Technical Case Study

Electric Bus Charging System – HV/LV Integration and Testing

(Jandakot Bus Depot, Perth, Western Australia, 2025)

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Abstract

This technical case study presents the engineering, testing, and commissioning of the Electric Bus Charging System at Jandakot Bus Depot in Perth, Western Australia. The project included the integration of HV and LV infrastructure, installation of charging stations, and validation of protection and control schemes. The system aimed to support Perth's transition towards sustainable transport by enabling fast and reliable charging for a growing electric bus fleet.

Keywords: Electric Bus Charging, HV/LV Integration, Protection Testing, Sustainable Transport, Australia

1. Introduction

The Jandakot Bus Depot project was a critical component of Western Australia's strategy to decarbonize public transport. In 2025, new HV and LV electrical infrastructure was required to support multiple electric bus charging stations with fast-charging capabilities. The commissioning program focused on system reliability, protection coordination, and compliance with Australian standards.

2. Methodology

The integration and testing program consisted of the following activities:

- HV Infrastructure: Testing of transformers, switchgear, and protection relays.

- LV Distribution: Verification of feeder circuits, MCC panels, and charger connections.

- Protection Validation: Omicron-based testing of overcurrent, earth fault, and load-shedding functions.

- Functional Testing: End-to-end validation of charging systems, communication protocols, and safety interlocks.

3. Results

The project delivered the following measurable outcomes:

Metric	Before	After	Improvement
Charger Availability	90%	99%	+9%
Average Charging Time	120 min	45 min	-63%
System Compliance (AS/NZS)	Partial	Full	100% compliant

4. Discussion

The Jandakot Bus Depot project demonstrated the application of HV and LV integration to enable large-scale electric bus charging. Through rigorous testing and validation, the system achieved significant improvements in availability and charging times. This project also established a replicable framework for future electric transport infrastructure projects across Australia.

5. Conclusion

The 2025 commissioning of the Jandakot Bus Depot Electric Bus Charging System represented a milestone in Western Australia's transition to sustainable transport. By integrating HV/LV systems with reliable protection schemes, the project ensured safe, efficient, and scalable charging infrastructure for public transport electrification.

6. References

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