Operating Instructions

GOSSEN METRAWATT

PROFITEST H+E EASY CHECK

Function Tester for AC Charging Stations per IEC 61851-1, VDE 0122-1

3-447-123-03
3/9.23

Table of Contents

1 Safety Instructions

1.1 General

- Carefully and completely read and adhere to these operating instructions. The documents can be found at http://www.gossenmetrawatt.com. Retain these documents for future reference.
- Carefully and completely read and adhere to the product documentation for the tested/inspected AC charging point.
- Use only the specified accessories (included in the scope of delivery or listed as options) with the tester.
- The tester and its accessories may only be used for the tests described in the documentation for the tester. Safety of the operator, as well as that of the tester, is only assured when it's used for its intended purpose.

1.2 Personnel Qualifications

- The tester is designed exclusively for use by laypersons as well as qualified electricians.

1.3 Handling the Tester

- Observe and comply with all safety regulations which are applicable for your work environment.
- Only use the tester and its accessories within the limits of the specified technical data and conditions (ambient conditions, IP protection code, measuring category etc.).
- Do not use the tester in humid environments where condensation occurs, or in environments with explosive gases.
- Never plug in wet connector plugs.
- Connect the test setups correctly in order to prevent injury to persons and damage to the equipment.
- The USB socket must be covered when executing tests. Use the cover attached to the tester for this purpose.
- Do not use the tester and its accessories after long periods of storage under unfavorable conditions (e.g. humidity, dust or extreme temperature).
- Do not use the tester and its accessories after extraordinary stressing due to transport.
- Do not expose the tester to direct sunlight.

1.4 Damaged Tester

- The tester may not be used:
  - If external damage is apparent
  - If the test plug is damaged
  - If it no longer functions flawlessly
  - After long periods of storage under unfavorable conditions (e.g. humidity, dust or extreme temperature)
  - If any changes have been made to the tester itself or to the accessories
  - If internal damage to the tester or accessories can be detected (e.g. loose parts in the housing)
- If the tester or its accessories don't function flawlessly, permanently remove the tester/accessories from operation and secure them against inadvertent use.
- If the tester or accessories are damaged during use, for example if they're dropped, permanently remove the tester/accessories from operation and secure them against inadvertent use.

2 Applications

Please read this important information!

2.1 Intended Use / Use for Intended Purpose

The PROFITEST H+E EASY CHECK is a function tester for testing AC charging points in accordance with DIN EN / IEC 61851-1 (VDE 0122-1) and permits automatic testing of functional performance by laypersons. In the event of a confirmed malfunction of the AC charging point, qualified personnel must become involved.

The tester is intended exclusively for function tests conducted on AC charging points in charging mode 3. The tester can be connected to AC charging points with type 2 inlet or permanently attached type 2 cable (extended CP test pin for permanently attached cables).

Safety of the operator, as well as that of the tester, is only assured when it's used for its intended purpose.

2.2 Use for Other than Intended Purpose

Use of the tester for any purposes other than those described in these operating instructions is contrary to use for intended purpose.

2.3 Liability and Guarantee

Gossen Metrawatt GmbH assumes no liability for property damage, personal injury or consequential damage resulting from improper or incorrect use of the product, in particular due to failure to observe the product documentation. Furthermore, all guarantee claims are rendered null and void in such cases.

Nor does Gossen Metrawatt GmbH accept any liability for data loss.

2.4 Opening the Tester / Repairs

The tester may only be opened by authorized, trained personnel in order to ensure flawless, safe operation and to assure that the guarantee isn't rendered null and void. Even original replacement parts may only be installed by authorized, trained personnel.

Unauthorized modification of the tester is prohibited.

If it can be ascertained that the tester has been opened by unauthorized personnel, no guarantee claims can be honored by the manufacturer with regard to personal safety, measuring accuracy, compliance with applicable safety measures or any consequential damages.

3 Documentation

Identifiers

The following identifiers are used in this documentation:

Identifier	Meaning
Attention! Warning	Safety information that must be complied with
Note! Important	Important information which must be taken into consideration and complied with
✓ Prerequisite	A condition etc. which must be fulfilled before a given action can be taken
1. Procedural step	Steps of a procedure which must be completed in the specified order
↳ Result	Result of a procedural step
• Enumeration	Bullet lists
– Enumeration	
Figure 1: Caption	Description of the content of a figure
Table 1:	Description of the content of a table
Footnote	Comment

4 Getting Started

1. Read and adhere to the product documentation. In particular, observe all safety information in the documentation, on the tester and on the packaging.
   ⇨ “Safety Instructions” 🗎1
   ⇨ “Applications” 🗎3
   ⇨ “Documentation” 🗎4
2. Familiarize yourself with the tester.
   ⇨ “Background Knowledge Concerning Electromobility” 🗎5
   ⇨ “The Tester” 🗎7
   ⇨ “User Interface” 🗎12
3. Start up the tester ⇨ “Initial Startup” 🗎13.
4. Execute measurements and tests ⇨ “Operation” 🗎14.

5 Background Knowledge Concerning Electromobility

5.1 Charging Point / Wallbox

Electric vehicles are charged with alternating current (AC) at AC charging points in charging mode 3 with type 2 plug. Since electric vehicle batteries can only store direct current (DC), the alternating current is converted to direct current by the electric vehicle's on-board charger.

AC charging points are available for single-phase or three-phase connection. In the case of single-phase connection, currents of up to 20 A are permissible. Three-phase connections are designed for currents of up to 32 A.

Electric vehicles are charged with direct current at so-called fast charging points.

5.2 Charging Cables

The mode 3 charging cable establishes a connection between the electric vehicle and the AC charging point. There are 3 different ways to establish a connection between the electric vehicle and the AC charging point:

- The charging cable is permanently attached to the vehicle. The charging cable is plugged into the type 2 charging socket at the AC charging point.
- The charging cable is portable. The type 2 plug is plugged into the vehicle's charging socket, and the type 2 coupler is plugged into the charging socket at the AC charging point.
- The charging cable is permanently attached to the AC charging point. The type 2 plug of the AC charging point is plugged into the charging socket of the electric vehicle.

5.3 Plugs

Type 2 plugs are used to transmit power to, and communicate with the electric vehicle.

The plug controls the following functions:

– Verification that an electric vehicle is connected
– Monitoring of protective conductor continuity
– Switching the system on
– Switching the system off
– Charging current selection
– Charging current settings
– Locking/unlocking the connectors
– Enabling power

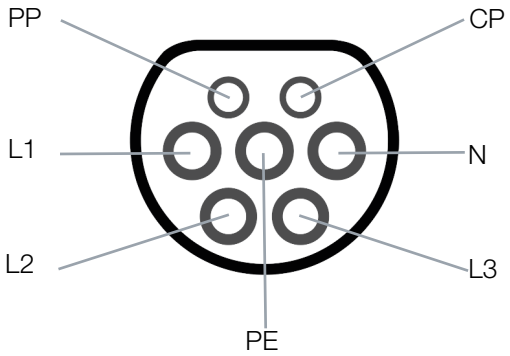


Figure 2: Type 2 Plug Layout

Function	Function
L1	Phase conductors
L2	
L3	
N	Neutral conductor
PE	Protective conductor
PP	Proximity plug Signal line for detecting the current carrying capacity of the cable
CP	Control pilot Pilot line for safety testing and communication

6 The Tester

6.1 Functions Description

The tester presents laypersons with the possibility of safely checking the functionality of AC charging points without the need for the direct involvement of qualified personnel.

Qualified personnel only need to be summoned for further action (e.g. repair) in the event that a malfunction has actually been confirmed.

6.2 Device Characteristics

- The tester can only be used to test AC charging points in charging mode 3.
- Vehicle simulation (CP): the tester simulates the charging socket of the electric vehicle. It can be connected to the charging socket or the type 2 plug of an AC charging point.
- Cable simulation (PP): the tester checks values for 20 A cables with an automatic program sequence.
  If the 20 A test is not passed (e.g. if the AC charging point does not support 20 A cables), a test for 32 A cables can be started.

6.3 Scope of Delivery

Please check for completeness.

1 PROFITEST H+E EASY CHECK (M525F)

1 Charging cable (micro USB plug)

1 Operating instructions (this document)

6.4 Device Overview

6.4.1 Front

Figure 3: Front Panel

6.4.2 Symbols on the Tester and the Included Accessories

Warning concerning a point of danger (attention, observe documentation!)

Double insulation (protection category II)

European conformity marking

The tester may not be disposed of with household trash ⇨ “Returns and Environmentally Sound Disposal” 24.

6.5 Relevant Standards

The tester has been manufactured in accordance with the following safety regulations:

IEC 61010-1 EN 61010-1 VDE 0411-1	Safety requirements for electrical equipment for measurement, control and laboratory use – general requirements
EN 60529 VDE 0470, part 1	Test instruments and test procedures Degrees of protection provided by enclosures (IP code)
DIN EN 61326-1 VDE 0843-20-1	Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements
DIN EN IEC 61851-1 VDE 0122-1	Electric vehicle conductive charging system – Part 1: General requirements

6.6 Technical Data

Power Supply	Internal rechargeable battery (charging via USB port)	
	Type	18650H-2600
	Nominal voltage	3.7 V
	mAh	2600 mAh
	Energy	9,62 Wh
	Protective function	PCB/IC protection
	Charging current	Max. 1 C
	Discharge current	Max. 5.2 A (2 C)
	Internal resistance	180 mΩ
	Weight	48 g
	Dimensions (dia. x L)	18 x 69 mm
Ambient Conditions	Operating temperature	-5 ... +45 °C
	Storage temperature	-5 ... +60 °C
	Relative atmospheric humidity	Max. 75%, non-condensing, no condensation allowed
	Elevation	Max. 2000 m
Electrical Safety	Measuring category	CAT III, 300 V
	Pollution degree	2
	Protection category	II
Mechanical Design	Protection	IP 21
	Housing (W × H × D)	110 × 70 × 210 mm
	Weight:	998 g
	Display	Monochrome
Interfaces	Micro USB port (for charging the battery)	

6.6.1 Test/Analysis Standards

AC	DIN EN IEC 61851-1 VDE 0122-1 Electric vehicle conductive charging system – Part 1: General requirements

Measurement of voltage values in all three phases and N

6.6.2 Test Parameters

Cable Simulation	20 A 32 A * * Only if the 20 A test fails
Vehicle Simulation	State A State B State C Phase tAUS Rotary field Duty cycle

7 User Interface

The tester is equipped with a membrane keypad which serves as a central control panel. Individual function keys are located on the control panel. The screen is used to display measurement results.

Press the corresponding function key on the membrane keypad in order to display options or trigger the desired action.

Control Panel and Navigation

Figure 4: Membrane Keypad with Control Panel and Screen

Function Key	Description	
	**ON/OFF**	Press: the tester is switched on. Press and hold: the tester is switched off.
	ESC	Aborts an action. Display returns to the next higher menu level.
	**START/ STOP**	Confirms a selection and starts the measurement.
	**Up**	Scrolls up through a list of options.
	**Down**	Scrolls down through a list of options.
	**OK**	Triggers the selected action.

Available navigation options for the current step are displayed at the screen. Press the corresponding function key on the membrane keypad in order to display options or trigger the desired action.

- Press **ON/OFF** in order to switch the tester on or off.
- Press **Up/Down** in order to scroll forwards or backwards through available menu options.
- Press **START/STOP** in order to confirm a menu selection.
- Press **OK** to trigger an action.
- Press **ESC** to abort an action.

8 Initial Startup

8.1 Unpacking the Tester

1. Carefully remove the tester and its accessories from the packaging.
2. Check for completeness and possible damage.
3. If any damage, hidden defects or missing items are detected, contact the manufacturer or you dealer without delay.
4. Retain the packaging materials for future use.

8.2 Power Supply

The tester is powered by an internal rechargeable battery. The internal battery is charged via the tester's USB port.

Battery Charge Level

The battery charge level is displayed briefly after switching the tester on. If the battery charge level drops to below a certain value during operation, a message is displayed at the screen.

Display	Battery Level
BATTERY CHARGE LEVEL OK	The battery charge level is sufficient.
LOW BATTERY – PLEASE RECHARGE	The battery charge level is low. The battery must be charged.

Charging the Tester's Internal Battery

✓ USB power pack with connector for charging cable and mains plug suitable for your mains power outlet (not included)

1. Connect the micro USB plug to the micro USB socket on the side of the tester.
2. Connect the USB plug to a mains power pack.
3. Connect the power pack's plug to a mains outlet.

↳ The internal battery is charged.

Note!
The USB socket is equipped with a cover. The cover must be removed before charging.
After charging, reseal the USB socket with the cover!
This is the only way to protect the USB socket from contamination and damage.
Furthermore, measurements may only be performed with the cover on the USB socket ⇨ "Safety Instructions" 🗎1.

9 Operation

The tester performs functional testing of AC charging points. AC charging points in charging mode 3 with a type 2 socket or a permanently attached type 2 cable can be tested.

All parameters required for testing are set at the factory and cannot be changed by the user. After starting the test, the test program runs automatically in a predefined sequence. Testing is executed with 20 A. If this test is not passed, testing can be started with 32 A.

The results appear at the display in plain text.

9.1 Switching the Tester On

1. Briefly press the **ON/OFF** function key.

↳ The tester is switched on.
The battery charge level is displayed briefly.

The initial screen appears.

After a few seconds, the display changes and **TEST STANDARD (20A)** appears.

9.2 Language Selection

✓ The initial screen appears.

1. Press **Up** or **Down** until the **LANGUAGE SELECTION** submenu appears.
2. Press **START/STOP** in order to open the **LANGUAGE SELECTION** submenu.
   The currently selected language is displayed.

3. Press **Up** or **Down** to select another language, e.g. **ENGLISH**.
4. Press **OK** in order to save your selection.

↳ The selected display language is activated.
The display returns to the next higher menu level.

9.3 Performing the Function Test

9.3.1 Performing the Test with a 20 A Cable

✓ The **TEST STANDARD (20A)** start screen is displayed.

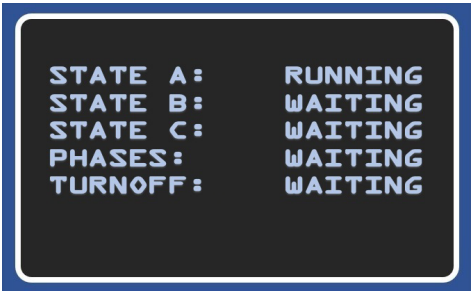
✓ The USB socket is sealed with the cover.

1. Press **START/STOP** in order to confirm your selection.
   The **CONNECT PLUG & AUTHORIZE** prompt appears at the display.

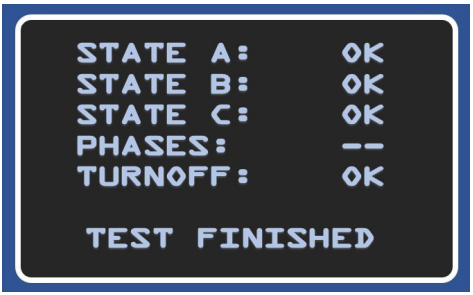
2. Connect the tester's plug to the AC charging point under test.
3. Authorize yourself at the AC charging point.
4. Press **OK**.
   Testing is started with 20 A.
   State A, state B, state C, phases, tOFF (state E), rotating field and duty cycle are tested. The display indicates which step is currently active.

Test Step	Scope of Test Step
State A	Charging cable connected to AC charging point only, CP signal (pilot line signal) is activated, voltage between PE and CP: 12 V
State B	Charging cable connected to AC charging point and vehicle, charging cable locked at the AC charging point and at the vehicle, vehicle not yet ready for charging, voltage between PE and CP: +9 V / –12 V
State C	Non-gassing vehicle detected, vehicle ready for charging, power is switched on, voltage between PE and CP: +6 V / –12 V
Phases	Single or 3-phase charging
tOFF (state E)	In the event of a short circuit, the charging process is switched off within 100 ms.

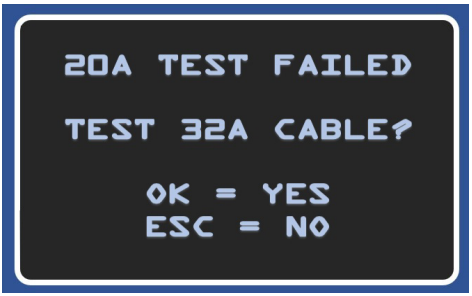
Rotary field	Testing for correct phase sequence
Duty cycle	The pulse-to-pause ratio of the PWM signal is checked. Available charging current is indicated in this way.



When testing with 20 A has been completed, the **TEST FINISHED** message appears.



5. Press **OK**.
   The test result is displayed (**PASSED** or **FAILED**).
   The **TEST 32A CABLE?** prompt appears at the display.

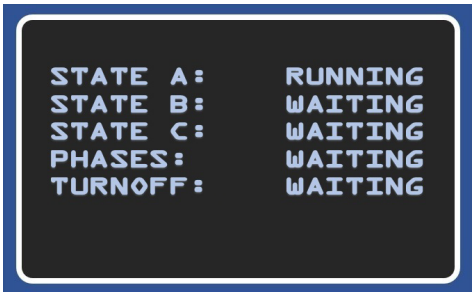


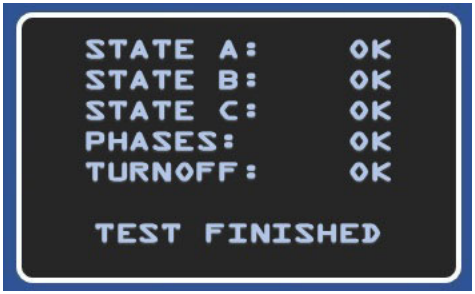
9.3.2 Performing the Test with a 32 A Cable

✓ 20 A cable testing has been executed and has failed.
The **TEST 32A CABLE?** prompt appears at the display.

✓ The USB socket is sealed with the cover.

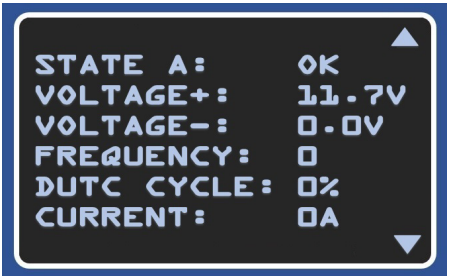
1. Connect the tester's plug to the AC charging point under test.
2. Authorize yourself at the AC charging point.
3. Press **OK**.
   Testing is started with 32 A. State A, state B, state C, phases, tOFF (state E), rotating field and duty cycle are tested. The display indicates which step is currently active.
   When testing with 32 A has been completed, the **TEST FINISHED** message appears.





4. Press **OK**.

5. Press **OK** again to view test details.
   Test details are displayed.



6. Press **Up** or **Down** in order to scroll forward or backward in the results pages.
7. Press **ESC** in order to end the test.
   SAVE DATA? appears at the display.

Note!
Only the values of the last measurement are stored to the tester's internal memory. When new values are saved, the old values are overwritten.

8. Press **OK** in order to save the values.

↳ The display is returned to the initial screen.
The function test has been completed.

9.4 Retrieving Stored Test Results

✓ The initial screen appears.

1. Press **Up** or **Down** until the **SAVED DATA** submenu appears.

2. Press **START/STOP** in order to open the **SAVED DATA** submenu.
The results of the last measurement are displayed.

3. Press **Up** or **Down** in order to scroll forward or backward in the results pages.
4. Press **ESC** to exit the submenu and return to the next higher menu level.

9.5 Test Results

Test	Result	Meaning
20A CABLE	OK	AC charging point functional
20A CABLE 32A CABLE	FAILED OK	AC charging point functional
20A CABLE 32A CABLE	FAILED FAILED	AC charging point not functional

9.6 Switching the Tester Off

1. Press and hold the **ON/OFF** function key.

↳ **OFF** appears at the display.
The tester is switched off.

10 Registering the Tester

You can register your tester in your personal myGMC account.

1. Access the website at https://www.gmc-instruments.de/services/mygmc/.
2. Create a personal myGMC account.
3. Register your tester in your personal myGMC account.

11 Maintenance

The tester is maintenance-free.

Cleaning
Keep outside surfaces clean.

Attention!
Switch the tester off before cleaning.
During cleaning, the tester must not be connected to an AC charging point.
The type 2 plug and the USB socket must be sealed with their respective covers during cleaning.

Attention!
Avoid the use of cleansers, abrasives or solvents.
Unsuitable cleaning agents such as aggressive or abrasive cleansers result in damage to the tester.

Clean the tester by gently wiping it with a slightly damp, lint-free cloth.

12 Contact, Support and Service

Gossen Metrawatt GmbH can be reached directly and simply – we have a single number for everything! Whether you require support or training, or have an individual inquiry, we can answer all of your questions here:

+49-911-8602-0	Monday to Thursday: Friday:	8 a.m. to 4 p.m. 8 a.m. to 2 p.m.
Or contact us by e-mail at:	info@gossenmetrawatt.com	

Do you prefer support by e-mail?

Measuring and Test Technology:	support@gossenmetrawatt.com
Industrial Measuring Technology:	support.industrie@gossenmetrawatt.com

Enquiries concerning training and seminars can also be submitted by e-mail and online:

training@gossenmetrawatt.com

https://www.gossenmetrawatt.com/training

Please contact GMC-I Service GmbH for repairs, replacement parts and calibration[1]:

+49-911-817718-0
service@gossenmetrawatt.com
www.gmci-service.com

Beuthener Str. 41
90471 Nürnberg
Germany

1. DAkkS calibration laboratory per DIN EN ISO/IEC 17025 – accredited by the Deutsche Akkreditierungsstelle GmbH under reference number D-K-15080-01-01.

13 CE Declaration

The tester fulfills all requirements of applicable EU directives and national regulations. We confirm this with the CE mark. The CE declaration is available upon request.

14 Returns and Environmentally Sound Disposal

This tester is subject to directive 2012/19/EC on Waste Electrical and Electronic Equipment (WEEE) and its German national equivalent implemented as the Waste Electrical and Electronic Equipment Act (ElektroG) on the marketing, return and environmentally sound disposal of electrical and electronic equipment. The device is a category 9 product (monitoring and control instrument) in accordance with ElektroG (German Waste Electrical and Electronic Equipment Act).

The symbol at the left indicates that this device and its electronic accessories must be disposed of in accordance with applicable legal regulations, and not together with household trash. In order to dispose of the tester, bring it to a designated collection point or contact our product support department (⇨🗎24).

This device is also subject to directive 2006/66/EC on batteries and accumulators, as well as waste batteries and accumulators, and its German national equivalent implemented as the Battery Act (BattG) on the marketing, return and environmentally sound disposal of batteries and accumulators.

The symbol at the left indicates that batteries and rechargeable batteries must be disposed of in accordance with applicable legal regulations. Batteries and rechargeable batteries may not be disposed of with household trash. In order to dispose of the batteries or rechargeable batteries, remove them from the tester and bring them to a designated collection point.

Segregated disposal and recycling conserves resources and protects our health and the environment.

Current and further information is available on our website at http://www.gossen-metrawatt.com under the search terms “WEEE” and “environmental protection”.

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