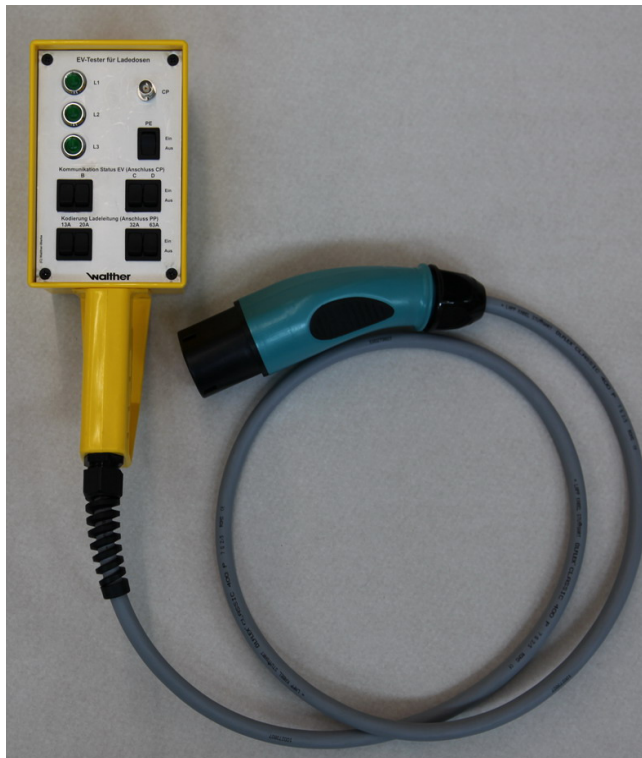


Operating instruction and technical description

EV tester / EV simulator with charging plug type 2 for charging devices



Photos: EV tester/simulator with charging plug type 2

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1 Operating instructions EV simulator

These operating instructions for the EV tester / EV simulator shall be a valuable help for the operation and troubleshooting of charging stations for electric vehicles.

This version of the document was last updated in February 2012, version 2.0

The manual is continuously adapted to the technical enhancement of the devices.

We would appreciate your requests and suggestions or ideas for improvement.



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2 Safety notes

Besides the technical protective measures, the following precautionary measures also help minimizing the risk of accidents. Compliance with these recommendations helps minimizing the risk of health damages, injuries, property damages and production downtimes.

Please see that these precautionary measures will be observed - it's in your own interest.

	<p>Train and instruct the operating personnel thoroughly!</p> <p>The plant must only be operated and opened by trained technical staff.</p> <p>Store these instructions in a way that they are clearly visible and within reach of the operating personnel.</p> <p>Acquaint all operators with the safety precautions.</p> <p>Ensure regular and professional care and maintenance.</p> <p>Orderly workplace = safety.</p> <p>Do not remove or deactivate any safeguards. Damages safeguards either have to be repaired professionally or have to be replaced.</p>
	<p>Protection against electric shock!</p> <p>Prior to any installation on electrical parts always switch off the supply or the main switch and withdraw the mains plug.</p> <p>Do not touch live parts.</p> <p>Use insulated tools.</p> <p>Never touch electric cables with wet hands.</p> <p>The plant must not be permanently exposed to rain or humidity.</p>

3 Operating instructions

3.1 General description

By means of the EV tester / EV simulator, different functions of charging devices can be tested by simulating the electric vehicle. EV testers are available both with firmly connected charging cable and type 2 charging plug (acc. to IEC 62196, draft standard from Germany) and as version for the type 1 charging device with integrated charging jack (acc. to SAE J1772 respectively IEC 62196, USA, Japan).

The EV tester/simulator comprises the following functions:

- Presetting of charging cable encoding for simulation of maximum charging current
- Checking of PE connection between PWM and vehicle plug
- Simulation of vehicle status B, C, D
- Indication of PWM signal (CP test jack)

The device simulates both different operating modes of a connected electric vehicle and differently encoded charging cables. In each case it only comes to a small power drain of approx. 3 mA for L1, L2 and L3 from the connected charging device.

The simulation is only possible when the device is connected.



Photos: EV tester/simulator for type 2



Photo: EV tester/simulator for type 1

3.2 Hardware

3.2.1 Components

The EV tester is built into a handy and robust hand-held case and is provided with an integrated charging cable with connected type 2 plug.

A suspension as wall bracket is included in the scope of delivery.

3.2.2 Optional components

The basic version of the type 2 EV tester has a tight and led outside supply line with charging device.

Optional contact-proof access from outside to the connections L1 to L3 (black), neutral conductor N (blue) and earth conductor PE (green-yellow) via integrated safety jacks (4 mm). The safety jacks are located on the right side of the EV tester. These can, for example, be used for external simulation of leakage currents. Also an external electrical load up to 10 A can be connected.

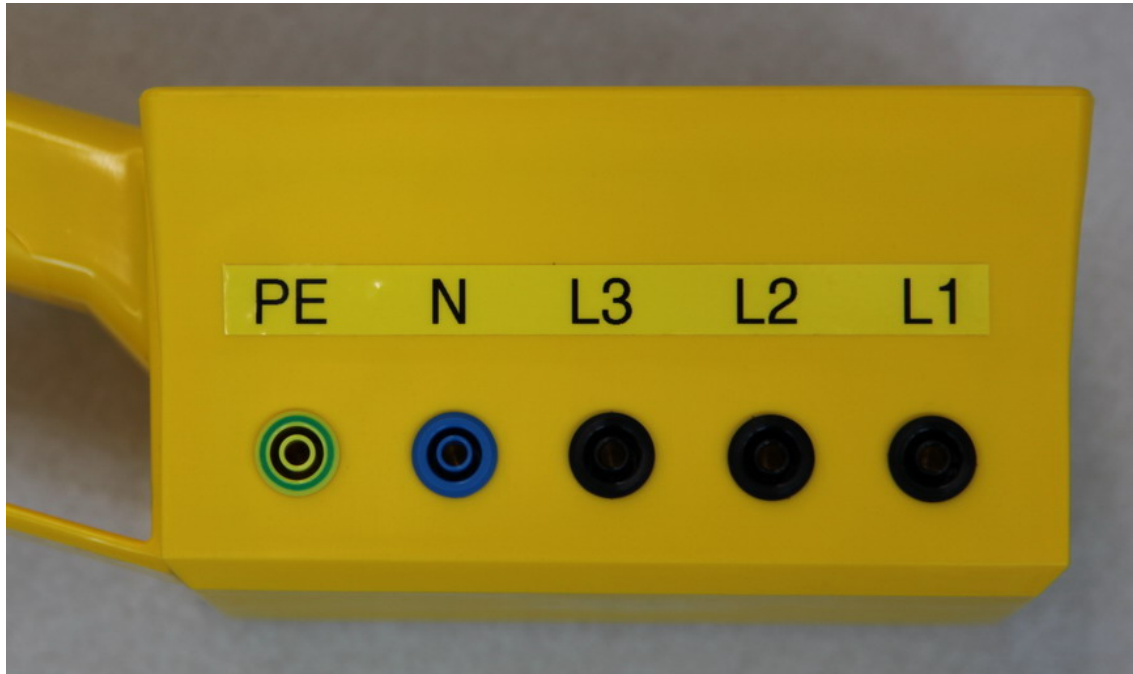


Photo: EV tester/simulator (type 2) with integrated safety jacks

3.2.3 Hardware configuration

Perform the following steps consecutively:

- Remove all parts of the packaging carefully. Avoid damaging.
- Check the device thoroughly regarding transport damages and other damages.
- Supplier and forwarder have to be informed immediately about each damage..
- Check whether all parts have been delivered completely. If applicable, do also consider spare parts you may have ordered. If parts are missing, inform the supplier immediately.
- Establish the electrical connection of the EV tester. Check the correct supply as well as the earth protection prior to operating the unit.
- For operating the EV tester there s no supply required.

If anything is unclear, please contact the supplier.

4 Operation

4.1 Handling

For simulation the plug (type 2) of the EV tester has to be inserted into the charging socket of the charging device.

4.2 Switching on the EV tester

The EV tester is switched on by inserting the plug into the charging socket of the charging device respectively by applying the supply voltage to the charging device. There is no separate switch available. For safety reasons the plug always has to be withdrawn after termination of the test procedure.

4.3 Coding of charging cable

The maximum allowed charging current of a charging cable can be preselected by the operator via the switch "charging cable coding" (connection PP). Hereby the used charging cable is simulated (mode 3 with the relevant conductor cross section coding) and the maximum power of the charging device according to the below shown table is considered. Always only one switch may be operated at a time.

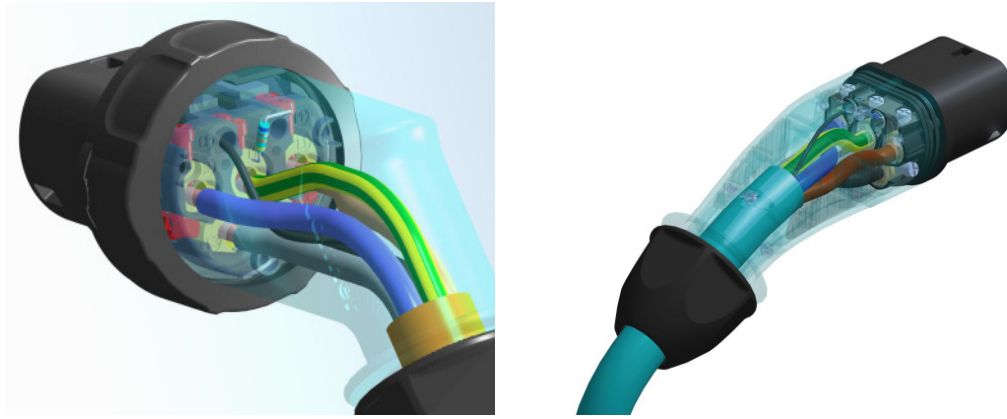
Coding of charging cable (connection PP)				
Max. power	13 A	20 A	32 A	63 A
Charging cable cross section	1,5 mm ²	2,5 mm ²	6 mm ²	16 mm ²
Switch 13 A	ON	OFF	OFF	OFF
Switch 20 A	OFF	ON	OFF	OFF
Switch 32 A	OFF	OFF	ON	OFF
Switch 63 A	OFF	OFF	OFF	ON

Table for coding of charging cable

The table shows that the different switch positions (charging cable coding (connection PP)) are simulating the cable cross section of the utilised charging cable. Normally, the maximum charging current is limited by the utilised cable cross section.



Photo: switch for charging cable coding



Photos: resistance coding of the charging cable inside the charging plug

The information regarding the cable cross section coding is evaluated inside the charging device and is afterwards transmitted to the electric vehicle as PWM signal, together with other parameters. The width of the PWM signal depends on the preset coding.

Via the same signal also the charging process is controlled by the electric vehicle and the charging current is switched on or off via the contactor which is integrated in the charging device.

4.4 Checking the PE connection between PWM and vehicle

To check the PE connection, the PE switch has to be operated. Thus the connection between PE and CP is interrupted and the charging process should be switched off. Now the charging device should no longer react to operating the switches "communication status EV (connection CP)" B, C or D. Switch A is not assigned.

4.5 Simulation of vehicle status B, C, D

The vehicle status can be simulated by means of different switch positions of the switches "communication status EV (connection CP) B, C, and D". The switch positions shall have the following meanings:

EV status and switch positions

Status B	Switch B	EIN/ON
Status C	Switch B and C	EIN/ON
Status D	Switch B and D	EIN/ON

Switch A has no function.

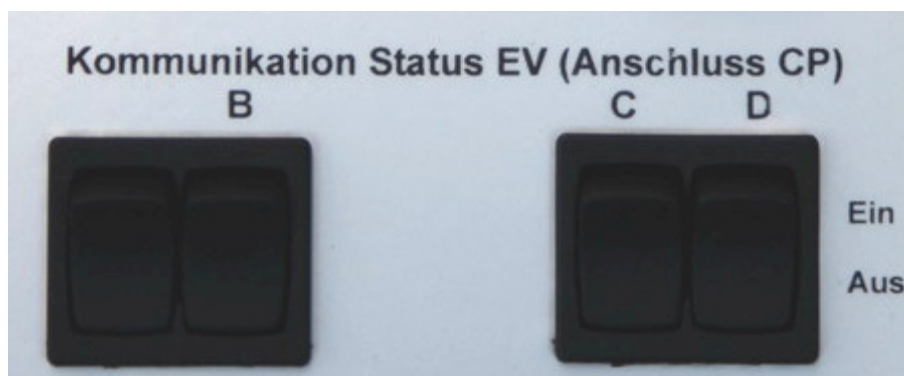


Photo: Switch for communication status EV

By operating switch B the vehicle status B is simulated. In this status the electric vehicle is connected to the charging device and is ready to be charged (PWM signal: 9 V).

By additionally operating switch C (now then B and C) the electric vehicle requests charging current and it is switched on by the charging device. Please note that no charging power is withdrawn. The electric vehicle simulated by the EV tester would be charged now (PWM signal: 6 V) and the LEDs L1, L2 and L3 should be lit now.

By operating switch D instead of C (now then B and D) the electric vehicle requests an additional ventilation during the charging process (PWM signal: 3 V). Thereby the charging device has to react accordingly. LED L1, L2, L3 are still lit.

Frequency and pulse width of the PWM signal stay constant during the simulation.

4.6 Measuring of PWM signal (CP test jack)

On the BNC female jack there is the PWM signal available. It can for example be evaluated with an oscilloscope (scope).

Attention: The measurement has to be carried out "unearthed, without PE". Otherwise, checking the PE connection is not possible.

5 Troubleshooting

Error, fault	Cause	Remedy
EV tester does not react	Voltage supply of charging device is missing. Plug is not inserted corrected.	Check voltage supply. Check connector. Check pre-fuses.
L1, L2 or L3 are not shining	Voltage supply of charging device is missing. Plug is not inserted correctly. LED is defective.	Check voltage supply. Check connector. Check LED.
The oscilloscope connected to the BNC female jack delivers no signal	BNC plug is not inserted correctly Switch positions are wrong	Check switch positions communication status EV (CP connection) B,C,D Check switch position PE. Check BNC plug.

6 Maintenance

The EV tester does not require any considerable maintenance.

Attention:

In any case, the EV tester has to be separated from the charging device prior to any maintenance work!

Maintenance work may only be carried out by trained specialised staff.

To avoid increased contact resistances, the contacts of the EV tester plug and of the charging socket on the charging device have to be checked.

7 General technical specifications

Length of hand-held case	approx. 210 mm
Width of hand-held case	approx. 115 mm
Height of hand-held case	approx. 85 mm
Weight	approx. 1,3 kg
Power supply	230 V / 400 V single- or three-phase 50 Hz / 60 Hz
Charging cable	7G2,5
Cable length	approx. 1,5 m
Plug type 2	7-pole plug, acc. to IEC 62196

