

# **DLEV1**

# **EVSE Adaptor**

# **Operating Instructions**

Revision 1.1



Figure 1 Identifying parts of the DLEV1 EVSE Adaptor

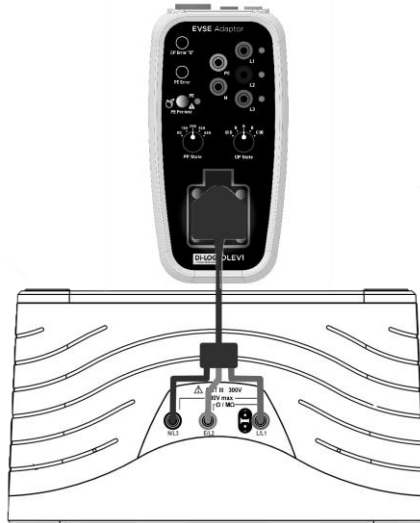


Figure 2 EV Adaptor connection to MFT with 13A mains lead

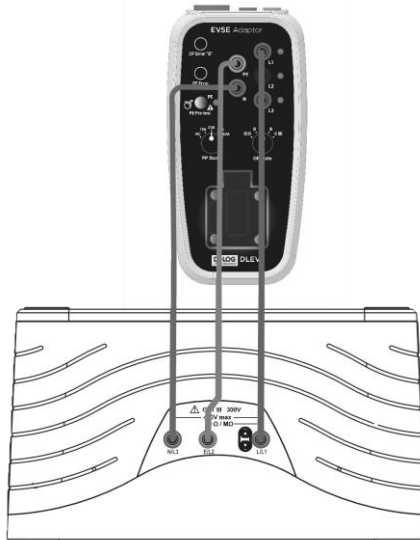


Figure 3 EV Adaptor connection to MFT with 3 wire test lead set (image indicates single-phase (L1) connection)



Figure 4 EV Adaptor with Type 1/Type 2 connection to EVSE charger mounted socket



Figure 5 EV Adaptor with Type 1/Type 2 connection to EVSE charger with fixed charging cable

## Limited Warranty & Limitation of Liability

DI-LOG Test Equipment guarantees this product to be free from defects in material and workmanship under normal use and service for a period of 2 years. The period of warranty will be effective from the date of purchase.

(c) Copyright 2022

All rights reserved. Nothing from this manual may be copied, or made public in any form or manner, either electronically, mechanically, by photocopying, recording, or in any manner, without prior written consent from DI-LOG. This also applies to accompanying drawings and diagrams.

Due to a policy of continuous development, DI-LOG reserves the right to alter the equipment specification and description outlined in this publication without prior notice and no part of this publication shall be deemed to be part of any contract for the equipment unless specifically referred to as an inclusion within such contract.

## Table of Contents

Limited Warranty & Limitation of Liability .....	5
Table of Contents.....	6
Introduction .....	8
1 User Notes & Instruction Manual Symbols.....	9
2 Safety Notes .....	10
3 Accessories.....	11
3.1 Standard Accessories.....	11
4 Unit Description.....	12
4.1 Identifying parts of the DLEV1 .....	12
5 Using the DLEV1 .....	13
5.1 Functions of the DLEV1 Adaptor .....	13
5.2 Connection of the DLEV1 Charge Point Adaptor .....	14
5.3 Operation of a Charging Station to be Tested .....	15
5.3.1 PE Pre-Test .....	15
5.3.2 Proximity Pilot (PP) State (Cable Current Simulation) .....	16
5.3.3 Control Pilot (CP) State (Vehicle Simulation) .....	17
5.3.4 CP Output Signal Terminals .....	17
5.3.5 CP Error “E” Simulation .....	18
5.3.6 PE Error (Earth Fault) Simulator .....	18
5.3.7 Phase Indicator .....	18
5.3.8 13A Mains Socket .....	19
5.3.9 Measurement Input Terminals L1, L2, L3, N & PE .....	19
5.3.10 Load Test Using 13A Mains Socket .....	19
6 Specifications.....	20
6.1 Functions.....	20
6.2 Outputs (for test purposes only).....	20
6.3 General Features.....	20
7 Environmental Conditions .....	21
8 Maintenance .....	22
8.1 Cleaning .....	22
8.3 Service and Calibration.....	23
8.4 Spare Parts.....	24

## Disposal of Old Product



This product has been designed and manufactured with high-quality materials and components that can be recycled and reused.

Please familiarise yourself with the appropriate local separate collection system for electrical and electronic products.

Please dispose of this product according to local regulations. Do not dispose of this product along with normal waste material. The correct disposal of this product will help prevent potential negative consequences for the environment and human health.

## Introduction

The DLEV1 is a handheld, testing adaptor designed to interface between electric vehicle supply equipment (EVSE) and a multifunctional electrical installation test instrument capable of performing a comprehensive range of tests.

The DLEV1 will enable the user to safely conduct the following measurements when used in conjunction with a multifunctional electrical installation tester:

- PE Pre-Test to indicate the potential presence of dangerous voltage at the PE terminal before testing commences via a touch electrode and led indicator.
- Live phase to neutral presence of all phase voltages indicated by three individual phase led indicators.
- PP State simulation (Proximity Pilot) simulating the current capabilities of the charging cable; NC, 13A, 20A, 32A and 63A with a rotary switch.
- CP State simulation (Control Pilot) simulating various vehicle charge states, A, B, C & D with a rotary switch.
- CP Error “E” simulation where the signal is short-circuited to PE via a push button.
- PE Error simulates an earth fault interrupting the PE conductor via a push button.
- 4mm input terminals for test leads to connect to multifunctional electrical installation testers; L1, L2, L3, N and PE conductors (figure 3).
- CP Signal Output via two 4mm terminals for connection to an oscilloscope to check waveform and amplitude of the CP signal.
- 13A mains socket for multifunctional installation tester connection or external loading up to 10A (figure 2).

The adaptor is designed to test the function and electrical safety of charging stations mode 3 for AC charging.

With this adaptor, charging stations can be tested in accordance with IEC/EN62851-1 and IEC/HD 60364-7-722.

Please read this instruction manual carefully to ensure the safe performance and function of the test adaptor.



# 1 User Notes & Instruction Manual Symbols

**This instrument and its operating instructions are intended for use by trained personnel only.**

The following symbols are used in these operating instructions and on the DLEV1.



Warning of electrical danger!

Indicates instructions must be followed to avoid danger to persons.



Important, follow the documentation! This symbol indicates that the operating instructions must be consulted and adhered to in order to avoid danger.



Equipment protected throughout by double or reinforced insulation.



Earthing (grounding) terminal



Conformity symbol, the instrument complies with the relevant directives. It complies with EMC Directive (2014/30/EU), Standards EN 61326-2-2. It also complies with the Low Voltage Directive 2014/35/EU, Standards EN 61010-1 and EN 61010-2-030 are fulfilled.



Conformity symbol, the instrument complies with the relevant directives. It complies with EMC Directive (Electromagnetic Compatibility Regulations 2016), Standards BS EN 61326-2-2. It also complies with the Low Voltage Directive (Electrical Equipment (Safety) Regulations 2016), Standards BS EN 61010-1 and BS EN 61010-2-030 are fulfilled.



The DLEV1 meets the standard (2012/19/EU) WEEE. This marking indicates that this product should not be disposed with other household wastes throughout the EC. To prevent possible harm to the environment or human health from uncontrolled waste disposal, recycle it responsibly to promote the sustainable reuse of material resources. To return your used device, please use the return and collection systems or contact the retailer where the product was purchased. They can take this product for environmentally safe recycling.

## 2 Safety Notes

This DLEV1 is fully compliant with the requirements of:

BS EN 61010-1

BS EN 61010-2-30

In order to ensure the safe operation of this adaptor, all notes and warnings in these instructions must be observed at all times.



The DLEV1 has been designed to make measurements in a dry environment.



The DLEV1 may be used to test circuits with a maximum over-voltage Category II, 300 V AC/DC with reference to earth.



The danger of electric shock is present when PE Pre-Test indicator lights while performing PE Pre-test. In this case, further testing must be stopped immediately, ensure a sufficient connection of your body to earth while performing this test.



The DLEV1 and all associated cables and leads must be checked for signs of damage before the equipment is operated.



Terminals with low voltage CP Signal output (Approx.  $\pm 12V$ ) powered by the charging station, when the terminal marked with " $\perp$ " is connected to PE, use for test purposes only and in the case of incorrect wiring or error of the charging station, these terminals may present a hazard.

Where the safe operation of the DLEV1 is no longer possible, it should be immediately shut down and secured to prevent accidental operation.

It must be assumed that safe operation is no longer possible:

- if the instrument or leads show visible signs of damage or
- the instrument does not function or
- after long periods of storage under adverse environmental conditions.



If the DLEV1 is used in a manner not specified by this document, then the protection provided by the equipment may be impaired.

## 3 Accessories

### 3.1 Standard Accessories

The DLEV1 is supplied with the following items:

DLEV1 unit

Type 1 Connector Lead

Type 2 Connector Lead

Professional carry case

Operating Instruction Manual



Do not open unit, no other serviceable parts.

## 4 Unit Description

The DLEV1 is a handheld testing adaptor designed to interface between electric vehicle supply equipment (EVSE) and a multifunctional electrical installation test instrument. Tests are selected using the two rotary switches and three push buttons.

### 4.1 Identifying parts of the DLEV1

The numbering below refers to figure. 1

1. CP Error “E” Button
2. PE Error (Earth Fault) Button
3. PE Pre-Test Touch Electrode
4. PE Pre-Test Warning LED Indicator
5. PP State Rotary Switch
  - NC No cable
  - 13A 13A cable current capability
  - 20A 20A cable current capability
  - 32A 32A cable current capability
  - 63A 63A cable current capability
6. 13A Mains Socket for test purposes only or loading. Maximum current 10A
7. PE Measurement Terminal
8. Single & 3 Phase Measurement Terminals (L1, L2 & L3)
9. Phase LED Indicators (L1, L2 & L3)
10. Neutral Measurement Terminal
11. CP State Rotary Switch
  - A Electric vehicle (EV) not connected
  - B Electric vehicle (EV) connected & not ready to charge
  - C Electric vehicle (EV) connected; ventilation not required & ready to charge
  - D Electric vehicle (EV) connected; ventilation required & ready to charge
12. Test cable for EV charging point Type 1/Type 2 with socket outlet or fixed cable with vehicle connector
13. EV test cable input
14. CP Signal Output Terminal
15. CP Signal Output Terminal (Connected to PE)

## 5 Using the DLEV1

### 5.1 Functions of the DLEV1 Adaptor

There are two main functions of the Test Adaptor:

- The DLEV1 adaptor is designed to simulate connection of an electrical vehicle to the charging station under test by simulating the communication signals electric vehicles produce when connected. Connection of the test adaptor to a charging station triggers the charging process when the correct Control Pilot (CP) state is selected (A, B, C or D) in conjunction with the Proximity Pilot (PP) state for cable charging current capability (NC, 13A, 20A, 32A or 63A).
- To provide easy access to charging terminals L1, L2, L3, N, PE and to CP signal terminals to which additional measuring equipment, such as a multifunctional installation tester, can be connected for further testing. Charging stations should be tested after installation and testing should be repeated periodically.

Please refer to the manufacturer's recommendation and national standards which are linked to IEC/HO 60364-6 for the initial test or IEC/HO 60364-7-722, required tests are:

- Visual inspection
- Continuity of protective conductors and protective bonding
- Insulation resistances
- Loop/Line impedance
- RCD test
- Function tests, including but not limited to:
  - Vehicle state A,B,C,D
  - Error handling Error "E", PE Error (Earth Fault)
  - Communication PWM signal
  - Mechanical locking of plug
  - Rotary field/phase sequence
  - Other tests

## **5.2 Connection of the DLEV1 Charge Point Adaptor**

The Test Adaptor can accept the following two connection cables:


- TYPE 2 test cable; for charging stations type 2 with panel mount with socket-outlet or fixed cable with vehicle connector.
- TYPE 1 test cable; for charging stations type 1 with fixed cable and vehicle connector.

### **Steps for connecting the test adaptor to the charging station:**

- Connect the corresponding test cable to the test adaptor.
- Connect the above assembly to the charging station to be tested.
- Suitable test adaptor used for the connection to the charging station is shown in Figures 4 & 5.

## 5.3 Operation of a Charging Station to be Tested

### 5.3.1 PE Pre-Test

- Do not touch the PE terminal on the front power socket until the PE pre-test is successful.
- The PE Pre-Test is a safety feature of the test adaptor, it allows the operator to test the PE conductor for the possible presence of dangerous voltage against earth.
- In normal circumstances, the PE conductor is connected to earth and therefore has no voltage against earth, however, if the PE conductor is not connected to earth (connected to a live phase or the PE is disconnected) a potentially hazardous situation may occur.
- Test procedure:
  - First, connect the adaptor firmly to the charging station.
  - Then touch the contact electrode with a bare finger.
- If the LED light indicator is illuminated, then a dangerous voltage is present at the PE conductor, stop further testing immediately and check for a possible wiring fault of the tested PE conductor.
-  In the case of this error, the PE terminal may carry a hazardous voltage, there is a high risk of electric shock to the operator and or other persons nearby!
- Possible errors are: PE interrupted, PE not connected, voltage present on PE (e.g., connected to phase).
- Do not wear gloves while performing this test and ensure a firm connection to the earth electrode.
- In case of improper connection to the earth electrode (e.g., isolated placement of your body) this indication may not be a reliable indication.



### 5.3.2 Proximity Pilot (PP) State (Cable Current Simulation)

- With the PP State rotary switch various current capabilities of the charging cable can be simulated when the test adaptor is connected to the charging station.
- Current capabilities are simulated with different resistances connected between PP and PE conductors.
- Correlation between resistance and current capability of the charging cable is shown in Table below:

#### Correlation between resistance and current capability of the charging cable

Cable current capability	Resistance between PP and PE
No Cable (NC)	Open $\infty$
13A	1.5k $\Omega$
20A	680 $\Omega$
32A	220 $\Omega$
63A	100 $\Omega$





### 5.3.3 Control Pilot (CP) State (Vehicle Simulation)

- With the CP State rotary switch selector various vehicle states can be simulated when the test adaptor is connected to the charging station.
- Vehicle states are simulated with different resistances connected between CP and PE conductors.
- Correlation between resistance and vehicle is shown in Table below:

#### Correlation between resistance and current capability of the charging cable

Vehicle State	Description	Resistance between CP & PE	Voltage at CP Output (1kHz)
A	Electric vehicle (EV) not connected	Open $\infty$	$\pm 12V$
B	Electric vehicle (EV) connected & not ready to charge	2.74k $\Omega$	$\pm 9V/-12V$
C	Electric vehicle (EV) connected, non-vented & ready to charge	882 $\Omega$	$\pm 6V/-12V$
D	Electric vehicle (EV) connected, ventilation required & ready to charge	246 $\Omega$	$\pm 3V/-12V$

### 5.3.4 CP Output Signal Terminals

- CP output terminals are connected to CP and PE conductors of the tested charging station via the test cable, the green socket is connected to PE.
- This output is intended for the connection of an oscilloscope to check the waveform and amplitude of the CP signal.
- Control Pilot function uses Pulse Width Modulation [PWM].
- The purpose of the Control Pilot function is communication between a vehicle and the charging station, the duty cycle of the PWM signal defines the possible available charging current.
- For details of communication protocol please refer to IEC/EN 62851-1& IEC/HD 60364-7-722 and the documentation of the manufacturer of the charging station.

### 5.3.5 CP Error “E” Simulation

With the CP Error “E” button pressed and held, a CP Error can be simulated (in accordance with the standard IEC/EN 6185-1).

- PP State switch will need to be set to any current position other than NC.
- CP State switch will need to be set to position C or D.
- When CP error “E” is pressed and held, a short circuit between CP and PE through the internal diode is made. As a result, the pending charging process is aborted indicated by the immediate voltage drop.

### 5.3.6 PE Error (Earth Fault) Simulator

When pressing the PE Error button, an interruption of the PE conductor is simulated.

- As a result, the pending charging process is aborted.

### 5.3.7 Phase Indicator

The phase indicator consists of three LED lamps, one for each phase.

- When the test adaptor is connected to the charging station and phase voltages are present at the charging connector, the LED indicators will illuminate.

#### **Please Note:**

In the case neutral (N) conductor is not present, or it is interrupted, the LED indicators will not indicate possible voltage presence at L1, L2 and L3 conductors.

The LED indicators cannot be used for phase sequence testing.

If the charging station has only a single-phase output, only one LED will illuminate.

### 5.3.8 13A Mains Socket

- The mains socket on the front of the DLEV1 provides a direct connection to L1, N and PE conductors of the charging station. The connection between the adaptor and the charge station is made via the interchangeable Type 1 or Type 2 connector plug.
- The mains socket output is intended for measuring purposes only and offers the ability to connect directly to an electrical multifunctional tester with a 13A mains lead (Figure 2).
- The max current is limited to 10A, the mains socket is protected against overload with 10A/250V,5x20mm fuse.

### 5.3.9 Measurement Input Terminals L1, L2, L3, N & PE

- Measuring terminals are directly connected to L1, L2, L3, N and PE conductors of the tested charging station via the test cable.
- These terminals may be used for measuring purposes only, it is not allowed to draw current over a longer period or supply anything else.
- An appropriate electrical multifunctional tester is needed.

### 5.3.10 Load Test Using 13A Mains Socket

- The mains socket on the front of the DLEV1 can also be used to connect a load to check if the electric charge points and power monitoring meter works and counts in the right manner (load test).
- To power the loading appliance, the CP state will need to be switched to position C or D with the PP state switched to any current position other than NC.
- An external load can be connected for measuring purposes only, it is not allowed to supply anything else.
- The max current is limited to 10A, the mains socket is protected against overload with 10A/250V,5x20mm fuse.

## 6 Specifications

### 6.1 Functions

PE Pre-Test	Yes
PP Simulation	NC, 13A, 20A, 32A & 63A
CP States	A EV not connected B EV connected and not ready C CEV connected, non-vented & ready to charge D EV connected, vented & ready to charge
CP Error "E"	Charge On/Off
PE Error (Earth Fault)	Charge On/Off

### 6.2 Outputs (for test purposes only)

Measuring Terminals (L1, L2, L3, N & PE)	Max. 250V CAT II 300V, Max. 10A
Mains Socket	Max. 250V.CAT II 300V, allowed current max.10A. <b>Note:</b> Do not load mains socket simultaneously with measuring terminal
Mains Socket Protection	Fuse 10A/250V (5x20mm)
CP Signal Output Terminals	Approx. $\pm 12V$ , CAT O (Under normal conditions). In the case of incorrect wiring or error of the charging station, these terminals may become a hazard $\geq$ up to max. CAT II 300V against PE.

### 6.3 General Features

Input Voltage	Up to 250V [Single phase system]/up to 430V (Three phase system), 50/60Hz, max 10A.
Type 2 Test Cable	AC charging mode 3, suitable to IEC62196-2 type 2 socket outlet or fixed cable with vehicle connector (Type 2, 7P three-phase).
Type 1 Test Cable	AC charging mode 3, suitable to IEC62196-2 type 1 or SAE J1772 with vehicle connector (Type 1, 5P single-phase).
Weight	Adaptor Approx. 470g, Adaptor with connector plug Approx. 950g
Adaptor Dimensions	(L)110mm x (W)50mm x (H) 230mm
Safety	IEC/BS EN 61010-1:2010 IEC/ BS EN 61010-2-030:2010

## **7 Environmental Conditions**

The DLEV1 has been designed to perform tests and measurements in a dry indoor/outdoor environment.

Operating Altitude 0 to 2000 metres.

Overvoltage category IEC 60664/IEC 61010, 300V Category II.

Pollution degree 2 according to IEC 61010-1.

Protective system IP54 according to IEC 60529.

Electromagnetic compatibility (EMC). Interference immunity and emitted interference conforming to IEC 61326-1.

Operating temperature range of 0°C to 40°C.

Operating humidity up to 85% without condensation.

Reference humidity up to 60% without condensation.

The DLEV1 can be stored at any temperature in the range -10°C to +50°.

## 8 Maintenance

When using the test adaptor in compliance with the user manual, no special maintenance is required.

Should a functional error occur during normal operation, the Di-LOG after-sales service team will repair your instrument. Please contact our service department for further information.



Before maintaining the DLEV1 ensure that it is disconnected from all voltage! Danger of Electric Shock!

### 8.1 Cleaning

Clean the external case of the DLEV1 with a clean dry cloth.

Avoid using solvents and abrasive scouring agents to clean the external case of the DLEV1.

After cleaning, do not use the test adaptor until it has dried completely.

### 8.2 Replacing the Fuse



Before opening the DLEV1 ensure that it is disconnected from all voltages! Electric shock danger!



All replacement fuse types are specified for ratings and size within this instruction manual and on the rear of the of the DLEV1.

Disconnect all the test leads from the unit.

Position the DLEV1 face down and turn the fuse holder cap  $\frac{1}{4}$  turn counter clockwise using an appropriate flat-bladed screwdriver.

Remove the fuse carrier and replace the defective fuse.

Reinsert the fuse carrier in the same position that it was removed and turn the carrier  $\frac{1}{4}$  turn clockwise using an appropriate flat-bladed screwdriver.

### **8.3 Service and Calibration**

To maintain the specified accuracy of the measurement results, the instrument must be recalibrated at regular intervals by either the manufacturer or an authorised service agent. We recommend a recalibration period of one year.

## 8.4 Spare Parts

	Part No.
Type 1 Connector Cable	DLEVT1
Type 2 Connector Cable	DLEVT2
Carry Case	CCDLEV

For help or advice on Service and Calibration contact:

Service Department  
Di-LOG Test Equipment  
28 Wheel Forge Way  
Trafford Park  
Manchester  
M17 1EH

Tel: 0161 877 0322  
Fax: 0161 877 1614  
**email: [support@dilog.co.uk](mailto:support@dilog.co.uk)**  
web: [dilog.co.uk](http://dilog.co.uk)