

Static Inverter for Naval Applications



The fully solid-state 60 Hz and 400 Hz Inverter is built according to most advanced technology. Unique design with modular configuration covers versatile applications with shipborne operation.

The Inverter is built-up by the following main assemblies:

- EMC unit for input and output leads
- Input unit (contactors/filter)
- Power bridges
- Control electronic with monitoring
- Output transformer with filter

The Inverter is controlled by central electronic with synthetic sine wave generation and monitoring device, feeding several power bridges acc. to required power rating. The DC-voltage is separated into phase-shifted PWM-signals by power

transistor switches, while each power transistor is switched by multi-pulse-train which contains the synthetic sine. With this multi-pulse technique a very fast response to any load step or input voltage step is achieved within one half cycle.

Further smoothing of switched sine curve is achieved by small L/C filter network. Voltage matching and galvanic separation is achieved by special low noise output transformer. For suppression of radiated and conducted emission the equipment is fitted with specially designed

EMC devices. The Built-In Test Equipment (BITE) is realized by integrated fault detection and location system.

Outstanding features like high efficiency, low noise, modular design, paralleling or no-break operation and easy maintenance makes this Inverter the most useful Power Conversion Equipment for any critical load.

The inverter fulfills all applicable NATO and MIL-STDs and is fully qualified for extreme load and network requirements.



Inverter 20 kVA, 3-phase, 60 and 400 Hz

For Submarine Type 209

Standard Features

- High efficiency
- Low noise
- High reliability
- Modular design

Application

- U 209 rotating inverter replacement

Support Service

- Complete Integrated Logistic Support (ILS)



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Electrical Specifications

Input

Voltage 160 V to 330 VDC

Output

Power 20 kVA/kW

Overload 30% for 2 min.

Power factor 0.8 to 1

Voltage 115 V, 3-phase, delta

Static tolerance + 0.5 %

Max. voltage

Unbalance + 2 % at up to 100 % unbalanced load

Voltage modulation 0.5 %

Voltage transient $\leq 5\%$ at 50-100-50 % loadstep
 $\leq 16\%$ at 0-100-0 % loadstep

Recovery time max. 100 ms (60Hz)
max. 20 ms (400Hz)

THD $\leq 3\%$

Frequency 60 and 400 Hz

Frequency tolerance $\pm 0.01\%$

Efficiency see diagram

Short circuit current 2 x Inom.

Environmental Specifications

Temperature Range 0° C to 65° C

Storage Temperature -20° C to +70° C

Humidity up to 95 %

Shock Acc. to BV 043

RFI/EMI MIL-STD 461 E

RE 102, CE 101, CE 102

Noise < 55 dB(A)

Insulation Class acc. to VDE 0160

Protection IP 23 acc. to DIN 40050

Physical characteristics:

Dimensions Depth 730 mm

Width 630 mm

Height 420 mm

Weight 304 kg (60 Hz)

260 kg (400 Hz)

Design Characteristics

Design Modular

MTBF > 25,000 h

Components US MIL-STD, German Federal
Navy Standard, as far as available

Cooling Air-cooling by fans up to 55° C
Water-cooling at > 55° C

Self-control system FDL-System
(Fault Detection and Location)

External Monitoring

- Voltmeter/Ammeter with phase selector
- Time Counter
- Stand-by mode
- Inverter ON-LINE
- Overtemperature
- Input voltage
- Input temperature
- Cooling air control
- Fault detection and location display

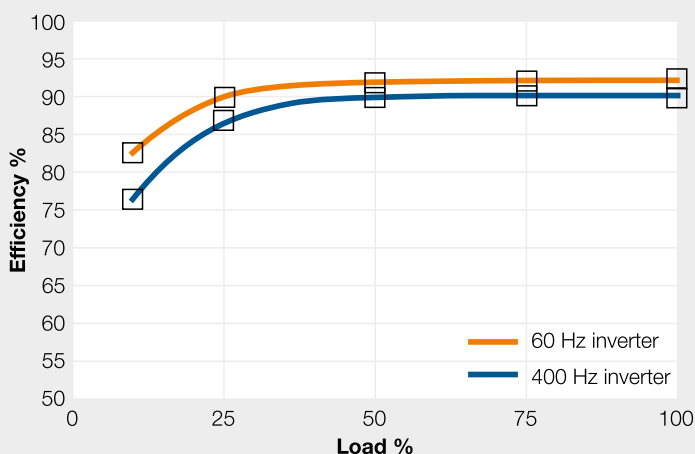
Control

- ON/OFF
- Emergency

Indication

- Present input voltage
- Inverter ON-LINE
- Inverter fault
- Overtemperature
- General fault

Static Inverter 20 kVA efficiency



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