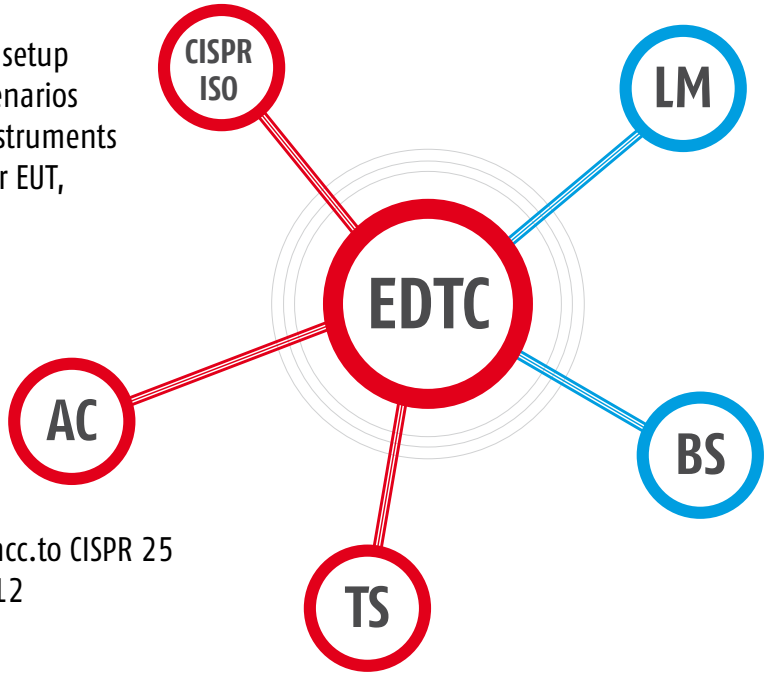
FRANKONIA

Frankonia Battery System

Requirements

Standards CISPR & ISO
- CISPR and ISO conform test setup
- Respect of different test scenarios
- Interference suppressed instruments
- Secure test environment for EUT, chamber and staff
- Future-proof functionality



Load Machine (Dynamometer)
- fixed version up to 350 kW
- mobile version up to 120 kW

Battery System
- Battery simulation
- Battery test
- Charging emulation
- for components and vehicle tests

Available power range:
- 300 A or 600 A
- 100 kW up to 600 kW

Anechoic Chamber
- dedicated for component tests acc.to CISPR 25
- or for vehicle tests acc.to CISPR 12
- or both in a single solution

Test System
Defined according to CISPR and ISO standards
- dedicated for component tests
- dedicated for vehicle tests

Battery System

Features & Functions

Battery System meets EMC Anechoic Chamber and Test System

With our partners, Frankonia offers adapted EMC test environments incl. EMC test equipment, and integrates a battery test system, DC emulator, and testing charging infrastructure in a turnkey solution.

The Battery System includes modular packages:

- Battery Test units from 100 kW up to 600 kW, and from 300 A to 600 A
- Dynamic DC Emulators and AC Emulators
- Charging Infrastructure with Communication Modules (PLC, GB/T, CHAdeMO)

- **Basic version:** Test of the battery system that only considers the power supply for battery components.
- **Standard version:** Test of battery system that can emulate a battery and offers an extended spectrum of testing methods.
- **Extended version:** With the so-called Charging Discovery System, it is possible to measure and monitor the communication between charging station and battery component or vehicle, as well as the charging behavior of a charging station.

Battery System

Power Range

Power	Item	Size Cabinet	Output Voltage	300 A	600 A
100 kW	FSL-100	2,4 x 2,8 x 0,8 m	50… 1.000 V	Yes	Yes
150 kW	FSL-150	2,4 x 2,8 x 0,8 m	50… 1.000 V	Yes	Yes
180 kW	FSL-180	2,4 x 2,8 x 0,8 m	50… 1.000 V	Yes	Yes
250 kW	FSL-250	2,4 x 3,6 x 0,8 m	50… 1.000 V	Yes	Yes
350 kW	FSL-350	2,4 x 3,6 x 0,8 m	50… 1.000 V	No	Yes
600 kW	FSL-600	2,4 x 7,2 x 0,8 m	50… 1.000 V	No	Yes

System Basics

- Highest European safety standards
- Integration kit for existing chambers available
- EMC knowledge base and worldwide service
- Project Management
- Turnkey solution by Frankonia

System Configuration Packages

Configuration	Packet I	Packet II	Packet III
Battery test	x	x	x
Dynamic DC Emulator	-	x	x
Charging infrastructure	-	-	x
General & regional project realization	x	x	x
Service (according to region)	Opt.	Opt.	Opt.
Software maintenance*	Opt.	Opt.	Opt.

Battery System

Functions

This Battery System typically offers a 1.000 V battery test system with the following options:

- Operation as battery test system (=current source to test HV battery packs)
- Operation as DC Emulator (=emulation of HV battery, e.g., to supply a traction inverter or machine)
- Operation as DC quick charging station (=emulation of EVSE incl. communication)
- Operation as AC charging station (with local grid, grid emulation excl.)
- ChargingDiscoverySystem with EMC optimized casing
- Fully adapted and integrated to Frankonia EMC Anechoic Chambers

The battery system is tailored for Frankonia and for integration into an EMC anechoic chamber.

Charging Discovery System

The communication between EV (Electro Vehicle) and EVSE (Electro Vehicle Supply System) will be done by the Charging Discovery System (CDS).

Charging standards:

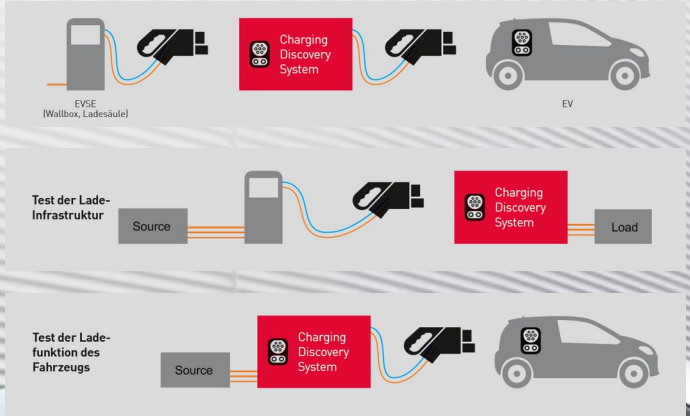
- PLC communication module
- GB/T communication module
- CHAdeMO communication module

Charging Discovery System (CDS)

Case 1: Analyzing communication between the EVSE and EV

Case 2: Testing the charging function of a charging station (EVSE test)

Case 3: Testing the charging function of electric/hybrid vehicles (EV test)



Battery System

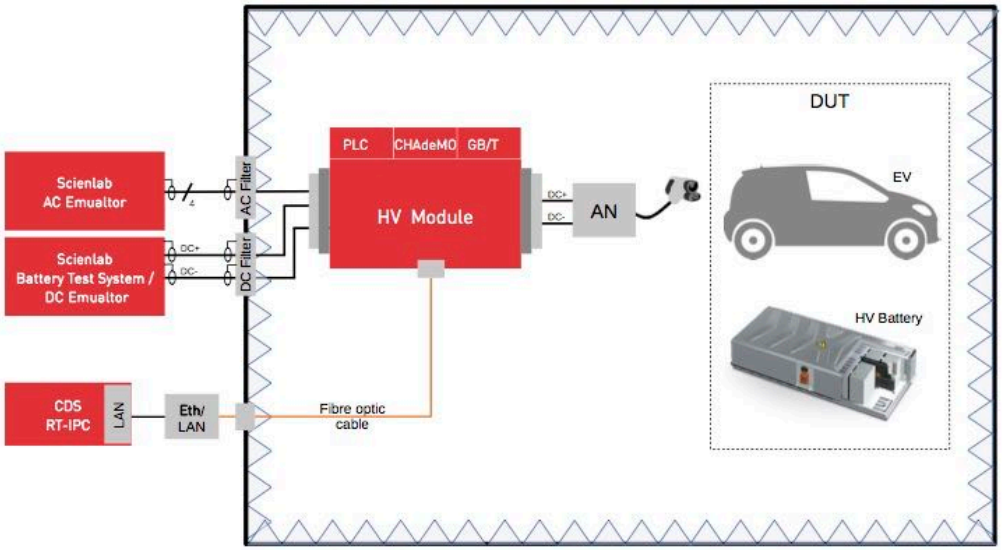
Charging Discovery System - Functions

System Features

- Real-time capable control unit with high system performance and low dead times
- Standard-compliant emulation of the EV or EVSE charging communication controller (CC); programmable using documented interfaces
- Built-in control of up to two charging sockets with locking actuator and temperature monitoring
- Fault injection at the control and proximity pilot (idle and short circuit)
- Man-in-the-middle mode for analyzing the charging communication interface between the EV and EVSE
- Direct support of Scienlab power sources/sinks
- Included *Charging Discovery* operating software

EMC Features

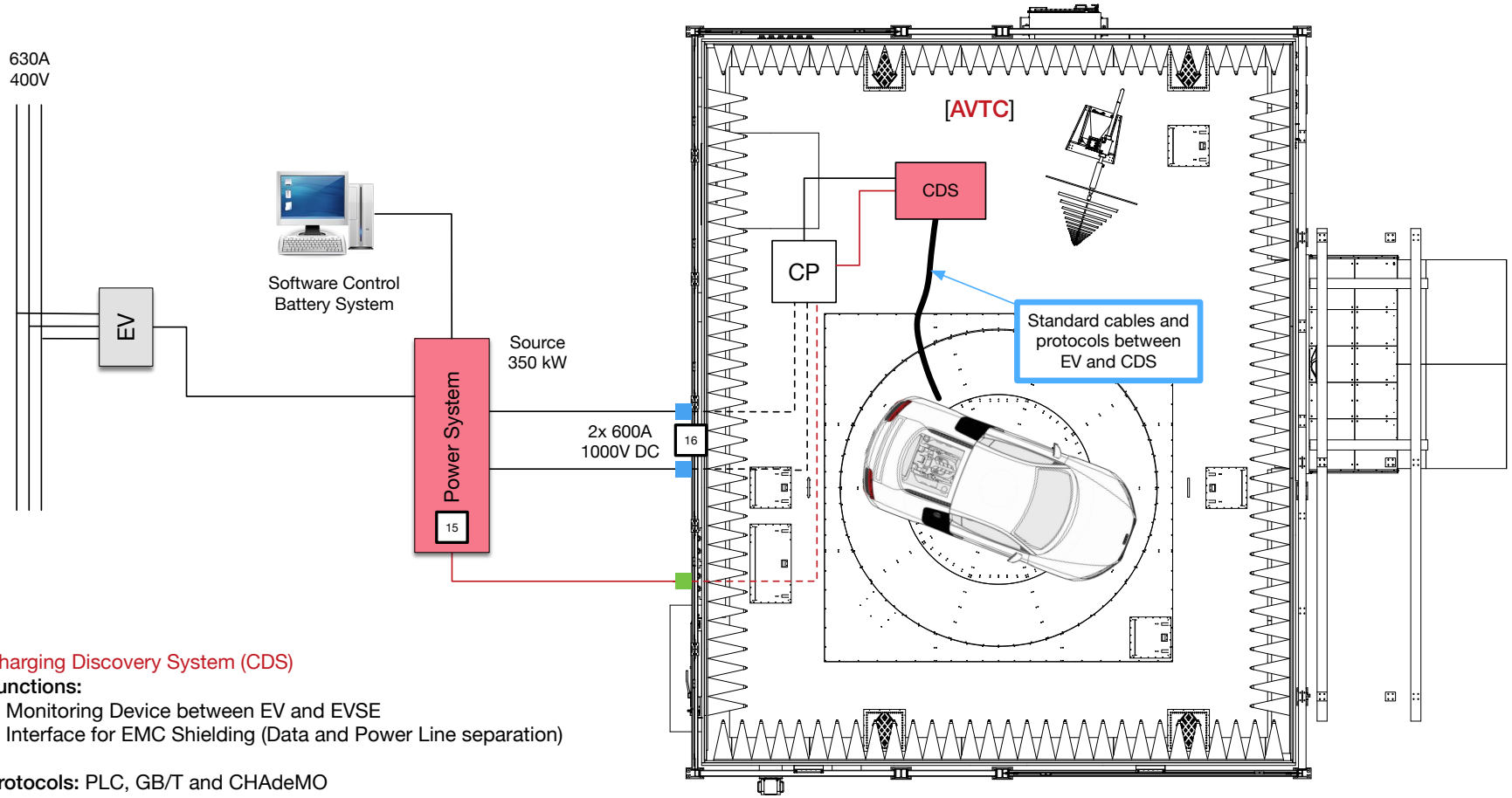
- Separate data line to cross the shielding using an optic converter
- Separate power line to cross the shielding using high-power DC filters
- HV-optimized shielding enclosure for the CDS to be placed inside the EMC chamber



A Scienlab - Frankonia solution that meets EMC test characteristics.

Frankonia E-Drive Test Chamber

EMC Test on HV Battery or Vehicle using the CDS System



Charging Discovery System (CDS)

Functions:

1) Monitoring Device between EV and EVSE
2) Interface for EMC Shielding (Data and Power Line separation)

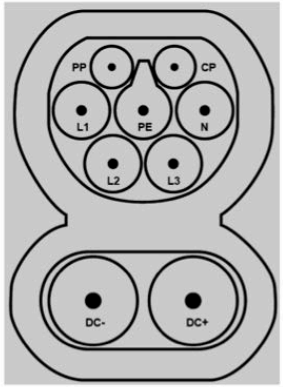
Protocols: PLC, GB/T and CHAdeMO

Cables: AC Type 1 and 2, CCS Type 1 and 2, GB/T AC or DC, CHAdeMO

Battery System

PLC Communication

- Emulation of the electrical interface on the EV and EVSE side

Pin	Designation	Function	Charging interface
CP	Control pilot	PWM control line plus digital communication via PLC	
PP	Proximity pilot	EV testing of the charging cable connection	
Note: This option does not include electromechanical contacting (plug/inlet). See the options for the "HV module" for more on this.			

- EV emulation according to the standards DIN SPEC 70121 and ISO 15118 (EIM only)
- EVSE emulation according to the standards DIN SPEC 70121 and ISO 15118 (EIM only)
- Recording of all EV or EVSE V2G messages and display of the information contained therein in plain text
- Manipulation of V2G messages and active delaying of timings (fault insertion)
- Testing of the PLC communication for adherence to the PLC level, the standardized frequency bands, the carrier frequencies, and the signal quality/strength
- Testing of the EV or EVSE charging interface for compliance with the standard

Battery System

PLC Communication

Charging adapter AC Type 1 and 2

EV charging adapter AC type 1

Left connection	Cable	Right connection
AC type 1 plug according to IEC 62196-2 / SAE J1772	2x6mm² L1, N 1x6mm² PE 2x0,5mm² CP, PP	compatible ChargingDiscoverySystem plug
Application	Connecting of an EV with type 1 AC Inlet to the Scienlab ChargingDiscoverySystem, AC charging	
Rated voltage	up to 250 V	
Rated current	up to 32 A	
Miscellaneous	Cable length: 5 m; Color: black; Weight: approx. 3 kg	

EV charging adapter AC type 2

Left connection	Cable	Right connection
AC type 2 plug according to IEC 62196-2	4x6 mm² L1, L2, L3, N 1x6 mm² PE 2x0,5 mm² CP, PP	compatible ChargingDiscoverySystem plug
Application	Connecting of an EV with type 2 AC / type 2 CCS Inlet to the Scienlab ChargingDiscoverySystem, AC charging	
Rated voltage	up to 440 V	
Rated current	up to 32 A	
Miscellaneous	Cable length: 5 m; Color: black; Weight: approx. 3 kg	

Charging adapter CCS Type 1 and 2

EV charging adapter CCS Type 1

Left connection	Cable	Right connection
CCS Typ1 plug according to IEC 62196-3 / SAE J1772	2x 42,4mm² DC+/- 1x 26,7mm² PE 4x 0,5mm² CP, PP, PTC	Compatible ChargingDiscoverySystem plug
Application	Connecting an EV with CCS Type 1 inlet to the Scienlab ChargingDiscoverySystem, DC charging	
Rated voltage	Up to 600 V	
Rated current*	Up to 125 A	
Miscellaneous	Cable length: 5 m; Color: black; Weight: approx. 9 kg	
* limited by EV plug manufacturer's certification		

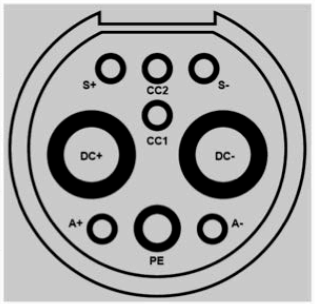
EV charging adapter CCS Type 2

Left connection	Cable	Right connection
CCS Type 2 plug according to IEC 62196-3	2 x 70 mm² DC+/- 1 x 35 mm² PE 6 x 0.75 mm² CP, PP, PTC	compatible ChargingDiscoverySystem plug
Application	Connecting an EV with CCS Type 2 inlet to the Scienlab ChargingDiscoverySystem, DC charging	
Rated voltage	Up to 1000 V	
Rated current*	Up to 200 A	
Miscellaneous	Cable length: 5 m; Color: black; Weight: approx. 11 kg	
* limited by EV plug manufacturer's certification		

Battery System

GB/T Communication

- Emulation of the electrical interface on the EV and EVSE side

Pin	Designation	Function	Charging Interface
S+	CAN-High	CAN Bus: High Level communication	
S-	CAN-Low		
CC1	Connection Check 1	EV testing of the charging cable connection	
CC2	Connection Check 2	EVSE testing of the charging cable connection	
A+	auxiliary circuit +	EVSE voltage supply for EVCC	
A-	auxiliary circuit -	EVSE voltage supply for EVCC	
Note: This option does not include electromechanical contacting (plug/inlet). See the options for the "HV module" for more on this.			

- EV emulation according to GB/T 20234-3 (DC)
- EVSE emulation according to GB/T 20234-3 (DC)
- Recording of all EV or EVSE messages and display of the information contained therein in plain text

Charging adapter GB/T - AC

EV charging adapter GB/T AC		
Left connection	**Cable**	**Right connection**
GB/T AC plug according to GB/T 20234.2	4x6 mm² L1, L2, L3, N 1x6 mm² PE 2x0,5 mm² CP, PP	Compatible ChargingDiscoverySystem plug
Application	Connection of an EV with GB/T 20234 AC Inlet to Scienlab ChargingDiscoverySystem; AC Charging	
Rated voltage	up to 480 V	
Rated current*	up to 32 A	
Others	Cable length: 5m; Color: black; weight: 3 kg	
* limited by specifications of EV plug manufacturer		

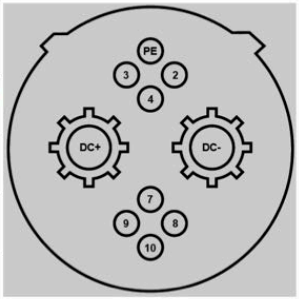
Charging adapter GB/T - DC

EV charging adapter GB/T DC		
Left connection	**Cable**	**Right connection**
GB/T plug according to GB/T 20234-3	2x35mm² DC+/- 1x25mm² PE 6x0,5mm² S+/-, CC1/2, PTC 2x1,5mm² A+/-	Compatible ChargingDiscoverySystem plug
Application	Connection of an EV with GB/T 20234 DC Inlet to Scienlab ChargingDiscoverySystem; DC Charging	
Rated voltage	up to 750V	
Rated current*	up to 125 A	
Others	Cable length: 5 m; Color: black; weight: ca. 8 kg	
* limited by specifications of EV plug manufacturer		

Battery System

CHAdeMO Communication

- Emulation of the electrical interface on the EV and EVSE side

Pin	Designation	Function	Charging Interface
8	CAN-High	CAN Bus: High Level Communication	
9	CAN-Low		
7	Connector proximity detection	EV testing of the charging cable connection	
4	Vehicle charge permission	EV opening for charging process	
2	Charging sequence signal 1	EVSE „Start" Charging	
10	Charging sequence signal 2	EVSE Releasing the charging process	

Note: This option does not include electromechanical contacting (plug/inlet). See the options for the "HV module" for more on this.

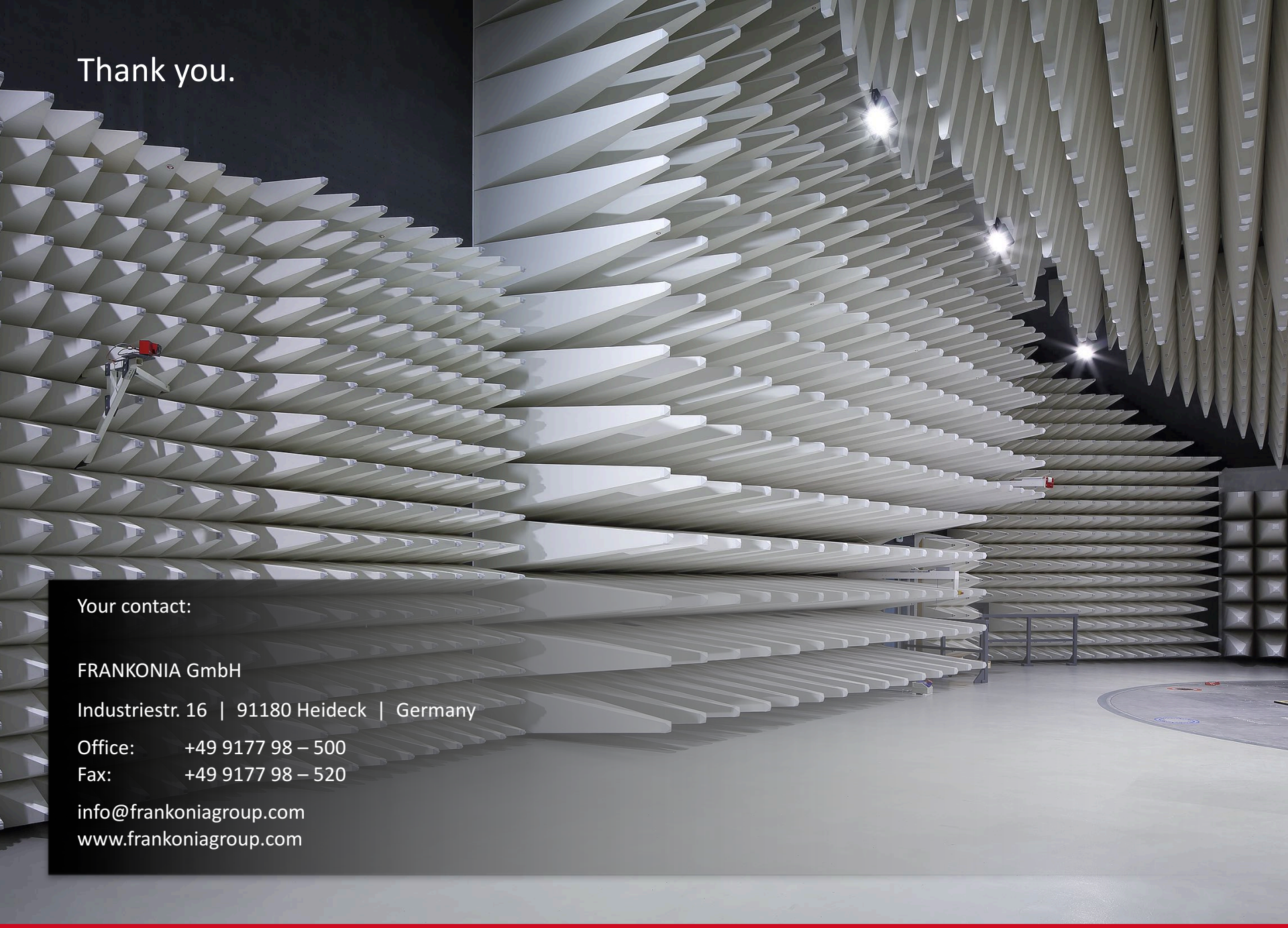
- EV emulation according to CHAdeMO standard
- EVSE emulation according to CHAdeMO standard
- Recording of all EV or EVSE messages and display of the information contained therein in plain text

Charging adapter CHAdeMO

EV charging adapter CHAdeMO

Left connection	Cable	Right connection
CHAdeMO plug	2x35 mm² DC+/- 6x Signal + PE	compatible ChargingDiscoverySystem plug
Application	Connecting of an EV with CHAdeMO inlet to the Scienlab ChargingDiscoverySystem, DC charging	
Rated voltage	up to 600 V	
Rated current*	up to 125 A	
Miscellaneous	Cable length: 5 m; Color: black; Weight: approx. 8 kg	

* limited by EV plug manufacturer's certification



Thank you.

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