DATA SHEET

Scienlab Charging Discovery System

High-Power Series | EV & EVSE Test

SL1047A

SL1048A Scienlab Cooling Unit

SL1051A Scienlab Liquid-Cooled Charging Adapter[1]

KEYSIGHT TECHNOLOGIES

[1] See EV Charging and EVSE Plug-In Adapter data sheet for complete details

Table of Contents

Solution Overview 3

Modularity of the Scienlab Charging Discovery System – High-Power Series 5

Configuration examples 6

SL1047A-HP3 Scienlab Charging Discovery System – High-Power Series 7

Real-time computer in 19" plug-in unit 8

High-voltage module 11

SL1040A-301 Communication module PLC 14

SL1040A-302 Communication module GB/T 15

SL1040A-303 Communication module CHAdeMO 16

SL1048A-CU1 Scienlab Cooling Unit 17

SL1040A-IRE Scienlab Insulation Resistance Emulator 19

Technical Data 20

Licenses 22

Software functionality without additional license 22

SL1040A-S01 Expert mode 24

SL1040A-S02 Developer mode 25

Project Management, Consulting and Installation Services 27

PS-XPM-100-SL Project management services 27

PS-XINS-100-SL Project installation services 27

PS-XENG-100-SL Project engineering services 27

PS-XCOM-100-SL Project commissioning services 27

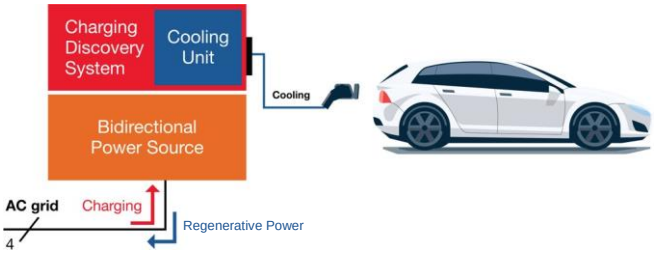
Extend the Capabilities of your Test Solution 28

Solution Overview

The Scienlab Charging Discovery System – High-Power Series (CDS HP Series) from Keysight is a modular solution for conformance and interoperability testing of electric vehicles (EV) and EV supply equipment (EVSE) high-power charging interfaces with up to 900 kW. Thanks to its modular design, the CDS HP Series can be configured to customers' specific needs for testing and validating the charging interface of electric vehicles and charging infrastructures. The Scienlab Charging Discovery System – High-Power Series can be ordered with the maximum voltage of 1000 or 1500 V DC. The upgrade functionality from 1000 V DC to 1500 V DC is possible at any time for an additional charge.

SL1047A Scienlab Charging Discovery System – High-Power Series with Scienlab Cooling Unit incl. liquid-cooled charging adapter

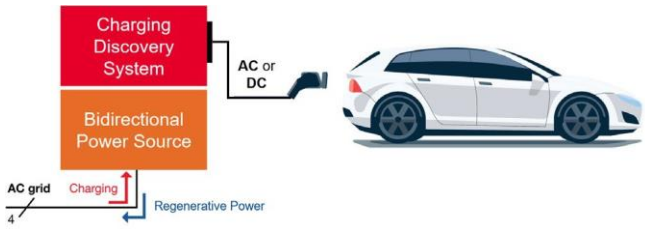
Three main use cases for the Scienlab Charging Discovery System:

Use case 1a: EV test with Scienlab Cooling Unit incl. liquid-cooled charging adapter	
The CDS HP Series is used as an universal, configurable charging infrastructure (e.g. DC charging station or AC wallbox). Together with the separate cooling unit with interchangeable liquid-cooled charging adapter, a high-power charging infrastructure of up to 600 A DC is emulated. It can be used for functional testing of the charging interface of any EV, as well as for safety, interoperability, conformance, and durability tests.	

Use case 1b: EV test without Scienlab Cooling Unit

Here, the CDS HP Series is used as a configurable charging infrastructure (e.g. DC charging station or AC wallbox), too. The EV test without cooling unit and with non-cooled charging adapter is designed for testing of up to 350 A DC and 100 A AC (max. according to supplier specification).

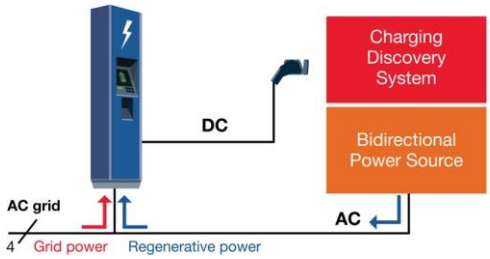
It can be used for functional testing of charging interfaces of any EV, as well as for safety, interoperability, conformance and durability tests.



Use case 2: EVSE test

In this use case, the CDS HP Series is an universal, configurable charging interface emulation of an EV.
Designed depending on the plug-in used for up to 500 A DC and 80 A AC.

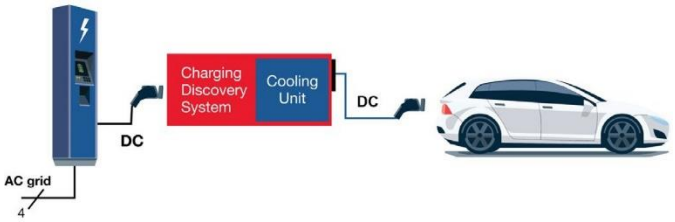
Again, this allows functional, safety, interoperability, conformance and durability testing of any EVSE product.



Use case 3a: Man-in-the-middle test with Scienlab Cooling Unit incl. liquid-cooled charging adapter

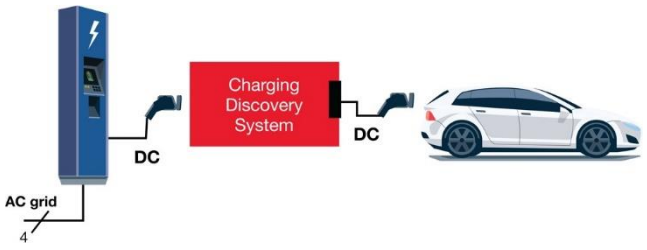
In this third use case, the CDS HP Series is connected between two real devices to capture all electrical signals and digital communication between an EVSE and EV.

The user can identify and trace potential interoperability issues.



Use case 3b: Man-in-the-middle test without Scienlab Cooling Unit

This use case is equal to the one above without the separate cooling unit for the use of high-power EVSE and EV at the same time.



Modularity of the Scienlab Charging Discovery System – High-Power Series

Figure 1 shows the modularity of the Scienlab Charging Discovery System for high-power charging. This data sheet describes components in the blue and red boxes. The components in the dark gray boxes are described in separate data sheets and clarify the extensibility of the test system. Power source adapters, EV inlets, and EV connectors can be found in the EV Charging and EVSE Plug-In Adapter data sheet.

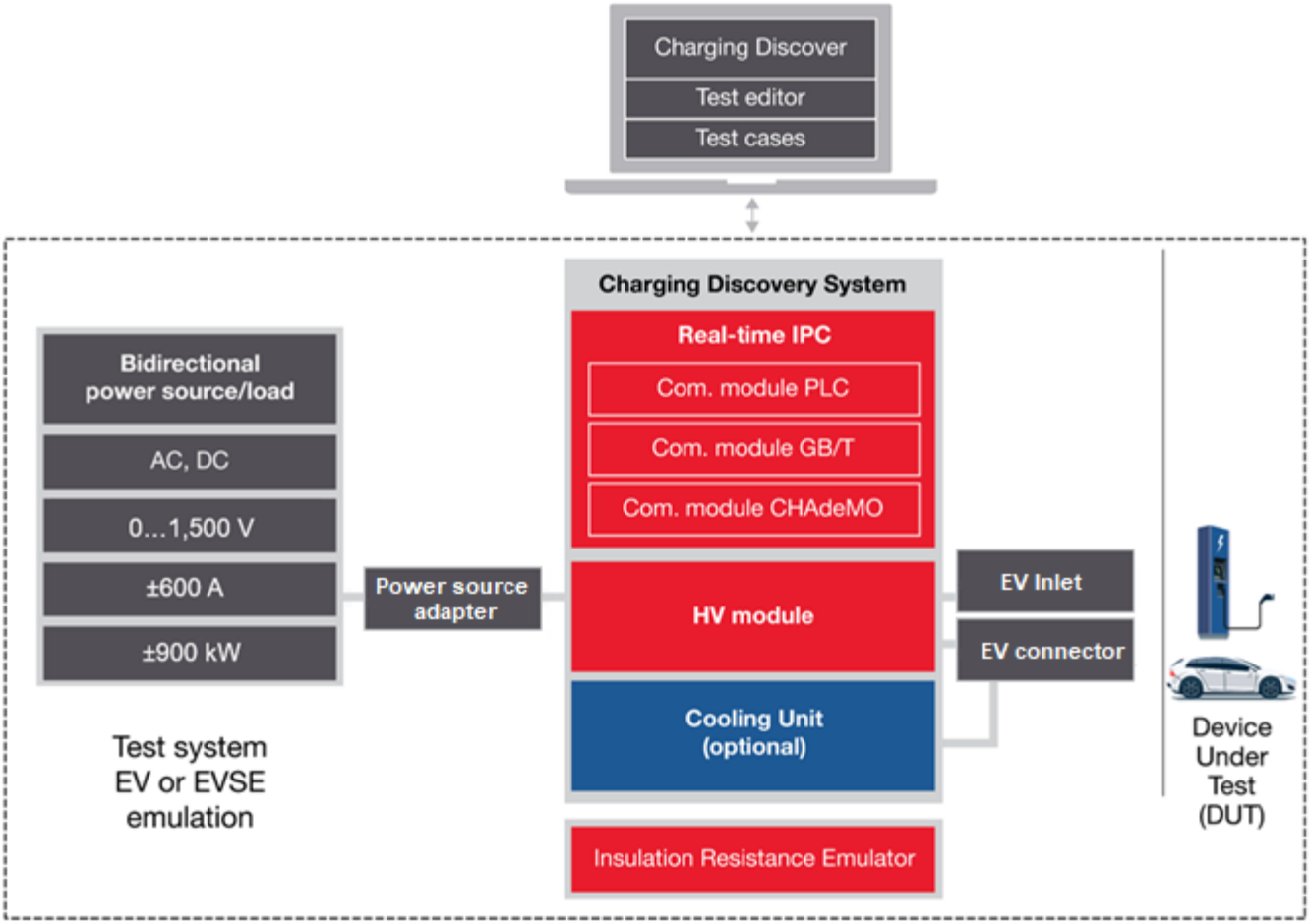
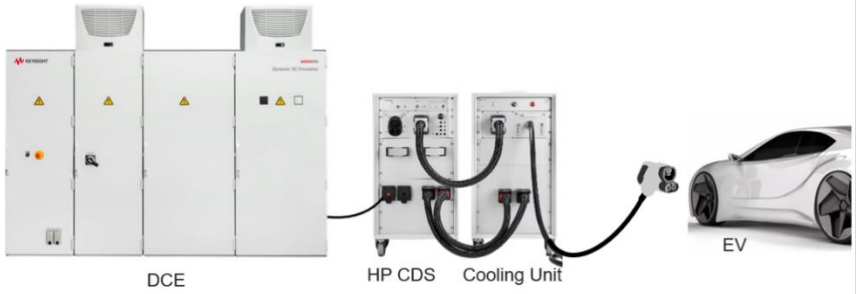
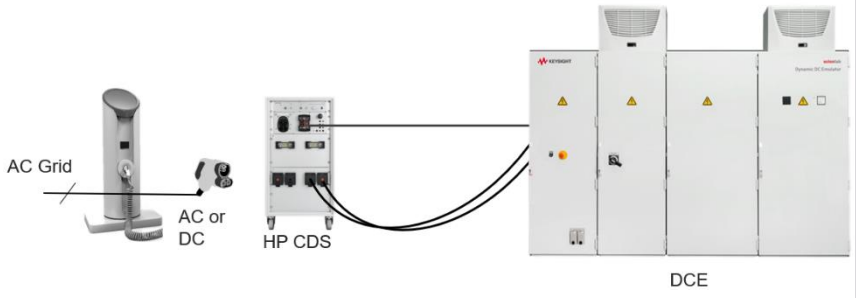


Figure 1. Modularity of the Scienlab Charging Discovery System for high-power charging

Configuration examples

Consider the desired use cases and test scope when ordering CDS HP Series hardware. For some applications, such as testing EV or EVSE with a maximum charging power of 300 kW, the CDS HP Series alone may suffice. If tests with EV shall be performed with high-power charging, the CDS HP Series is combined with an additional cooling unit and liquid-cooled charging adapter to support charging power up to 900 kW.

The following table shows three examples of CDS HP Series configurations:

Example 1: Stand-alone CDS HP Series	
In some cases, a stand-alone CDS HP Series configuration is adequate. It allows AC man-in- the-middle analysis. Adding high level communication modules (see SL1040A-301…303) allows DC man-in-the-middle analysis and V2G/CAN communication protocol testing.	
Example 2: CDS HP Series with Scienlab Cooling Unit and high-power DC supply for EV test	
For high-power DC charging, the CDS HP Series can be connected to larger DC emulators (DCE) up to 900 kW. EV testing at the full power range becomes possible.	
Example 3: CDS HP Series and High-Power DC Supply for EVSE test	
For high-power DC charging, the CDS HP Series can be connected to larger DC emulators (DCE) up to 900 kW. EVSE testing at full power range becomes possible.	

SL1047A-HP3 Scienlab Charging Discovery System – High-Power Series

SL1047A-HP3 Scienlab Charging Discovery System – High-Power Series

1500 V DC Option: SL1047A-UP1

The option SL1047A-HP3 contains the Scienlab Charging Discovery System – High-Power Series including High Voltage Contacting Module 600 A, 1000 V. The option SL1047A-UP1 will upgrade the maximum voltage of the solution from 1000 V DC to 1500 V DC. This upgrade functionality is orderable at any time for an additional charge.

Real-time computer in 19" plug-in unit

CDS HP Series real-time computer; 19" plug-in unit

General functions

- Real-time computing 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 EV and EVSE
- Included drivers allow easy integration of Scienlab power sources and sinks
- Included Scienlab Charging Discover software for Windows operating system (find out more below)

System characteristics	
Dimension	2 U (rack units) in a 19-inch open frame rack
Weight	6 kg
Protection class	IP00
Recommended re-calibration period	12 months

Standards and directives

The CDS HP Series supports the following charging communication

standards. The basic function includes:

- AC charging mode according to IEC 61851-1 (PWM)
- AC charging mode according to SAE J1772 (PWM)
- AC charging mode according to GB/T 18487.1 (PWM)
- AC charging mode according to Bharat AC fast IS17017 Part 1

The following items are also available as additional options:

- DC fast charging mode according to DIN SPEC 70121
- DC fast charging mode according to ISO 15118
- AC charging mode according to ISO 15118
- DC fast charging mode according to GB/T 27930
- DC fast charging mode according to CHAdeMO
- DC fast charging mode according to Bharat DC

PWM functionality

- Measurement of the PWM level on the EVSE and EV sides
- Emulation of the EVSE signal generator with adjustable positive or negative amplitude, frequency, and duty cycle
- Testing of the PWM signal with respect to level, noise component, edge steepness, frequency, and duty cycle
- Variation of the control pilot's (CP) line impedance with switchable parallel resistors and capacitors
- Emulation of the vehicle side with freely programmable resistance emulation at the CP
- Fault injection: control pilot line break, short circuit to PE

GB/T and CHAdeMO signals

- CAN high and CAN low signals
- GB/T communication signals (CC1 and CC2, A+, A-)
- CHAdeMO communication signals
- All signals provided by 2 DSUB 15 mating plug divided in EV and EVSE side

Proximity pilot

- Measurement and interpretation of the resistance of the Proximity Pilot (PP) for coding the current rating of the charging cable
- Emulation of the PP resistance (during EVSE emulation)
- Fault injection: line break, short circuit to PE

System architecture

The CDS HP Series consists of several internal electronic functional groups to meet EV and EVSE requirements. The following block diagram shows the system architecture:

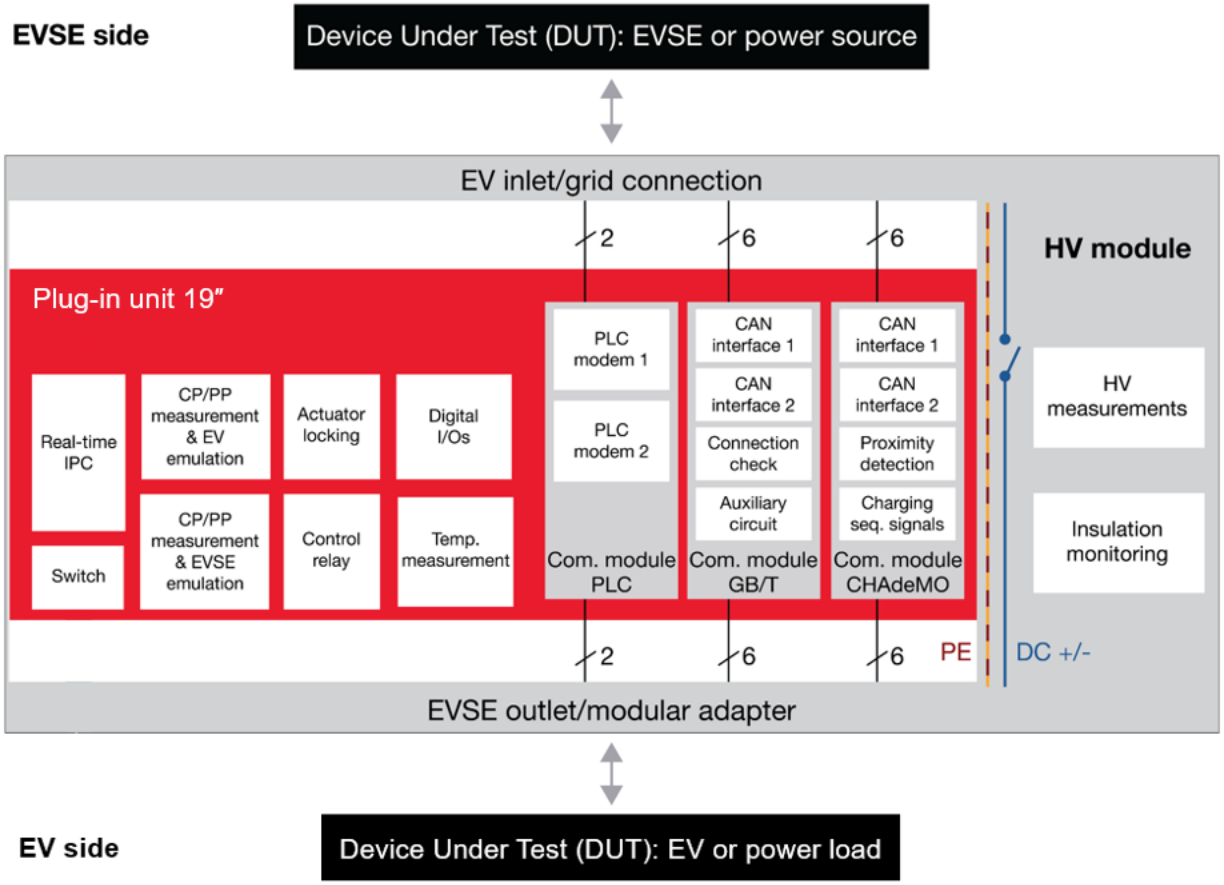


Figure 2. Block diagram of CDS HP Series architecture

Note: Only red function blocks are included in this item.

High-voltage module

The HV module connects the control unit and the communication modules to the DUT, i.e. vehicle and/or charging infrastructure. Together with the available plug-in modules and charging adapters different worldwide standards can be tested. In addition to country and standard-dependent DUT contacting, the HV module includes a 19" housing, current transducers, safety components, and power contactors for AC and DC.

For the high-power charging application, the HV module provides special high-power DC connectors to easily connect the cooling unit. Additional high-power AC contactors allow testing up to 100 A.

HV module of the CDS HP Series

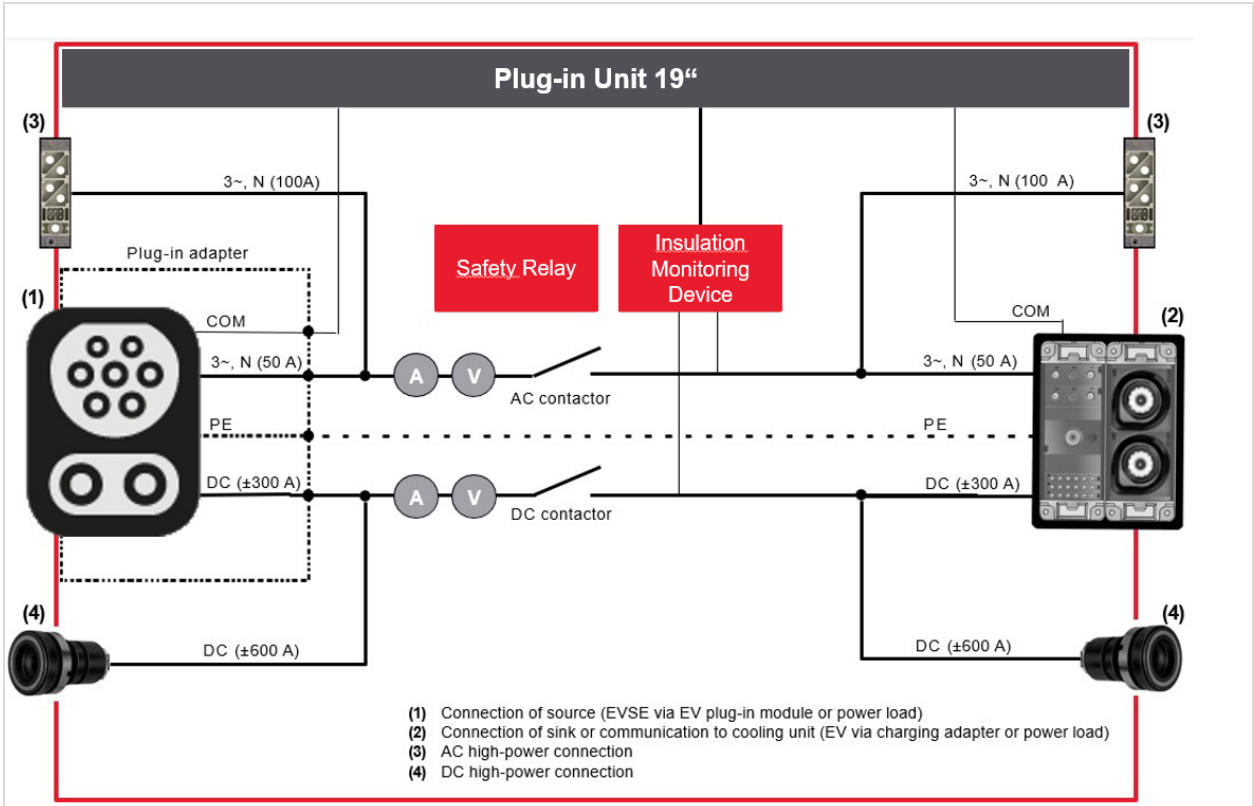
Included in the scope of delivery:

- 19" compact cabinet
- Power cord for the included power supply depending on country requirements
- Integration of an insulation monitoring device (Bender ISOMETER®)
- Integration of a safety relay for interlock control (Pilz PNOZ X)
- DSUB15 mating plug for stand-alone operation
- Operating instructions, CE declaration of conformity

Measurement specification			
	Range	Accuracy	
		Offset Max./Typ.	Gain Max./Typ.
Voltage AC	0 to 500 V_{L-L} rms 0 to 300 V_{L-N} rms	0.5 V	±0.25%
Current AC (L1, L2, L3)	0 to 100 A rms*	±0.25 A	±0.25%
Voltage DC±	±1500 V ±1000 V	±1 V	0.2%
Current DC±	±600 A	±0,12 A	±0.1%
Residual current PE	±300 mA	±1 mA	±0.5%

***Note:** Please contact your local field engineer to discuss maximum specification in combination with various Keysight AC Emulators.

System characteristics	
Dimensions (H x W x D)	1075 x 600 x 555 mm
Weight including control computer + Com. module	approx. 200 kg (without adapters)
Protection class	IP20
Recommended re-calibration period	12 months



Interfaces		
Operating buttons		Fast stop (safety shutdown)
(1)	Connection EVSE/external source	Via EVSE plug-in adapter or AC/DC high-power connection
(2)	Connection EV/external load	Via EV charging adapter
(3)	AC high-power connection	0 to 500 V_{L-L} rms/0 to 300 V_{L-N} rms 100 A rms (per phase)
(4)	DC high-power connection	1500 V DC / 1000 V DC 600 A DC
HV measuring		Non-touchable banana plug

Note: Power source adapters, EV inlets, and EV connectors can be found in the EV Charging and EVSE Plug-In Adapter data sheet**.**

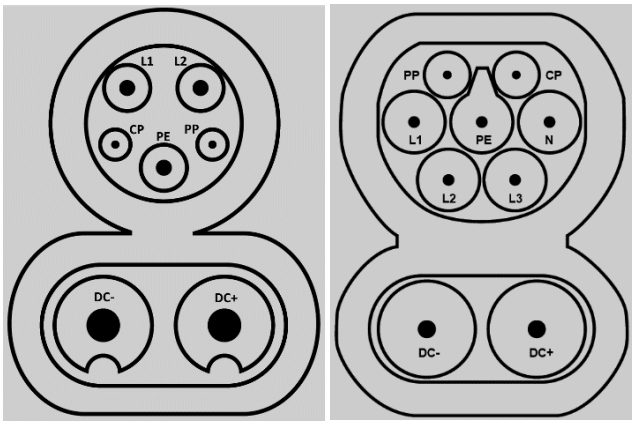
Note: The voltage and current carrying capacity rating may be limited by the attached EV connector or inlet. DC charging according to the relevant standard is only possible with the associated communication module (see item SL1040A-301 to -303).

SL1040A-301 Communication module PLC

Adding two additional power line communication (PLC) modules to the Scienlab Charging Discovery System supports the following additional functions:

- Emulation of the electrical interface on the EV and EVSE side
- EV emulation according to the standards DIN SPEC 70121 (2014) and ISO 15118 Ed. 1 (EIM only*)
- EVSE emulation according to the standards DIN SPEC 70121 (2014) and ISO 15118 Ed. 1 (EIM only*)
- Man-in-the-middle measurement between EVSE and EV with low latency
- Recording of all EV or EVSE V2G messages and display of the information contained therein in plain text
- Recording and visualization of QCA attenuation statistic when charging with PLC
- Access to the most important PWM, V2G and SLAC parameters from test editor for creation of sophisticated test cases, e.g. inserting fault conditions by manipulating the application data (e.g. “EV target voltage”) and delay single response/request messages

* Plug and Charge (PnC) will be available with future software update (included in SW maintenance contract).

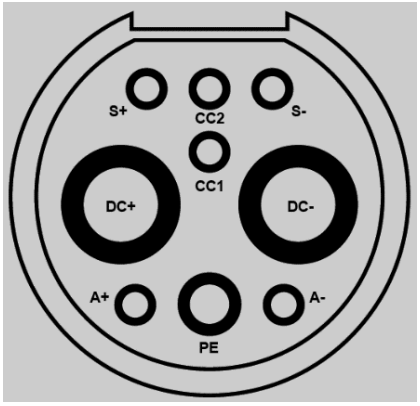
Pin	Designation	Function	Charging interface
CP	Control Pilot	PWM control line plus digital communication via PLC	
PP	Proximity Pilot	EV testing of the charging cable connection	

Note: This option does not include electromechanical contacting (connector/inlet). See the EV Charging and EVSE Plug-In Adapter data sheet for complete details.

SL1040A-302 Communication module GB/T

Adding two communication modules to the Scienlab Charging Discovery System support the following additional functions:

- Emulation of the electrical interface of EV and EVSE
- EV emulation according to GB/T 27930-2011 and 2015 (DC)
- EVSE emulation according to GB/T 27930-2011 and 2015 (DC)
- Man-in-the-middle measurement between EVSE and EV with low latency
- Recording of all EV or EVSE CAN messages and display of the information contained therein in plain text
- Access to the most important CAN parameters from test editor for creation of sophisticated test cases, for example by inserting fault conditions by manipulating the application data (e.g. “Voltage demand”) and/or delay single response/request messages

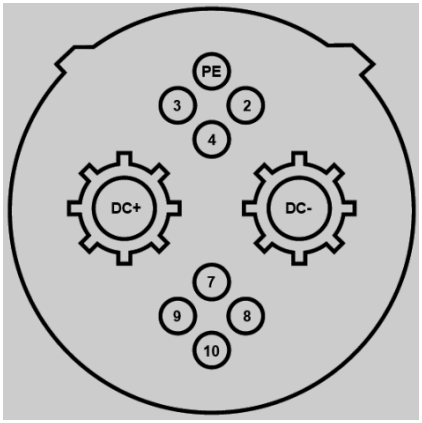
Pin	Designation	Function	Charging interface
S+	CAN-High	CAN Bus: High level communication	
S-	CAN-Low		
CC1	Connection Check 1	EV testing of the charging cable connection	
CC2	Connection Check 2	EVSE testing of the charging cable connection	
A+	Auxiliary Circuit +	EVSE voltage supply for EVCC	
A-	Auxiliary Circuit-	EVSE voltage supply for EVCC	

Note: This option does not include electromechanical contacting (connector/inlet). See the EV Charging and EVSE Plug-In Adapter data sheet for complete details.

SL1040A-303 Communication module CHAdeMO

Adding two communication modules to the Scienlab Charging Discovery System support the following additional functions:

- Emulation of the electrical interface on the EV and EVSE side
- EV emulation according to the CHAdeMO specification
- EVSE emulation according to the CHAdeMO specification
- Man-in-the-middle measurement between EVSE and EV with low latency
- Recording of all EV or EVSE CAN messages and display of the information contained therein in plain text
- Access to the most important CAN parameters from test editor for creation of sophisticated test cases, for example by inserting fault conditions by manipulating the application data (e.g. “Charging current request”) and/or delay single response/request messages
- Supported CHAdeMO protocols: 0.9; 0.9.1; 1.0.0; 1.0.1; 1.1; 1.2; 2.0

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	

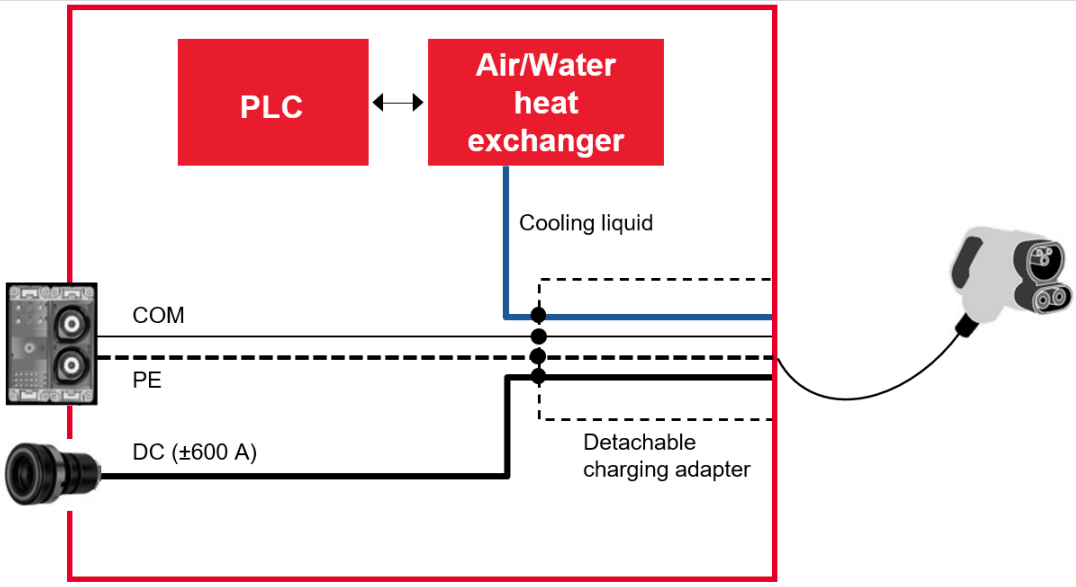
Note: This option does not include electromechanical contacting (connector/inlet). See the EV Charging and EVSE Plug-In Adapter data sheet for complete details.

SL1048A-CU1 Scienlab Cooling Unit

For test applications with an output power of up to 900 kW or an output current of 600 A DC, a cooling unit with liquid-cooled charging cable is used. The cooling technology (Scienlab Cooling Unit) consists of a 19” cooling unit responsible for cooling the charging cable of the Scienlab Charging Discovery System – High-Power Series.

SL1048-CU1 – Scienlab Cooling Unit incl. liquid-cooled charging adapter

System description	
Dimensions (H x W x D)	1075 x 600 x 555 mm
Weight	approx. 200 kg
Protection class	IP20



Interfaces	
High-Power CDS HV circuit	Via HV adapter
Communication (internal and charging)	Communication adapter and Ethernet to SPS
DC	Via interchangeable liquid-cooled EV charging adapter 1500/1000 V 600 A

Note: The cooling circuit contains synthetic oil.

Communication adapter

- Connection of emulated charging communication from control module in CDS HP Series cabinet to Cooling Unit
- Connection of temperature measurement from liquid-cooled charging adapter to the control module of the CDS HP Series cabinet
- Connection of pilot and emergency circuit between CDS HP Series cabinet and Cooling Unit
- Length: 1.5 m

HV adapter

- Consists of two independent DC cables, one for DC+ and one for DC- connection
- Connection of DC+ and DC- between CDS HP Series cabinet and Cooling Unit
- Length: 1.5 m

SL1040A-IRE Scienlab Insulation Resistance Emulator

For testing the insulation monitoring function of vehicle or charging station, a variable resistance between DC+ and PE and DC- and PE is connected to the Scienlab Charging Discovery System for high-power charging (CDS HP Series). The Scienlab Insulation Resistance Emulator (IRE) can be used in this way to emulate an insulation fault systematically. The IRE may only be used in combination with the CDS HP Series and is shipped with an example test case for EVSE testing.

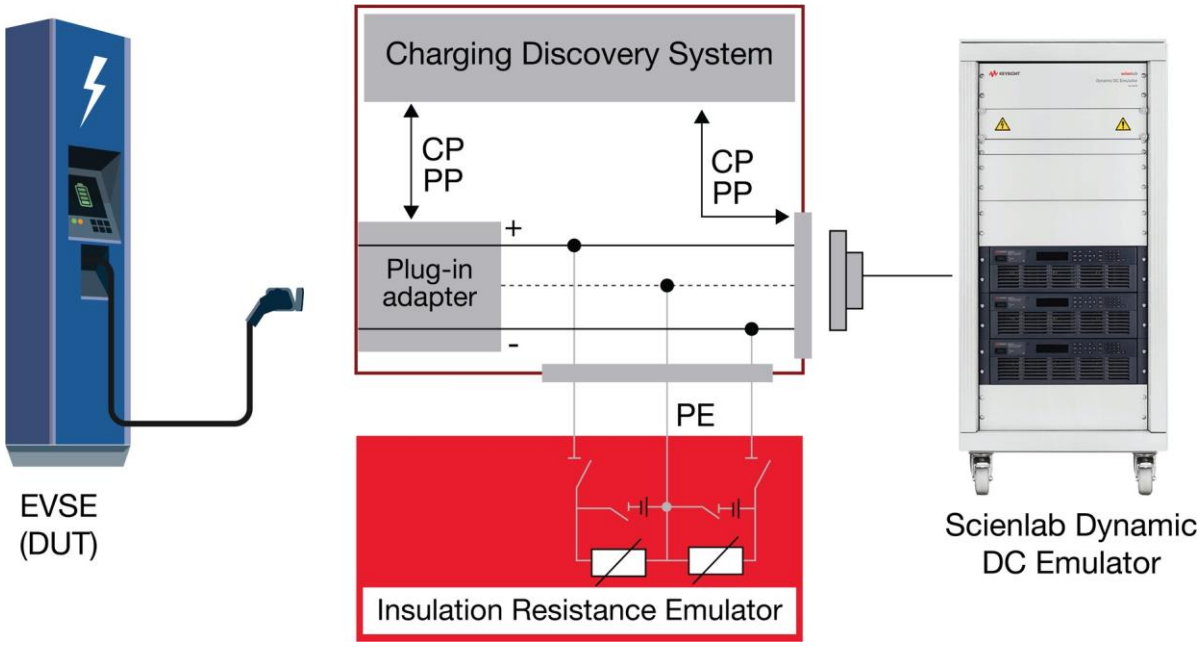


Figure 3. System topology including Scienlab Insulation Resistance Emulator

System Characteristics	
Dimension (H x W x D)	300 x 520 x 600 mm
Weight	Approx. 15 kg
Protection class	IP20
Adjusting range per R-cascade	500 Ω to 2 MΩ (adjustable in 500 Ω steps)
Adjusting range Y-Capacitance	0; 0.5; 1.0; 1.5; 2.0; 2.5; 3.0; 3.5 µF ±5%
Max. adjustment deviation at 1 kΩ to 1 MΩ	1% of adjustment value
Electric strength	1000 V
Self-protection	Minimal total resistance DC+ to DC- limited by software
Self-protection	32 mA fuse

Technical Data

EV/EVSE	Function/electric parameter		Range	Tolerance	
				Offset	Gain
				Max./Typ.	Max./Typ.
EVSE	PWM generator	Fundamental frequency	900 to 1100 Hz	±0.1 Hz	
		Open circuit voltage (adjustable, positive and negative)	±15 V	±0.02 V/ ±0.004V	
		Pulse width	0 to 100%	±0.05%	
		Maximum rise time	2 µs at Cc = 0 pF		
		Maximum fall time	2 µs at Cc = 0 pF		
		Minimum settling time to 95% of steady state	3 µs at Cc = 0 pF	±1 µs	
		Input resistance R1	1000 Ω ±30 Ω	±0.1%	
		Capacity Cs	300 pF		±5%
		Capacitance Cc for emulating the max. cable capacitance on control pilot	switchable: 0, 1300, 1500, or 2800 pF		±5%
EVSE and EV	Control pilot measurement	Voltage measurement	±15 V 14 bits AD converter, 20 MS/s	±0.02 V/ ±0.004 V	
		Frequency measurement	900 to 1100 Hz	±0.1 Hz	
		Pulse width	0 to 100%	±0.5%	
		Rise/fall time	1 to 220 µs	<1 µs	
		Input impedance	1 MΩ +100 pF		
EV	Control pilot manipulation	EV resistance CP-PE (R2||R3)	1 to 20000 Ω		±0.5%
		Capacitance Cc for emulating the max. line capacitances	switchable: 1500, 2400, or 3900 pF		±5%
	Proximity pilot measurement	EV resistance PP-PE	50 to 3250 Ω	±0.3%/1 Ω	
	Proximity pilot emulation	Charging plug EV resistance PP-PE	fixed: 2160, 2430, 2700, 2970 or 3240 Ω		

Note: Valid technical data from August 2020.

Interfaces

Description	
Self-supply	24 V DC (connection via terminal) Note: Desktop power supply unit is not included.
Measuring taps	
Control pilot EV	BNC socket
Control pilot EVSE	BNC socket
GB/T or CHAdeMO signaling EV	DSUB 15
GB/T or CHAdeMO signaling EVSE	DSUB 15
Digital interfaces	
Interface to operating PC	1000 MBit/s Ethernet
Remote interface (e.g. HiL)*	1000 MBit/s Ethernet
Power source/sink	1000 MBit/s Ethernet
External data media	USB
Status LEDs	
System status	3 LEDs (monochrome)
EV	Status of EVCC (RGB) and Power Line Communication (PLC) modem
EVSE	Status of SECC (RGB) and PLC modem

* Support and remote interface license are optional available.

Licenses

Software functionality without additional license
Reading and writing test cases is a basic function of the Charging Discovery System. With the Test Editor the user can conveniently define own test cases directly within the Charging Discover graphical user interface.
Test case programming is performed using functions based on common high-level language elements. Loops, test steps, and subroutines can be combined. Available system functions and parameters are automatically suggested and explained through tooltips while typing (intelligent code completion).

- Simple and intuitive programming language (proprietary, but C-like) and clear tabular representation.
- Use of chronological value tables or real charging profiles.
- Dynamic source/sink parametrization: modification of setpoint parameters while the source/sink is active.
- Independent creation of test sequences using variables for different device under test profiles.
- Use of "print commands" for documenting dynamic results in the Charging Discover trace.

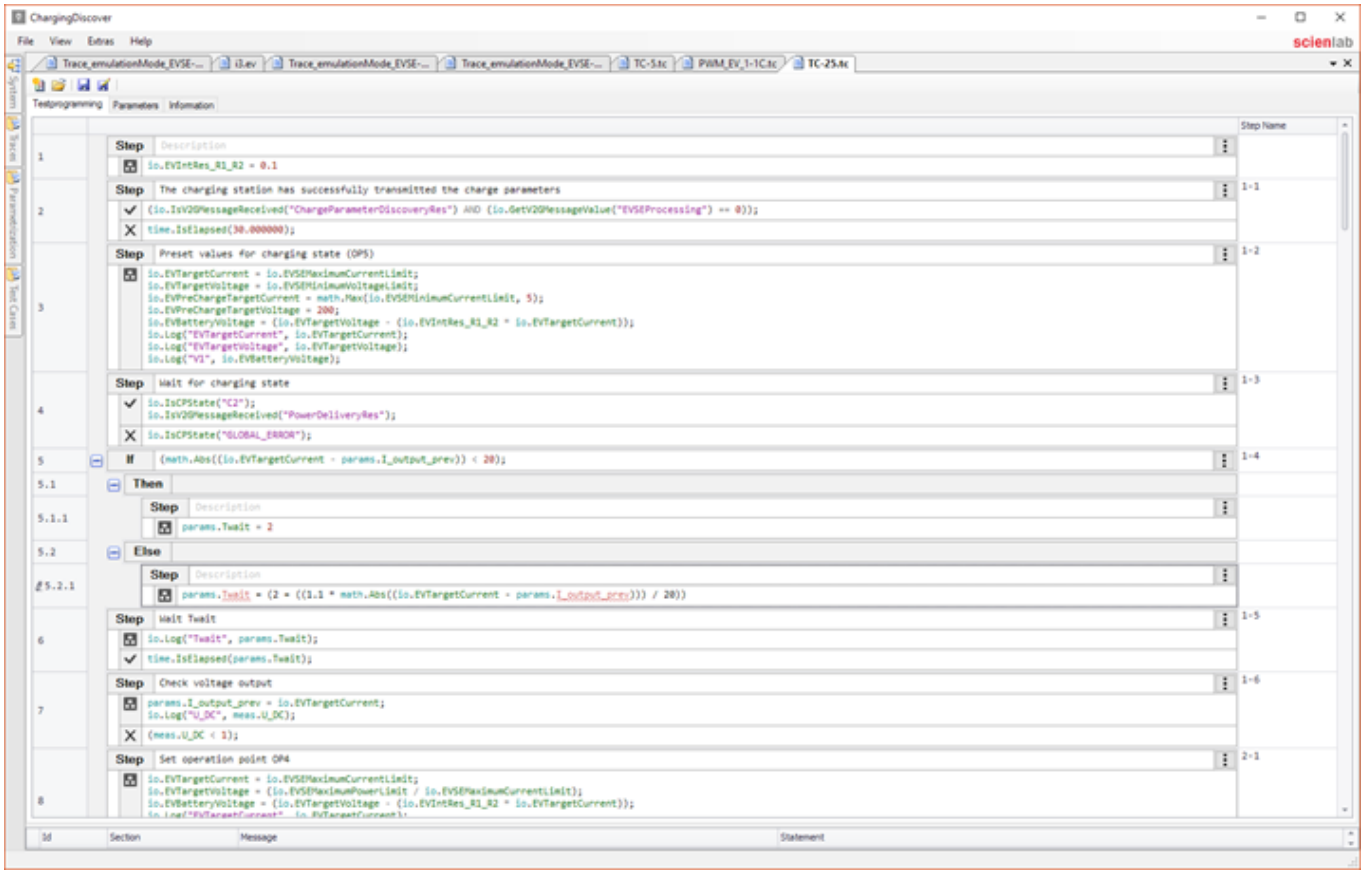


Figure 4. Test Editor screenshot

Note: Test Editor documentation is part of the Charging Discover operating manual. If the CDS is ordered without a power source or an EVSE load, only test cases on signal level can be executed.

The following figure shows the interface topology of CDS with basic software functionality:

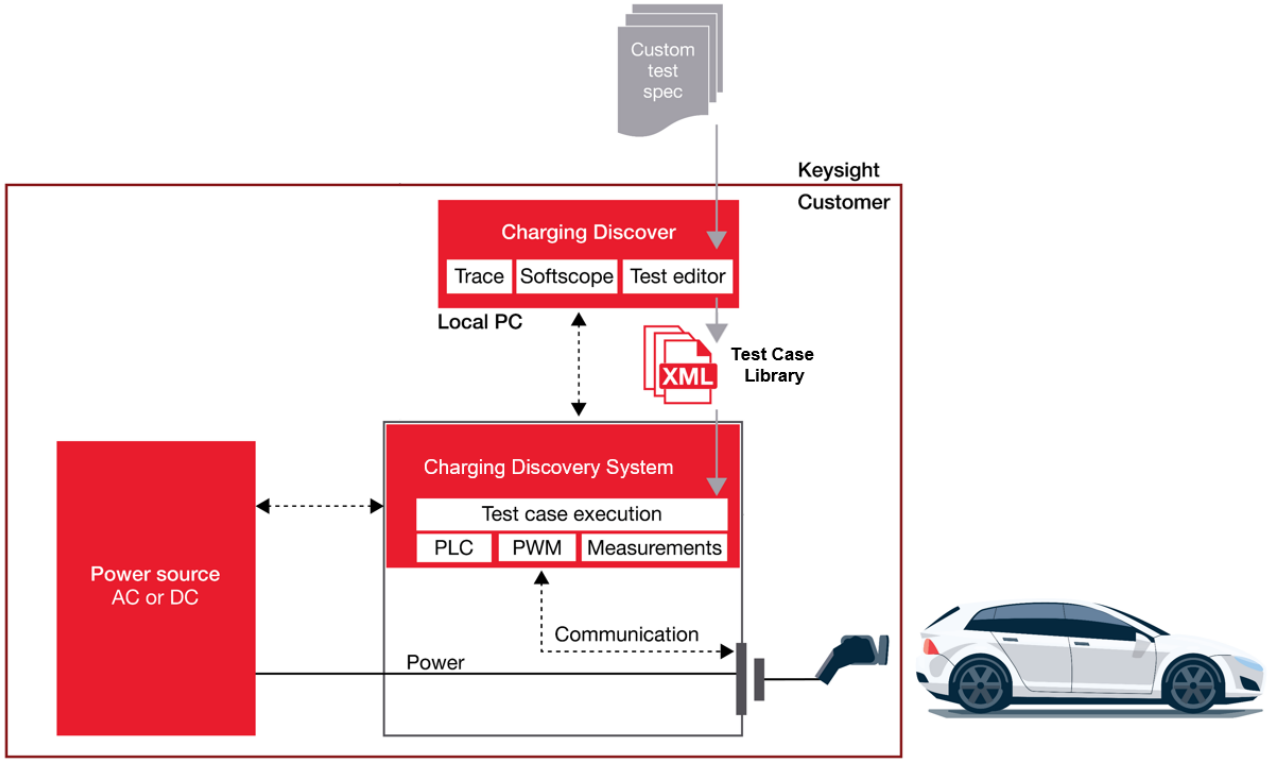


Figure 5. Interface topology of CDS with basic functionality

The software functionality, without an additional license, includes reading and modifying test case packages purchased from Keysight as well as customized (self-created) test cases. The execution of the test case packages purchased from Keysight is also possible.

Note: If the user wants to execute customized test cases, the Expert Mode license (SL1040A-S01, next page) is required.

SL1040A-S01 Expert mode

The Expert mode represents an extension of the available software functionality described above by enabling the possibility to execute customized test cases. In addition, it is possible to control and monitor the test case execution via remote access.
Therefore, the Expert mode license includes SL1040A-S03:

SL1040A-S03 .NET Driver DLL 1.1.0 for CDS remote testcase interface
This interface specification describes the main class with all data types and functions of the Scienlab Test Case Library. In combination with the CDS HP Series and the application software Charging Discover the Scienlab Test Case Library can be used to:

- Open and read Charging Discover project files
- Show and modify test case parameters in a project file
- Start and stop test cases in the Charging Discovery System
- Show test case live states

Within this license, a DLL file “TC .NET” will be provided via Keysight Software Manager (KSM). This file will be updated with every update of the firmware interface, whenever applicable for a convenient usage of the interface of the test case library.
The following figure shows the interface topology of CDS HP Series with Expert mode:

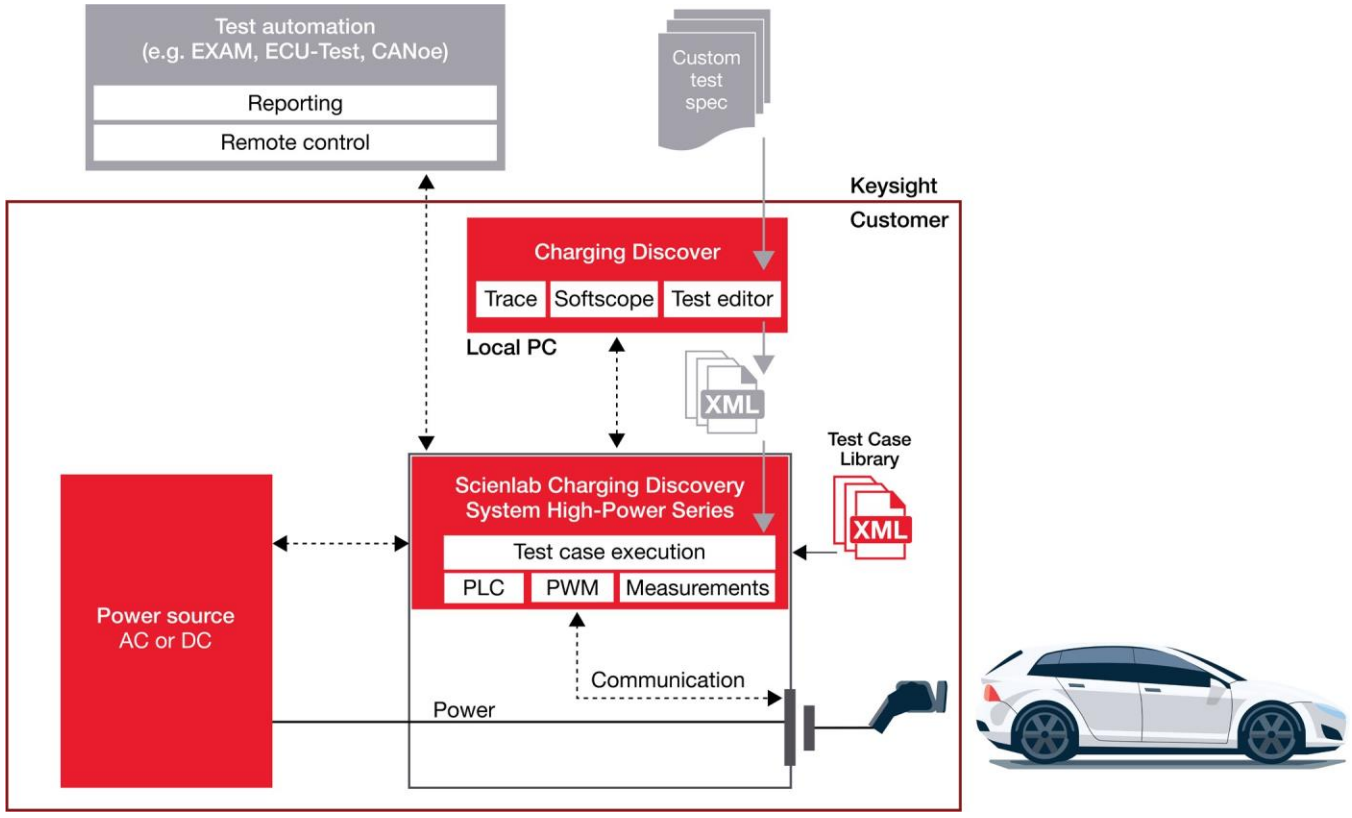


Figure 4. Interface topology of CDS HP Series with Expert mode

SL1040A-S02 Developer mode

Remote interface
The Developer mode enables users to connect the CDS HP Series with a third-party test automation through Ethernet (TCP/UDP). This interface allows users to parametrize EV/EVSE emulation or test case mode and execute tests remotely. The Keysight Windows application software, Scienlab Charging Discover, captures traces in this mode when automatically connected, but the software tool is not required during test execution anymore.

Note: It is still required for test case and test project definition.
The Developer mode license is an extension of the Expert mode and includes SL1040A-S03 and SL1040A-S04.

Remote access supports the following functions:

- Configure use case, charging standard and operation mode (AC or DC) or select and run test projects/cases
- Start, stop and reset the system
- Read charging state (PWM and high-level communication)
- Read all electrical measurements of CDS (signal and power)
- Manual control of CP and PP output in EVSE emulation (e.g. PWM amplitude, frequency or duty cycle)
- Manual control of CP in EV emulation (e.g. setting R2/R3 resistance and cable capacitance)
- Remote variation of all charging communication parameters (before and during charging)
- Remote injection of fault states in CP and PP (e.g. short circuit)
- Manual control of attached power sources/loads: voltage/current setpoints, power-switch off limits
- Access all charging state related high-level parameters of EV and EVSE (V2G or CAN) as decoded values (e.g. TargetCurrent, PresentVoltage, SOC)
- Direct access to EV and EVSE PLC modem of CDS (GreenPHY QCA7000)

Furthermore, the Developer mode license includes SL1040A-S04:

SL1040A-S04 .NET Driver DLL 1.6.5 for CDS SLEP interface
The interface specification of the SLEPLibrary describes the main class with all data types and functions, which are necessary to communicate with Keysight emulators and Scienlab Measurement & Control Modules.

This specification is valid for all systems.

Within this license, a DLL file “SLEP .NET” will be provided via Keysight Software Manager (KSM). This file will be updated with every update of the firmware interface, whenever applicable for a convenient usage of the SLEP interface.

The following figure shows the interface topology of CDS HP Series with Developer mode:

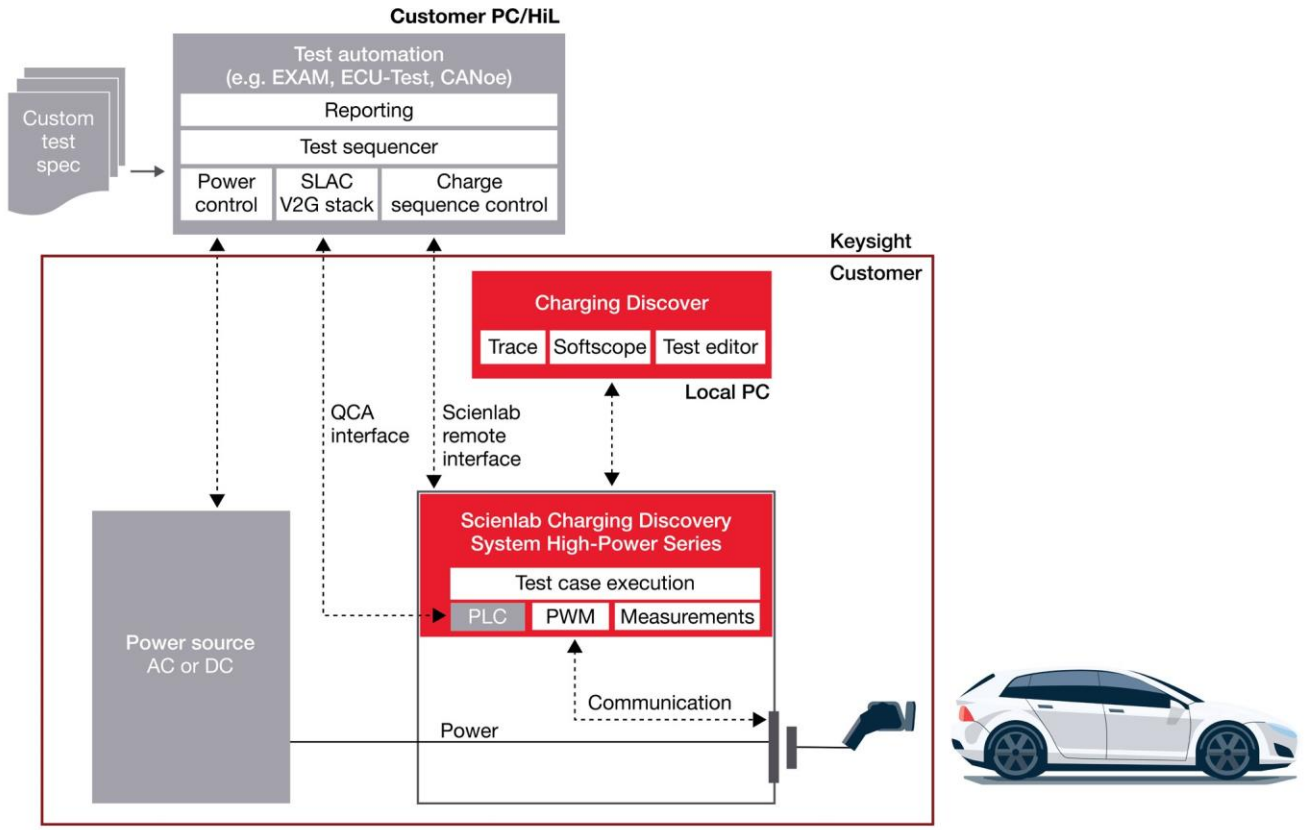


Figure 5. Interface topology of CDS HP Series with Developer mode

Because of the direct access to all internal CDS HP Series components, users can integrate the CDS HP Series in their own test bench, automation software or hardware-in-the-loop systems and therefore combine the CDS HP Series with other third-party power sources/loads.

Note: When doing so, the CDS HP Series is neither controlling the charging sequence, nor the third-party power sources and loads. Since this control is managed by the customer's software and operator, Keysight is not responsible for technical integration issues. Technical support can be received through productivity support service.

Project Management, Consulting and Installation Services

Service features depend on the facilities, customer expertise, and overall scope of the project. For that reason, it is not possible to give exact service efforts without knowing the customer's requirements and goals. Keysight offers the following services to secure a successful project execution and reduce ramp-up time for our customers.

PS-XPM-100-SL Project management services

Keysight recommends project management services for each test bench project. By ordering the project management services, an experienced project manager is dedicated to your project and acts as a direct communication interface from Keysight to the customer's project management team.
The project manager takes over the responsibility:

- To develop and manage the project plan
- To track project progress and milestones
- Communication project status regularly and ensure any unscheduled project events or project deviations are communicated and promptly discussed with the customer project team
- To provide complete and accurate project documentation to the customer.

PS-XINS-100-SL Project installation services

These services provide installation expertise to manage, deliver and coordinate local facilities installation for the test bench. Specific installation efforts depend on the customer's individual facility, the locally available power and cooling and the test bench being delivered.

PS-XENG-100-SL Project engineering services

Project engineering services provide specialized engineering services during project development and implementation. The customers project team will have access to engineering expertise to aid in various tasks specific to their project including but not limited to – safety matrix and test bench guard, facilities and lab layout, special power requirements, etc.

PS-XCOM-100-SL Project commissioning services

Project commissioning services for the test solution provide an experienced test bench engineer to validate and complete the test bench setup in readiness for the customer's initial usage. It includes validating specific hardware and software configurations per the project requirements and any specific consulting agreed to beforehand, given the test bench's customer-specific usage.

Extend the Capabilities of your Test Solution

You can get further information and more detailed specifications here:

Meet the SL1200A Series Scienlab Regenerative AC Emulator, 3-Phase

The SL1200A Series was designed to handle all your 3-phase AC test needs up to 1200 VAC, from 30 to 630 kVA without the need for a transformer. Two voltage ranges are available: 600 VAC and 1200 VAC. The 600 VAC models are ideal for low voltage inverter test as well as EV and EVSE charging test applications. The 1200 VAC models allow for (HVRT) testing at the IEC LV-AC limit without the need for a large, complex test setup.

- Covers AC test needs; up to 1200 V_{L-L}; up to 130 A; up to 630 kVA
- Achieve 1200 V_{L-L} at full specifications without extra equipment, such as a transformer
- Save energy with 100% regenerative (bidirectional) power solution with >85% efficiency
- Get up and running immediately with intuitive soft front panel (SFP)
- Feel confident with complete, one-vendor solution of hardware, software, consulting, and support services worldwide for many applications, such as EVSE/EV charging test

Find out more about the SL1200A Scienlab Regenerative AC Emulator, 3 Phase.

Meet the SL104XA Series Scienlab Dynamic DC Emulator

With bi-directionality, integrated DC voltage and current controllers, high dynamics, and its regenerative energy feedback capacity, the Scienlab Dynamic DC Emulator provides an all-in-one system for efficient and effective testing of the power electronic components in electric vehicles (EV) and electric vehicle supply equipment (EVSE).

- Efficient testing of power electronics and charging technology
- Available for high voltage as well as 48 V applications
- Energy-efficient source and sink mode
- Real-time-capable, open interface
- Power increase through parallelization

Find out more about the SL104XA Series Scienlab Dynamic DC Emulator.

Meet the SL1093A Scienlab Charging Discover Test Software

The Scienlab Charging Discover test software controls the Scienlab Charging Discovery System (CDS). With this up-to-date, user-friendly software, you can operate the system, visualize measured values, record test sequences, and generate reports for trusted insights.

- Live and synchronized views of recorded measurements
- Test editor for creating individual test cases
- Powerful graph view for analyzing recorded traces
- Export of measured values (for example, MDF)
- Remote functionality for Hardware in the Loop test benches

Find out more about the SL1093A Scienlab Charging Discover Test Software.

Meet the Scienlab Test Case Library

The Scienlab Test Case Library provides complete test case libraries for all important charging conformance and interoperability standards. Each library is developed according to official specification and carefully verified with all CDS hardware configurations and every software release version. Hence, it is the quickest and most simple way to get valid test results out of the box.

Find out more about the SL1095A Scienlab Test Case Library – TTCN-3.

Find out more about the SL1300A Scienlab Test Case Library – Charging Discover.

Learn more at: www.keysight.com

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at: www.keysight.com/find/contactus

KEYSIGHT TECHNOLOGIES