

Final Report – Compleo

Brief Summary of Compleo's activities:

Within the OSCD consortium, Compleo Charging Solutions AG – from now on Compleo, is responsible to develop and provide necessary hard- and software for the smart charging demonstration. Moreover, Compleo had contributed also to other work packages with providing necessary hard- and software information.

In frame of OSCD project, development of two charging stations for different use-cases had been planned. One of the prototypes was planned with a single charging point (Sample-A) while the second one was planned to be developed with two charging points (Sample-B). The development of both charging stations required electric and electronic, mechanical design and software development and implementations. Finally, a real-life demonstration has been planned and partially performed.

Hardware development of charging stations:

For both charging stations development of a new control unit has been planned. For the new control units, a master-slave-concept has been developed. The development of the concept was necessary for future integration and mass deployment of the smart charging. Another important development for the control unit was the development and integration of the ISO 15118 hardware module. The module is required for the implementation of the communication protocols. This module is responsible to acquire necessary data from the EV and transmit it to the other parties.

Software development

For the control units a new software architecture has been developed. The programming and implementation have been carried out. Besides of the software of the control units, complete implementation of the ISO 15118 communication module has been planned. Although the development could not be completed by the end of the project, compleo would like to continue the development and implementation of the protocol also after the project. For the demonstration of the hardware, the required information from EV may be acquired via power line communication.

For the smooth function of the smart charging, implementation for the backend is also necessary. For integration of all smart charging functions, the implementation of the OCPP 2.0 communication protocol is also necessary. Since it was not possible to integrate the whole communication protocol within the project time, the extension of the current backend communication OCPP 1.6 has been performed.

Mechanical design

The mechanical design consists of the design of the control unit and integration of the devices into the housing of the charging station. Please note that the external housing of charging station Sample-A has been designed with our own resources.

During all the developments, the standardizations and conformity requirements have been considered and the technical implementation have been carried out according to the requirements.

Deliverables:

4.7. Hardware and test results

The specifications of the charging stations consist of hard- and software. The complete specifications have been defined and a product requirement document (PRD) for the software has been prepared.

In the following figure, a screenshot of the table of content of the PDR is shown.

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Figure 1: Figure 1: Product Requirement Document of the technical specifications of Software for the prototypes (Screenshot of Table of Content).

For the OSD Project the development of two different charging stations for different use cases have been planned. One of the charging stations has been developed with a single

charging point, while the second one has been developed with two charging points. In the following figure the final state of the prototypes are shown.



Figure 2: Functional prototypes. Left: Charging station with single charging point, Right: charging station with two charging points.

Test Results:

The functional prototypes have been tested both in external and internal labs. The tests have been performed according to the standardization requirements which consists of soft- and hardware, mechanical and electrical, optimization tests.

In the following typical test results during development are introduced.



Figure 3: A screenshot of the oscilloscope during an internal EMC test (left) and authorization test via an RFID card (right).

Installation and Demonstration:

The mechanical design and development for different installation concepts have been carried out and integrated to the functional prototypes. The installation developments have

been carried out mainly for the charging station with one charging point. For the functional prototype with two charging points, the installation developments have been redesigned and integrated. While the station with two charging points can be installed from the bottom, the station with single charging point can be installed from behind on the wall or on a pole.

The demonstration of the functionality of the charging stations with a single charging point has been carried out at compleo site, as shown in the following figure (left). The demonstrations for the second prototypes have been carried out at ElaadNL site.



Figure 4: Functional demonstrations for the prototype with a single charging point