Siemens SISHIP\textsuperscript{CIS}
Completely Integrated Solution

ECOPROP
Hybrid solutions for small and pleasure crafts
Siemens ECOPROP
Dimensions & Weights are not a problem anymore

Industrial Products
SISHIP DRIVE LV

Automotive Products
SISHIP ECO PROP

Meters  Tons  →  Centimeters  Kilograms

Drastic reduction of weights and spaces!
ECOPROP Modular Components
Motor/Generator & Frequency Converter

Motor/Generator 135 kW
Dimensions (Lx Ø): 560 x 245 mm.
Weight: 120 kg

Motor/Generator 180 kW
Dimensions (Lx Ø): 560 x 310 mm.
Weight: 180 kg

Dimensions: 495 x 415 x 180 mm
Weight: Approx. 25 kg
Power: Max. 320 kVA

Modularity = Engineering costs reduction
Diesel-Electric series: Riverquest (USA)
Inland water passenger vessel – two shaft lines

2 x 200 kW DE Propulsion
Diesel-Electric series: Wally 164 (ITL)
164ft. Carbon Fiber Sailing Yacht – two shaft lines

2 x 250 kW DE Propulsion
Diesel-Electric series: Grave (NL)
40m. Car Ferry - four azimuth thrusters

4 x 120 kW DE Propulsion
Diesel-Electric series: Shiptec (CH)
50m. Cruise Ship – two shaft lines

2 x 180 kW DE Propulsion
SISHIP ECO PROP
Diesel- Electric System - Parallel - BASIC

- Permanent magnet 180kW Motor / Shaft generator
- Clean power filter Cabinet
Diesel-Electric parallel: Cantieri Megaride (ITL)
65m Supply Vessel – Italian Coast Guard

2 x 180 kW Hybrid Propulsion
Diesel-Electric parallel: Cantieri Palumbo (ITL)
36m Motor-yacht – Columbus 130 Sport Hybrid

2 x 60 kW Hybrid Propulsion
**SISHIP ECO PROP**

Diesel- Electric System - Parallel - ADVANCE

- **Diesel Genset**
- **Variable frequency Permanent magnet 180kW generator**
- **Main Diesel Engine**
- **Permanent magnet 180kW Motor / Shaft generator**
- **50kW Ship Services 400V, 3Ph, 50Hz**
- **Variable Voltage DC Bus Switchboard**

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Diesel-Electric parallel: Kingship Green Voyager (HK)
45m M/Y – RINA Green Star Plus
Diesel-Electric parallel: #yard confidential#
39m. M/Y with Lithium Batteries
Diesel-Electric parallel: #confidential#  
39m. M/Y engine room
Thank you very much for your attention.

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Experience

MAN Fuel Cell Bus II, 12/01
SBETI, 30ft Battery Bus, 06/02
FEYS, Diesel-electric Yachts,

Battery Bus with Inductive Charging, 09/02
BMB 10m Hybrid Bus Aosta (ITL)
ISE, 40ft Hybrid Bus for New Jersey
ISE, 40ft Gasoline Hybrid Bus

Van Carrier
MAN, Fuel Cell Hybrid Bus
Purolator, Hybrid Delivery Truck
ISE, 40ft HICE Hybrid Bus
Mech. Integration of a Diesel-Electric Propulsion
E-Motor free-standing coupled with azimuth thruster
Mech. Integration of a Diesel-Electric Propulsion Series Group: Gearbox with two E-Motors

EcoProp propulsion unit
270 kW
Mech. Integration of a Diesel-Electric Propulsion ZF Gearbox with E-Motor on the PTI

Foto da ZF News, ed. 02.2008
Operating Profiles: cases (1)

E-Mode - Electrical
- Generators ON
- Drive Motors ON
- Prime Movers OFF
- Recharge Batteries
- Supplying hotel load

D-Mode - Diesel
- Generators OFF
- Prime Movers ON
- Shaft Generators ON
- Recharge Batteries
- Supplying hotel load
Operating Profiles: cases (2)

Z-Mode – Zero Emissions
- Generators OFF
- Use Batteries
- Drive Motors ON
- Prime Movers OFF
- Supplying hotel load

B-Mode - Booster
- Generators ON
- Prime Movers ON
- Drive Motors ON
- Recharge Batteries
- Supplying hotel load
## 10.2.2 Technical data Generator / Motor

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>1FV5168</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>Siemens</td>
</tr>
<tr>
<td>Shaft power</td>
<td>200 kW</td>
</tr>
<tr>
<td>Rated voltage</td>
<td>max: 750 V, 3 phase</td>
</tr>
<tr>
<td>Rated frequency</td>
<td>max 400 Hz</td>
</tr>
<tr>
<td>Rated current</td>
<td>265 A max 360 A</td>
</tr>
<tr>
<td>Rated speed</td>
<td>4000 rpm</td>
</tr>
<tr>
<td>Field weakening</td>
<td>possible</td>
</tr>
<tr>
<td>Rotation</td>
<td>ccw &amp; cw</td>
</tr>
<tr>
<td>Service rating</td>
<td>S1 (continuous)</td>
</tr>
<tr>
<td>Cooling method</td>
<td>water-cooled</td>
</tr>
<tr>
<td>Cooling medium</td>
<td>freshwater, glycol 50%/50% mixture</td>
</tr>
<tr>
<td>Cooling medium temperature</td>
<td>max. 55°C</td>
</tr>
<tr>
<td>Type of construction</td>
<td>IM B9 (horizontal)</td>
</tr>
<tr>
<td>Type of protection</td>
<td>IP 65</td>
</tr>
<tr>
<td>Surface sound-pressure level</td>
<td>max. 75db(A)</td>
</tr>
<tr>
<td>Insulation class</td>
<td>F</td>
</tr>
<tr>
<td>Temperature rise</td>
<td>F</td>
</tr>
<tr>
<td>Ambient temperature:</td>
<td>-30°C- 50°C</td>
</tr>
<tr>
<td>Bearings</td>
<td>ball bearing</td>
</tr>
<tr>
<td>Moment of rotor inertia</td>
<td>0.090 kg m2</td>
</tr>
<tr>
<td>Dimensions (L x W x H) approx.</td>
<td>560x310x310 mm</td>
</tr>
<tr>
<td>Weight approx.</td>
<td>180 kg</td>
</tr>
</tbody>
</table>
## 10.3.1 Technical data

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td>ELFA MONO Inverter A5E00468614</td>
</tr>
<tr>
<td><strong>Manufacturer</strong></td>
<td>Siemens</td>
</tr>
<tr>
<td><strong>Power</strong></td>
<td>250 kVA</td>
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<tr>
<td><strong>Rated voltage DC</strong></td>
<td>750 V DC</td>
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<tr>
<td><strong>Operating voltage</strong></td>
<td>300 V – 750 V</td>
</tr>
<tr>
<td><strong>Rated current Inverter</strong></td>
<td>250A</td>
</tr>
<tr>
<td><strong>Rated power inverter (650V)</strong></td>
<td>200 kVA</td>
</tr>
<tr>
<td><strong>Max. current Inverter (10s)</strong></td>
<td>350 A</td>
</tr>
<tr>
<td><strong>Max. power (750V, 350A)</strong></td>
<td>320 kVA</td>
</tr>
<tr>
<td><strong>Switching frequency inverter</strong></td>
<td>2 – 6 kHz</td>
</tr>
<tr>
<td><strong>Rated Current</strong></td>
<td>1 x 150A (@ 6 kHz)</td>
</tr>
<tr>
<td><strong>Chopper or DCDC</strong></td>
<td>1 x 250A (@ 0 kHz)</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>30 kg</td>
</tr>
</tbody>
</table>

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ELFA Mono 250kVA Frequency Converter

Electrical diagram

- Rated power: 250 kVA
- Speed range: 0 - 5000 rpm
- Main supply voltage: variable, 3-phase, variable frequency
- Load torque characteristic: $T = n^2$

Diagram showing the electrical connections of the converter, including components like Inverter, Voltage DC link, PWM inverter, and Braking controller.
Controller Area Network = CAN-bus
- Field bus multicast (Robert Bosch GmbH)
- High EMC characteristics
- Transmission line similar to the RS485 (balanced)
- Bit-rate until 1 Mbit/s for networks smaller than 40 m.
- Higher distances at lower bitrates (125 kbit/s - 500 m)