



## Reliable and durable electrical energy systems by Jenoptik.

State-of-the-art and proven successful in both national and international applications.

All Jenoptik energy systems supply platforms with steady electricity in precisely the form in which it is required. Power, capacity, voltage, current, and frequency are all optimally tuned to the particular customer’s requirements in question – including innovative high-voltage consumers such as weapon stabilization or future electric armour and laser weapons. To achieve this, we offer tried and true state-of-the-art products – proven successful in both national and international applications. When used in the particular vehicle in question, our subsystems, such as generator sets, alternators, power electronics, or electrical components, are optimally tuned to one another and enable the energy for the platform to be managed intelligently and extremely efficiently.

Through our research and development at Jenoptik, we have come up with both customized complete systems and system solutions, as well as standardized subsystems and components. The latter are designed to be flexible enough to enable us to adapt them in line with all of your requirements with the least effort possible. Our system meets high voltage safety requirements using a fault-tolerant IT-system. This allows you to modernize your fleet at lower cost and enhance the level of performance and availability offered by your vehicles. All newly developed systems are subjected to a rigorous process of testing and optimization in a “hardware-in-

the-loop” (HiL) simulation, in which we replicate the real-world environment. By taking this approach, you obtain a customized energy system that precisely meets your requirements within the shortest of time frames and offers you true added value. And you get fuel-saving solutions that support hybrid functionality, as well.

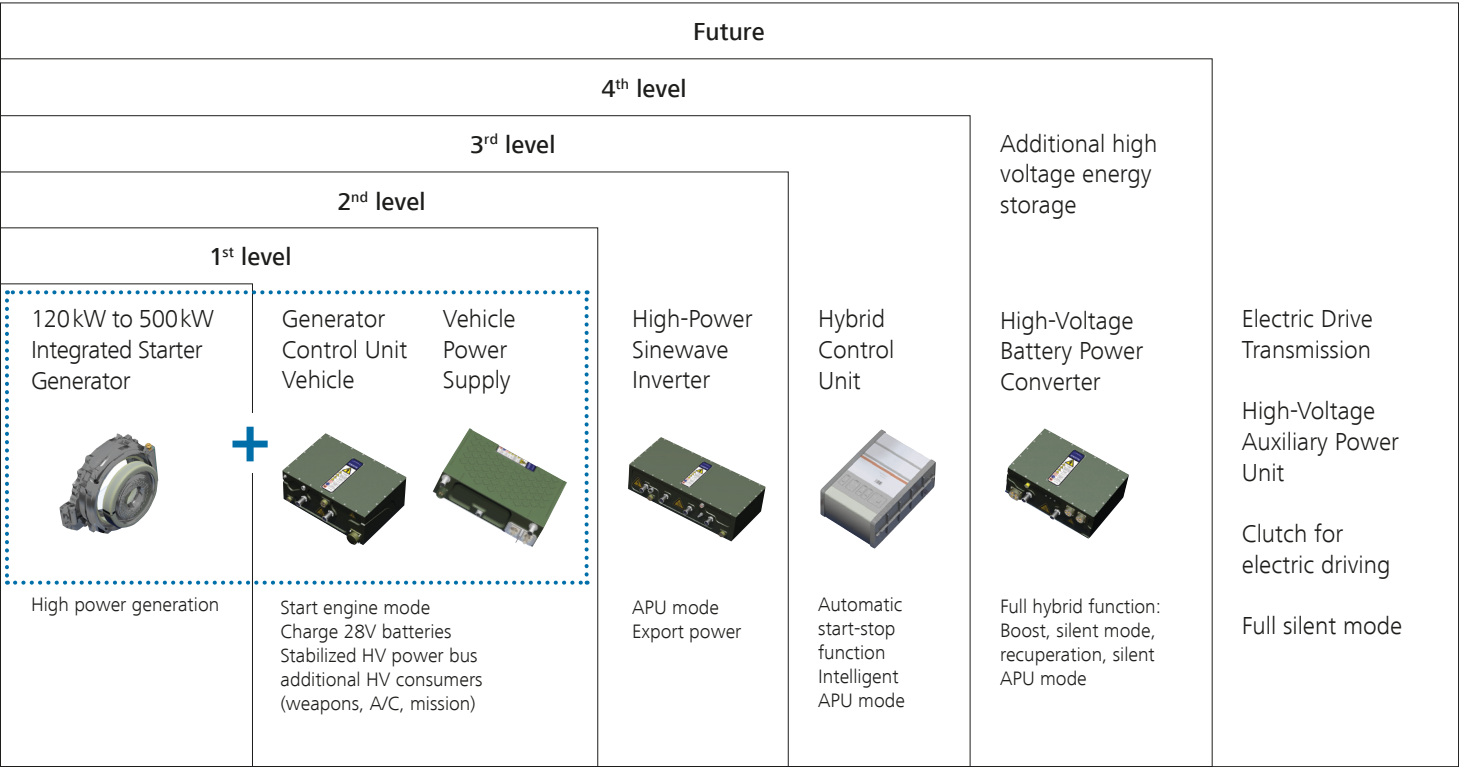
### The benefits speak for themselves:

- **Reduced life-cycle cost:** Maximum availability and operability
- **Fuel-saving, yet high power density:** Supports hybrid functionality
- **Easily adaptable to customer needs and flexible updates to existing systems:** Modular construction
- **Reliable:** Maximum availability and operability
- **Flexible:** Updating is a quick and simple process

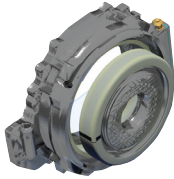
### Fields of application:

- **Security and defense technology:** System houses and procurement organizations
- **Power supply for military platforms:** Ventilation and air conditioning in military vehicles

## Basis system with optional add-ons depending on mission requirements.



## Integrated Starter Generator (ISG)



The Integrated Starter Generator is a permanent magnet-excited flywheel generator with a capacity of 20 kW to 500 kW. It is mounted on the crankshaft between the combustion engine and the transmission without any additional bearings.

### Features:

- High power density
- High efficiency (95%)
- Starter and booster functionality
- Water-cooled
- Can be operated as either an alternator or a motor
- SAE1 flange

### Technical specifications

Nominal DC power @ 2,200 rpm	120 kW
Nominal DC power @ 660 rpm	33 kW
Overload power	132 kW for 5 min / 144 kW for 1 min
Nominal torque	520 Nm
Max. starter torque	650 Nm (at $-46^{\circ}\text{C}$ to $0^{\circ}\text{C}$ for less than 10 s)
Nominal speed	2,200 rpm
Max. speed	3,150 rpm
Coolant temperature	$\leq 75^{\circ}\text{C}$
Operating temperature range	from $-40^{\circ}\text{C}$ to $+110^{\circ}\text{C}$
Ingress protection classification	IP67
Dimensions	Diameter: 490 mm Length: from 155 mm to 320 mm
Total weight	100 kg $\pm 5$
Integration	SAE 1 (with standard adapters SAE 2/3)

## Generator Control Unit



The General Control Unit (GCU) is a bidirectional power converter for generator and motor functionality.

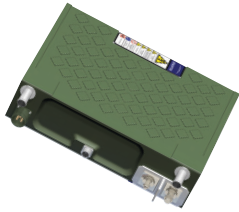
### Features:

- Stabilized 600 V DC / 750 V DC
- Integrated bus power management
- Cascading 120 kW modules
- Isolated network with high-voltage DC breaker
- Water-cooled
- CAN bus interface

### Technical specifications

Nominal electrical power	120 kW @ 750 V @ high-voltage DC interface
DC input voltage range	0 V to 750 V @ high-voltage DC interface (transients up to 850 V)
Nominal DC output voltage	750 V (standard)
Max. DC current	160 A @ high-voltage DC interface
Max. AC input voltage	650 Vrms @ generator AC interface (GCU not active)
Max. AC phase voltage	$3 \times 480 \text{ Vrms}$ @ generator AC interface generated by GCU @ nominal DC voltage
Max. AC phase current	$3 \times 170 \text{ Arms}$ @ generator AC interface
Coolant temperature	$\leq 75^{\circ}\text{C}$ ( $\leq 80^{\circ}\text{C}$ for less than 5 min)
Operating temperature range	from $-40^{\circ}\text{C}$ to $+110^{\circ}\text{C}$ ( $+120^{\circ}\text{C}$ for less than 5 min)
Ingress protection classification	IP67
Dimensions (L $\times$ W $\times$ H)	535 mm $\times$ 356 mm $\times$ 216 mm
Weight	53 kg

## Vehicle Power Supply



The DC/DC converter is a bidirectional and isolated DC converter. It is linked between the high-voltage DC bus (600 V/750 V) and the 28 V network of the vehicle.

### Features:

- Enables the ISG to be used as the engine starter
- Supplies 28 V onboard system
- Galvanically isolated
- High efficiency
- CAN bus interface

### Technical specifications

Nominal DC power	18 kW
Nominal DC output voltage	28 V @ low-voltage DC interface
Nominal current @ low-voltage DC interface	640 A
Nominal DC input voltage	540 V to 800 V @ high-voltage DC interface
DC input voltage range	750 V @ high-voltage DC interface
DC input voltage range with reduced power	450 V to 540 V @ high-voltage DC interface
Coolant temperature	$\leq 75^{\circ}\text{C}$ ( $\leq 80^{\circ}\text{C}$ for less than 5 min)
Coolant flow rate	$\leq 75$ l/min
Operating temperature range	from $-40^{\circ}\text{C}$ to $+110^{\circ}\text{C}$ ( $+120^{\circ}\text{C}$ for less than 5 min)
Ingress protection classification	IP67
Dimensions (L x W x H)	547 mm x 377 mm x 132 mm
Weight	40 kg

## High-Power Sinewave Inverter



The High-Power Sinewave Inverter provides a stable three/ one-phase power system for standard 50 Hz / 60 Hz AC equipment or facilities such as field hospitals or camps.

### Features:

- Grid-forming inverter in the form of a DC/AC converter
- Makes it possible to supply consumers outside the vehicle with power by means of a 230 V / 400 V, 50 Hz or 115 V / 200 V, 60 Hz three-phase voltage grid
- A setup enabling the vehicle to be used as a mobile auxiliary power unit (APU)
- Water-cooled
- CAN bus interface

### Technical specifications

Nominal output	100 kVA (total power @ 400 VAC) at $\cos = 0.8$
Nominal output current	145 A
Nominal voltage	400/230 V AC; (optional 210/120 V AC)
Output	3-phase, 1-phase, SL (isolated network); sinusoidal
Frequency	50 Hz $\pm 1\%$ ; (optional 60 Hz)
DC input voltage	600 V DC – 850 V DC (isolated network required)
Coolant temperature	$\leq 75^{\circ}\text{C}$ ( $\leq 80^{\circ}\text{C}$ for less than 5 min)
Coolant flow rate	$\leq 75$ l/min
Operating temperature range	from $-40^{\circ}\text{C}$ to $+110^{\circ}\text{C}$ ( $+120^{\circ}\text{C}$ for less than 5 min)
Ingress protection classification	IP67
Dimensions (L x W x H)	812 mm x 356 mm x 216 mm
Weight	Approx. 100 kg (incl. EMC filter acc. to MIL-STD-461F)

## High-Voltage Battery Power Converter



The High-Voltage Battery Power Converter is the link between the high-voltage DC bus (e.g. 750 V) and a high-voltage battery (e.g. 350 V) for optimized load flow management in combination with the Battery Management System.

### Features:

- Bidirectional connection to traction battery
- CAN bus interface
- Water-cooled
- Implemented charging characteristics

### Technical specifications

Nominal power	100 kW
Voltage level 1 (HV DC bus)	500–800 V (750 V)
Nominal DC current	134 A @ 750 V DC
Voltage level 2 (HV battery)	200–500 V (350 V)
Nominal DC current	266 A @ 375 V DC
Coolant temperature	≤ 75°C (≤ 80°C for less than 5 min)
Coolant flow rate	≤ 75 l/min
Operating temperature range	from –40°C to +110°C (+120°C for less than 5 min)
Ingress protection classification	IP67
Dimensions (L × W × H)	535 mm × 356 mm × 216 mm
Weight	75 kg

## Hybrid Control Unit



The Hybrid Control Unit is the interface between the vehicle and energy system. It enables power management for hybrid functionalities in combination with high-voltage energy storage.

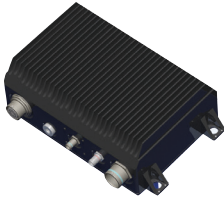
### Features:

- Links all high-voltage components with the vehicle's main engine and transmission to facilitate communication
- Intelligent interaction between all components
- Implements a full range of functions, like the start-stop function and intelligent APU mode
- Air-cooled

### Technical specifications

DC supply voltage range	8V to 32V
Nominal DC supply voltage	24V
Data interfaces	4 CAN bus interfaces 2 RS-232 interfaces 1 Ethernet interface 1 USB interface
Operating temperature range	from –40°C to +80°C
Ingress protection classification	IP66
Dimensions (L × W × H)	185 mm × 158 mm × 70 mm
Weight	1.2 kg

## Motor Control Unit



The motor control unit is used to control the compressor motor for onboard air conditioning systems in vehicles. It is specifically designed for the Jenoptik compressor motor SP 250 2 A.

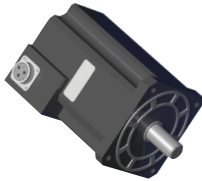
### Features:

- Small size through high DC input voltage
- CAN bus interface
- Integrated test system
- Air-cooled

### Technical specifications

Nominal power at maximum airflow	8.7 kW
DC input voltage range	570 V to 630 V
Nominal DC input voltage	600 V
Nominal AC output voltage	400 V
DC cutoff voltage	500 V
Nominal output frequency	up to 350 Hz
Coolant surface cooling with airflow	0.5 m/s at small load, 2 m/s at full load
Cooling air inlet temperature	$\leq 50^{\circ}\text{C}$ , $\leq 65^{\circ}\text{C}$ for 10 min.
Operating temperature range	from $-40^{\circ}\text{C}$ to $63^{\circ}\text{C}$ (at forced cooling)
Ingress protection classification	IP54
Dimensions (L x W x H)	393 mm x 246 mm x 140 mm
Weight	9 kg

## Auxiliary Drive Motor



The Auxiliary Drive Motor (SP 250 2A) is used for onboard air conditioning systems in vehicles. Although specifically designed for the Air Conditioning Drive Inverter, this motor can be used for other applications as well. The motor is permanent-magnet synchronous.

### Features:

- High efficiency
- Surface-cooled
- Hall sensor position encoder

### Technical specifications

Nominal power	400 W
Nominal voltage	8 kW @ 3,500 rpm
Nominal speed range	500 rpm to 3,500 rpm
Operating temperature range	from $+5^{\circ}\text{C}$ to $+70^{\circ}\text{C}$
Ingress protection classification	IP65
Dimensions (L x W x H)	290 mm x 190 mm x 190 mm
Weight	20 kg