



PcVue CSMS/SCADA PLATFORM FOR E-BUS & E-TRUCKS

TECHNICAL OVERVIEW

GLOSSARY

OCPP: Open Charge Point Protocol → open communication standard between EV charging stations and central management systems.

OPC UA: OLE for Process Control Unified Architecture → universal industrial communication standard for secure and reliable real-time data exchange between machines, sensors, and systems.

MQTT: Message Queuing Telemetry Transport → lightweight publish/subscribe messaging protocol widely used in IoT.

ModBUS: open serial communication protocol widely used to connect industrial devices (PLCs, sensors, meters).

BACnet: Building Automation and Control Network → standard protocol for building management systems (HVAC, lighting, security).

SCADA: Supervisory Control and Data Acquisition → systems for remote supervision and control of industrial processes or infrastructures.

HMI: Human Machine Interface → interfaces that allow operators to monitor and control machines or installations.

CSMS: Charging Station Management System → centralized management platform for EV charging infrastructure.

SoC: State of Charge → battery charge level (percentage of available energy).

SoH: State of Health → battery health indicator (actual capacity compared to initial capacity).

RTLS: Real-Time Location System → system for real-time tracking of assets, vehicles, or people.

DMS: Distribution Management System → software to optimize and control electrical distribution networks.

VDV (Preconditioning): Vehicle Data and Vehicle Preconditioning → feature that prepares an EV (battery conditioning, heating, cooling) before use.

GIS: Geographic Information System → software to map, analyze, and manage spatial data.

CMMS: Computerized Maintenance Management System → software to plan, track, and optimize maintenance operations.

EXECUTIVE SUMMARY

This document presents the key technical features of the PcVue charging management (CSMS) and supervision system (SCADA) for electric bus or truck fleets. The solution is designed to ensure reliable operations, seamless integration with client ecosystems, and scalability to support fleets of any size.

It combines advanced scheduling integration, real-time supervision, intelligent energy optimization, and powerful reporting tools, all within a flexible and high availability architecture. With built-in interoperability, comprehensive visualization, and automation capabilities, the system delivers both operational efficiency and long-term fleet sustainability.

It is important to note that the PcVue CSMS/SCADA platform is completely configurable (HMI, data processing, data acquisition...) according to end-user needs. Any required feature that is not mentioned in this document can be developed and added to the system through custom scripting and configuration.

TECHNICAL FEATURES LIST

BUS SCHEDULING INTEGRATION

This section outlines integration with the depot scheduling system and reception of bus assignments. This enables the platform to plan for optimized charging to ensure each bus can perform its next assigned route:

- ✔ Charge planning taking in account next 24-hour route schedules for each bus.
- ✔ Route length from depot departure to return.
- ✔ Manual adjustment of charging schedules possible.
- ✔ Adaptations for emergencies or unforeseen events.

REAL-TIME CHARGER SUPERVISION

This section describes real-time monitoring of all chargers, to detect any errors or faults:

- ✔ Compatibility with OCPP 1.6 and 2.0.1.
- ✔ OCPP proxy support.
- ✔ Data exposure to others systems through various protocols (OPC-UA, Modbus, MQTT,...)

CHARGING SESSION MANAGEMENT

This section covers real-time supervision and control of charging sessions:

- ✔ Bus charging status (waiting, active, completed, interrupted).
- ✔ Automatic initiation of sessions to ensure required adequate Soc for next route.
- ✔ Monitoring of key parameters:
 - Planned SoC and time to reach.
 - Default SoC target and time to reach.
 - Charger status (faults, energy delivered, etc.).
 - Bus status (faults, SoC, SoH, battery temperature, etc.).
- ✔ Recording of session data in historian:
 - Session start and end.
 - Total energy delivered.
 - SoC at start and end.
 - Faults encountered.
- ✔ Remote charger control:
 - Start / stop charging.
 - Unlock connector.
 - Emergency stop.

All the Charging information can be shared (Mobile App, Web) for operation and maintenance purposes.

BUS PRECONDITIONING

This section details bus preconditioning capabilities to ensure optimal passenger comfort is ensured as soon as the bus leave the depot, through preemptively activating the bus A/C system when connect to a charger, to save battery power:

- ✔ Compliance with VDV 261 (ISO 15118).
- ✔ Initiation of preconditioning with parameters managed by the bus.

CHARGING DATA ACQUISITION

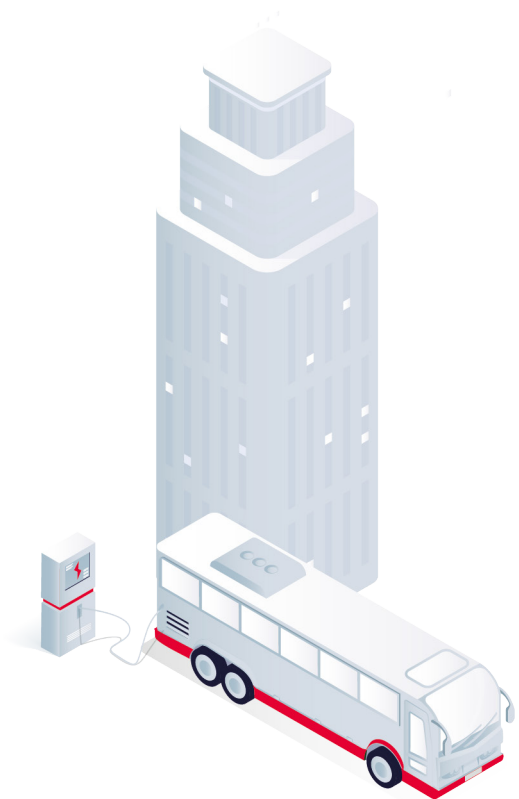
This section describes integration of charging-related data, for example, from power systems, building system and environment monitoring:

- ✔ Building systems data (BACnet).
- ✔ Current and planned meteorological data, through a local station or webservice.
- ✔ Integration with building controls.
- ✔ Power equipment data (Modbus, IEC, etc.).
- ✔ Substation, distribution, generators, filters, power meters.
- ✔ DMS/RTLS integration for depot positioning and real-time display.

VEHICLE TELEMETRY ACQUISITION

This section explains vehicle telemetry capabilities, for real-time monitoring of the fleet:

- ✔ Real-time data from buses on the road and in the depot.
- ✔ SoC, SoH, and battery temperature.
- ✔ Autonomy calculation based on SoC, SoH, weather, and route.
- ✔ Errors, warning, faults and alarms.
- ✔ GPS positioning with real-time tracking.
- ✔ GIS integration



ENERGY OPTIMIZATION

This section covers energy management and optimization features to ensure compliance with utility contract and all power optimization requirements:

✔ Supported optimization modes:

- Peak shaving.
- Load shifting.
- Dynamic pricing, Spot markets.

✔ Real-time energy profile of the depot:

- Charger consumption.
- Other equipment consumption (e.g., heating).

DATA HISTORIZATION

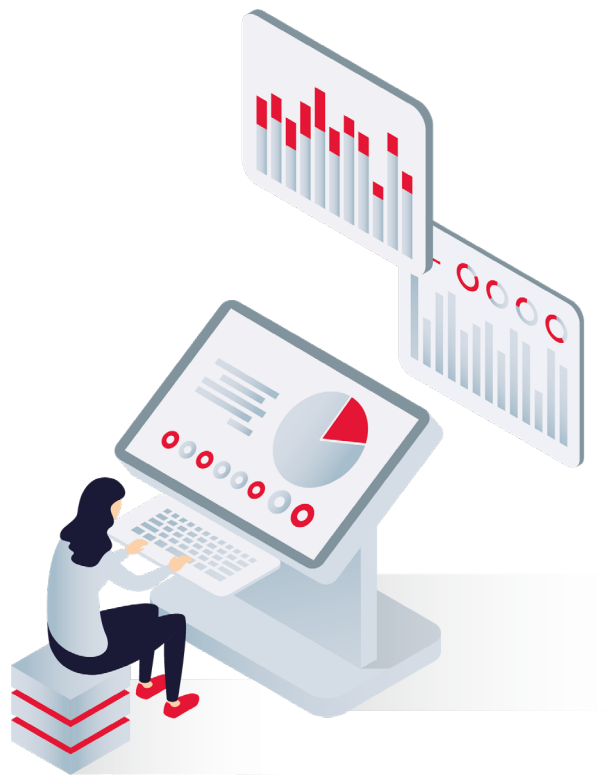
This section outlines storage and visualization of historical data. The platform comes with a complete historian system:

- ✔ Automatic transfer of significant data to historian.
- ✔ Calculation engine for KPI generation.
- ✔ Visualization via trend curves (e.g., SoC).
- ✔ Visualization via dashboards and tables (e.g., charging sessions).

REPORTING

This section describes reporting capabilities of the platform:

- ✔ Simple reports (text, CSV).
- ✔ Advanced reporting via web portal.
- ✔ Automatic reports (e.g., per charging session).
- ✔ Reports automatically sent by email if required.
- ✔ On-demand, customizable reports.



SYSTEM ARCHITECTURE

This section covers deployment options:

- ✓ On-premises deployment.
- ✓ Cloud-based deployment

SCALABILITY

This section highlights the system's ability to scale:

- ✓ Fleet sizes from fewer than 20 to more than 500 buses.
- ✓ Charger counts from fewer than 10 to more than 300.
- ✓ Multi-depot support.
- ✓ Typical deployment timelines:
 - 1 depot, 20 buses, 10 chargers – 6-8 weeks.
 - 3 depots, 450 buses, 250 chargers 12-16 weeks.



CLIENT ECOSYSTEM INTEGRATION

This section outlines interoperability with client systems, for example, to exchange data with the DMS, CMMS or other third-party applications:

- ✓ DMS/RTLS integration.
- ✓ VDV 463 or equivalent support.
- ✓ CMMS integration.
- ✓ Web services.
- ✓ REST APIs.

BATTERY LIFE MAXIMIZATION

This section highlights features to extend battery lifespan:

- ✓ Optimization methods to be defined with client or fleet OEM supplier.

¹Timelines given for guidance only, and does not replace a detailed technical analysis. Please contact us for more details.

ALARMS AND NOTIFICATIONS

This section details alarm and notification management, from reception of equipment alarms, monitoring of custom alarms and notifications through SMS, emails or voice calls:

- ✔ Equipment alarms (fault codes, etc.).
- ✔ System-generated alarms through scripting.
- ✔ Route completion failures.
- ✔ Inability to reach required SoC before next route.
- ✔ Other alarm conditions.
- ✔ Escalating notifications.
- ✔ SMS, email and voice alerts.
- ✔ Alarm banner with filtering.

DATA VISUALIZATION (IPM)

This section provides an overview of advanced visualization tools. Some screens are predefined, others can be completely customized to depot specific views:

- ✔ SCADA-class visualization engine.
- ✔ Auto-generated views by charger and bus configuration.
- ✔ Custom depot views based on client layouts.
- ✔ Real-time geo-mapping visualization.
- ✔ Real-time bus views on the road and in the depot (with RTLS system).
- ✔ Custom views (KPIs, alarms, historian, reports).
- ✔ Access via web browser, desktop, or mobile devices.
- ✔ Building control and power system views.

SCRIPTING CAPABILITIES

This section describes system scripting functions:

- ✔ Standard scripting .
- ✔ Automation of reflex actions, including:
 - Alarm handling.
 - Event-driven operational scenarios.
- KPI calculations.
- Real-time and historical data processing. AI-Driven flowcharts

DISCLAIMER

The technical information and data presented in this brochure are provided for general guidance only. While every effort has been made to ensure accuracy, the features and performance described may vary depending on system configuration and usage. Users are advised to verify and validate all data in their specific environment before relying on it for operational decisions.



PcVue CSMS/SCADA platform technical overview

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ARC Informatique is ISO 9001,
ISO 14001 and 27001 certified