



Media information
13 December 2018

Research project “FastCharge”: ultra-fast charging technology ready for the electrically powered vehicles of the future.

Increase in charging capacity to as much as 450 kW – industry consortium develops technology to make charging electric vehicles as fast and convenient as fuelling with petrol.

Jettingen-Scheppach. The industrial companies involved in the research project “FastCharge” yesterday presented the latest advancements in the field of fast and convenient energy supply for electrically powered vehicles. The prototype of a charging station with a capacity of up to 450 kW was inaugurated in Jettingen-Scheppach, Bavaria. At this ultra-fast charging station, electrically powered research vehicles created as part of the project are able to demonstrate charging times of less than three minutes for the first 100 kilometres of range or 15 minutes for a full charge (10-80 % State of Charge (SOC)).

The new charging station can be used free of charge right away and is suitable for electric models of all brands with the Type 2 version of the internationally widespread Combined Charging System (CCS), as is commonly used in Europe.

The research project “FastCharge” is being run by an industry consortium under the leadership of the BMW Group; its other members are Allego GmbH, Phoenix Contact E-Mobility GmbH, Dr. Ing. h. c. F. Porsche AG and Siemens AG.

“FastCharge” is receiving total funding of EUR 7.8 million from the Federal Ministry of Transport and Digital Infrastructure. The implementation of the funding directives is being coordinated by NOW GmbH (National Organisation Hydrogen and Fuel Cell Technology).

Fast and convenient charging will enhance the appeal of electromobility. The increase in charging capacity up to 450 kW – between three and nine times the capacity available at DC fast-charging stations to date – enables a substantial reduction in charging times.

“FastCharge” is investigating the technical requirements that need to be met in

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terms of both vehicles and infrastructure in order to be able to tap into these extremely high charging capacities.

The basis is provided by a high-performance charging infrastructure. The Siemens energy supply system being used in the project enables researchers to test the limits of the fast-charging capacity demonstrated by vehicle batteries. It can already handle higher voltages of up to 920 volts – the level anticipated in future electrically powered vehicles. The system integrates both the high-power electronics for the charging connections as well as the communication interface to the electric vehicles. This charge controller ensures the output is automatically adapted so that different electric cars can be charged using a single infrastructure. The system's flexible, modular architecture permits several vehicles to be charged at the same time. Thanks to high-current, high-voltage charging the system is suitable for a number of different applications, including fleet charging solutions and, as in this case, charging along highways. In order to link the system to the public power grid in Jettingen-Scheppach as part of the project, a charging container was set up with two charging connections: one provides an unprecedented charging capacity of max. 450 kW while the second can deliver up to 175 kW. Both charging stations are now available for use free of charge for all vehicles which are CCS-compatible.

The Allego charging station prototypes now presented use the European Type 2 version of the well-established Combined Charging System (CCS) charging connectors. This standard has already proved successful in numerous electrically powered vehicles and is widely used internationally.

In order to meet the demands of fast charging at high capacity, cooled HPC (High Power Charging) cables made by Phoenix Contact are used, which are fully CCS-compatible. The cooling fluid is an environment-friendly mixture of water and



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glycol, allowing the cooling circuit to be half-open. This makes maintenance comparatively straightforward as compared to hermetically sealed systems that use oil, e.g. in terms of refilling the cooling fluid.

One challenge was ensuring that the cooling hoses in the charging line were not squeezed when connected to the charging station, as would happen with a conventional cable gland. In the present instance this would impair the cooling flow and therefore cooling efficiency. This problem was solved by Phoenix Contact by means of a specially developed wall duct with defined interfaces for power transmission, communication and cooling as well as integrated tension relief.

Depending on the model, the new ultra-fast charging station can be used for vehicles fitted with both 400 V and 800 V battery systems. Its charging capacity automatically adapts to the maximum permitted charging capacity on the vehicle side. The time saved as a result of the increased charging capacities is demonstrated in the example of the BMW i3 research vehicle. A single 10-80 % SOC charging operation now only takes 15 minutes for the high-voltage battery, which has a net capacity of 57 kWh. This can be achieved on the vehicle side by means of a specially developed high-voltage battery combined with an intelligent charging strategy. The latter includes precise preconditioning of the storage temperature at the start of charging, temperature management during the charging operation itself and a perfectly coordinated charging capacity profile over time. The charging operation is carried out via a novel multi-voltage network on the vehicle side using a high-voltage DC/DC (HV-DC/DC) converter, transforming the required 800 V input voltage of the charging station to the lower 400 V system voltage of the BMW i3 research vehicle. The HV-DC/DC system also gives the vehicle reverse compatibility, allowing it to be charged at both old and future charging stations. A key factor in ensuring reliable operation is secure communication between the vehicle and the charging station. For this reason, standardisation issues relating to interoperability are also being investigated and submitted to standardisation bodies.



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The Porsche research vehicle with a net battery capacity of approx. 90 kWh achieves a charging capacity of more than 400 kW, thereby allowing charging times of less than three minutes for the first 100 km of range.

About Allego.

Allego is a leading European operator of charging solutions for electrically powered vehicles with longstanding experience in the area of electromobility, including the creation of a network of fast-charging stations adhering to several standards in Belgium, France, Germany, the Netherlands, Luxembourg and the United Kingdom. Allego collaborates successfully with partners from various sectors in the planning, construction and operation of charging stations. Allego operates more than 10,000 charging points in urban areas and along the main traffic arteries, as well as providing support for companies and drivers of electric vehicles via a cloud-based service platform. This platform encompasses the entire portfolio of practical services such as billing, active monitoring, mobile apps, website portals and analytics. Companies can offer their customers, staff and visitors e-charging solutions worldwide under their own brand.

www.allego.eu

About Phoenix Contact.

Founded in January 2013, Phoenix Contact E-Mobility GmbH has a workforce of more than 200 and is the competence centre within the Phoenix Contact Group for charging technology in the area of electromobility, supplying components and solutions for the charging infrastructure and for electrically powered vehicles. Its product portfolio includes charging cables, charging control units and vehicle inlets for DC and AC charging. With the appropriate software and numerous other components, the Phoenix Contact Group also develops solutions for a high-performance charging infrastructure, including intelligent charging park management. As an innovation leader, the company sets the benchmark in the advancement and worldwide standardisation of modern charging infrastructures suitable for day-to-day use – not least by developing pioneering fast-charging technologies such as High Power Charging so as to contribute to the acceptance and breakthrough of electromobility in modern society.

www.phoenixcontact.com/hpc

About Porsche.

Dr. Ing. h.c. F. Porsche AG with its headquarters in Stuttgart-Zuffenhausen is the world's leading manufacturer of exclusive sports cars.

In 2017 the company supplied some 246,000 new cars to customers all over the world, generating a turnover of EUR 23.5 billion.

Its operating result was EUR 4.1 billion, making Porsche one of the most profitable automotive manufacturers in the world.

Porsche founded the sports car segment more than 50 years ago with the sports car icon 911.

Other model series have since become established in addition with the 718 Boxster, 718 Cayman, Panamera, Macan and Cayenne.

Porsche has also set milestones with its plug-in hybrid drives:



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it was the first manufacturer to use this technology in high-performance sports cars (918 Spyder), exclusive sedans (Panamera S E-Hybrid) and premium off-road vehicles (Cayenne S E-Hybrid).

And in the rolling test lab 919 Hybrid, Porsche worked highly successfully up until 2017 in the LMP1 class of the FIA World Endurance Championship on the technology of the future, which will also be used from 2019 onwards in the first ever purely electrically powered serial-production sports car Taycan. Porsche AG employs a total workforce of approx. 30,000, including 70 subsidiaries worldwide. Its production sites are in Zuffenhausen (911, 718 Boxster, 718 Cayman) and Leipzig (Panamera, Macan).

Development, design and motor racing are based at the Development Centre Weissach.

<https://www.porsche.com/>

About Siemens.

Siemens AG (Berlin and Munich) is a global technology powerhouse that has stood for engineering excellence, innovation, quality, reliability and internationality for more than 170 years. The company is active around the globe, focusing on the areas of electrification, automation and digitalization. One of the largest producers of energy-efficient, resource-saving technologies, Siemens is a leading supplier of efficient power generation and power transmission solutions and a pioneer in infrastructure solutions as well as automation, drive and software solutions for industry. With its publicly listed subsidiary Siemens Healthineers AG, the company is also a leading provider of medical imaging equipment – such as computed tomography and magnetic resonance imaging systems – and a leader in laboratory diagnostics as well as clinical IT. In fiscal 2018, which ended on September 30, 2018, Siemens generated revenue of €83.0 billion and net income of €6.1 billion. At the end of September 2018, the company had around 379,000 employees worldwide. Further information is available on the Internet at www.siemens.com.

About BMW i.

BMW i is a BMW Group brand that stands for networked mobility services, visionary vehicle concepts and a new understanding of premium that draws strongly on the idea of sustainability. BMW i is represented in 74 countries with the models BMW i3 (electrically powered vehicle for urban regions), the BMW i8 (plug-in hybrid sports car) and BMW iPerformance automobiles (all BMW plug-in hybrid vehicles).

BMW i taps into new target groups on behalf of the company as a whole and serves as an incubator for innovations. Once technologies have been successfully applied for the first time to BMW i, they are transferred to the BMW parent brand.

Other business areas associated with BMW i are DriveNow (car sharing), ReachNow (car sharing 2.0), ChargeNow (simple access to the world's largest network of charging stations), ParkNow (simple location, reservation and payment of parking spaces), BMW i Ventures (investment in young companies focusing on urban mobility), BMW Energy (energy services) and the Competence Centre for Urban Mobility (consultation service for municipal authorities).



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