 - 1134 mm, Length: 2256 - 2279 mm, Frame Profile Height: 35 mm
Strings	Module string length supported: 18, 27, 30 to support a range of central and string inverters from 1,000 - 1,500 V
Earthing	All metal and electrical wiring components are continuous according to maximum requirements in electrical standards
Logistics	4 MAVs (~194 kWp) per 40' HQ container or flatbed Weight ~5.7 - 6T per MAV
O&M	No moving parts post deployment, limited light ingress inhibiting vegetation growth and low profile protect inner modules from soiling
GCR	Ground coverage ratio of up to 86% depending on O&M access provision

POWERING A CLEANER FUTURE



Hydrogen Power Generators · Energy Storage Systems · Hybrid Power Systems

Blue Diamond Machinery is dedicated to the transition towards an emission-free future for construction and mining sites. Our range of innovative power solutions for alternative energy output provides a sustainable alternative to lower emissions and optimise energy generation.

Visit our website for expert guidance on your customised clean power solution.

BLUE  **DIAMOND**
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