

Comeca

Solutions and Principles for Charging Electric Buses



What Solutions Are Available for Recharging My Vehicle?

In Europe, the vast majority of current electric buses are charged with direct current (also called DC). AC buses are more common outside Europe, particularly in China.

Discover all the possible solutions for recharging electric buses with direct current, depending on the different aspects of your vehicle fleet.

Two Types of Connection Solutions: Per Socket and per Opportunity

Electric buses with a battery are powered only by the battery on the vehicle, which provides the energy required. The choice of bus and battery size will depend on the power requirements, electrical energy, distance to be covered, climate, topography of the journey and the chosen recharging infrastructure.

There are two connection solutions for vehicle charging:

- Plug-in charging (CCS2 in Europe). This connection method represents the traditional energy supply model for the vehicle (similar to refuelling). The user manually connects the charging socket to the vehicle. This type of socket is available on our Comeca chargers, for power ratings of 50 to 160kW.
- Recharging by opportunity (via a pantograph, dome, etc.) allows much greater power to be conveyed and therefore considerably reduces the vehicle's charging time.

No manual intervention is necessary with this technology: it is the vehicle that warns of its arrival and alerts the charger of its intention to charge. Physical contact is then established between the two systems. This technology can deliver power up to 640kW.

Comeca's range of electrical recharging solutions responds to these two recharging modes and is adapted to meet our customers' needs. We assist our customers by studying their projects in order to offer them the most convenient solution. Our charging stations are accessorised to make their use even more ergonomic: brackets, reels and storage devices are just some of the solutions we offer to make the use of our charging stations optimal.

3 Possible Recharging Solutions: At the Depot, at the End of the Line and at the Station

Different recharging solutions are possible for 100% battery-electric buses:

- Charging at the depot: the bus is recharged during the inactivity phase (usually at night) in order to be ready for the start of service (in the morning). The distribution of energy to all the charging stations is then managed globally to smooth out the electrical power over the entire charging period, which is known as 'smart charging'. Various elements are taken into account: bus parking times, service schedules, etc. This technology makes it possible to reduce the size of the electricity delivery point and the electrical



infrastructure associated with the charging stations. It also reduces the amount of electricity and therefore the total cost of ownership of the buses.

- The end-of-line charging system: this method allows rapid recovery of autonomy and thus limits the size of the batteries. The bus terminus must be connected with sufficient power to limit the downtime of the bus to a few minutes.
- The pantograph charging system (ascending or descending): this system requires a stop of a few seconds or minutes (from 3 to 10 minutes) and allows the vehicle with low-capacity on-board batteries to increase its range limited by the size of its battery. The vehicle is therefore recharged at some stations to ensure its journey.

These methods are not necessarily exclusive and can be combined to suit the needs of each mobility operator and each city: it is possible to recharge the bus in the evening at the depot and by pantograph during the day, for example. The

preferred solution must be selected, taking into account the needs and constraints of each player.

Comeca's portfolio of solutions allows us to meet each need in the most appropriate way, from the electrical network to the charging point. Our solutions also allow us to meet all customer requirements relating to charging times: a need for a five-hour charge during the night or a shorter charge at the terminus of the main line of the network.

Vehicle and Charger Interoperability

Interoperability at the Core of Comeca's Solutions through Test Procedures

Interoperability must allow each vehicle put on the market to be recharged by different brands of chargers.

At Comeca, we make it a priority to be interoperable with all the manufacturers present on the markets for which we sell our products.

To make this possible, we have set up a test procedure and we meet our partners at our site in Le Mans (France), in order to confirm the interoperability of buses, coaches, trucks, etc. This test procedure can be carried out in just one day.

Since the first launch of its recharging solutions, Comeca has ensured its compliance with the two CCS standards ISO 15118 and DIN 70121 by calling on an external laboratory to validate all the normative points.

Comeca Solutions and Interoperability Tests

When it comes to charging infrastructure for electric vehicles, standards evolve and compliance can be incomplete. On-board systems have software versions that are constantly evolving, which is why we have set up an

interoperability test programme with all bus and electric car manufacturers that meet the Combo CCS standard. We regularly monitor the manufacturers' market to identify new entrants and plan interoperability tests. At the end of these tests, we produce an 'interoperability report' co-signed with the manufacturer concerned. Our requirements in this area mean that we are now interoperable with the majority of buses used in Europe.

The recharging infrastructure market has a large number of players. Few are capable of adapting to the constraints of 360°, turnkey projects that will guarantee an appropriate investment cost, a limited cost of ownership, guaranteed availability, flexibility in operation and the evolution of charging power over the life of the installation.

Scan the QR code below to find out more about Comeca, integrated, ultra-fast charging solutions for large vehicles, buses, trucks, utility vehicles.



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