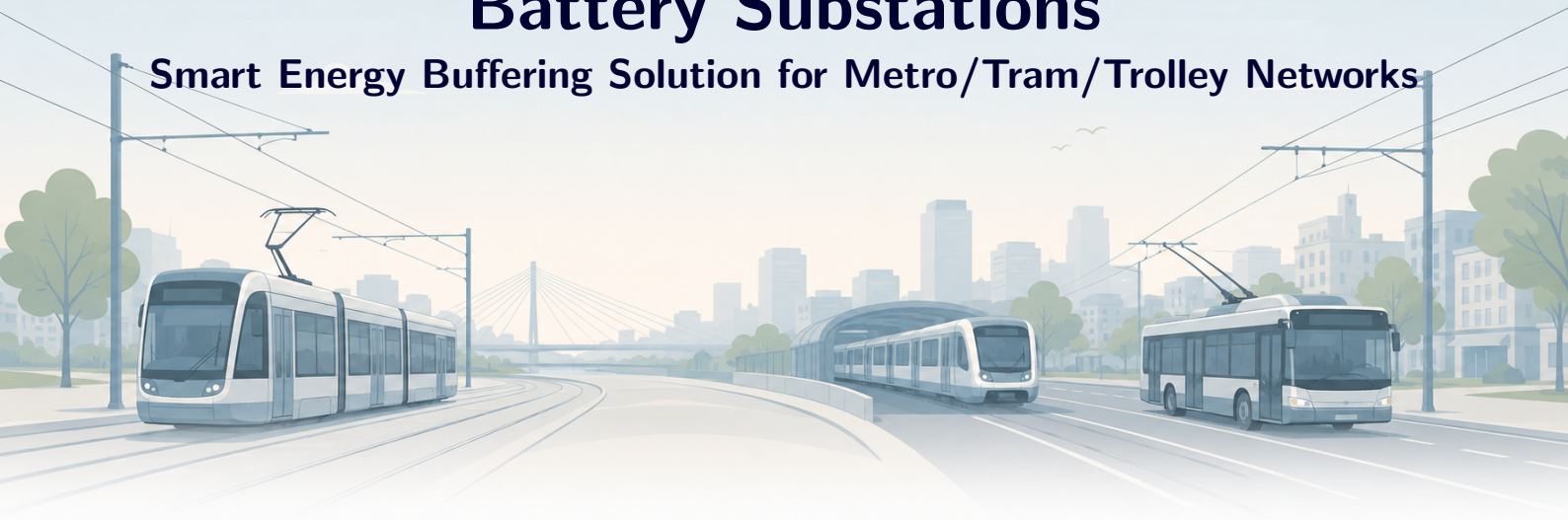
Battery Substations

Smart Energy Buffering Solution for Metro/Tram/Trolley Networks



Trackside energy storage

The Strukton Battery Substation (BSS) is a trackside energy storage system that can reduce the need for new substations. It stabilises line voltage by limiting voltage drops during acceleration and rises during braking. During busy traffic periods, the system supplies additional peak power.
Multiple compact BSS units distributed across the network operate together as a decentralised substation. They reduce peak currents from existing substations and reuse recovered braking energy. During a power outage, the stored energy can also provide emergency power to move vehicles and passengers to the nearest station.

Key benefits

- **Stronger traction supply:**
  Dynamic energy absorption and injection
- **Autonomous substation:**
  No AC grid connection required
- **Stable line voltage:**
  More network capacity during peak demand
- **Peak shaving and efficiency:**
  Recovery and reuse of braking energy
- **Limited network currents:**
  Less need for overhead-line reinforcement and lower track touch voltages

Straightforward integration, autonomous operation

A BSS operates fully autonomously and requires no operator intervention. Remote monitoring is available as standard, while integration with a SCADA system is optional.

The energy management system can be configured through parameters for charge and discharge behaviour and current setpoints. A bidirectional DC/DC converter manages energy exchange with the overhead line.



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System characteristics

Specification Variant:	Compact	Plus	High Capacity
			
General			
Rated system voltage	600/750 V (IEC 60850)		
Voltage range	400–1000 V		
Energy storage	**168 kWh**	**544 kWh**	**1088 kWh**
Maximum power supplied to overhead line (30 s)	670 kW	530 kW	1060 kW
Maximum peak current to overhead line at 500 V (30 s)	1340 A	1060 A	1600 A
Thermal current (IEC 62924 CAT III)	600 A	474 A	715 A
Network and BSS protection			
HSCB with protection relay	Yes, standard substation protection functions		
Current protection	di/dt, Imax, thermal		
Voltage protection	Umin, Umax, Utrack		
Cable protection	Optional		
Communication			
Remote monitoring	Yes		
SCADA interface	Optional		
Battery			
Battery technology	LTO	LFP	LFP
Cooling	Air cooling with climate control		
Fire safety			
Battery compartment fire resistance	120 minutes		
Fire detection system	Yes		
Fire suppression system	Yes, aerosol		
Converters			
Non-isolated bidirectional DC/DC converter	1600 A peak, 800 A RMS		
Isolated 400 V AC auxiliary converter	22 kVA		
Performance			
Duty cycle according to NEN-EN-IEC 62924, Table C.1	Classes I, II and III		
Mechanical			
Dimensions (L × W × H)	1.5 × 3.0 × 3.15 m	2.5 × 3.0 × 3.15 m	6.0 × 3.0 × 3.15 m
Footprint	4.5 m^2	7.5 m^2	18.0 m^2

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