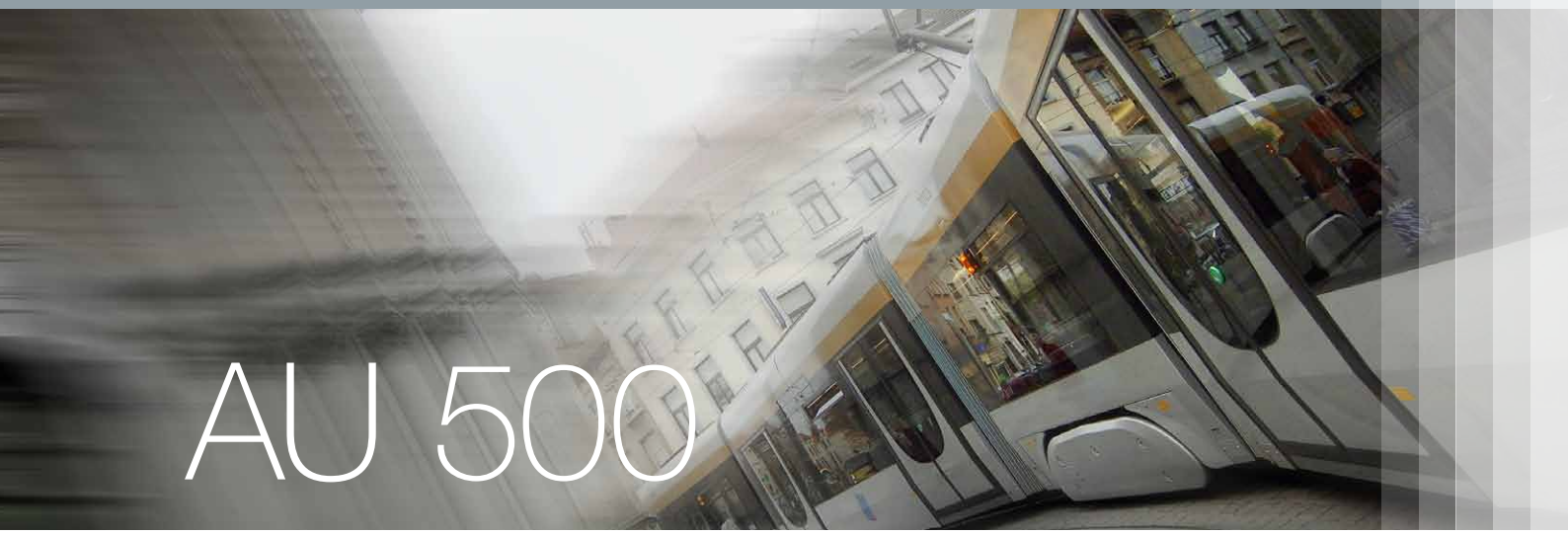
PCS Rail



AU 500

Compact and lightweight, silent and low-maintenance: The auxiliary converter platform for mass transit.

PCS Rail AU 500 is a product platform of auxiliary converters that meet the highest standards for use in LRVs, metro trains and commuter trains. There are over 1,250 PCS Rail AU 500s currently in use.

The PCS Rail AU 500 product line is distinguished by its compact design, easy maintenance and low noise emission. The auxiliary converters have two insulated outputs: a DC output, which charges the vehicle battery and supplies the DC auxiliary power system, and an inverter output, which provides AC voltage for the 3-phase and 1-phase 50 Hz grid.

All converters have an emergency supply to start up the vehicle without a battery or with a very low battery. An MVB connection is available for communicating with the vehicle control. Connection to other bus systems, such as CAN or Ethernet, is available as an option.

The auxiliary converter can be serviced directly using its RS 232 interface together with the “ComDev” service software. The service function can also be connected to the vehicle control via Ethernet.

Reference projects

Bombardier Flexity 2 LRVs:
The latest generation of low-floor LRVs,
Blackpool (UK)

Bombardier Flexity Berlin LRVs:
Berlin (Germany)

Bombardier Flexity Outlook LRVs:
Leipzig, Augsburg (Germany); Linz, Innsbruck (Austria);
Lodz (Poland); Geneva (Switzerland); Brussels (Belgium);
Valencia, Alicante (Spain); Palermo (Italy); Marseille (France);
Eskisehir (Turkey); London (UK)

Bombardier Flexity Classic LRVs:
Dessau, Dresden, Leipzig, Halle (Germany)

Bombardier Flexity Swift LRVs:
Rotterdam (The Netherlands)

Bombardier Movia metro trains:
Singapore

PCS Rail AU 541 V2

PCS Rail AU 500

Left, Flexity tram in Berlin, right, in Marseille

Component groups that can be replaced quickly make it easy to service the on-board power supply.

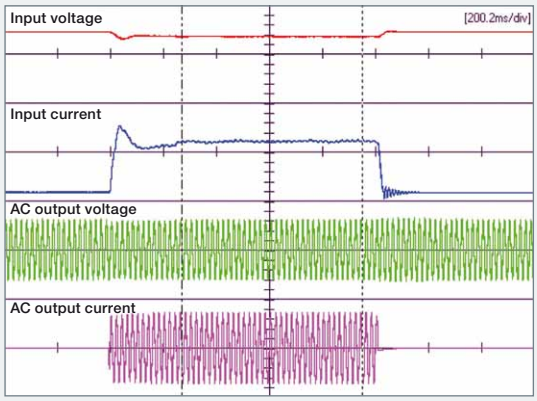
Auxiliary converters in the PCS Rail AU 500 line are designed for use both on the roof and under the floor. Many power classes are available for an input voltage of DC 750 V. Power module technology makes service and repairs easy: modules can be exchanged quickly. The essential electronic components are grouped together as a power module to make this possible.

High overload capacity

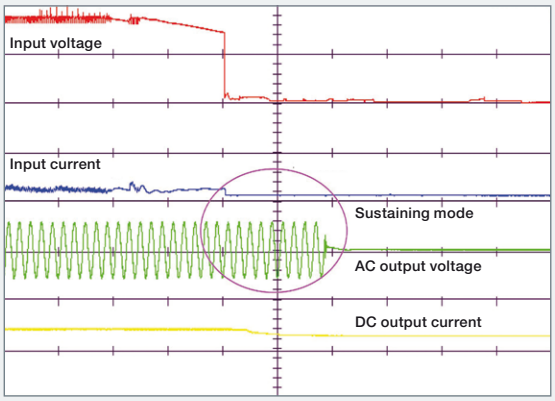
PCS Rail AU 500 auxiliary converters have highly dynamic controls and a large overload capacity. These characteristics are particularly important when hard starts for inductive or capacitive loads cause high starting currents, such as when air-conditioning compressors start up. The converters can withstand such power surges without switching off or being damaged. The maximum permitted pick-up current is about three times the nominal current. These loads only have a minor effect on the quality of the output voltage because the control circuit for the AC voltage is optimized for these processes.

PCS Rail AU 500 Types

Type	Underfloor/ Roof	Power AC (kVA)	Voltage AC (V)	Power DC (kW)	Voltage DC (V)	Dimensions (L/W/H mm)	Mass (kg)
PCS Rail AU 521 V3	U	15	400/230	7	24	1552/682/500	230
PCS Rail AU 541 V2	R	35	400/230	7	24	1500/850/500	230
PCS Rail AU 541 V3	R	35	400/230	8	24	1500/550/450	230
PCS Rail AU 542 V1	R	35	400/230	12	24	1600/550/450	240
PCS Rail AU 542 V2	R	43	208/120	11 0.4	24 36	1600/750/450	280
PCS Rail AU 551 V1	U	50	400/230	8	24	1552/682/500	287
PCS Rail AU 552 V1	R	55	400/230	12	24	1660/550/450	255
PCS Rail AU 572 V1	R	75	400/230	12	24	1600/750/450	310
PCS Rail AU 5124 V1	U	120	400/230	15	110	1350/2080/500	648



Switch on/switch off process at rated load



Catenary switch-off process with subsequent buffering

Flexity Outlook LRVs in Valencia and Alicante

No interruptions with gaps in overhead wires

The internal energy stores allow the auxiliary converters of the PCS Rail AU 500 series to easily sustain interruptions in the overhead wires caused by bow skips at crossings and junctions. This means that there is no interruption in the supply for the consumer. The effect the storage has during a shutdown is shown in the figure on the top right.

Depending on the AC load applied, the auxiliary converters can maintain the power supply for 200 ms when there are interruptions in the power supply.

Properties

- Power classes of AC 15 kVA to 120 kVA and DC 7 kW to 15 kW in voltages DC 24 V and 110 V
- Equipped with electronic speed-controlled fans to minimize noise
- Utilizes the latest IGBT technology
- Emergency supply for start up if battery is very low
- Compact design that can be adapted to existing infrastructure
- Very easy to maintain using compact power modules

Options

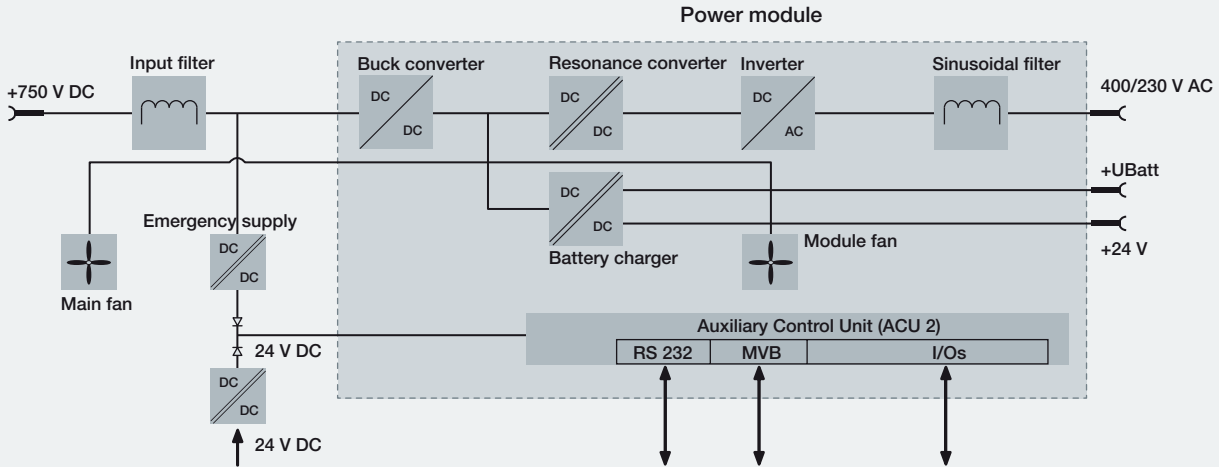
- Decoupling diode for parallel circuits of DC outputs
- AC output protection/coupling protection
- Battery fuse
- AC-phase failure monitoring
- AC synchronization
- Fault current monitoring

Example of use on the roof of a Flexity Outlook LRV in Germany, Belgium, Switzerland, Austria and France

An underfloor example in the Docklands Light Railway in London

PCS Rail AU 500

Block diagram of an auxiliary converter from the PCS Rail AU 500 product line



The component groups at a glance:

The circuit is divided into five component groups: Input filter, buck converter, resonance converter, inverter with sinusoidal filter and the control unit ACU 2. The input filter contains the line choke, an overvoltage protector and a current-mode choke which limits the high-frequency asymmetrical currents. The buck converter generates a controlled voltage which supplies the resonance converter and the medium-point half-bridge converter. The output voltage of the inverter is directed via a sinusoidal filter.

In addition to the three-phase current output, a single-phase output with 230 V/50 Hz is available, formed from any one phase of the three-phase current system and the center pick-up of the intermediate circuit capacitor at the resonance converter output.

The control unit Auxiliary Controller Unit (ACU 2) implements all required functions, such as the control of the power electronics, the control of the main fan and the recording of events and faults. In addition, the control unit ACU 2 enables communication with the vehicle control and is an interface for the service functions.

Technical data

Input voltage	DC 600 V/750 V
Power efficiency	> 90 %
Power transfer	through medium-frequency technology
Ambient temperature	-30 °C to +45 °C
Storage temperature	-40 °C to +85 °C
Installation type	Roof/underfloor
Degree of protection: container	IP 65 underfloor IP 54 roof

Assembling/disassembling a power module

PCS has for decades developed highly reliable power converters and electrical equipment. Take advantage of state-of-the-art solutions plus project management and service.

PCS
Power Converter Solutions

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