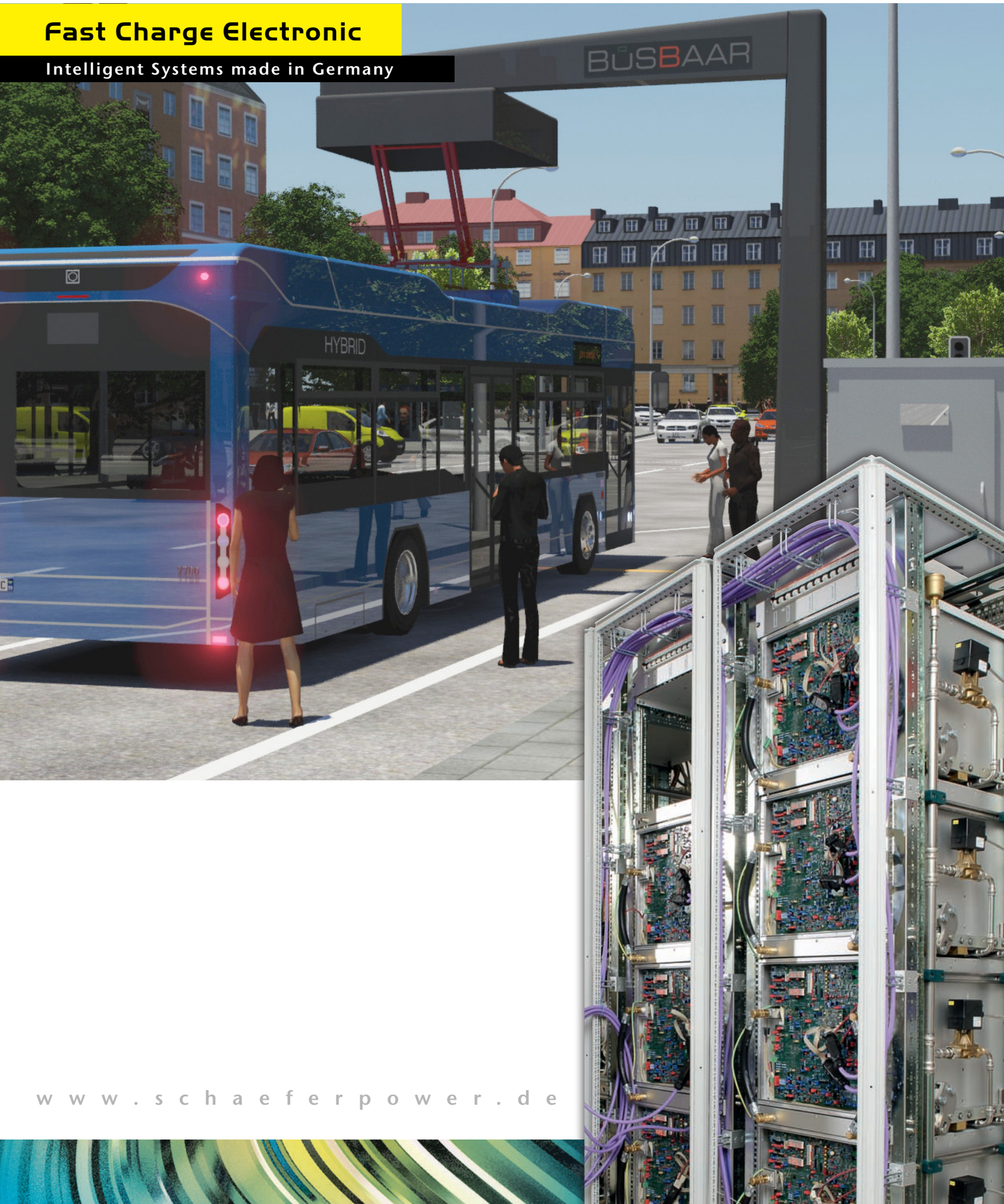


Fast Charge Electronic

Intelligent Systems made in Germany





COMPANY

SCHAEFER with its headquarter in South-Germany, a production facility in Ireland and Sales offices in USA and UAE has grown to a dedicated workforce of 200 people, who oversee the entire concept, design and manufacture of all the SCHAEFER product portfolio. Stemming from more than 40 years experience, SCHAEFER Personnel can tap into a rich resource which can only be gained after detailed and in-depth consultation with Clients.

MANUFACTURE

Immediate proximity also generates the free flowing information path, which is the production and development areas, along with the testing and customer support areas being all under the same roof. This enhances the SCHAEFER Teams ability to react to exacting demands with ease. Fruits of this labour are to be seen throughout the World, in a variety of fields such as:

- Rail & Automotive Industry
- Power Generation Plants
- Oil & Gas Industry
- Chemical Industry
- Industrial Automation & Building Security
- Military Industry

PRODUCTS

It is as a result of this intensive depth of Engineering that the Product Portfolio has been expanded to include

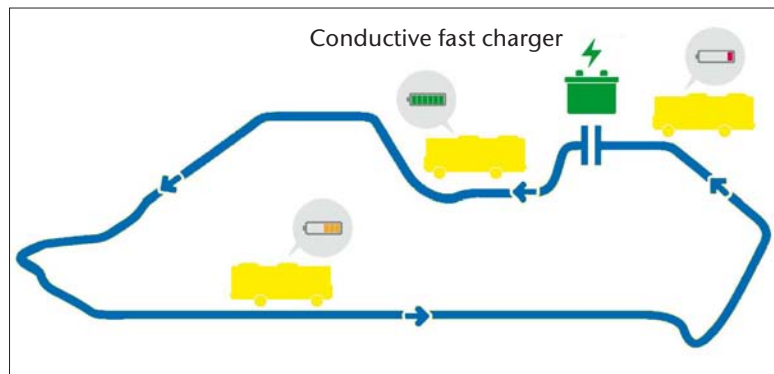
- DC / DC Converters
- AC / DC Rectifiers & Battery Chargers
- DC / AC Inverters – single & three phase
- AC / AC Frequency Converters - single & three phase
- THYRISTOR Controlled Power Supplies & Battery Chargers

Be they stationary or mobile, on shore or off shore, land, air or marine based, environmentally Hazardous area 1, corrosive or simply Industrial, there is always a SCHAEFER Power Solution to fit the parameters.



Zero-emission mobility is no longer a vision. Today's technology enables us to have clean air with electric public transport running all day with fast opportunities charging. Discover SCHAEFER's high power fast charge systems, optimised solutions tailored to the needs and parameters of the Project:

- High power fast charging systems up to 3 MWatts
- Ultra-fast charging within minutes provides excellent availability rates
- Large variety of input voltages, AC or DC up to 2500 VDC
- Output voltages from 0 up to 1000 VDC
- Safe charging process and security functions acc. to IEC 61541-1 / IEC 61851-23 / IEC 61851-24
- Compatible with every BMS, all types of batteries and charging characteristics
- Intelligent battery boosted system to reduce the load applied on the mains
- High efficiency rate $\geq 93\%$
- Power factor $\geq 0,99$ - low mains THDi with active filter option
- Robust construction for extreme environmental conditions
- Operating temperature range from -40°C to $+50^{\circ}\text{C}$
- System Available with Air or liquid cooling
- 7/24h remote monitoring via ethernet
- Individual and innovative solutions designed in cooperation with all involved partners



Intelligent Systems
made in
Germany



300kW ultra fast charge station for electrical busses

Arctic Whisper Fast Charged Hybrid Bus



The 300kW charging station developed by SCHAEFER and OPBRID allows the ultra fast charging in 3-10 min. of Lithium Ion battery on board of the "Arctic Whisper" busses in Umea in the North of Sweden. The Arctic Whisper is billed as the world's first fast charger hybrid bus. The charging station provided by SCHAEFER and OPBRID is located at one end of an Umea bus route and fast charges the bus for a few minutes at the end of each trip:

- 300 KW ultra fast charger
- Modular and expandable power capability
- N+1 redundancy concept:
fully redundant and fault tolerant system
- Safe charging acc. to IEC 61851-23
- Customized AC or DC input up to 2500VDC
- Output voltage from 0 up to 1000VDC
- Use of customized industrial modules
- CAN interface for communication to the bus



Outdoor Ultra-fast Bus Charging Station

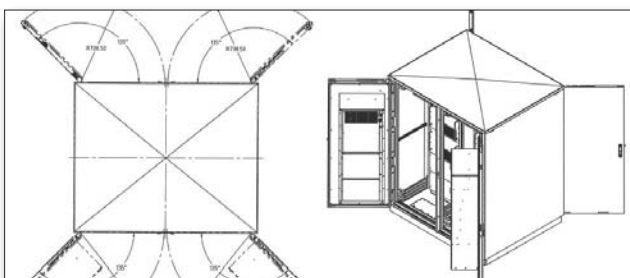
Gothenburg's HyperBus Project



The battery charger system made by SCHAEFER and OPBRID is located in the outdoor area of the city of Gothenburg at each end of the #60 bus route and charges 3 Volvo plug in hybrid busses.

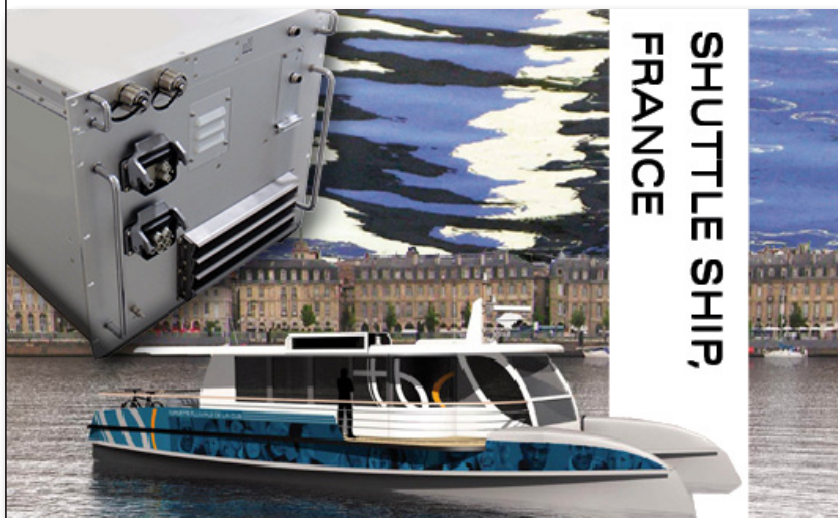
Fuel consumption is reduced by over 80% and the total energy consumption by over 60%. The results of the field tests being conducted in Gothenburg show that Volvo Busses' plug-in hybrid exceed all expectations.

- 120 kW ultra fast chargers on both route ends
- Special output cabinet with double wall structure IP55, vandal proof
- Air or liquid cooling options
- Easy maintenance via a modular design
- Operating temperature from -40°C to +50°C



30kW new hybrid diesel-electric river shuttle in Bordeaux

On-board Li-Ion battery charger



This SCHAEFER battery charger has been developed to charge Lithium Ion Batteries from Saft which will provide efficient and low-emission power for hybrid diesel-electric ferry boats that carry around 200 passengers a year. With this project, we move towards greener transportation methods while each hybrid ferry boat will be equipped with two on board SCHAEFER chargers.

- 30 kW compact unit for on board
- CAN Open communication with a boat controller Master
- CAN bus communication with BMS controller
- Micro processor controlled charging mode: Navigation / Dockside
- Customized mechanic for installation in restricted space and air circulation
- Increased mechanical strength for harsh on board environment



120kW Charger for vessel Sjövägen in Stockholm

On-board battery charger for passenger service



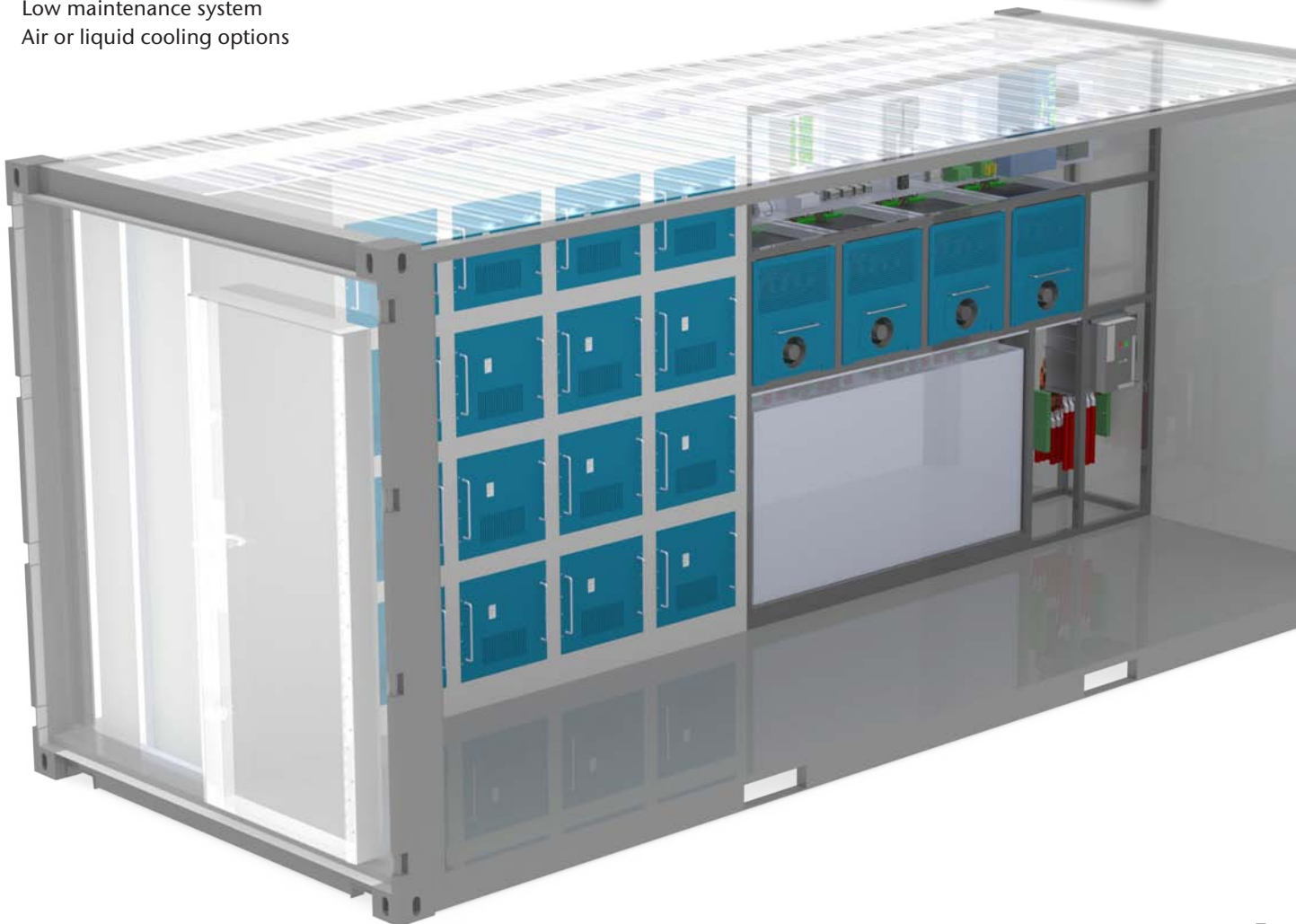
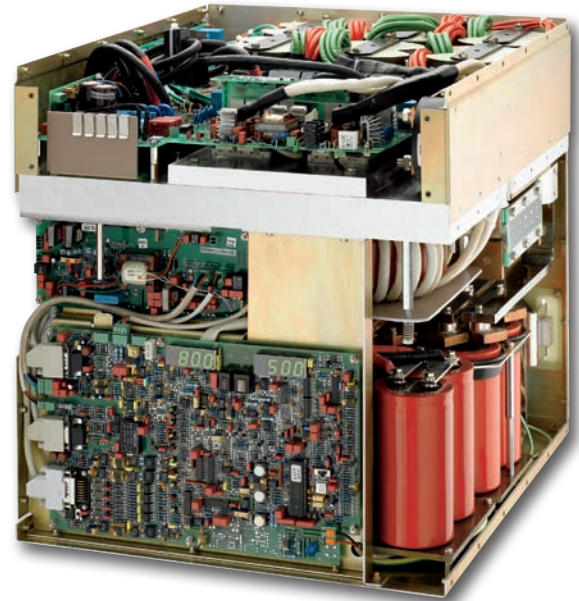
Battery boosted ultra fast-charging system up to 3MW

Innovative high power solution



SCHAEFER is involved in further pilot projects featuring a Zero-emission mobility for public transportation in cities.

- Intelligent battery boosted system to reduce the load applied on the mains
- High power density system up to 3 MW
- High efficiency $\geq 93\%$
- Power factor $\geq 0,99$ and low THDi with optional active filters
- 7/24h remote monitoring system via Ethernet
- Low maintenance system
- Air or liquid cooling options



Milestones



2011



Arctic Whisper project for Umeå, Sweden with first SCHAEFER ultra fast charger. Hybricon wins Elmia Future Transport Award for this project.

2012



Volvo HyperBus Project. Hybricon begins Airport Passenger Service in Umeå with 300kW SCHAEFER Charger and Busbaar V1.

2012



30kW on-board Charger for new hybrid diesel-electric river shuttle service in Bordeaux, France.

2013



120kW Outdoor Charger for rough environmental conditions. Hyperbus Volvo Plug-in Hybrid busses go into passenger service in Gothenburg.

2014



120kW on-board Charger for Vessel Sjövägen Project in Stockholm, Sweden. The vessel begins Passenger Service in September 2014.

2014



Design of 650kW battery boosted ultra fast Charging System reducing the load to the power grid for Umeå, Sweden.

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