MAGNUS

Dependable Marine Power

Shore Power Converters
Hybrid Power Systems
Frequency Converters
CleanNet™ for sensitive equipment

Contents

Our Story

Delivering dependable marine power solutions to the world's finest yachts

We design and manufacture state-of-the-art, bespoke marine power conversion systems.

Our core products are shore-to-ship converters. Other products in our range include hybrid generators, energy storage systems, frequency converters and systems to protect sensitive on-board equipment (CleanNet™ converters).

Because all luxury yachts have uniquely different requirements, we do not have a single design approach, instead we use a standard platform where each unit is customised for the client. We design and customise each product to unique specifications, addressing both the engineering and commercial requirements.

Building for tomorrow, today

At Magnus Marine we always demand the highest standards from our specialist trained staff and suppliers. We have developed strategic partnerships with the world's best manufacturers to ensure that our systems are efficient, reliable and built to last.

Continuous improvement is our goal and the quality of our systems are always under scrutiny in our pursuit of excellence.

We have a highly skilled after sales team who are available worldwide, to help and assist whenever needed.

Wymondham, UK

Milestones

2002

Distributor of Shore Power Converters for ABB New Zealand, formally Vectek Marine

2006

Set up manufacturing site at Hethel Engineering Centre UK, designing and manufacturing customised converters

2014

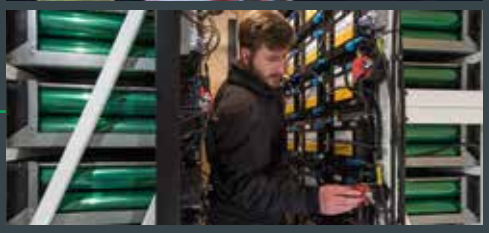
Expansion into providing units for new-build projects in shipyards

2015

Awarded the Queen's Award for Enterprise

2016

Designed and manufactured our innovative energy storage system on S/Y Black Pearl



2019

Moved to purpose-built engineering site in Wymondham, UK

2020

Opened Magnus Marine BV, in the Netherlands

2022

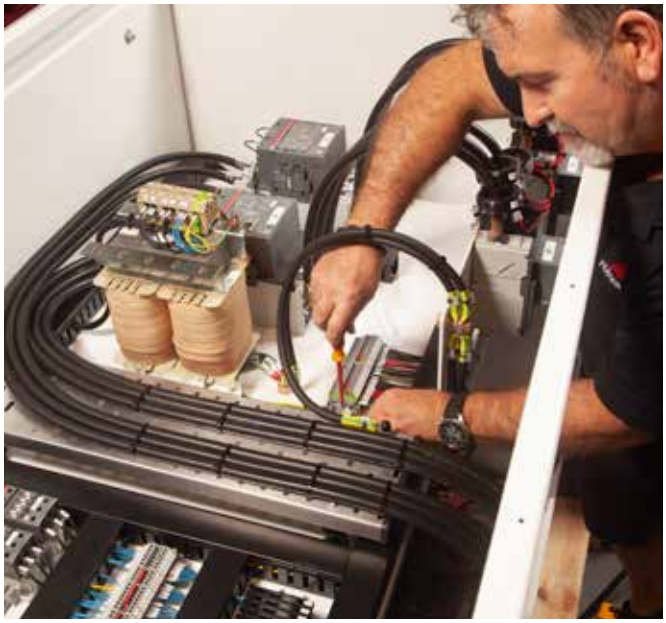
Launch of the SP150 and a universal remote diagnostics tool to improve worldwide customer support

Our Approach

World-class design and manufacturing

All our products are designed to individual specifications, so every product is unique. We configure our systems around the yacht, rather than the other way round.

Our company focuses on quality and innovation, continuously developing and improving our systems to meet the changing needs and expectations of our customers. Our aim is to deliver world-class systems with an infrastructure that is built to last.



Industry-leading expertise at every level

Facilities in our purpose-built workshops in the UK include 3D-modelling design and manufacture, clean manufacturing and in-house test facilities. We are able to fully test, under load, every element of the systems as we build them – a facility that is unique in the industry.

Either on-site or remotely, we are able to support our products as well as resolving any wider system problems our customers may encounter. To serve our worldwide customer base, we have engineering support available in the UK, Spain, New Zealand and the USA.

Our Process

1 Discuss requirements with customer.

2 Engineer a solution which meets the client's electrical and mechanical needs.

3 Build a system, taking into consideration the client's cable entry, type and access restrictions.

4 Quality control tests to include full heat rise and water cooling, where fitted.

5 Deliver the system using air or sea freight.

6 Provide on-site integration support.

7 Provide on-site assistance, to include power up and commissioning of unit.

8 Supply worldwide 24/7 technical support, advice and maintenance.

Shore Power Converters

SP150 50kVA

SP150

SP200

SP300

SP200 200 kVA

Westport 125

Maximises power availability

Using cutting-edge modular design principles, we construct shore power conversion systems that excel in reliability, cleanliness and efficiency. The incorporation of active front-end technology on each shore cord input optimises power transmission to the yacht. Drawing clean, sinusoidal current at Unity Power Factor from any power source not only ensures minimum supply disturbances, but also increases power availability to its maximum. The versatility of our design allows seamless connection of multiple input converters to any accessible power supply.

Protection from shore supply

High-grade transformers, connected directly to the shore cord, guarantee galvanic isolation at the lowest possible weight. There is no path for any currents which may be sensitive to the shore supply breaker with RCD protection.

Continuous clean output power

System output delivers a stable and clean waveform for powering on-board equipment. Loads range from utility services (heating, lighting and air conditioning) and entertainment (television and audio) to marine hardware (winch, pumps and navigational equipment).

Built-in synchronisation

Built-in synchronisation allows for seamless transfer from shore to generator and vice versa. In addition, automatic synchronisation allows the converter to start on a live bus, minimising on-board control and automation.

Unique modular design

Modular design makes the system compact and highly serviceable. In the unlikely event of module damage, the system will continue to operate at a reduced capacity. Modules can be isolated and replaced with minimal downtime. On replacement, each module will automatically be configured ready for service.

SP200 Power Modules

Connect and control your power anywhere in the world

M/Y Jubillee

Benefits

- Reliability and performance guaranteed
- Lower operating cost with better efficiency
- No interference with sensitive equipment
- Protection from shore supply faults
- Quiet, trouble-free operation
- Full galvanic isolation
- Easy connection for crew
- Cabinet customisation as standard.

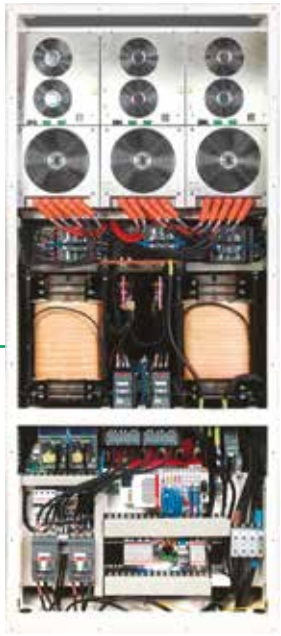
Features

- Worldwide operation, wide input voltage and frequency range
- Compatibility with shore supplies worldwide
- Reliable connection to new generation pedestals with built-in RCD protection; no nuisance tripping caused by earth leakage
- Maximum power transfer from shore supply to yacht
- Designed for continuous and automatic operation
- RFI protection to prevent on-board and shore supply disturbances
- Pure sinusoidal clean output supply
- Rugged overload capability
- Built-in module redundancy without interruption of power
- Seamless transfer between shore and generator
- System can connect to a live bus, minimising control and automation
- Parallel load share with generators for extra power
- Power limiting through soft start and soft stop
- Low noise operation
- Graphical touchscreen user display
- IP43 and 45°C rating as standard.

Range Review

SP150

30-50m yachts
15-90 kVA



90 kVA Dual Shore Cord

SP200

50-80m yachts
100-1000 kVA

200 kVA Dual Shore Cord

SP300

80-160m yachts
100-2000 kVA

400 kVA Single Shore Cord

All specifications are subject to change. †Other colours available on request

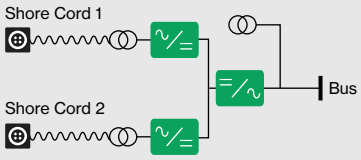
SPECIFICATIONS: SP150/SP200/SP300

INPUT	
Type	3 phase active rectification (single phase optional)
Voltage	180 to 520 VAC
Frequency	47 to 64 Hz
Displacement power factor	Unity
OUTPUT	
Type	Single/3 phase
Voltage	208-480 VAC (specified on order)
Frequency	50 or 60 Hz
Voltage distortion	< 2.0% (linear load)
Overload	150% for 30 Seconds/200% for 2 Seconds
ENVIRONMENT	
Protection	Thermal, overload, short circuit
Operating temperature	0 to 45°C
Humidity	< 95% non-condensing
Efficiency of system	> 92% typical (at full power)
Cooling	Forced ventilation/water cooling optional
Noise	< 75dBA @ 2m
Enclosure	IP43
Mounting	Bulkhead or floor
Standard colour†	Powder-coated RAL 9010
Interface	12.1" Graphic touch screen display with monitoring and event log (Modbus RS485 RTU or TCP)

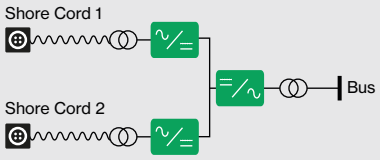
CONFIGURATION TOPOLOGY

To accommodate different power requirements, a range of configurations are available. This includes single and dual shore cords to yachts with IT distribution, requiring a high insulation.

SP150



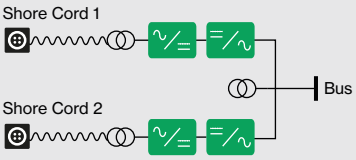
A Dual shore cord with a 3 phase, neutral output



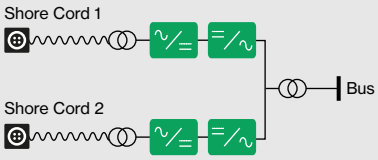
B Dual shore cord with a low voltage 3 phase, neutral output or high insulation IT bus

C 15 kVA single shore cord, no isolation with any output configuration

SP200

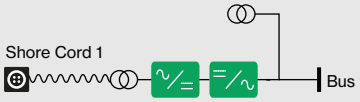


D Dual shore cord with a 3 phase, neutral output

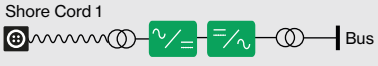


E Dual shore cord with a high insulation IT output (440/480V or 690V)

SP150 SP200 SP300

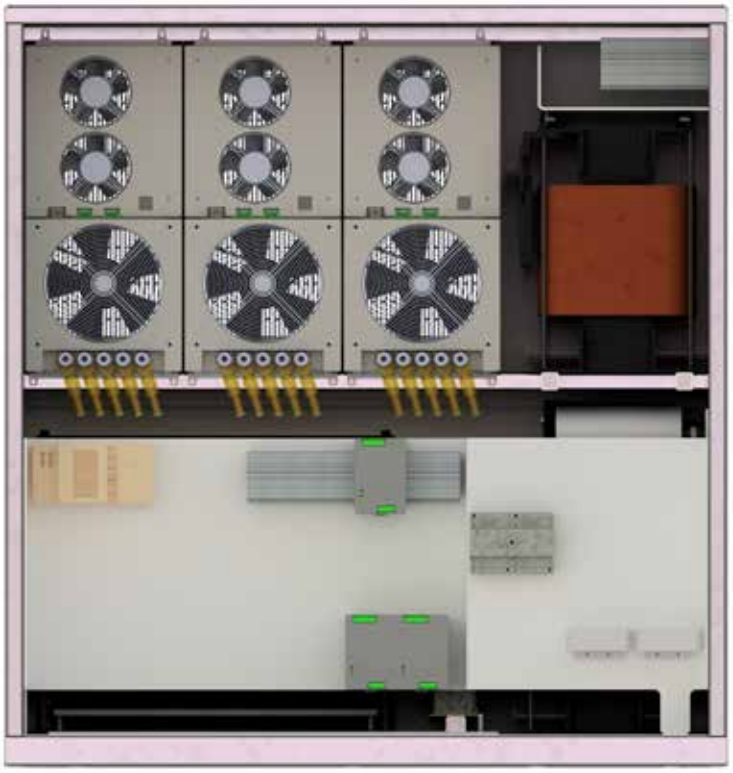


F Single shore cord with a 3 phase, neutral output



G Single shore cord with a low voltage 3 phase, neutral output or high insulation IT bus

SP150 (15-90 kVA)



Modular and compact design, configurable for multiple shore cord inputs. Shore cords can be powered from any single or 3 phase supply. Output converter is powered by a common DC Bus which can be configured for single or 3 phase output.

Module specifications:
H554 x W262 x D467mm | 69kg
480V 125Amps

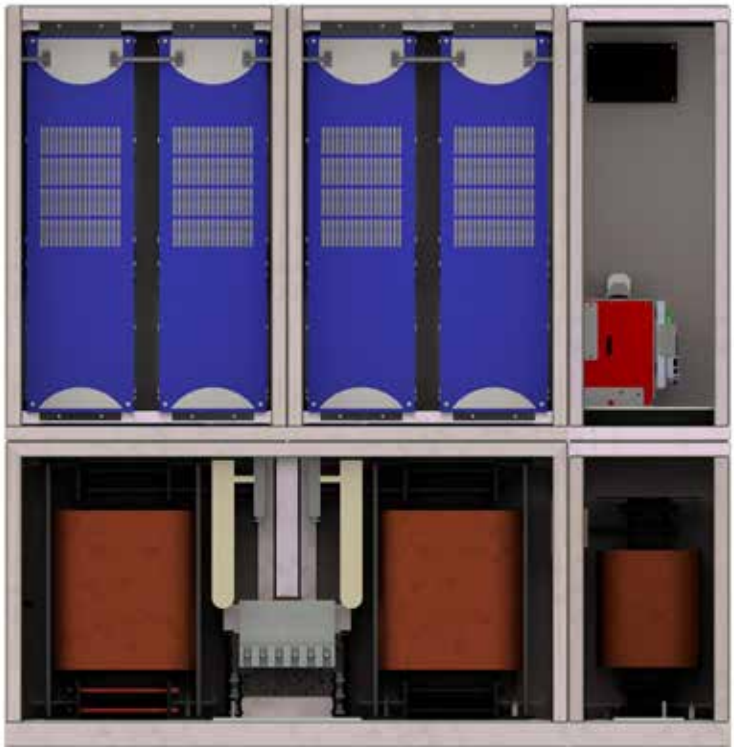
Key features:

- Universal rectifier and inverter module
- Common DC Bus with multiple inputs
- Single or 3 phase input connectivity
- M Controller as standard
- Full galvanic isolation
- Stable output supply with all loads
- High efficiency
- Flexible system design.

SP150 EXAMPLES

OUTPUT	Modules	Shore Cords	Topology	Height (mm)	Width (mm)	Depth (mm)	Weight (kg)
SPLIT/SINGLE PHASE 240V 60/50HZ							
15 kVA	2	1	C	650	950	550	344
30 kVA	2	1	G	1300	660	550	464
40 kVA	2	1	G	1380	660	760	573
50 kVA	2	1	G	1500	700	760	646
60 kVA	3	2	B	1950	650	650	773
3 PHASE 208V/120V 60HZ							
30 kVA	2	1	F	1300	660	550	404
40 kVA	2	1	F	1380	660	600	473
50 kVA	2	1	F	1500	700	650	536
60 kVA	3	2	B	1950	650	650	883
80 kVA	2	1	G	2000	700	650	954
80 kVA	3	2	B	2000	850	600	979
3 PHASE 400V/230V 50HZ							
30 kVA	2	1	F	1300	660	550	384
40 kVA	2	1	F	1380	660	600	473
50 kVA	2	1	F	1500	700	650	526
80kVA	2	1	F	1900	700	590	664
80kVA	3	2	F	1900	820	590	769

SP200 (100-1000 kVA)



Scalable platform from 100 to 1000 kVA. Unique modular platform with isolated DC per module group provides multiple system redundancy. Most advanced platform in the industry.

Module specifications:
H754 x W208 x D672mm | 80kg
480V 150 Amps

Key features:

- Multiple system redundancy
- Harmonic cancellation
- Flexible mechanic design
- Stable output supply with all loads
- Five-year service interval
- Bi-directional power flow
- High efficiency
- Flexible system design
- Unique modular design
- Advanced diagnostics and monitoring.

SP200 EXAMPLES							
OUTPUT	Modules	Shore Cords	Topology	Height (mm)	Width (mm)	Depth (mm)	Weight (kg)
3 PHASE 208V/120V 60HZ							
100 kVA	2	1	G	1800	820	800	1079
100 kVA	4	2	D	1800	1300	850	1008
3 PHASE 400V/230V 50HZ							
100 kVA	2	1	F	1986	865	555	836
200 kVA	4	2	D	1400	1370	850	1393
300 kVA	6	1	F	2000	1400	850	1882
400 kVA	8	2	D	2000	2000	850	2631
500 kVA	10	1	F	2000	2350	850	2995
600 kVA	12	2	D	2100	3100	850	3364
800 kVA	16	2	D	2100	3500	850	4512
1000 kVA	20	2	D	2100	4000	850	5530
3 PHASE 690V 60HZ							
500 kVA	10	1	G	2350	3000	950	4457
1000 kVA	20	2	E	2138	4800	980	7096

SP300 (100-2000 kVA)

SP300 EXAMPLES						
OUTPUT	Modules	Topology	Height (mm)	Width (mm)	Depth (mm)	Weight (kg)
3 PHASE 208V/120V 60HZ						
100 kVA	2	F	1400	1350	850	925
3 PHASE 400V/230V 50HZ						
200 kVA	2	F	1600	1500	850	1325
600 kVA	6	F	2000	1580	900	3550
1000 kVA	10	F	2100	3250	1000	6320

Latest design and specification for high-power applications. Includes 3 level switching for a reduced footprint and improved efficiency.

Module specifications:
H223 x W723 x D710mm | 115kg
480V 300 Amps

Key features:

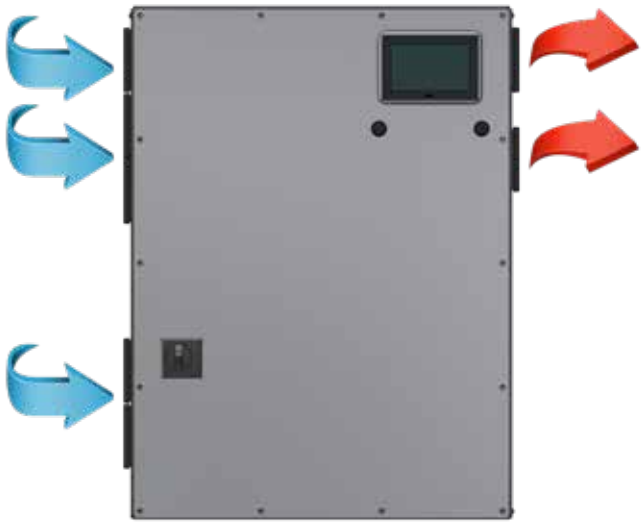
- Highly compact design with 3 level switching
- Bi-directional power flow
- High power quality output
- High efficiency
- High power density
- Multiple system redundancy
- Flexible system design
- Unique modular design
- Advanced diagnostics and monitoring
- Operation noise <65 dB(A)
- Bus bar clamp – no cable connections
- Robust fibre-optic control.

Cooling Options

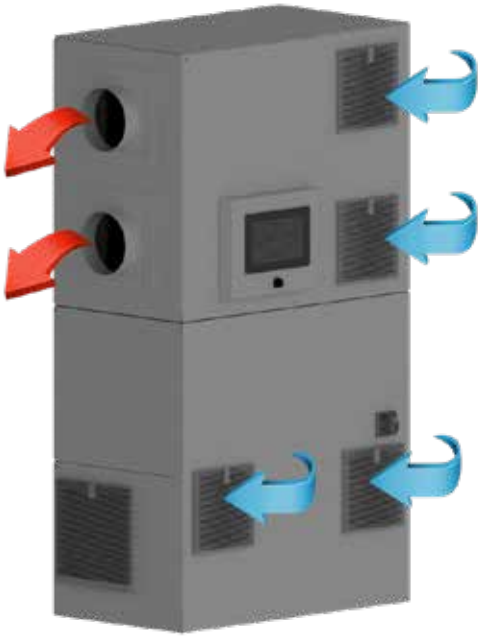
Air cooling

Systems can be configured with a single point extraction so heat generated by the Shore Power Converter can be effectively removed from compartment space.

FORCED AIR VENTILATION



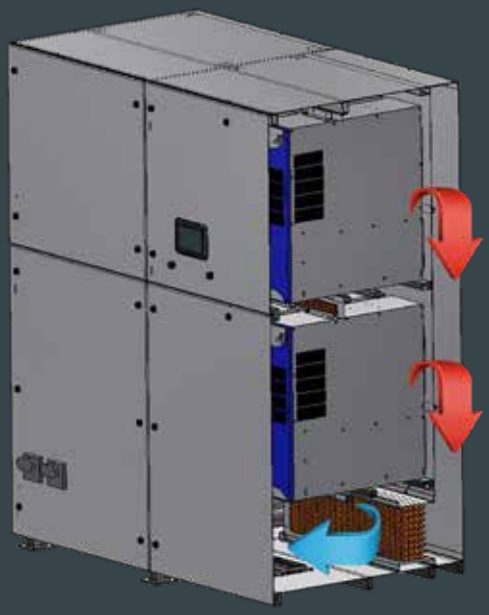
SINGLE POINT EXTRACTION



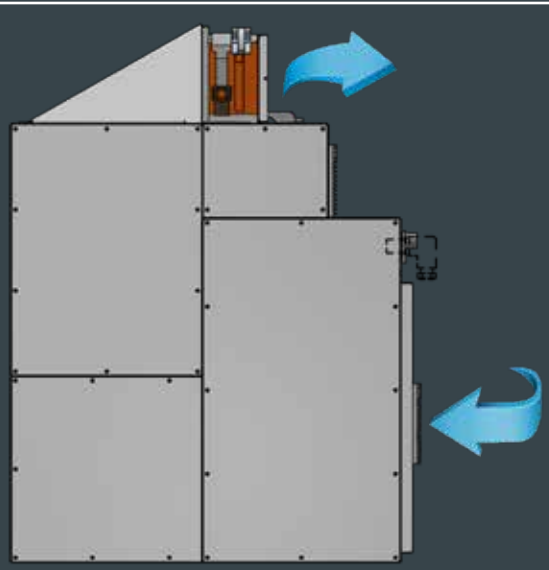
Water cooling

Cooling with water significantly improves the performance of the entire system as well as its life expectancy. All heat generated by the system is forced through a heat extraction unit which is chilled by water. Chilled air leaving the heat extraction unit recirculates back into the system as a closed-loop design. Compartment temperature, when the system is online, is well regulated without any additional cooling required. Being sealed, noise is also kept to a minimum.

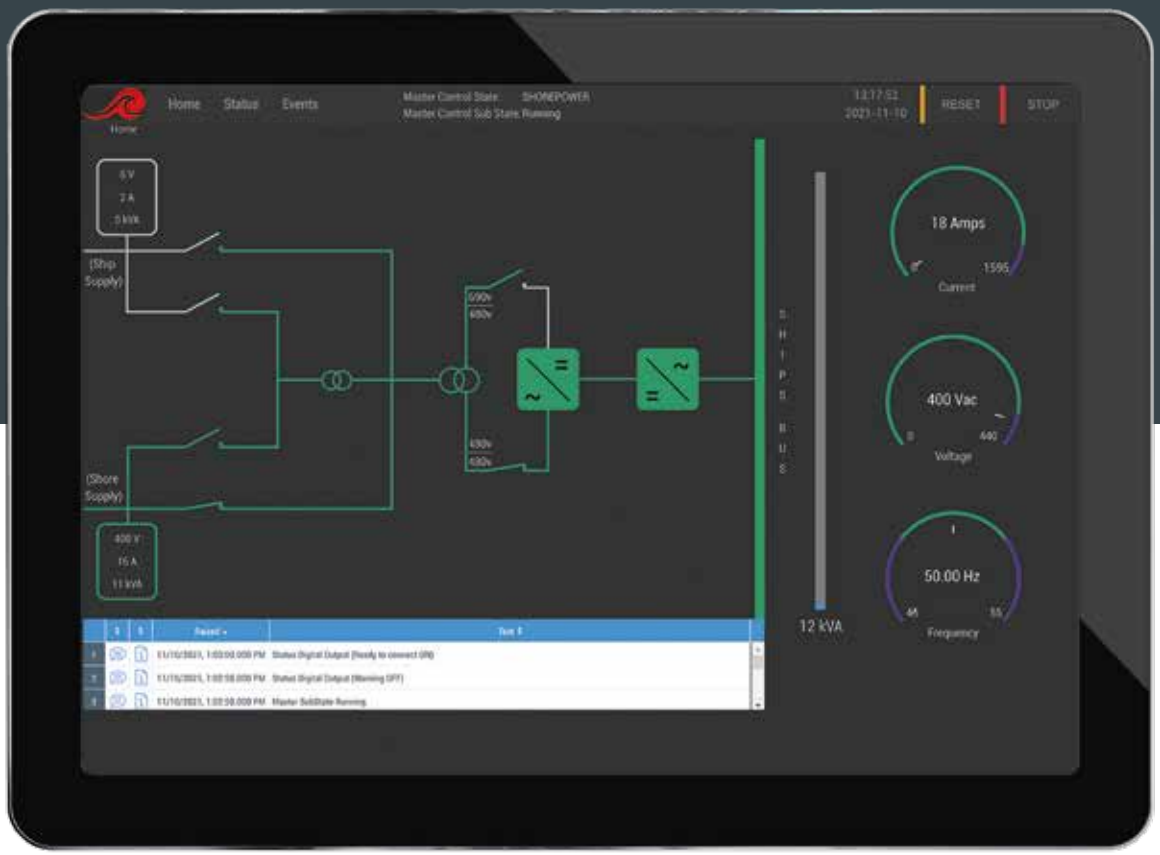
SEALED SYSTEM



OPEN SYSTEM



M Controller



Real-time monitoring

An advanced diagnostics tool with real-time monitoring for total control. Using a ship's internet connection, this can be accessed remotely by an off-site Magnus engineer. Power quality, temperatures and software updates can be completed through the controller, either remotely or on-site. The M Controller is standard on all SP150 products.

Key Features:

- High level trending with diagnostics
- Power quality logging
- Remote diagnostics
- Over-air updates
- Advanced engineer level access
- System configuration updates through display
- Standard 12" graphic display (15" with virtual generator + energy storage)
- Flexible system design for PMS integration.

Accessories

Shore cord kWh display

Record energy imported from the dock supply using the instrumentation connected to each shore cord input. Crew can cross reference energy consumption with the harbour officials.

Shore cord kWh display smart meter

Thruster operation

Our all-in-one shore power and bow/stern thruster operation gives you the option to run bow/stern thrusters from the Shore Power Converter whilst not berthed.

As thrusters and Shore Power Converters do not operate together utilising the same electronics, we can offer impressive space and weight savings. Also, with a pure sinusoidal input and output, there are no cable length restrictions or supply disturbances to the ship's generators when in operation.

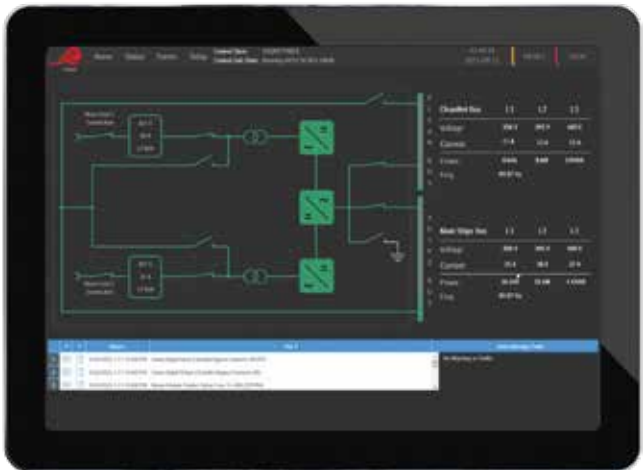
Thruster operation

CleanNet™ operation at sea

The option to power your yacht using CleanNet™ distribution from the Shore Power Converter at sea, offers many advantages.

The converter protects loads sensitive to supply disturbances, such as harmonic distortion, voltage sags and frequency instability. The CleanNet™ supply is reserved for sensitive loads, such as the lighting and entertainment network, while automation, pumps, winches and air conditioning remain powered by the Main Ship's Bus.

In harbour, the main and CleanNet™ distribution is powered by a common bus through the converter. By utilising the same electronics, we can offer impressive space and weight savings. The converter operates as a black-box design, meaning protection starts as soon as it is connected to shore power.



Clean Net™ operation at sea

Accessories

Mechanical design

The modular frame construction allows for complete flexibility in cabinet design, which can help maximise space. A split-frame design is also an option where there are tight entry restrictions.

Cabinet colours

Our standard specification is a powder coating with any RAL colour and finish. This can be extended to wet paint using Jotun, Awlgrip or any other manufacturer.

Single/dual shore cord selector

Shore cord selection can be configured using the system front panel for single and dual shore cord operation. In harbours with low power availability, a second cord can be connected to shore. Each cord input is independent so connection can be made to two completely separate shore cord supplies. Connection to shore is completely automatic and input phase sequence between cord inputs is non-essential.

Premagnetisation unit

An isolation transformer is fitted on all Shore Power Converters to isolate the yacht from the dock. These transformers inherently have a large current start-up. To limit this to less than nominal, a premagnetisation unit can be fitted.

Galvanic isolator

A diode isolator can be installed between ship and shore earth to block any stray DC currents and still provide a low impedance path for short circuit current protection.

Synchronisation for seamless transfer

Before a supply is connected to the Main Ship's Bus, via generator or shore power, the incoming supply must be synchronised. All Magnus Marine converters have built-in synchronisation which can be used to enable seamless transfer of the ship's electrical load, to and from the converter supply.

Live bus synchronisation is also available to alleviate the need for power switching between the ship's bus and the converter.

Reactive power conditioning

At sea, the converter can be connected to the Main Ship's Bus operating in parallel with the ship's generators, producing a pure sinusoidal waveform supply. Harmonic currents are sourced from the converter where voltage distortion is generated on the ship's supply. Voltage distortion is generated by non-linear loads, such as frequency drives, which produce fifth and seventh harmonics.

Lloyds certification

Design Appraisal Documents (DAD), to include witness testing can be arranged on request. Equipment complies with IEC 60146 standard.

Service levels

A choice of three service level agreements are available to meet customer requirements:

- **Bronze:** Basic package with one-year international warranty. Travel and commissioning not included
- **Silver:** Includes one-year international warranty with on-site commissioning and shipment of spare parts if required. On-site engineer at customer's expense
- **Gold:** Two-year warranty, including international on-site engineer support.

Hybrid Power Systems

Amels LE160

Virtual Generator + Energy Storage

Shaft Generators

Madsummer

Virtual Generator + Energy Storage

160 kVA Water cooled

1000 kVA Open water cooled

Improved generator efficiency and emissions

Generators operating outside of their efficiency zones often cause increased fuel consumption, leading to higher emissions and unexpected maintenance issues. By introducing energy storage, Magnus can maintain the generator operation inside the efficiency regions, saving time, money and the environment.

Seamless storage of energy

As the ship's load fluctuates, excess generator power can be stored by the energy storage system. Stored energy can then be used when power demand exceeds that of the generator. Using the energy storage system during peak periods prevents additional generators from starting. Operating the ship in this configuration offers significant fuel savings which would otherwise have been lost. Additionally, maintaining the generator at its nominal load keeps generator run hours, maintenance and exhaust fumes to a minimum.

Value and performance

Autonomous control, which includes online synchronisation and parallel load sharing with generators, provides seamless bi-directional transmission of power during operation.
A proven and reliable power quality platform that provides seamless system integration and battery control.

Battery supply

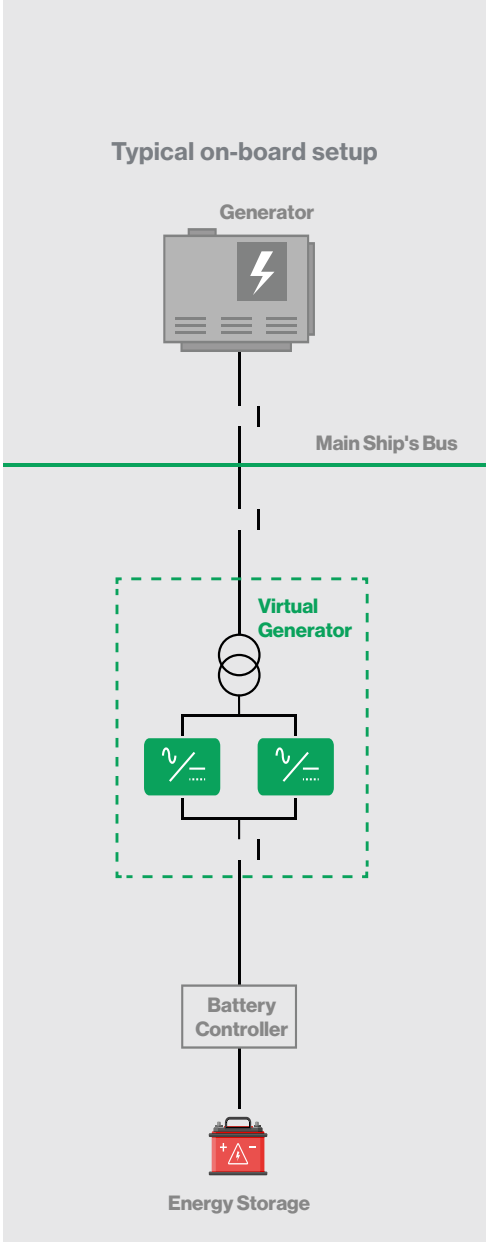
With ever-evolving battery technology, clients can supply their own batteries. Our energy management system is compatible with all types, including MG Energy, Corvus and Leclanché.

Virtual Generator + Energy Storage

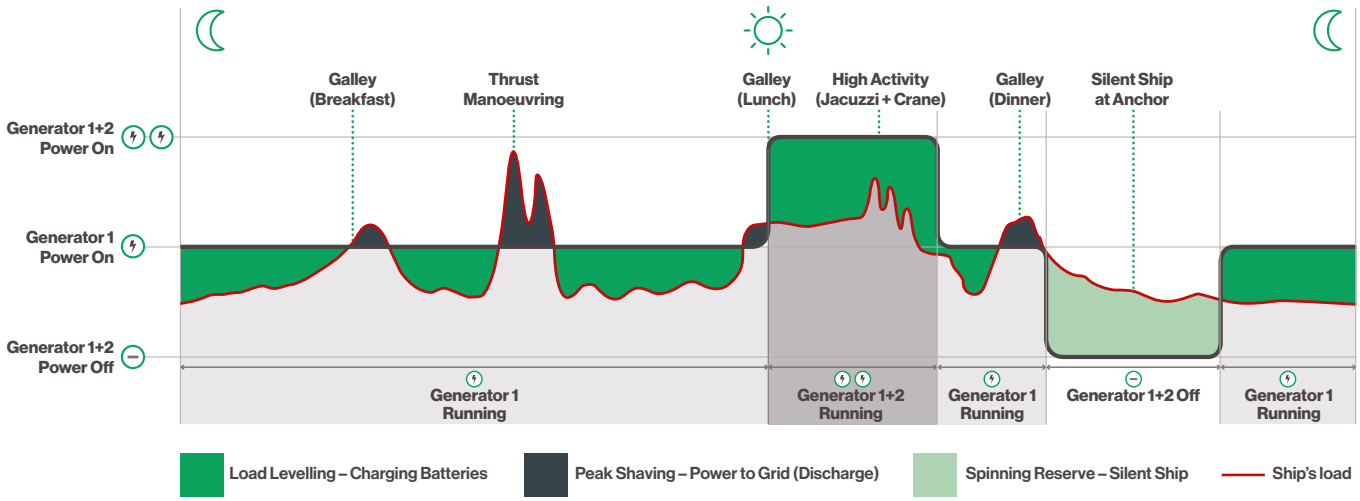
Virtual Generator Operation

The Virtual Generator operating mode is unique to the Magnus power electronic platform and mimics the behaviour of a generator. Interfacing the ships generator(s) with a balanced, 3 phase voltage delivers a true dynamic system with bi-directional connectivity. The benefit of this is a natural connection between the generator(s) and the energy storage system.

In addition, physical inertia is modelled by the system, providing a stable response to the grid frequency. The Virtual Generator can control its own voltage and frequency, enabling it to create an island grid should a problem occur with the generators or shore supply. In such conditions, it will support the load without disturbance.



ENERGY STORAGE SYSTEM DAILY OPERATION



Virtual Generator + Energy Storage

Key features:

- Generous fuel savings with reduced emissions
- Permanently online with power outage protection
- Safe, reliable and well-proven platform
- 15" M Controller display
- Peak Shaving – delivers power to the grid when peak demand is high. Prevents additional generators coming online, thereby lowering fuel and maintenance costs
- Load Levelling – store energy when demand is low and deliver energy when demand is high
- Spinning Reserve – meets shortfalls, supplying backup power during a loss of generation or silent ship operation
- Design maximises battery life expectancy.

SPECIFICATIONS: VIRTUAL GENERATOR + ENERGY STORAGE

Battery	Ship's Bus	Current (Multiples)	DC Side Grounding	AC Side Grounding
500-820V	208-480V 50Hz or 60Hz	150Amps	DC Side RFI Grounded	Floating (AC Transformer Coupled)

For higher DC voltages, the C-type module has to be used, which can run up to 1120Vdc 105Amps

POWER	Modules	Height (mm)	Width (mm)	Depth (mm)	Weight (kg)
80	1	1800	850	500	576
160	2	1800	800	850	865
320	4	2000	1250	850	1357
480	6	2000	1800	850	2082
800	10	2000	2500	850	2710
960	12	2100	2750	850	3514

Shaft Generator PTO/PTI

200 kVA Shore power combined 100kW shaft generator

Multiple energy sources

Energy efficiency plays an important role in yacht operation, helping to reduce environmental impact and improve efficiency. Using the energy efficient main engine to generate electrical power, Power Take Off (PTO) the system can also be used for the main propulsion shaft, Power Take In (PTI). The system offers the opportunity to connect energy storage, shore to ship power and other new energy sources and functionalities to the power and propulsion plant.

Seawolf

Standalone system

Supported by the M Controller, the shaft generator is combined with shore power to offer a standalone system that can source power from shore or shaft. Multiple redundancy can also be combined into the system, with power ratings greater than 100kW.

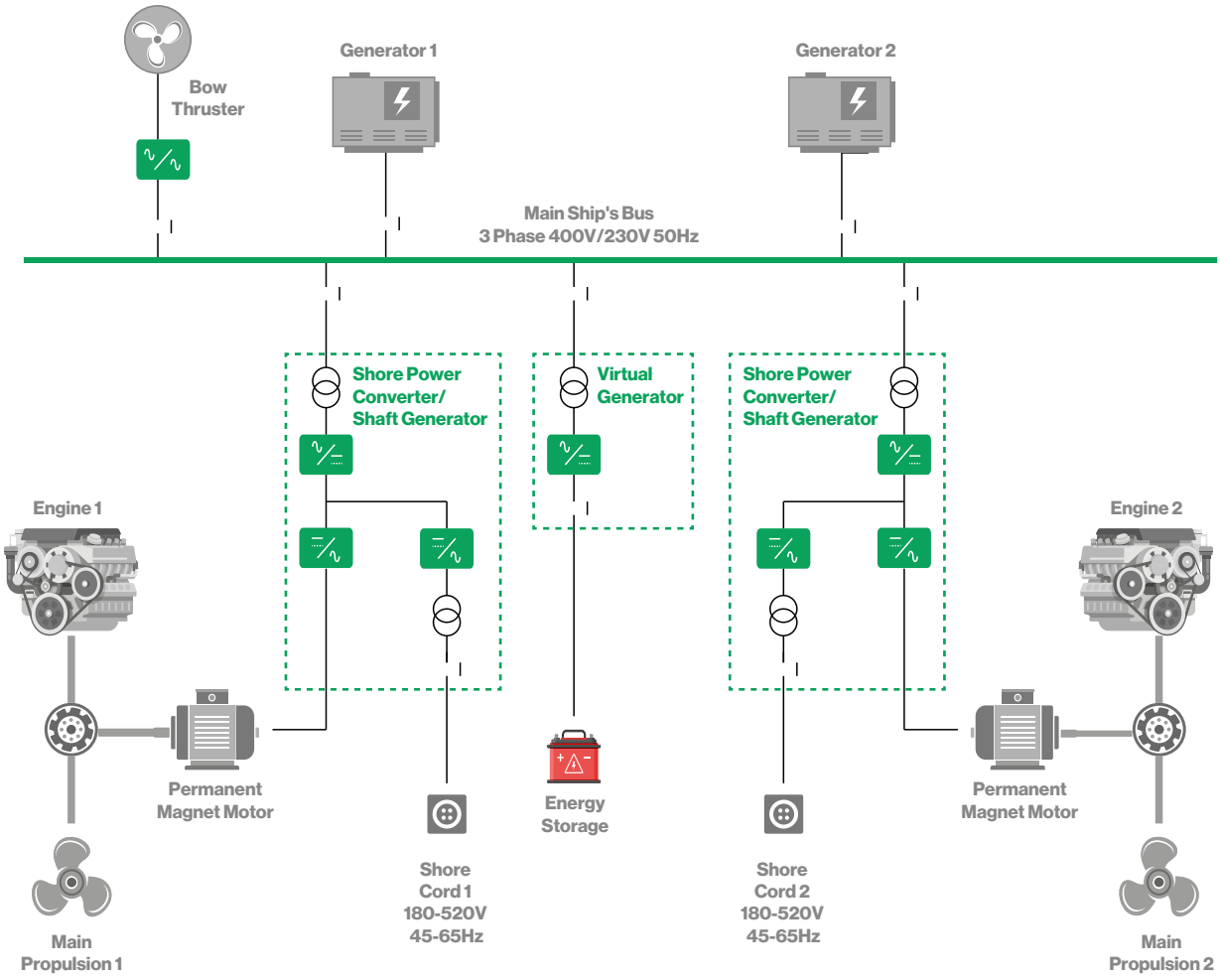
Shaft Generator
PTO/PTI

Key features:

- Standard modular platform
- Combined PTO/PTI and Shore Power Converter
- High power quality output.

In PTO mode, shaft generators are driven by the main engine to supply power to the Main Ship's Bus, and this is supported by a fixed voltage source, such as a generator or energy storage system. This allows the vessel to not cause a power disturbance when travelling at different speeds, even if the propeller speed strongly varies in heavy seas. Used in combination with an energy storage system, the batteries can be charged or used to support the bus when power demands change.

In PTI mode, power is sourced from the ship's AC bus to control the main ship's propulsion. The Main Ship's Bus is supported by generators and/or an energy storage system. The ship's speed and direction can be controlled with accuracy and, dependent on bridge controls and motor types, can be induction or permanent magnet.



SPECIFICATIONS: SHAFT GENERATOR

POWER	Height (mm)	Width (mm)	Depth (mm)	Weight (kg)
When combined with shore power, will require an isolation transformer couple between ship's bus and rectifier – not included in size and weights.				
100 kW	1049	310	290	66
200kW	1190	310	312	70
400kW	1750	295	526	130

Frequency Converters

On-board equipment with alternative supply requirements

50 kVA Frequency Converter

M/Y Double Haven

M/Y Vava

For Europe and the US

Frequency converters can be installed on board and used to power on-board equipment with supply requirements different to that found on the yacht's AC distribution. This might include a 120 VAC/60 Hz (US) supply to cabins on European yachts or 230 VAC/50 Hz (European) to US yachts. Items carried on board can then be readily used by guests with connection via European or US socket outlets. Such converters can also be used to power special equipment, including tenders and specific machinery requiring an alternative supply.

Benefits

- Reliability and performance guaranteed
- Lower operating cost with better efficiency
- No interference with sensitive equipment
- Protects equipment from voltage distortion, voltage sags or frequency instability
- Quiet, trouble-free operation
- Fully galvanic isolated output supply
- Pure sinusiodal clean output supply.

50 kVA Frequency converter 120V 60Hz output

Frequency Converter

SPECIFICATIONS: FREQUENCY CONVERTER	
INPUT	
Type	3 phase active rectification
Voltage	180 to 520 VAC
Frequency	47 to 64 Hz
Displacement power factor	Unity
OUTPUT	
Type	Single or 3 phase, neutral, isolated output
Voltage	208-480 VAC (specified on order)
Frequency	50 or 60 Hz
Voltage distortion	< 2.0% (linear load)
Overload	10 minutes 125%/30 seconds 150%
ENVIRONMENT	
Protection	Thermal, overload, short circuit
Operating temperature	0 to 45°C
Humidity	< 95% non-condensing
Efficiency of system	> 92% typical (at full power)
Cooling	Forced ventilation/water cooling optional
Noise	< 75dBA @ 2m
Enclosure	IP43
Standard colour†	Powder-coated RAL 9010
Interface	Graphic display Digital I/O for control and monitoring

All specifications are subject to change. †Other colours available on request

Key features:

- Minimal supply disturbances with active front end as standard
- Maximum power transfer from the Main Ship's Bus
- Low earth leakage
- Isolated output supply
- Digital touchscreen user displays
- RFI protection to prevent supply disturbances
- Pure sinusoidal clean output supply
- Rugged overload capability
- Designed for continuous and automatic operation
- Low noise operation
- IP43 and 45°C rating as standard
- Air cooled.

Options:

- Water cooling
- Cabinet colour
- M Controller.

FREQUENCY CONVERTER EXAMPLES

INPUT	INPUT	OUTPUT	Platform	Height (mm)	Width (mm)	Depth (mm)	Weight (kg)
6 kVA	3 Phase 400V 50Hz	Single Phase 120V 60Hz	VFD	750	440	371	127
12 kVA	3 Phase 400V 50Hz	3 Phase 208V 60Hz	VFD	914	775	320	251
20 kVA	3 Phase 400V 50Hz	3 Phase 208V 60Hz	SP150	650	950	550	344
50 kVA	3 Phase 400V 50Hz	3 Phase 208V 60Hz	SP150	1400	700	550	454
100 kVA	3 phase 690V 60Hz	3 Phase 208V 60Hz	SP200	900	1560	830	816
125 kVA	3 phase 690V 60Hz	3 Phase 400V 50Hz	SP200	1600	994	850	1289
200 kVA	3 Phase 400V 50Hz	3 Phase 208V 60Hz	SP200	900	1800	850	1088

CleanNet™

M/Y Vibrant Curiosity

For sensitive on-board equipment

S/Y Twizzle

85 kVA CleanNet™

The perfect solution for sensitive equipment

With increasing on-board automation and many different power requirements, it is essential to deliver a clean electrical supply for sensitive loads and guest comfort. Loads sensitive to supply disturbances (such as voltage distortion, sags and frequency instability) can be protected by the installation of a separate supply independent from the ship's AC bus.

The CleanNet™ supply is reserved for sensitive loads, such as the lighting and entertainment network, while automation, pumps, winches and air conditioning remain powered by the Main Ship's Bus.

With CleanNet™ built-in bypass and synchronisation, sensitive on-board equipment has the ultimate protection.

The transfer to CleanNet™ mode is completely automatic and seamless. In the event of alarm or fault condition, the converter will automatically bypass to the Main Ship's Bus.

The converter operates as a black-box design; protection starts as soon as it is connected to power.

Benefits

- Isolates and protects sensitive equipment from power disturbances
- Pure sinusoidal clean output supply
- No interference with sensitive equipment
- Protects equipment from voltage distortion, voltage sags or frequency instability
- Quiet, trouble-free operation
- Fully galvanic isolated output supply.

85 kVA CleanNet™ converter

CleanNet™ (25-200 kVA)

SPECIFICATIONS: CLEANNET™

INPUT	
Type	Single or 3 phase active rectification
Voltage	180 to 520 VAC
Frequency	47 to 64 Hz
OUTPUT	
Type	Single or 3 phase, neutral, isolated output
Voltage	208-480 VAC (specified on order)
Frequency	50 or 60 Hz
Voltage distortion	< 2.0% (linear load)
Overload	30 seconds 150%
ENVIRONMENT	
Protection	Thermal, overload, short circuit
Operating temperature	0 to 45°C
Humidity	< 95% non-condensing
Efficiency of system	> 92% typical (at full power)
Cooling	Forced ventilation/water cooling optional
Noise	< 75dBA @ 2m
Enclosure	IP43
Standard colour†	Powder-coated RAL 9010
Interface	Graphic display Digital I/O for control and monitoring

All specifications are subject to change. †Other colours available on request

Key features:

- No crew intervention – black-box design
- Seamless transfer of power between CleanNet™ and bypass
- Monitors power demand for seamless bypass operation
- Automatic transfer to bypass in a converter fault or overload condition
- Automatic transfer to CleanNet™ when system returns to health
- IP43 and 45°C rating as standard.

Options:

- Local bypass control and monitoring
- Cabinet colour
- M Controller.

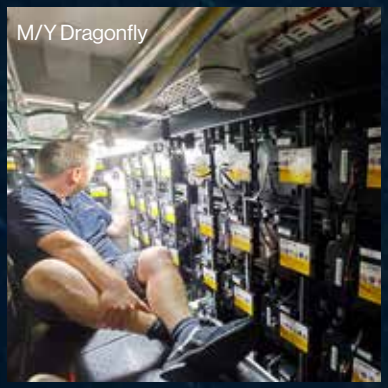
CLEANNET™ EXAMPLES

INPUT	SUPPLY	Platform	Height (mm)	Width (mm)	Depth (mm)	Weight (kg)
25 kVA	3 Phase 400V / 230V 50Hz	VFD	1000	850	480	210
50 kVA	3 Phase 400V / 230V 50Hz	SP150	1400	700	550	454
100 kVA	3 Phase 400V / 230V 50Hz	SP200	850	1200	850	744
50 kVA	3 Phase 208V / 120V 60Hz	SP200	850	1200	850	554

Service and Support

A complete support package for total peace of mind

Amels 188 Series/Westport 112



M/Y Dragonfly

Reliable support services

We offer an exemplary support package so you can enjoy total peace of mind, which lasts well beyond purchase and installation.

Our international service agreements have been selected to suit the needs of owners, crew and shipyards. Engineering support is available 24 hours a day, 7 days a week. A choice of service level agreements include delivery of spare parts and engineer attendance anywhere in the world.

Commissioning overview

To guarantee years of dependable power, we recommend that one of our engineers attends commissioning. This is included at no extra cost with all Silver and Gold service level agreements.

Commissioning is fully documented and includes:

- Internal and external inspection
- Check monitoring and control interfaces
- Electrical check and initial power-up
- Full functionality set-up and testing.

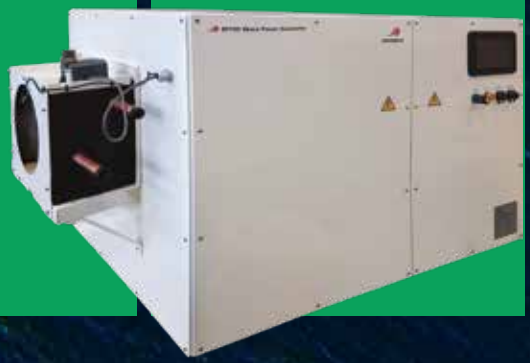
Health check

All our products are essentially maintenance-free, however an annual service and inspection is recommended. This includes a full health check of the system, which is fully documented and recorded. All this can be managed by Magnus to guarantee you years of dependable power and total peace of mind.

SERVICE LEVEL AGREEMENT	BRONZE	SILVER	GOLD
TRANSPORTATION			
Packaging suitable for international freight	■	■	■
DOCUMENTATION			
English user manual (electronic and print copy)	■	■	■
Electrical and mechanical drawings (AutoCAD/PDF format)	■	■	■
Factory acceptance test report	■	■	■
PROJECT MANAGEMENT			
Commissioning Category 1 – Initial power-up. Expect to be on board one day.		■	■
Commissioning Category 2 – Harbour acceptance. Expect to be on board one day.		■	■
Commissioning Category 3 – Sea acceptance. Expect to be on board one day. Applies to bow/stern thruster operation.		■	■
WARRANTY			
12 months after commissioning or 24 months after dispatch, whichever is sooner	■	■	
24 months after commissioning or 36 months after dispatch, whichever is sooner			■
CONDITIONS			
Free issue parts and engineer	■	■	■
Engineer's travel at customer's cost	■	■	
Engineer's travel to a major port at supplier's cost			■
Delivery of spare parts at customer's cost	■		
Delivery of spare parts to a major port at supplier's cost		■	■
Report following on-site servicing or assessment	■	■	■

Case Studies

Every Magnus system is engineered precisely for an individual yacht and its power requirements.

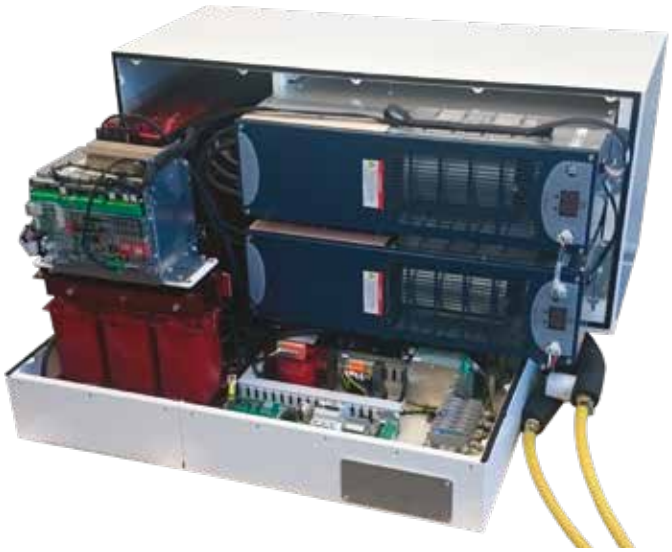


S/Y Bliss
Shore Power Converter 50 kVA

After returning from worldwide sailing, a 50 kVA Shore Power Converter was retrofitted onboard S/Y Bliss to allow connection to shore when berthed in harbour.
The system was fully dismantled to facilitate transportation through the engine room door. The system has a hybrid water cooling system where all heat generated is forced through a heat extraction unit, chilled by water. The chilled air is then circulated back into the compartment space.
The temperature outlet, controlled by a 3-way valve, can be adjusted through the system's front panel graphic display.

M/Y Limitless
Shore Power Converter 50 kVA

A 310 kVA Shore Power Converter was retrofitted and commissioned on the iconic yacht Limitless in 2021.
To make better use of available space, the system was modularised with transformer and electronics separately installed. The cabinet was painted using Awlgrip to keep the engine room appearance consistent. The electronics cabinet can be converted from sealed water cooling to forced air by adjusting using the front system panel.
The Ship's Bus is 440V IT and to maintain high impedance integrity, the output is fully isolated. To improve future customer support, the M controller was installed.



S/Y Hetairos
Shore Power Converter 80 kVA

The majestic and iconic Hetairos upgraded their Shore Power Converter in 2016 to reduce generator runtime when in harbour. To improve sailing performance, the unit was positioned in the bow compartment space and the system is structurally reinforced to facilitate hull forces under sail. Installed in a restricted location, the system is sealed and water cooled using the ship's chilled water supply. A graphic display was installed in the engine room for monitoring and control.

S/Y Mouse Trap
Shore Power Converter 50 kVA

Commissioned for an experienced owner, a Shore Power Converter was retrofitted to S/Y Mouse Trap in New Zealand in 2017. With extensive sailing around the south Pacific Ocean, a reliable on-board Shore Power Converter was required.

The system was designed to be installed in the engine room on a bulkhead above the main engine. Seamless transfer was commissioned using the existing Woodward controllers, synchronising both to and from the shore supply.

M/Y Madsummer
Virtual Generator 160 kVA / 54 kWh Batteries

Designed and installed during the build, the M/Y Madsummer installation is certified by Lloyds. An energy storage system was installed during the build to improve green credentials and optimise single generator power. The system is 160 kVA with 54 kWh of battery storage, air cooled and relies on forced air ventilation for cooling.

The virtual generator has dynamic control, is continually online and delivers power for loads with a high current peak demand, including vessel stabilisers. The converter is installed outside the battery room, which has a large 15" display for battery monitoring and system control.

Altea
Virtual Generator 80 kVA / 64 kWh Batteries

The new owner of the Altea wanted to improve its environmental credentials and needed the vessel to operate using a single generator. An energy storage system was installed during the final construction phases for peak shaving operation. The system was easily integrated into the switchboard and provided shore operation with a third-party converter. The battery was installed in an A60 compartment space with the converter located in the engine room. The installation was designed and surveyed to ABS class. The results have exceeded all expectations and the system is proving to be essential on-board equipment.

Grid/Shore Power 2 MVA and 2 MVA Virtual Generator

For this combined Grid/Shore Power Converter and energy storage system, the grid converter was taken from our SP300 platform which utilises the latest 3-level switching. Two independent 1 MVA converter supplies can be switched from the 690V Ship's Bus to shore and provide a stable 400V 50 Hz supply for utility equipment. Also connected to the 400V Ship's Bus are two 1 MVA virtual generators which are coupled to 4.8 kWh of lithium-ion batteries. The batteries can peak shave with the ship's 690V generators or operate standalone for silent ship operation. All the converters have water cooling where heat exchangers, using an inter-cooled water network at sea water temperature, force cool air into the compartment space.

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