

Delivering
the power
as you need

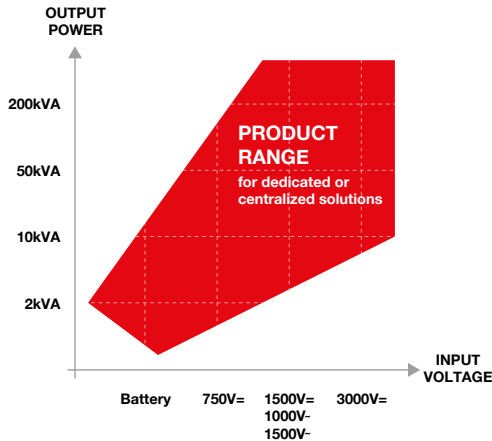
Auxiliary Power Systems



Our know-how at the heart of auxiliaries

REGULATING EXTERNAL FACTORS

Auxiliary power systems are essential to powering auxiliaries on trains. But a variety of external factors can impact auxiliary power performance. For example, **electromagnetic interference** from the overhead contact line can disturb frequencies, resulting in malfunctions in the signaling circuit. In addition, when integrating large components into the train design, finding a place for the auxiliary power system can be a challenge. And a weak auxiliary power supply can reduce reliability, resulting in **lower train availability and higher maintenance costs**. To meet these challenges, you require comprehensive auxiliary power know-how to design the right solution for your needs.



POWERING TODAY'S TRAINS

Faiveley Transport provides industry-leading power electronics that are used on board all types of mass transit vehicles: light-rail, high-speed, main-line, and underground trains, trams, and trolley buses. Compatible with a variety of tensions (i.e., overhead line voltage, third rail), our power electronics can convert input voltages up to 3,000 volts. They also have an output power range from 10 to 100 KVA.

Our product portfolio includes the following:

- **Auxiliary converters:** Our converters meet all of your vehicle's power conversion needs by switching the input voltage from the overhead line or third-rail power supply into constant, regulated power. They can supply power to a variety of loads, such as air conditioning and ventilation systems, air generation and treatment units, and more.
- **Battery chargers:** Our chargers conveniently charge your auxiliary batteries, supply power to electronic equipment, and operate lighting during train operation.



POSITIVE ENERGY SAVINGS

Auxiliary power systems do more than just supply power to loads, they can also help trains to realize major energy savings. Our new business model helps you to reach an optimized energy-efficiency level through our commitment to achieving shared energy-saving performance targets. Our range of innovative technical solutions are designed to help you to choose and implement a chosen configuration, while adapting to your operational constraints.

AUXILIARY POWER INNOVATOR

Faiveley Transport is an international manufacturer and supplier of on-board railway equipment and systems. Since 1979, we have been providing power electronics and auxiliary power systems to train manufacturers and operators. By choosing Faiveley Transport, you benefit from:

- Our **dual expertise** that can address your technical needs in both power electronics and auxiliary systems
- Our **all-in-one auxiliary solutions**—in which auxiliary and inverter are one—that target the major challenges of traditional auxiliary power systems
- Our **technical expertise in and commitment to energy savings**, both of which help you to achieve your targets in energy efficiency
- Our **global presence** that includes competence centers, manufacturing plants, and engineering support sites for converters in France, Canada, the Czech Republic, and the United States, as well as Wabtec manufacturing facilities in more than 30 countries





Proven power modules for every need

Faiveley Transport has developed a set of proven power modules that enables you to face the numerous technical challenges of integrating and maintaining an auxiliary power system. Our solutions help you to reduce time to market without compromising flexibility.



STATE-OF-THE-ART INTERFACING

Katium® is a unique and smart power topology that reduces the weight and volume of power converters. You benefit from the following:



KATIUM® module

ADVANCED DIGITAL FILTERING OF ELECTROMAGNETIC INTERFERENCE

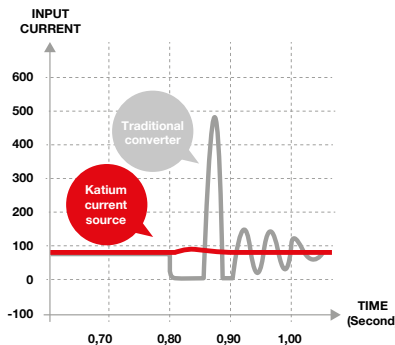
To ensure the safe operation of track signaling, electromagnetic interference from the overhead contact line, the auxiliary system, or the power converter must be filtered. Katium® operates as a digital input filter that can adjust its input impedance and reject load interference. Only a small inductance—as opposed to the common heavy LC filter—is enough.



CHICAGO CTA3200 converter

INCREASED RESISTANCE TO SUPPLY VOLTAGE DIPS

Iced or untightened catenaries, and electric arcs can produce voltage dips at the converter input. In this case, traditional converters may stop temporarily, thus reducing the availability of auxiliary systems and disrupting the power grid. Katium®'s topology acts as a current source and can run without interruption, even in the most challenging conditions.



Even in the worst weather conditions, our APS run uninterrupted.

GREATER FLEXIBILITY DURING SUPPLY VOLTAGE SURGES

The power grid voltage can sometimes exceed specifications, as a result of conditions that are often difficult to predict. High-voltage surges can damage the power converter prematurely. Katium®'s adaptive, multi-cell topology withstands any surge duration by providing a broad input voltage range.



SYSTEM OPTIMIZATION

Our products and solutions are designed to meet your complex mechanical specifications, overcome design challenges, increase energy efficiency, and optimize load control.



BELGIUM M7 converter



FRANCE REGIO 2N battery charger



COMPLEX ASSEMBLY INTEGRATION

When integrating large components (HVAC, air tank, seats) into your new train design or retrofit, finding a place for the auxiliary power system can be a challenge. Thanks to its light weight and small size, Katium® can be perfectly adapted to the unique mechanical specifications of your auxiliary power system. Possible positioning includes under the frame, on the roof, or inside the car. Our engineers work with you to find the best solution.

STANDARD DESIGN LIMITATION

Conventional converters can pose design challenges relating to efficiency, availability, integration, weight, and space. Whether you need to facilitate integration, increase efficiency, or preserve availability, we can provide the most adapted solution (i.e., 3+1 phase inverter, dedicated HVAC inverter, distributed system).

OPTIMIZING AUXILIARY

Your auxiliary power system should be capable of controlling its load, such as the HVAC motor, and the air generation and treatment unit. Our wide range of products offers compact and energy-efficient solutions that enable you to take full control of your auxiliary system.



PERFORMANCE ENHANCEMENT

Our products and solutions focus on enhancing the performance of your auxiliary power system via high-performance technologies, powerful monitoring tools, and designs that improve reliability.

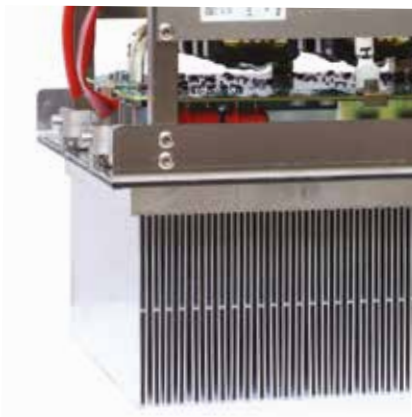
Cooling in a confined space

The cooling fan is an efficient solution to cool your auxiliary power system. But it also reduces electrical efficiency, requires periodic cleaning, and produces noise. Our auxiliary power system uses silicon carbide (SiC) power switches that can operate at higher temperatures and have lower switching losses. This increases electrical efficiency, thereby rendering the fan useless. Compared with a fan-less Si-IGBT converter, a fan-less SiC converter is lighter and takes up less space.



Reducing repair time

In case of repairs, maintenance work on your auxiliary power system must be conducted as efficiently as possible to reduce costs and ensure availability. Our solutions can quickly identify the fault module through built-in self-diagnosis and powerful monitoring tools. Weighing less than 15 kg, they are lightweight and can be replaced quickly.



Ensuring optimal reliability

Your auxiliary power system supplies many devices, therefore its reliability is important. When reliability is compromised, lower train availability and higher maintenance costs can result. To incorporate reliability into the design, we include complete environmental characterization (voltage range, surges, loads). We also take into account feedback from our +15,000 in-service systems and focus on continuous improvement.





FIGURES

40 years
of experience

15,000 APS
in service

60 projects

Years of experience



LEADING INNOVATION SINCE 1979

We developed our first auxiliary converter in 1979. Since then, we have been at the forefront of innovation, developing APS offering ever-higher reliability and efficiency. In 2004 we launched our breakthrough patented Katium® technology, going on to develop a simplified topology in 2011 and the Katium® SiC in 2017.



NEW YORK PRODUCT QUALIFICATION FOR R160

Katium® technology is approved for use on the New York metro following retrofit as a demo on two R160 trains for a year. It addresses specific operator demands for a converter offering superior performance without exceeding existing volumes. Our Katium® solution is designed to be quieter and more energy efficient than converters currently used on the R160. Faiveley Transport teams also worked on mechanical integration to identify a solution that makes it easier for maintenance engineers to access and maintain the technology.



BELGIUM CONVERTER OF CHOICE FOR NEW M7 PLATFORM

Bombardier's M7 carriages are in use in Belgium from September 2018, bringing passengers greater comfort and safety. Faiveley Transport's strong relationship with SNCB and our partnership approach to solving technical issues led us to be chosen to provide auxiliary converters for 355 carriages with an option for 710. The M7 design is an evolution of the M6, presenting specific challenges. Bombardier required a lighter, more powerful auxiliary converter that could be integrated into the carriage design; that controls harmonic current, minimizing disruption to signaling; that is compatible with catenars in Belgium and the Netherlands; and whose onboard functions are comparable to those of the current M6. Faiveley Transport's solution achieves all this while increasing reliability.



SINGAPORE ENERGY SAVINGS FOR SMRT

Our converter solution for the Singapore metro helped the client achieve its objective to save energy. The new units are up to two thirds more efficient than the previous generation, with energy savings achieved through improved HVAC efficiency. Other features of our solution helped the client optimize costs. For example, the use of natural convection and no filters reduces maintenance; in addition, the use of several smaller converters for each carriage achieves optimum weight distribution without impacting carriage design.

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