

Turn Key Shore-to-Ship Shore Power Solution

# ShoreMaster

## Up to 8MW

The ShoreMaster is Ensmart's fully integrated dock side shore-to-ship power supply solution designed to help to reduce emissions in ports, by enabling them to shut down their diesel generators and connecting to the port's electricity grid via a shore-to-ship power connection while berthed.



### All-in-One Reliable Shore Power Supply

- Plug-in-Play Containerized IP65 Solution
- Equipped and pre-assembled with high quality power components
- Scalable from a hundred kW to 8 MW tailored to port traffic needs
- Continuous power quality and safety
- 50Hz to 60Hz conversion for differing port and ship frequencies

### Highest Flexibility

- Can be installed in an existing equipment room
- Can be built in a HVAC container or an outdoor enclosure
- Support LV 400V, 690V or MW 6.6kV, 11V power distribution
- Active Front End (AFE) option
- Emergency energy storage is available for energy during micro power outage

### Advanced Power Technology

- State-of-the-art IGBT technology with DSP control
- Ultra high overall efficiency 96%
- Maximum Marine Power (PF 0,9 and PF 1 for kW=kVA)
- Wide selection of alarms, indications and measurements
- Powerful SCADA and HMI systems
- Advanced Connectivity options (RS232, RS485, MOD-Bus, J-Bus, Web, Tel-Net, GPRS, CAN-Bus, SNMP)



## Technical Specifications

MODEL																																				
Capacity	10kVA	15kVA	20kVA	30kVA	40kVA	60kVA	80kVA	100kVA	120kVA	160kVA	200kVA	250kVA	300kVA	400kVA	500kVA	600kVA	800kVA	1000kVA																		
Power Watt	9kW	13.5kW	18kW	27kW	36kW	54kW	72kW	90kW	108kW	144kW	180kW	225kW	270kW	360kW	450kW	540kW	720kW	900kW																		
<b>INPUT</b>																																				
Nominal Voltage	400 VAC 3 P																																			
Voltage Tolerance	-20% +15%																																			
Frequency Tolerance	50 / 60 Hz ±50% (Selectable)																																			
Power Factor	>0.99																																			
Total Harmonic Distortion	THDi <3%																																			
<b>OUTPUT</b>																																				
Power Factor	0.9 (1 Optional)																																			
Nominal Voltage	380/400/415 /440/480 VAC 3 P																																			
Voltage Tolerance	Static ±1, Dynamic ±3																																			
Frequency Tolerance	50Hz / 60Hz ±0,01%																																			
Output THD	Linear Load <1% / Non-Linear Load <3%																																			
Crest Factor	3:1																																			
Overload Capacity*	At 125% Load 10min, at 150% Load 1min																																			
Efficiency (Online Mode)	96%																																			
Efficiency (Eco Mode)	Up to 99%																																			
<b>BYPASS</b>																																				
Nominal Voltage	380/400/415 VAC 3 P																																			
Voltage Tolerance	15% (Configurable from 10% to 30%)																																			
Frequency Tolerance	±5 (Selectable)																																			
<b>ENVIRONMENTAL</b>																																				
Operating Temperature	0°C / +40°C																																			
Storage Temperature	-15°C / +45°C																																			
Protection Class	IP20 (Other IP Options are Optional)																																			
Humidity	0-95% Without Condensation																																			
Altitude	<1000m, Correction Factor 1. <2000m, Correction Factor >0.92, <3000m; Correction Factor >0.84																																			
Noise Level	<53 dBA	<55 dBA	<60 dBA	<65 dBA	<72 dBA							<74 dBA																								
<b>COMMUNICATION</b>																																				
Communication Port	RS232 (Standart), RS485, MOD-Bus, J-Bus, Web, Tel-Net, GPRS, CAN-Bus, SNMP (Option)																																			
<b>STANDARDS</b>																																				
Quality	ISO 9001, ISO 14001, ISO 18001, TSE-HYB																																			
Performance	EN62040-3 (VFI-SS-111, Bureau Veritas Certified)																																			
EMC/LVD	EN62040-2, EN62040-1, EN60950, (TÜV SÜD Certified)																																			
<b>DIMENSIONS &amp; WEIGHT</b>																																				
Cabinet Dimensions (mm)	Width	490				763		810		830			1250			1999																				
	Depth	805				771		820		870			845			867																				
	Height	1190				1555		1705		1800			2102			2045																				
Net Weight (kg)	100	100	107	118	125	260	270	350	355	450	460	470	850	850	850	1740	1740	1740																		
	Packaging Dimensions (mm)		600				600		900		900			1370			2150																			
Gross Weight (kg)	Depth		900				900		970		970			870			970																			
	Height		1400				1400		2040		2040			2120			2120																			
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140	141	145	164	185	353	361	376	387	398	491	500	890	890	890	1820	1820	1820																			

\* under certain conditions.  
3 Phase In / 1 Phase Out Version is Available. (10 to 30kVA)

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## Highlights



**Reliable and Robust**  
Power coated for ultimate durability and protection



**Marine Approved**  
MeetS all marine classification societies such as ABS, DNV GL, Lloyd's Register, etc.



**Easy Installation**  
Small footprint and front access for easy service



**Scalable and Movable**  
Can be easily relocated at berth. Easy Paralleling

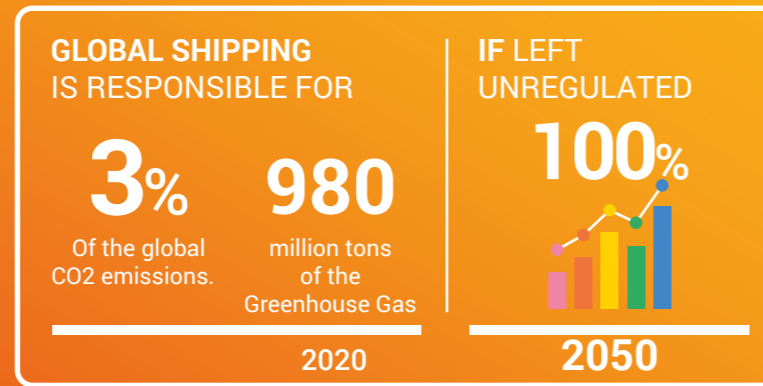


## Helping ports to reduce environmental footprint

Today, the environmental footprint of ports is under close observation. Governments, port authorities and ship owners are seeking different solutions to reduce emissions from ships while they are engaged in port operations.

### Challenges:

To “plug into” the local city power supply grid on the dockside is an option so the vessel can turn off its engines while at port. However not all the world’s power is at the same frequency. When ships at berth turn the engines off would normally continue to run its diesel generators to power the on board auxiliaries. The diesel generators produce noise; vibrations; exhaust smoke; air pollution; gases; and CO2 emissions.



## Shore-to-Ship Connection: An answer to the challenge of reducing ship emissions while in port:

Ships can shut down their engines while berthed and plug into an onshore power source

- The ship’s power load is transferred to the shoreside power supply without disruption to onboard services
- Emissions to the local surroundings are eliminated
- Tip: Shore connection is also known as Cold ironing, Onshore power supply, Alternative Maritime Power supply (AMP), etc.

This fully integrated system helps to reduce emissions in ports, by connecting ships to the port’s electricity grid via a shore-to-ship power connection. A seamless automated power transfer of the ship load is secured, from the onboard power plant to the onshore source and back. This enables vessels to shut down their diesel-generator sets, used to create onboard electric power, and plug into an onshore power source while berthed

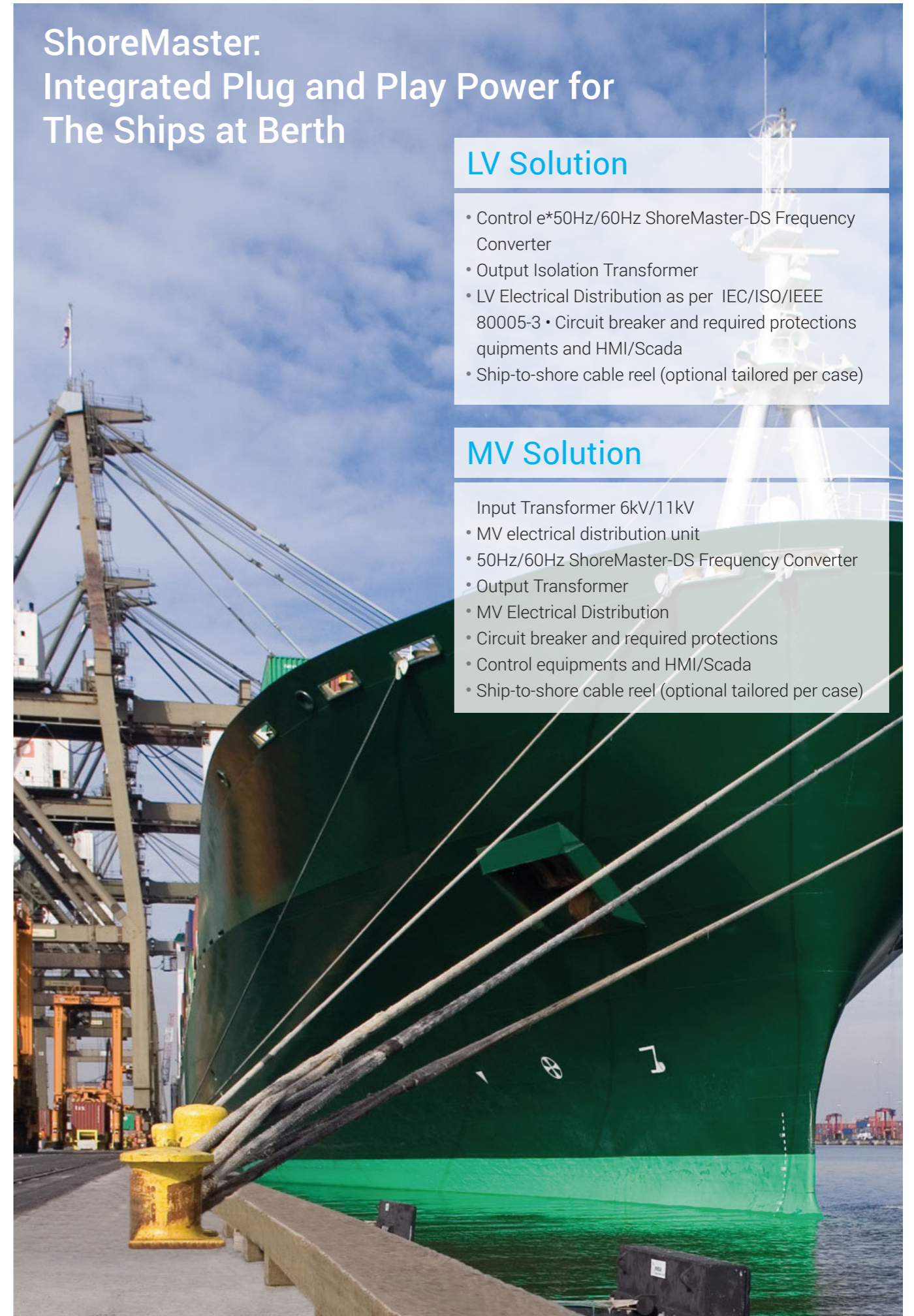
## ShoreMaster: Integrated Plug and Play Power for The Ships at Berth

### LV Solution

- Control e\*50Hz/60Hz ShoreMaster-DS Frequency Converter
- Output Isolation Transformer
- LV Electrical Distribution as per IEC/ISO/IEEE 80005-3 • Circuit breaker and required protections equipments and HMI/Scada
- Ship-to-shore cable reel (optional tailored per case)

### MV Solution

- Input Transformer 6kV/11kV
- MV electrical distribution unit
- 50Hz/60Hz ShoreMaster-DS Frequency Converter
- Output Transformer
- MV Electrical Distribution
- Circuit breaker and required protections
- Control equipments and HMI/Scada
- Ship-to-shore cable reel (optional tailored per case)



# Shore-To-Ship Connection With ShoreMaster

EnSmart Power offers a complete distribution and energy management solution in a single plug-and-play package designed to meet the specific power requirements of ports and ships with scalable up to 8MW in 50Hz - 60Hz output with LV and MV power distribution options.

## Highly Efficient, Advanced Power Design

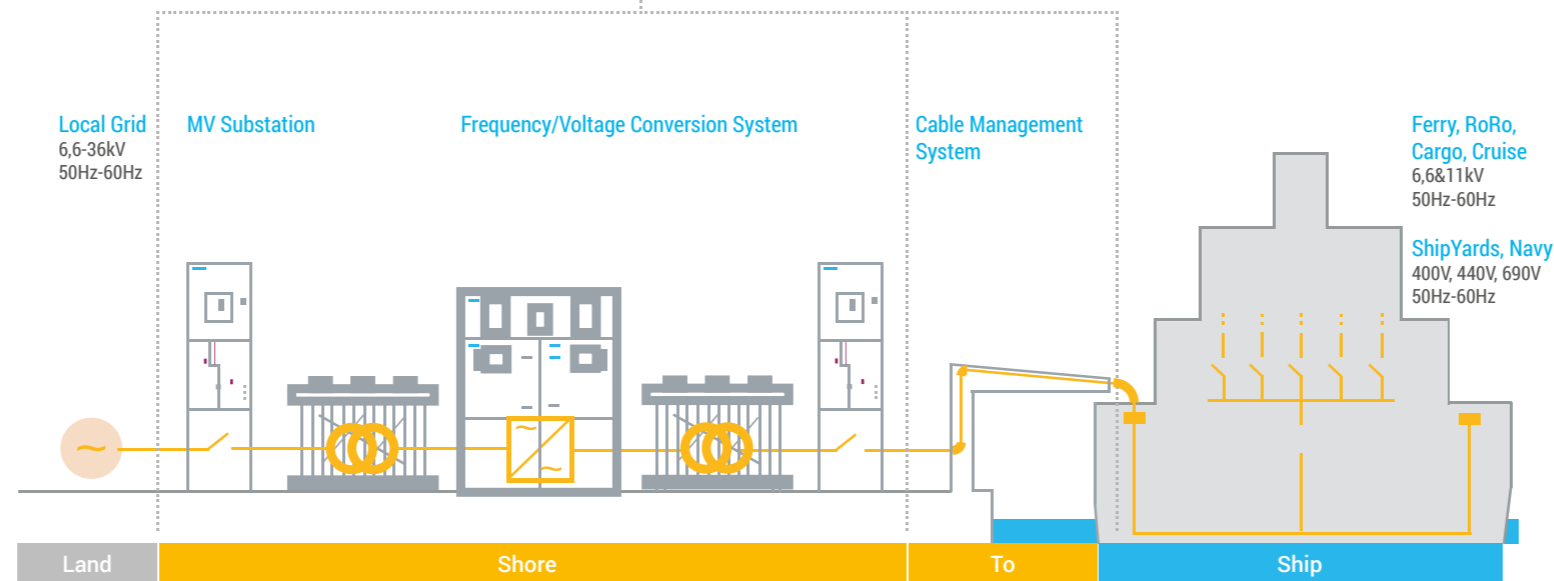
- Less energy consumption to supply the loads thanks to high efficiency up to 96%.
- IGBT based PFC technology provides input power factor close to 1 ( $\geq 0,99$ ) and leads to reduced electricity pay-out, minimizes cable, investment cost.
- Low input current total harmonic distortion (THDi) less than 3% helps to avoid the disturbance and expensive harmonic filters.

## High Reliability

- High Quality components
- Tested, Approved, Documented
- Compliant with IEC 80005 international standard
- Marine and Offshore Certified

## Scalable and Flexible

- Can be installed in parallel for power increase and redundancy
- Can be easily relocated at berth
- Frequency Converter can be Modular or Stand Alone
- Can be built in 20ft, 40ft Containers or HVAC IP65
- Enclosure with various configurations



## Benefits for ports:

- Reduce pollution in coastal areas
- Improve working conditions
- Have a new source of revenue

## Benefits for vessels:

- Reduce fuel costs, where electricity is less expensive than the bunkering fuel to use
- Reduce auxiliary engines maintenance costs and increase their life time
- Benefit from port fees discounts
- Meet regulations



## Frequency Converter Standard Features

- IGBT Rectifier and Inverter Technology
- Output Power Factor 0.9 (Optional1)
- DSP Control
- Ultra High Efficiency up to 96%
- Low Input Current THD (<3%)
- High Input Power Factor (>0,99)
- Frequency Range 40-70Hz
- Auto- Ranging /Multi-Voltage Input (180-520V)
- Seamless Power Transfer Between Converter and Generator
- RFI protection to prevent on board and shore supply disturbances
- Overload and Short Circuit Protection
- Paralell Operation (Up to 8)
- 1000 Real Time Event Log With Detailed Parameters

- Front Access for Easy Maintenance
- Advanced User Interface
- Excellent Generator Compability
- EPO (Emergency Shutdown)
- Galvanic Isolation
- Auto Restart
- Short MTTR (Average Repair Period)
- Backfeed Protection

## Options

- Output Power Factor 1
- Reactor Transformer (Capacitive Kit)
- Manual Maintenance ByPass
- 115V , 690V 50-60Hz Output Voltage
- Horizontal Enclosure Design
- Remote Panel
- Dry Contact, SNMP Card



## Benefits for Ports and Vessels



**Reduced Fuel Costs**  
For Vessels, shore power is less expensive than fuel



**New Source of Revenue**  
For Ports Shore Power create a new revenue



**Better Working Conditions**  
No Noise  
No Vibration



**Reduced Maintenance Costs**  
For Vessels, engine maintenance costs reduced



**Reduces Pollution**  
Less emissions and air pollution at coastal area