

# EVlink AC Charging Station Testing Tool EVA1SADS

## User Manual

09/2020



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All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

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## Safety Information

### Important information

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of this symbol to a “Danger” or “Warning” safety message indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages with this symbol to avoid possible injury or death.

### **DANGER**

**DANGER** indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

**Failure to follow these instructions will result in death or serious injury.**

### **WARNING**

**WARNING** indicates a hazardous situation which, if not avoided, could result in death or serious injury.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

### **CAUTION**

**CAUTION** indicates a hazardous situation which, if not avoided, **could result in** minor or moderate injury.

**Failure to follow these instructions can result in injury or equipment damage.**

### **NOTICE**

**NOTICE** is used to address practices not related to physical injury.

**Failure to follow these instructions can result in equipment damage.**



**Please Note**

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved, particularly when performing measurements and checks in low voltage applications.

## Overview

### Functionalities

  **DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Never dismantle this device.
- Check that this device is in good condition before using it. Do not use it if it is damaged.
- This device may only be used by qualified and duly trained personnel.
- This device must only be used for the tests described in this document.
- Do not use this device if it is wet.
- Do not use the N, L1, L2, L3 outputs to connect an electrical load to the charging station.
- Do not connect an electrical load which consumes more than 13 A to the type F socket-outlet for more than 30 minutes.
- Disconnect this device from the charging station as soon as you stop using it.

**Failure to follow these instructions will result in death or serious injury.**

## ***NOTICE***

**HAZARD OF CHARGING STATION AND TESTING TOOL DAMAGE**

Do not inject voltage into the device sockets.

**Failure to follow these instructions can result in equipment damage.**

The EVlink testing tool EVA1SADS of an electric vehicle charging station in alternative current operates with all Schneider Electric EVlink charging stations equipped with a type 2 socket-outlet, or an attached cable with a type 2 connector, to which it must be connected. It can also be used with other charging stations operating in Mode 3 in compliance with standard IEC 61851-1.

The EVlink testing tool simulates the connection of an electric vehicle to the charging station, condition required for the charging station to supply power on the downstream charging circuit (type 2 socket-outlet or vehicle connector) by closing its contactor or its relay. Some charging stations may require user authentication, for example with an RFID card - refer to the charging station documentation.

The following operations are then possible using the measurement sockets and the type F socket-outlet:

Operations	Specific tools required
Check voltage presence on each phase.	
Measure the voltage between phases, between phase and neutral, between neutral and protective earthing conductor.	Measuring instruments (multimeter, residual current device tester, oscilloscope) not supplied with the EVlink testing tool.
Test the residual current protective device of the charging station.	
Measure the voltage between the CP pilot line and the protective earthing conductor PE in order to check its conformity with standard 61851-1	
Observe the signals transmitted on the control pilot line.	
Simulate various charging cable ratings.	
Check that the energy meter is correctly connected.	

By simulating the connection of an electric vehicle to the charging station, the EVlink testing tool can check that the charging station is allowed to start charging: user authenticated, charging authorized, etc.

**Note:** The EVlink testing tool is used to test a charging station in Mode 3 in compliance with standard IEC 61851-1. Charging control in compliance with standard ISO 15118 is not implemented.

## Use

### Product Description



- 1 Type F socket-outlet (withstands a maximum amperage of 13 A)
- 2 Power On indicator lights on the N-L1, N-L2, N-L3 phases
- 3 Measurement sockets for the protective earthing conductor PE, the neutral N and the L1, L2, L3 phases
- 4 Vehicle status selector
- 5 CP pilot line measurement socket
- 6 Charging cable rating selector
- 7 Type 2 plug

## Mains checks and tests

### Simulating an Electric Vehicle (CP)

The vehicle status is defined by the position of the selector (4). The various statuses are simulated on the CP pilot line in compliance with standard IEC 61861-1:

- Status A: vehicle not connected.
- Status B: vehicle connected not requiring charging.
- Status C: vehicle connected and ready for charging, charging area ventilation not required.
- Status E: error, short-circuit between CP and PE.

In compliance with the provisions of standard IEC 61851-1, the charging circuit downstream from the charging station stays open if no vehicle is connected and ready for charging. Under these conditions, measurements or tests cannot be performed on the power circuit downstream from the charging station.

To simulate an electric vehicle connected and ready for charging, perform the steps described below:

1. Set imperatively selector **(4)** to position A.
2. Set selector **(6)** to position N.C. if and only if the charging station is equipped with an attached cable.  
Otherwise refer to the Simulating a cable (PP) paragraph.
3. If access to the type 2 socket-outlet on the charging station or to the cable is locked, or if the start of charging is related to authentication, you must authenticate yourself on the charging station if necessary (for example with an RFID card).
4. Connect the EVlink testing tool to the charging station.
5. Set selector **(4)** to position B. If the charging station has required the user authentication, this action must be performed within a limited time. Refer to the charging station documentation.  
Warning: Before changing the position of the switch, pause on each position.
6. 6. Set selector **(4)** to position C. Then the charging station closes the charging circuit and supplies power (switch). If the test is successful, depending on the charging station supply type, the phase 1 LED or the LEDs of the three phases light up, indicating voltage presence on each of the phases and the charging station switch closes..

In compliance with the provisions of standard IEC 61851-1, the charging station equipped with a type 2 socket-outlet locks the cable during charging. To end the test, before disconnecting the EVlink testing tool, you must set selector **(6)** to position A, or even position B after having stopped charging on the charging station side..

### Simulating a Cable (PP)

You can simulate all charging cable ratings defined in standard IEC 61851-1 on the proximity contact PP. The rating is chosen with selector **(6)**: 13 A – 20 A – 32 A - 63 A. Warning: Do not change the value during the "Simulating an Electric Vehicle" test.

If the charging station is equipped with an attached cable, use position N.C.

If the station communicates correctly with the station tester, charging will start in accordance with the previous test.

### Simulating a Fault


This test can be performed after step 6 of the "Simulating an Electric Vehicle" test

You can simulate a short circuit between the CP pilot line and the protective earthing conductor PE by setting the selector **(4)** to position E. The charging station must open its charging circuit and the charging should then stop, the cable should unlock and no new charging should be able to start when the selector is in this position. If necessary, the charging station must report the fault locally or remotely.



## Additional checks and tests

### Checks and Measurements


DANGER

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

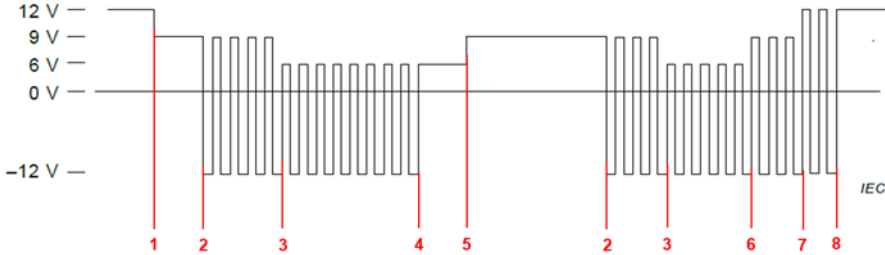
- Use only leads with banana plugs complying with standard IEC 61010-031 when performing measurements and checks.
- Use only measuring instruments complying with standard IEC 61010-1.

**Failure to follow these instructions will result in death or serious injury.**

The following checks and measurements can be performed after executing all the steps described previously to simulate an electric vehicle connected and ready for charging (step 6 of the "Simulating an Electric Vehicle" test), using the measurement sockets equipped with banana sockets:

Operations	Specific tools required
<p>Measure the voltage between phases, between phase and neutral, between neutral and protective earthing conductor PE, using the measurement socket inputs L1, L2, L3, N and PE.</p> <ul style="list-style-type: none"> <li>Check that the phase and neutral have not been inverted.</li> <li>In TT and TN earthing systems, check that the voltage between neutral and protective earthing conductor does not exceed a few volts. Refer to the electric vehicle documentation to find the maximum voltage permitted by the vehicle.</li> </ul> <p>In an EV Ready installation, this voltage must not exceed 10 Volt.</p>	<p>Measuring instruments (multimeter, residual current device tester, oscilloscope) not supplied with the EVlink testing tool.</p>
<p>Test the differential protection of the charging station.</p> <p>Before performing this test, ensure that you have access to the RCD, as you will have to reactivate it. To perform this test, a leak current is created. This leak current flows from phase L, to PE. When this happens, the protective device should trigger and charging should immediately stop.</p> <p>Important: This test may cause general power failure after the charging station, if the selectivity of the electrical installation has not been set correctly.</p> <p>To perform the test, use a differential circuit breaker tester and connect it between N and then each of the phases separately L1, L2, L3, in a 3-phase installation.</p> <p>If the test is carried out correctly, the RCD must trigger each time and charging must stop immediately. Re-activate the RCD between each test.</p>	

If troubleshooting operations are carried out on the charging station, it may be useful to perform the following operation:

Operations	Specific tools required
<p>Measure the voltage between the CP pilot line and the protective earthing conductor PE.</p> <ul style="list-style-type: none"> <li>• Connect your measuring equipment between the CP and PE measurement socket.</li> <li>• Perform the "Simulating an Electric Vehicle" test.</li> <li>• To measure the voltage and observe the signals transmitted on the CP pilot line, a good knowledge of the charging control mechanisms described in standard IEC 61851-1 is required according to the statuses (A, B, C, E).</li> <li>• For information purposes, here is an example of a frame according to version 3 of the standard.</li> </ul>  <ol style="list-style-type: none"> <li>1. Connection from the vehicle to the charging terminal, (status A)</li> <li>2. Charging station ready to provide energy, (status B)</li> <li>3. Vehicle ready for charging, the charging station then closes its switch within 3 seconds, the vehicle consumes current at any moment thereafter, (status C)</li> <li>4. The charging station requests charging to stop, the vehicle stops consuming current in less than 3 seconds,</li> <li>5. The vehicle responds to the request to stop charging, the charging station then opens its switch in less than 100 ms,</li> <li>6. The vehicle stops charging, the charging station then opens its switch in less than 100 ms,</li> <li>7. Cable disconnected from the charging station or vehicle, The charging station can stop the PWM signal at any time, when it is no longer ready to supply energy.</li> </ol> <p><b>Note:</b> To measure the voltage and observe the signals transmitted on the CP pilot line, a good knowledge of the charging control mechanisms described in standard IEC 61851-1 is required.</p>	<p>Measuring instruments (oscilloscope) not supplied with the EVlink testing tool.</p>

### Functional Tests

Functional tests can be performed after executing all the steps described previously to simulate an electric vehicle connected and ready for charging.

- Simulate various charging cable ratings.
  - The maximum charging current setpoint given to the electric vehicle by the charging station must not exceed the charging cable rating measured by the charging station. The charging station must not start charging if it has not recognized the cable rating.
  - If the charging station is equipped with a user interface and if the information is available, you can check that the setpoint varies depending on the rating. To perform this test, select a cable rating using selector (6), then perform all the operations described during the "Simulating an Electric Vehicle" test. During step 6, check on the charging station, if the information is available, that the setpoint is respected correctly. Then end the test, select another value using selector (6) and repeat the operation.
  - If the charging station is equipped with a type 2 socket-outlet, charging must not start if selector (6) is set to position N.C. which corresponds to an attached cable.

- Check that the energy meter is correctly connected.
  - This test is only possible if, in single-phase, an energy meter has been connected upstream of the charging station
  - Supplying power to an electrical load is temporarily possible using the type F domestic socket-outlet (1), provided that the absorbed current never exceeds 13 A.
  - It is then possible to check that energy metering is carried out, by looking at the power consumed, in step 6 of the "Simulating an Electric Vehicle" test.
- In case of fault, check the behavior of the charging station.
  - Set selector (4) to position E to simulate a fault on the pilot line. The charging station must stop the charging in progress and open the charging circuit.
  - If necessary, the charging station must report the fault locally or remotely.
- Test the order and rotation of phases.
  - The end of this test is to validate phase matching which supplies the charging stations on the electrical installation and to check the configuration of phases during the commissioning of the LMS.

This test is only possible using Schneider Electric AC charging stations and requires the installation and configuration of a Load Management System (LMS) by Schneider Electric. (Consult document MFR6297701-02 for configuring the LMS),  
 This test can be performed after step 6 of the "Simulating an Electric Vehicle" test.

- 1 - Configure the connection between the LMS and the charging station.
- 2 - Connect an electrical load to the type F domestic socket (1), which never exceeds a consumed current of 13 A,
- 3 - Carry out the "Simulating an Electric Vehicle" test up to step 6,
- 4 - Check that the phase corresponding to the measurement performed by the energy meter, or to a current measurement on the electrical board, (measurement given on the interface of the LMS), correctly matches the charging phase connected to the type F domestic socket (1). Measure the phase order on the measuring terminals using a phase rotation tester.
- 5 - If you have several stations, carry out the same operation on each station and check the phase rotation. The order 123,231,312 is correct as the LMS can only manage this order. The order 132,321,213 is not correct

The screenshot displays the EVLink LMS interface with several key sections:

- Charge points:** A donut chart shows 2 charge points, with 1 available (blue) and 1 charging (green).
- Charges:** A table shows L1 (0/400), L2 (32/400), and L3 (0/400). L2 is circled in green.
- Power meter (PMS320):** Shows L1 (0/400), L2 (8/400), and L3 (0/400). L2 is circled in green.
- STATIONS:** A table with columns: Name, Zone, Connector, Status, Phase.
 

Name	Zone	Connector	Status	Phase
borne-1	Parking	1	charging	TRI231
borne-2	Parking	1	available	TRI123
- TRANSACTION:** A table with columns: Id, Station, Badge, Status, Phase, Date, Duration, Energy, Setpoint, Current.
 

Id	Station	Badge	Status	Phase	Date	Duration	Energy	Setpoint	Current
3	borne-1	SIMTAG	Charging	2	25/06/2020 à 13:21:12	1min	0.05 kWh	32	8.3 A

Annotations in green text and boxes:

- "The energy meter is installed correctly as the measured value is identical" points to the L2 value in the Power meter section.
- "The configuration of the phases of the LMS is correct. The phase order of the connector is 2-3-1 and the connected load on the charging station test is measured on phase 2" points to the L2 value in the Charges section and the Phase column in the STATIONS table.

Fig 1. – Test result correct

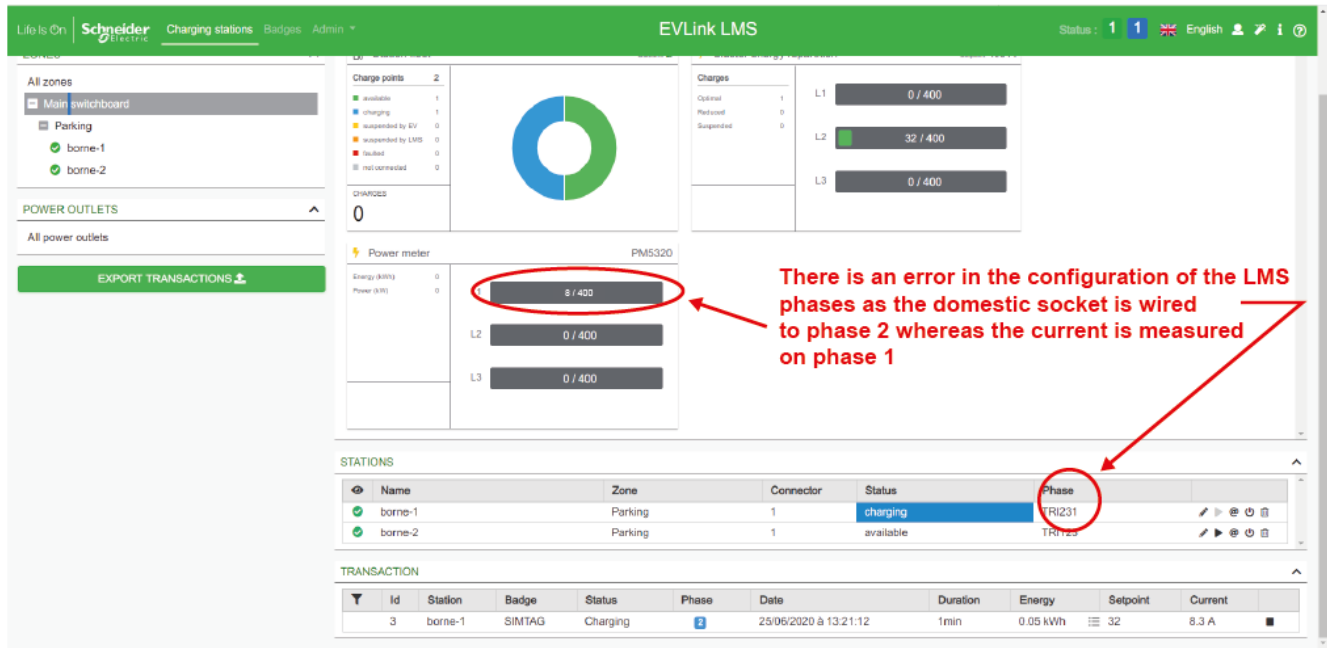


Fig 1. – Test result incorrect

- Check the configuration and communication of the charging station when it is monitored
  - Connect a supervisor to the charging station.
  - Simulate a complete charging cycle by carrying out all of the operations described in the "Simulating an Electric Vehicle" test then return to status B, and check that the charging station transmits the information required to the charge point operator.

## Servicing



### HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Do not use liquid products to clean this device.

**Failure to follow these instructions will result in death or serious injury.**

The EVlink AC charger testing tool is maintenance-free. It cannot be repaired and must not be dismantled.

A dry lint-free cloth can be used to clean the device after disconnecting it from the charging station.

## Specifications

Electrical safety category	CAT III – 300 V
Input voltage	230 V (phase/neutral) - 400 V (phase/phase)
Frequency	50 Hz
Maximum current on the type F socket-outlet	13 A (must not be used permanently)
Degree of protection	IP20
Operating temperature	-10 ° C to 45 ° C
Storage temperature	-25 ° C to 60 ° C
Air relative humidity	max. 80 % (no condensation)