


## ZENORO HYBRID MARINE GENERATOR


### 6090SFM85 Variable Speed Marine Generator Set

209 - 230 ekW / 1200 - 2000 rpm

**Model: ZAJDRA230VHESE**


**DIMENSIONS**  
 2380 x 1340 x 1160 mm 

**WEIGHT**  
 dry weight 2125 kg 

**SOUND REDUCTION**  
 equal or > than 20 dB(A) at  
 1 meter free field conditions 


**VIBRATIONS**  
 low 



 **POWER**  
 209 - 230 ekW

 **EMISSION**  
 IMO II / IMO III optional

 **COLOURS**  
 RAL 9010 or custom

 **ENCLOSURE**  
 aluminium modular design

#### GENERATOR RATINGS PRIME

Variable speed 1200 - 2000 rpm  
 100% power 209 ekW (rated genset power output)  
 110% power 230 ekW (overload, unlimited)

#### JOHN DEERE ENGINE SPECIFICATION

##### INLINE 6 CYLINDERS, 4 CYCLE-DIESEL

Engine type	6090SFM85
Prime Power	242 kWm
Emissions	IMO Tier II, EPA Tier III
Firing order	1-5-3-6-2-4
Displacement	9.0 L (549 cu. in.)
Rated engine speed	2000 rpm
Bore	118.4 mm (4.66 in.)
Stroke	136 mm (5.35 in.)
Aspiration	Turbocharged-aftercooled
Combustion	Direct injection
Governor	Electronic
Cooling system	Heat exchanged
Refill capacity	
- Cooling system	30 L (7.9 US GAL)
- Lube oil system	31 L (8.19 US GAL)
Coolant change interval	Up to six years or 6000 hours of operation with John Deere COOL-GARD™ II Premix, COOL-GARD II PG Premix and COOL-GARD II Concentrate
Oil change interval	Up to 500 hours with John Deere Plus-50 II Oil & use of Low Sulphur fuel < 1000 ppm
Rotation (from flywheel end)	Counter clockwise
Engine crankcase ventilation system	Closed to eliminate room contamination

#### COOLING SYSTEM

Seawater pump	Gear driven
Max. seawater pump suction lift	3.0 m (10 ft)
Seawater pump flow	295 L/m (78 US GAL/m)
Seawater temp maximum engine in	32 °C
Ambient temperature max.	50 °C

#### FUEL

Fuel recommended	EN 590 or ASTM D975
Fuel injection system	HPCR
Recommended fuel line Inside diameter	9 mm
Max. fuel inlet restriction	20 kPa
Total fuel flow	251 L/hr
Maximum fuel height above transfer pump	2.4 m
Fuel pre-filter yard supply	Min. 30 micron, recom. 10 micron

#### OPERATION REQUIREMENTS

##### AIR REQUIREMENTS

Engine combustion air restriction(dirty)	22 m³/min max air intake
Ventilation air flow required	6.25 kPa
Exhaust flow	42 m³/min
Exhaust temperature	51.5 m³/min
Maximum exhaust backpressure	460 °C
	7.5 kPa

##### FUEL CONSUMPTION

Diesel fuel at 100% load	63.2 L/hr
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All above values at rated speed and power at standard conditions per SAE J1995 unless otherwise noted.

#### ENGINE ELECTRICAL

Battery voltage	24 volt isolated ground
Battery charging	100 amps
Battery recommendation	Min. 24V@32 °F (0 °C) 750 amps

## ZENORO STANDARD FEATURES

- Engine marine white painted
- Single service side (oil filter, fuel filter & air filter)
- Double walled fuel lines + leak detection
- Steel foundation frame to support engine & electrical machine
- Integrated electrical ventilation fan
- Double pass air intake & outlet muffler boxes
- Approved vibration isolators
- Wet elbow through enclosure
- Emergency button
- ABS classification, other classification societies by option

## STANDARD ENGINE SAFETY SYSTEM

- Engine oil pressure low warning & shutdown
- Engine coolant temperature high warning & shutdown
- Engine coolant level low warning
- Wet exhaust elbow temperature high warning & shutdown
- Fuel oil leakage from double walled fuel lines warning
- Over speed shutdown
- Belt guard

## STANDARD INTERCONNECTIONS

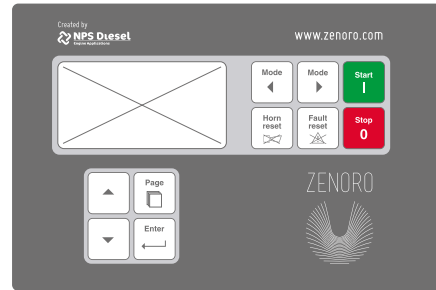
- Fuel connections, fuel inlet/outlet
- Seawater inlet pipe hose connection
- Seawater outlet via wet elbow
- Oil drain
- Opening for electrical machine leads
- Opening for battery cables

## STANDARD HIGH QUALITY HEAVY DUTY SOUND ENCLOSURE

- High quality modular sound enclosure with aluminium extrusion profiles
- RAL 9010 standard color , 2 layers powder coating, 70% gloss, minimum total layer thickness 120 micron measured according ISO 2808
- Easy built up & dismantle
- Heavy duty service panels, easily removable
- Non-combustible insulation material according IMO (oil & vapour proof)

## ENGINE CONTROLLER PLATFORM FEATURES

- Certified marine engine controller with redundant microprocessor based control for complete engine protection and control certified marine engine



## DISPLAY / USER INTERFACE

- Graphic 128 × 64 pixels display
- 2 languages, user changeable from PC; default English
- Buttons with mechanical feedback

## COMMUNICATION INTERFACES

- Generator ready to start (pot. free contact)
- Engine running (pot. free contact)
- Common warning (pot. free contact)
- Common shutdown (pot. free contact)
- External variable speed setpoint command
- Modbus (RS 232)

## ENGINE CONTROL & PARAMETERS

- Engine fault code descriptions and codes
- Black out start, 3 start attempts
- Remote start & stop

Engine parameters are visualized on display and/or Modbus RS 232 as:

- |                        |                       |
|------------------------|-----------------------|
| - Engine running hours | - Engine status       |
| - Oil pressure         | - Coolant temperature |
| - Rpm                  | - Engine load %       |
| - Battery voltage      | - Fuel consumption    |

## HISTORY LOGS

- Event based history (200 records)
- Reason, date and time + all important values are stored
- Battery backed-up RTC

### PERMANENT MAGNET MACHINE

Manufacturer	Randax
Pole number	8
Back-emf Voltage	433 V @ 2000 rpm
Rated Current	314 amps
Winding connection	Delta inside
Efficiency	up to 97%
Min. PWM converter freq.	3 kHz
Coolant flow	12 L/min
Max. coolant temperature	45 °C
Insulation Class	H
Bearing	Double bearing design
Coupling	Flexible coupling
IP	55
Space heater*	2 x 65 W

\*To be connected by yard

### PERMANENT MAGNET MACHINE FEATURES

- Water cooled
- Interior Permanent Magnet design
- High efficiency
- Compact & low weight
- One insulated bearing and grounded shaft
- Pt100 temperature sensor and 2 x PTC thermistor per winding
- Configurable as one 3 phase winding or two galvanically separated 3 phase windings
- Permanently greased bearings

### GENERAL

- Plastic wrap packing
- Manuals supplied in cd rom format with instruction, Operation and Maintenance Manual (in PDF format only)
- Factory Quality Report

### OPTIONAL

- Dry exhaust + exhaust compensator with exhaust insulation
- Drip pan underneath oil & fuel filter(s)
- Engine coolant level low warning by Murphy gauge
- Engine oil temperature sensor warning & display
- Duplex fuel oil filter switchable
- Engine oil drain with hose & hand pump
- Sea water flow sensor
- Modbus converter for RS 485 protocol
- Optional Internet/Ethernet connection for remote monitoring
- Electric cable penetrations with Roxtec
- Outside muffler & water separator
- Other classification societies as Lloyds, GL-DNV, RINA
- Unit certificates for certain notations
- Manuals in hard copy format
- Electrical machine fitted with resolver or encoder
- Other electrical machine winding configuration to match different DC bus voltage level
- Integrated electrical machine cooling system with sea water heat exchanger

### OPTIONAL EXHAUST AFTERTREATMENT SYSTEM

- XEAMOS DPF Soot filter with electrical or fuel burner regeneration
- IMO Tier III compliant emissions with XEAMOS SCR (Selective Catalytic Reduction) system or combined SCR & DPF system

### REFERENCE CONDITIONS

- Rated speed and power
- Gross Power guaranteed within +/-5% at SAE J1995 and ISO3046
- J1995 and ISO 1346 conditions:
  - 25 °C (77 °F) air inlet temperature
  - 99 kPa (29.31 in. Hg) barometric pressure
  - 40 °C (104 °F) fuel inlet temperature
  - 0.853 fuel specific gravity @ 15 °C (60 °F)

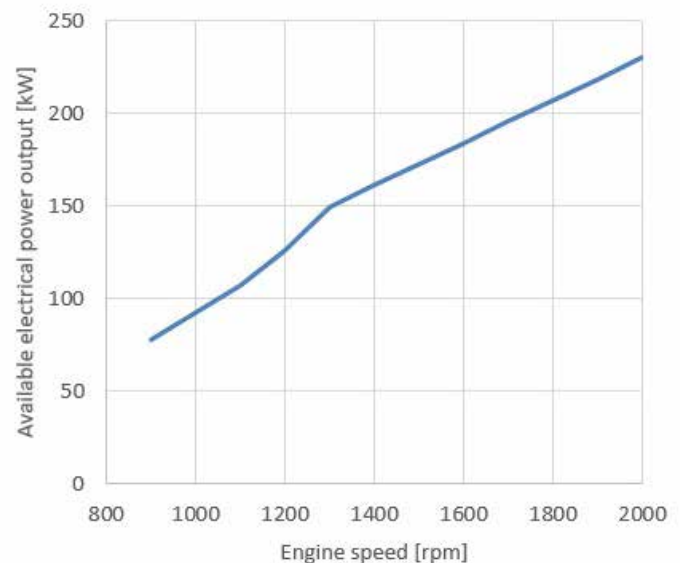
Ambient air temperature is defined to be the temperature of ambient air close to operating vessel that is not influenced at any manner by operating characteristics of the vessel (free field temperature).

All values from current available data. Subject to manufacturing and measurement variations and to change without notice. Actual performance is subject to application and operation conditions outside of Zenoro control.

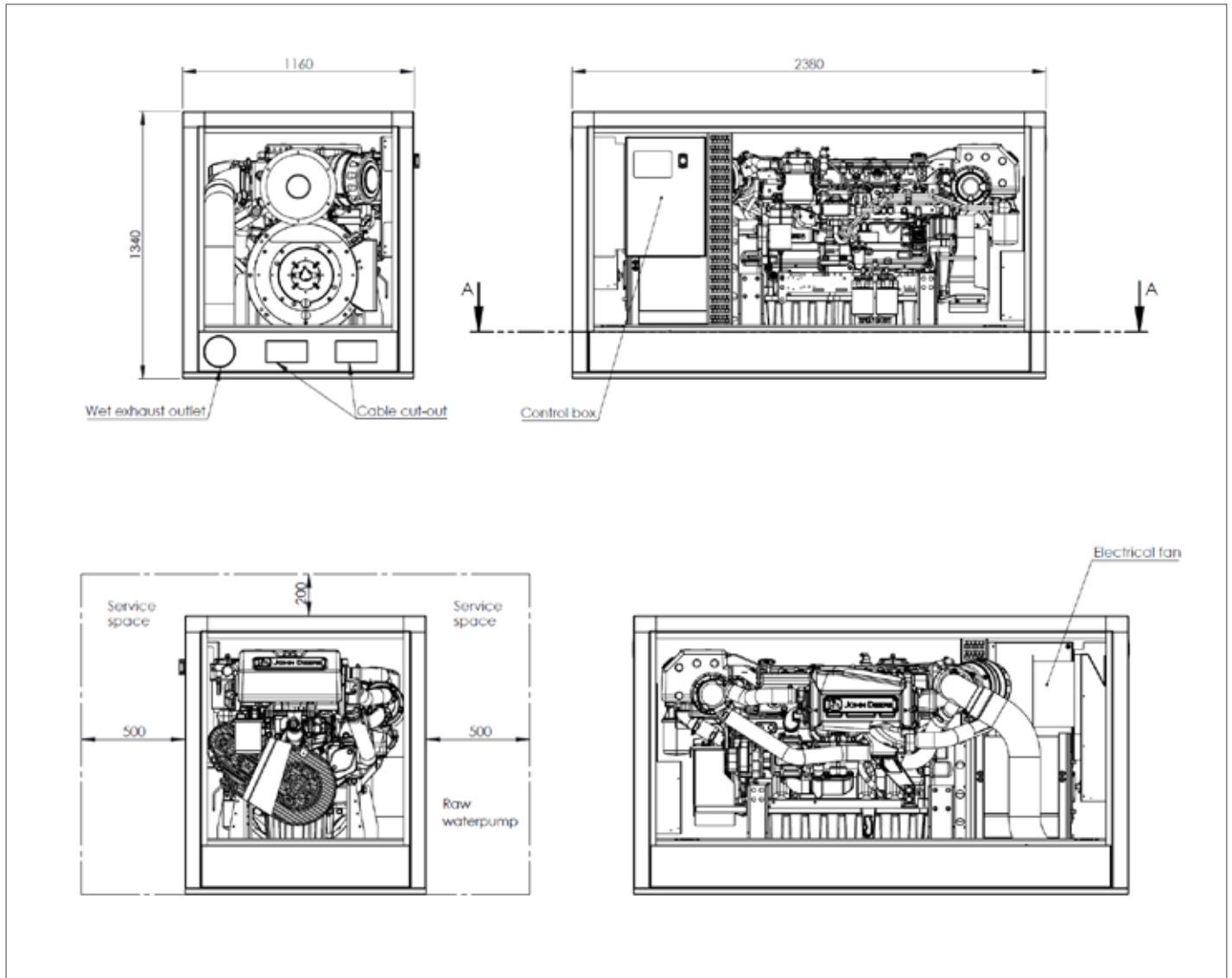
### RATINGS

6090SFM85 Rating for Hybrid Vessels. This variable speed rating allows usage of 2500 hours per year, with an average load factor of 75% or less with respect to the rated genset power output. Engine is certified according to ISO 8178 C1 and E3 test cycles.

This rating is ideal for hybrid vessels that require a variable-speed generator drive engine to develop electrical power for any combination of electric propulsion, energy storage, hotel load, and auxiliary electric loads.



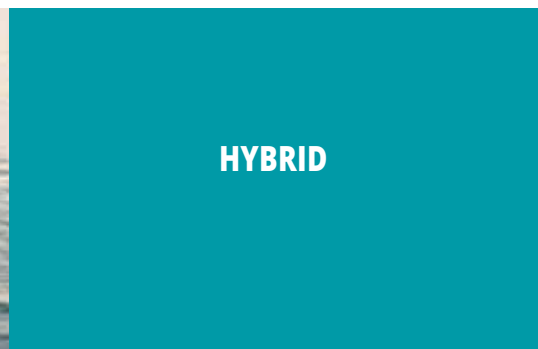
## DIMENSIONS



NOTE: Generator sets to be installed above waterline. If not consult factory. Minimum space required to remove air panels 150 mm, non air panels 80 mm. This drawing is provided for reference only and is not intended for installation purpose. Contact us either your local distributor for detailed information.

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**HYBRID**