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1. Safety Introduction

- Introduction: You have acquired a high-quality test adapter that enables you to perform repeatable measurements for an extended period of time.
- Designed specifically for testing the function and electrical safety of AC charging stations in mode 3, this adapter can be used in conjunction with suitable test instruments such as installation testers and/or oscilloscopes.
- By using this adapter, charging stations can be tested in compliance with IEC/EN 61851-1 and IEC/HD 60364-7-722 standards.
- It is important to carefully read this manual to ensure the safe operation and functionality of the test adapter,
- and also make sure that the end user of this product receives a copy of this manual.

2. Symbols Description

	Notice Please refer to the instructions in this manual.
	WARNING Hazardous Voltage, Risk electric shock.
	Equipment protected by double insulation or reinforced insulation
	Grounding
	Attention is requested in regard to the reference.
	The conformity symbol indicates adherence to the applicable European directives, as well as compliance with the relevant regulations and standards of the Low Voltage Directive.
	Symbol for marking of electrical and electronic equipment (WEEE Directive).

3. Safety Precautions

- The utilization of this equipment is restricted to individuals who have undergone appropriate training and are capable of operating it effectively.
- In order to achieve optimum performance, it is essential to read the instruction manual before using the product.
- After reading this manual, remember to store it in a safe location for future use.
- The user manual provides essential information and references for the secure operation and maintenance of the adapter.
- Before utilizing the test adapter, we urge you to thoroughly read the safety information.
- Failure to follow the warnings and instructions may result in electric shock, fire, serious bodily injury, or equipment damage.

3-1.Safety Working Area

- Ensure your work area is tidy and well illuminated.
- Avoid using equipment in environments that are potentially explosive, such as areas with flammable liquids, gases, or dust.
- Keep children and bystanders away while using equipment.

3-2.Electricity safety

- Do not expose equipment in rain or wet conditions.
- The risk of electrical shock will be higher if water enters the equipment.

3-3.Personnel Safety

- Stay alert, watch what you are doing and use common sense when operating equipment.
- Avoid using equipment when tired or affected by drugs, alcohol, or medication.
- Serious personal injury may occur due to a brief lack of attention while operating equipment.

WARNING

- The improper utilization of this tester can result in damage, shock,

injury, or even fatality.

- Prior to operating the adapter, it is crucial to read and comprehend the user manual.
- The equipment's protection may be compromised if it is used in a manner not specified by the manufacturer.
- Use only accessories that are recommended by the manufacturer for your specific equipment, as accessories suitable for one piece of equipment may pose hazards when used with others.

4.Available Measurements and Product Description

- The adapter is capable of conducting electrical safety and function tests on mode 3 electric vehicle charging equipment (EVSE) with a NACS(Tesla) connector .
- PE Pre-Test (potential presence of dangerous voltage at PE. terminal by mistake)-touch electrode and led lamp.
- phase indicator(presence of all three phase voltages measured to N)-three led lamps.
- PP state simulation (NC,13A,20A,32A,63A)-rotary switch.
- CP state simulation (A,B,C,D)-rotary switch.
- CP error “E” simulation (cp signal short-circuited to PE)-push button.
- PE error (earth fault)simulation (interruption of PE conductor)-push button.
- Measurements on live conductors (L1,L2,L3 and N)and on PE conductor -five 4 mm safety sockets for connection to installation testers.
- Test of cp signal-two 4mm safety sockets for connection to an oscilloscope.
- Mains socket (on backside) to connect an external load only for test purposes.
- PM701UT has GFCI leakage switch tripping test (110V about 6mA) function.

5. Before Use

5-1. Standard Equipment

Prior to usage, ensure all the items listed below are present in the package:

- Main Unit x 1
- NACS(Tesla) Test Cable x 1
- Portable Package x 1
- Instruction Manual x 1

5-2. Safety precautions

- The test adapter has been manufactured and tested in accordance with the applicable safety regulations and has left the factory in a safe and perfect condition.
- To maintain this state and ensure safe operation of the instrument, the user must carefully read and adhere to the references and warnings provided in this user manual.

⚠ WARNING, DANGER OF ELECTRICAL SHOCK

- In order to avoid electrical shock, strict adherence to valid safety and national regulations regarding excessive contact voltages is essential when working with voltages exceeding 120V DC or 50V RMS AC.
- The relevant accident prevention regulations established by the national health & safety board for electrical systems and equipment must be strictly followed at all times.
- Before any operation, it is important to ensure that the adapter and cable assemblies are in excellent condition.
- The adapter should only be connected to charging stations specified in the technical specification section.
- The adapter should be used within the specified operating ranges mentioned in the technical specification section.
- The adapter should only be used in dry and clean environments as dirt and humidity can reduce insulation resistance and potentially lead to electrical shocks, especially for high voltages.

- Never use the adapter in precipitation such as dew or rain, as temperature fluctuations may cause condensation leading to its malfunction.
- Perfect tests and measurements can only be ensured within the temperature range of 0 to 40°C.
- If the operator's safety is no longer guaranteed, remove the adapter from service and protect against use.
- To ensure a safe measurement, always use original cable assemblies.
- Safety can no longer be guaranteed if the adapter (or cable assemblies): Show obvious damage.

Fail to conduct the desired tests or measurements. Have been stored under unfavorable conditions for an extended period.

Have been subjected to mechanical stress during transport.

5-3.Appropriate Usage

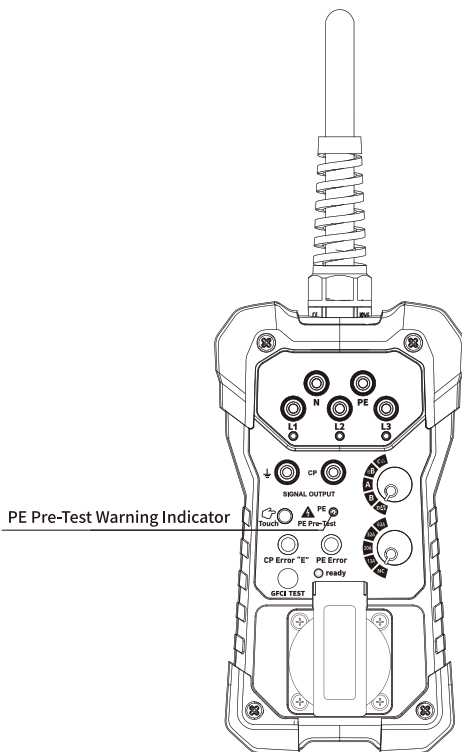
WARNING

- The adapter must be used in accordance with its intended conditions and purposes.
- Altering the adapter will compromise its operational safety.
- Authorized service technicians are the only ones permitted to open the adapter
- Before opening the adapter it must be disconnected from any electrical circuitry.

6. Warning Marks Description

1-Immediate cessation of further testing is necessary if the PE Pre-Test indicator lights up during the test, as it indicates a high risk of electric shock. Ensuring a proper connection between your body and the earth is crucial while performing this test.

2-The terminals labeled with " $\perp$ " on the charging station provide a low voltage output ($\pm 12V$) and are intended for testing purposes only. However, there may be a potential hazard if there is incorrect wiring or an error in the charging station's operation.



7.Operation Elements and Connectors

1-Measuring Terminal PE

2-Measuring Terminal N

3-CP Signal Output Terminal (Connected to PE)

4-PE Pre-Test Warning Indicator

5-PE Pre-Test Touch Probe

6-PE Error (Earth Fault) Button

7-CP Error "E" Button

8-GFCI test button

9-Mains socket, use for test purpose only, Max allowed current=10A.

10-Measuring Terminal L1,L2,L3

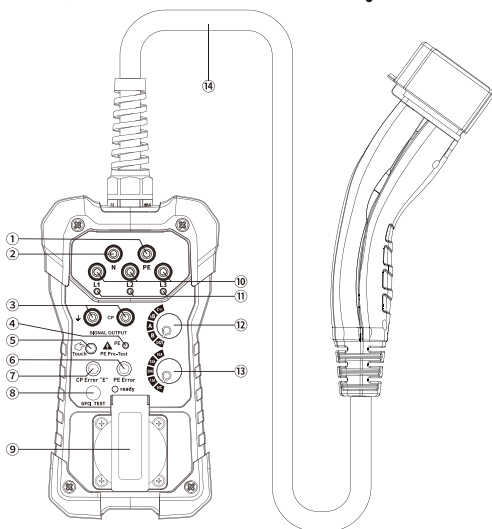
11-Phase Indicators of L1,L2,L3Terminals

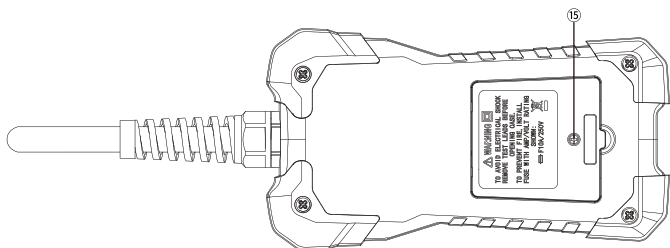
12-CP (Control Pilot) State Rotary Switch Selector (A,B,C,D).

13-PP (Proximity Pilot) State Rotary Switch Selector (NC, 13A,20A,32A and 63A)

14-Test Cable Input

15-Fuse 10A/250V, 5x20mm Protects Mains Socket Against Overload





8. Testing Charging Stations

8-1. Purpose of the Test Adapter

The Test Adapter serves two main purposes.

1-simulate connection of an electrical vehicle to the tested charging station (the test adapter simulates electrical vehicle and charging cable), connection of the test adapter to a charging station triggers the charging process in the charging station (CP switch at the adapter shall be in appropriate mode), various cable charging capabilities can be simulated (NC, 13A, 20A, 32A and 63A) as well as all possible electrical vehicle modes (A, B, C, D).

2-To provide convenient access to charging terminals L1, L2, L3, N, PE and to CP signal terminals to which additional measuring equipment can be connected for further testing, charging stations should be tested after installation and repeated periodically.

Please consult the manufacturer's recommendation and national standards that are associated IEC/HD 60364-6 for initial test or IEC/HD 60364-7-722. The 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):

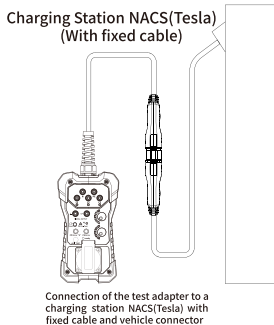
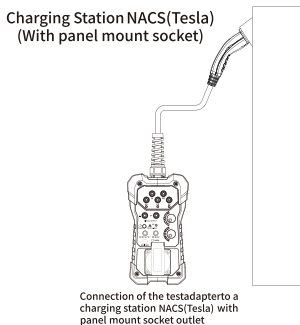
- Error handling (error “E”,PE Error (Earth Fault),...)
- Communication (PWM signal)
- Mechanical locking of plug
- Rotary field/phase sequence
- Other tests

8-2.Connection of the Test Adapter to Charging Station

NACS(Tesla) test cable, designed for NACS(Tesla) charging stations featuring a panel mount with socket outlet or a fixed cable with a vehicle connector.

Instructions for connecting the test adapter to the charging station:

- Attach the appropriate test cable to the test adapter.
- Connect the above assembly to the charging station intended for testing.
- Refer to the diagram in Figure for the correct connection of the test adapter to the charging station.



8-3.Operation of A Charging Station to be Tested

8-3-1.PE Pre-Test

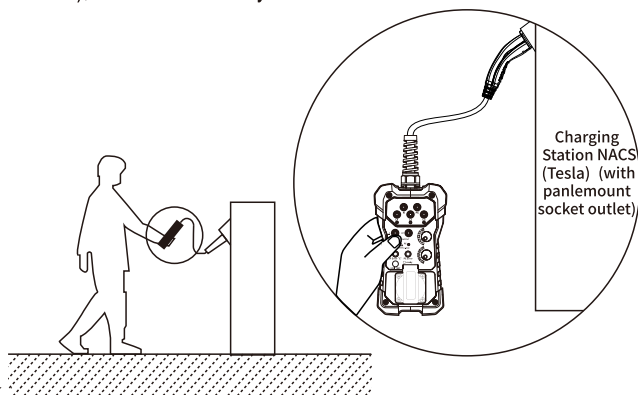
- Refrain from touching the PE terminal on the front power socket until the PE pretest is successful.
- The PE Pre-Test serves as a safety measure for the test adapter, allowing the operator to check for any potentially dangerous voltage in the PE conductor against earth.

allowing the operator to check for any potentially dangerous voltage in the PE conductor against earth.

- Normally, the PE conductor is connected to earth and does not carry any voltage against it. However, if the PE conductor is mistakenly connected to phase or if there is an interruption in the PE connection, the situation can become hazardous.
- Test procedure:
- Firmly connect the adapter to the charging station..
- Then touch the probe with a bare finger.
- If the light indicator illuminates, it indicates the presence of dangerous voltage at the PE conductor. Stop further testing immediately and investigate for possible wiring faults in the PE conductor.

⚠ This error implies that the PE terminal carries hazardous voltage, posing a high risk of electric shock to the operator and anyone nearby!

- Possible errors include: interrupted PE connection, no PE connection, or PE carrying voltage due to being connected to phase.
- Avoid wearing gloves while performing this test and ensure proper grounding.
- If there is an improper grounding connection (e.g., your body being isolated), the indication may not be reliable.



8-3-2.Proximity Pilot (PP) State (Cable Simulation)

- With the PP State rotary switch various current capabilities of the charging cable can be simulated when the test adapter is connected to the charging station.
- By connecting various resistances between the PP and PE conductors, different current capabilities are simulated.
- 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	
Marking of cable current capability	Resistance between PP and PE
No cable	Open (∞)
13A	1.5k Ω
20A	680 Ω
32A	220 Ω
63A	100 Ω

8-3-3.Control Pilot (CP) State (Vehicle Simulation)

- By using the CP State rotary switch selector while the test adapter is connected to the charging station, it is possible to simulate different vehicle states.
- 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, vehicle state and CP voltage signal

Marking of Vehicle State	Vehicle State	Resistance between CP and PE	Voltage at CP terminal (1kHz)
A	Electric vehicle (EV) not connected	Open (∞)	$\pm 12V$
B	Electric vehicle(EV) connected,not ready to charge	2.7k Ω	+9V/-12V
C	Electric vehicle (EV) connected, ventilation not required,ready to charge	1.3k Ω	+6V/-12V
D	Electric vehicle (EV) connected, ventilation required,ready to charge	270 Ω	+3V/-12V

8-3-4.CP Signal Output Terminals

- The CP output terminals are connected to the CP and PE conductors of the tested charging station via the test cable, with the green socket specifically connected to PE.
- This output allows 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 charging station,the duty cycle of the PWM signal defines the possible available charging current.
- For more information on the communication protocol, please refer to IEC/EN 61851-1& IEC/HD60364-7-722 and the documentation provided by the charging station manufacturer.

8-3-5.CP Error "E" Simulation

- The CP Error "E" button can be pressed to simulate a CP error according to IEC/EN 61851-1.
- When the CP error "E" button is pushed, a short circuit is created between CP and PE through an internal diode, resulting in the termination of the ongoing charging process.

8-3-6.PE Error (Earth Fault) Simulation

By pressing the PE Error button, an interruption in the PE conductor is simulated, which leads to the termination of the pending charging process.

8-3-7.Phase Indicator

- The phase indicator consists of three LED lamps, one for each phase.
- When the test adapter is connected to the charging station and phase voltages are detected at the charging connector, the corresponding LED indicators will light up.

Notes:

- If the neutral (N) conductor is absent or interrupted, the LED indicators will not indicate any voltage presence on the L1, L2, and L3 conductors.
- The LED indicators should not be used for phase sequence testing.
- In the case of a single-phase output from the charging station, only one LED will illuminate.

8-3-8.Mains Socket

- The mains socket of the charging station is connected to the L1, N, and PE conductors via the test adapter.
- This output is intended for measuring purposes only and offers the possibility to check if the electric power meter works and counts in the right manner (load test).
- Therefore, it is strictly prohibited to supply any other devices or equipment.
- The maximum current is limited to 10A, and the mains socket is safeguarded against overload with a 10A/250V, 5x20mm fuse.

8-3-9.Measuring Terminals L1, L2, L3, N and PE

- The measuring terminals are directly linked to the L1, L2, L3, N, and PE conductors of the tested charging station through the test cable.
- These terminals may only be utilized for measurement purposes, and it is not permissible to draw current over an extended period or supply any other electrical loads.
- An appropriate measurement instrument is required.

8-3-10.GFCI trip test

The test adapter is connected to the charging pile, the phase voltage exists in the charging connector, and the ready LED beside the GFCI button is on. At this time, pressing the GFCI button triggers the GFCI trip condition (L1 is connected to the PE terminal through a resistor, and the current is about 6mA when L1 is equal to 110V). Judging whether the charging pile is tripped or not by observing ready LED.

9. Maintenance

- Regular maintenance is not required when using the test adapter according to the user manual.
- In the event of functional errors during normal operation, please contact the local service office for instrument repair.

9-1.Cleaning

- After daily usage, if the test adapter needs cleaning, use a wet cloth and mild household detergent.
- Before cleaning, make sure to disconnect the test adapter from all measurement circuits.
- Avoid using acid-based detergents or dissolvent liquids for cleaning.
- Allow the test adapter to dry completely before using it again.

9-2.Transport and Storage

- It is recommended to keep the original packaging for future transport, especially if calibration is necessary. Any transport damage caused by improper packaging will not be covered under warranty.
- Store the adapter in dry, enclosed areas.
- If the adapter needs to be transported in extreme temperatures, allow a minimum recovery time of 2 hours before operating it.

9-3.Fuse Replacement

- The fuse (10A (H)/250V, 5x20mm) may blow if there is no voltage between the L and N terminals of the mains socket while the charging connector is connected to the charging station in charging mode.
- If a fuse blows due to overload or improper operation, follow these steps for replacement:
- Unscrew the fuse holder cap using an appropriate screwdriver.
- Remove the defective fuse and replace it with a new one.
- Replace the fuse holder cap.

👉 If the fuse continues to blow multiple times, the adapter should be sent to the service department for further inspection.

👉 Only use fuses as specified in the technical specifications, as using alternative fuses may pose a safety risk!

10. Specifications

Functions

PE Pre-Test	Yes
PP Simulation	NC/13A/20A/32A/63A
CP States	A(Electric vehicle not connected) B(Electric vehicle connected, not ready to charge) C(Electric vehicle connected,ventilation not required,ready to charge) D(Electric vehicle connected,ventilation required,ready to charge)
CP Error “E”	On/Off
PE Error (Earth Fault)	On/Off

Outputs (for test purpose only)

Measuring Terminals L1, L2, L3,N and PE	Max.250/430V,CAT III 600V,max.10A.
Mains Socket	Max.250V,CAT III 600V, allowed current max.10A.
Mains Socket Protection CP Signal Output Terminals	Note: Do not load mains socket simultaneously with measuring terminals! Fuse10A/250V,5x20mm. Approx, $\pm 12V$, CAT 0 (Under normal condition). In the event of incorrect wiring or charging station malfunction, these terminals may pose a potential hazard, with a maximum rating of CAT III 600V against PE.

General Features

Input Voltage	Up to 250V(Single phase system)/up to 430V(Three phase system), 50/60Hz, max 10A.
NACS(Tesla) Test Cable	AC charging mode 3,suitable to SAE J3400-2023 NACS(Tesla) socket outlet or fixed cable with vehicle connector (NACS(Tesla),5P single-phase.)
Weight	About 869 g.
Dimensions (LxWxH)	Handle size: 210x110x55mm (Length without connection cable)
Safety	
Measurement Category	IEC/EN 61851-1/IEC/HD 60364-7-722 600V CAT III
IP-Rating	IP54
Pollution Degree	2
Protection Class	III
Working Temperature Range	0 to 40°C
Storage Temperature Range	-10 to 50°C
Reference Humidity Range	10 to 60% relative humidity w/o condensation
Working Humidity Range	10 to 85% relative humidity w/o condensation
Altitude Above Sea Level	Max. 2000m