Equipment instruction

Measuring adapter HVB

Art. no. 105150

Translation of the document

Editor

Designwerk Technologies AG
www.designwerk.com
Member of the Volvo Group

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1 Introduction

The HVB measuring adapter is used to check whether the connections of a 400 V vehicle battery from Designwerk are still energised after the vehicle has been disconnected.

The measuring adapter was built by Designwerk, tested for safety and shipped in perfect condition. This condition can only be maintained if the instructions in this document are followed. The responsibility for maintaining quality is transferred to the recipient upon delivery of the measuring adapter.

NOTICE

Read the equipment instructions completely before using the device for the first time

This document describes how to use, check, maintain and dispose of the HVB measuring adapter safely. This OIU is an integral part of the product and must be available to users at all times. Keep this document in an easily accessible place.

The HVB measuring adapter is referred to as the measuring adapter in this document.

INFORMATION

In addition to this document and the applicable accident prevention regulations at the user's location and in the respective country, it is essential to observe the recognised rules for safety and professional work. The national legal regulations take precedence over the information in this document.

1.1 Manufacturer

Designwerk Technologies AG
Wülflingerstrasse 147
8408 Winterthur
Switzerland
+41 44 515 48 58

Our aftersales team will be happy to answer any questions you may have about the product at the following number or e-mail address:

+41 44 956 50 05
support@designwerk.com

1.2 Terms and conditions

The general terms and conditions can be obtained directly from the manufacturer at:
www.designwerk.com/agb

1.3 Original EU-Declaration of conformity

The document is available via the Designwerk Serviceportal under:
https://serviceportal.designwerk.com

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2 Information on safety regulations

In this document, symbols, designations, instructions and lists are shown as in chapters 2.1 to 2.4.

2.1 Safety notices and risk levels

DANGER

Danger

To indicate an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Warning

To indicate a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Caution

To indicate a potentially hazardous situation which, if not avoided, could result in a minor or moderate injury.

NOTICE

Notice

To indicate important information to avoid possible damage to property.

INFORMATION

Information

To indicate important information for the reader.

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2.2 Symbols and their meaning

Various symbols are used throughout this document. An overview and their meaning can be found in the following tables:

2.2.1 Warning signs

Symbol	Designation	Symbol	Designation
	General warning sign		Warning of electrical voltage

2.2.2 Commandment signs

Symbol	Designation	Symbol	Designation
	Important information to avoid potential property damage		Read this document
	To mark important information for the reader		Wear the Personal Protective Clothing (PPC)

2.3 Instructions and enumerations

All work steps are organised in a chronological sequence.

Instructions that must be carried out in a specific sequence are labelled as follows:

1. Work step 1
2. Work step 2

Preventive measures to avert a hazard are marked as follows:

- ➢ Measure 1
- ➢ Measure 2

General lists or instructions for action that do not have to follow a specific sequence of actions are marked as follows:

- Work step
- Work step

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2.4 General safety notices

DANGER

High voltage / danger of life

- Work on live parts may only be carried out by authorised personnel
- There is a danger to life if live parts are touched
- Have damaged cables or housings inspected immediately by specialised personnel.

WARNING

Serious injuries, including death, can occur if PPE is not worn

When working directly on high-voltage components, it is absolutely essential to wear suitable personal protective equipment in accordance with protection class 2. Long-sleeved work clothes made of natural fibres (e.g. cotton) must always be worn when working directly on high-voltage systems. Clothing made of polyester or polyamides is not permitted.

NOTICE

Required qualification

The work described in this document may only be carried out by instructed and trained personnel.

INFORMATION

Deviation of figures

The figures in this document may slightly deviate from your product.

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3 General notes and information

The following documents must be consulted for the safe use of the measuring adapter. They can be accessed via the Designwerk service portal (https://serviceportal.designwerk.com).

Working with HV-components	DW_009SIHHVK
Decommissioning LOW CAB	DW_LOC002ADS000
Decommissioning MID(X)/HIGH CAB	DW_VOC009ADS000
Commissioning LOW CAB	DW_LOC002IDS000
Commissioning MID(X)/HIGH CAB	DW_VOC009IDS000

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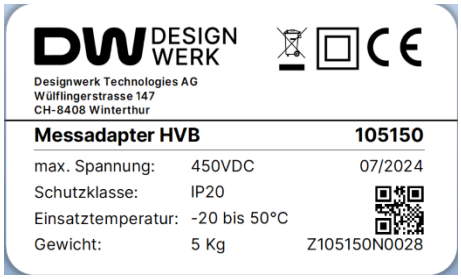
4 Structure and intended use of the measuring adapter

The 400 V vehicle batteries from Designwerk have their own battery management system. Among other things, this system ensures that the high voltage (HV) is switched on, which is realised by mechanical contactors. The connection only takes place when certain parameters and conditions are reached in the vehicle.
The measuring adapter is used to rule out a mechanical defect in a contactor. Such a defect could be, for example, that the contactor is always closed and 400 V is permanently applied. This defect can be safely detected with the measuring adapter.
The measuring adapter is also used to rule out the possibility of a short circuit on a component in the vehicle.

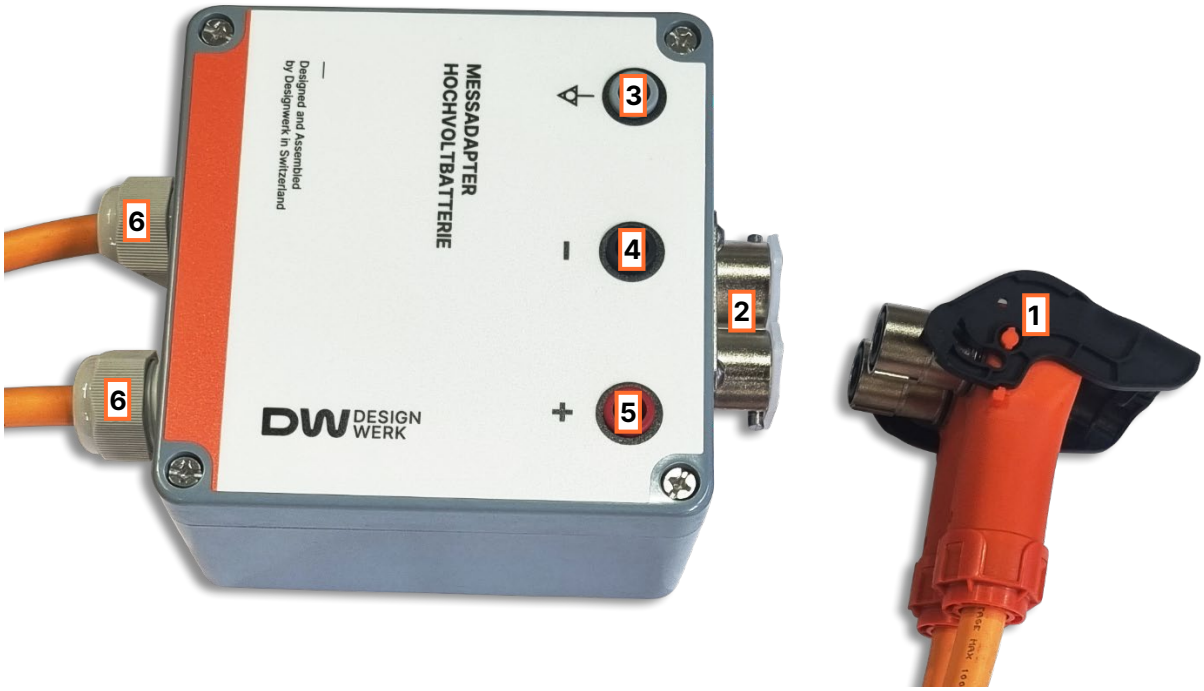
4.1 Type plate



4.2 Structure

The measuring adapter provides:

- an HV cable that is connected to the battery (orange-coloured cable with Powerlock HV plug)
- a Powerlock HV socket
- 3 measuring sockets for plus, minus, potential equalisation



1	Powerlock HV plug	**4**	Measuring socket -
2	Powerlock HV socket	**5**	Measuring socket +
3	Measuring socket potential equalisation	**6**	HV cable

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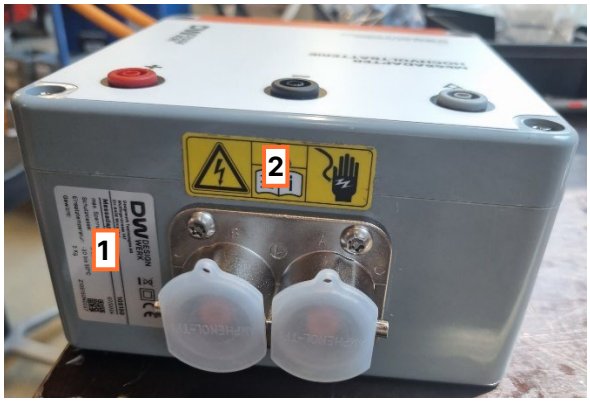
4.3 Position of the type plate, the warranty seal and the warning label



1	Type plate	**3**	Warranty seal
2	Warning label		

4.4 Intended use

The following points must be observed for the intended use:

- Maintenance and inspections must be carried out regularly (see chapter 7).
- The cables may only be connected to the intended connections.
- Only the measuring devices mentioned in these instructions or measuring devices with identical specifications should be connected:
  - Multimeter Fluke «175 true RS»
  - Test device Type «DusPol»
- The permissible ambient conditions must be observed (see chapter 8).
- If the measuring adapter is defective, the instructions in chapter 6.4.1 must be followed.
- The measuring adapter may only be used if the type plate is clearly legible.
- The measuring adapter may only be used with undamaged guarantee seals.

4.5 Non-intended use

Non-intended use includes all applications that are not expressly permitted in chapter 4.4.

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5 Delivery, transport and storage

5.1 Scope of delivery

- Eurobox with lid and foam protection
- Measuring adapter HVB
- Equipment instructions

5.2 Transport

The measuring adapter is checked before despatch, properly packed and placed in a Eurobox with foam protection. The Eurobox is dispatched in a cardboard box.

5.3 In-house transport

Always transport the measuring adapter in the Eurobox supplied. Make sure that it does not fall to the ground.

5.4 Storage

Always store the measuring adapter within the supplied Eurobox.

NOTICE

Damage to the device due to improper storage

- Improper storage can damage the measuring adapter.

➢ Store the measuring adapter in a clean and dry place indoors.

➢ Protect the measuring adapter from unauthorised temperature influences (see chapter 8).

➢ Protect the measuring adapter from moisture, dirt, damage and corrosion.

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6 Using the measuring adapter

6.1 Additional measuring and test devices

Designwerk recommends the measuring device by the brand Fluke «**175 true RMS»**.

Minimum requirements (measuring device AND measuring cables) :

- IEC 61010-1 for overvoltage categories CAT IV
- 600V/CAT III 1000V tested
- True-RMS measurements for voltage
- Basic accuracy of approx. 0.09 %
- Max. Voltage resolution 0.1 mV
- Max. resistance resolution 0.1 Ω
- Max. measured resistance 50 MΩ
- Test leads and test probes must be insulated

Designwerk recommends the use of the 2-pole test device **«DusPol»**.

The testing device needs to meet the following specifications:

- EN 61243-1, EN 61243-2, EN 61243-3 and EN 61243-5
- AC « TRUE RMS » 1-1000 V
- DC « TRUE RMS » 1-1200 V
- CAT IV 600 V, CAT III 1000 V
- IP 65

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6.2 Checking the meter for correct function before and after each use

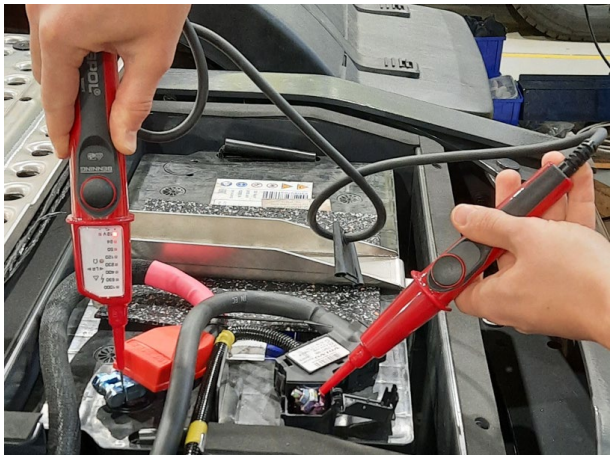
1. Set the multimeter to resistance measurement.

2. Attach the test cables and check the function of the multimeter by short-circuiting the test cables (holding the test probes together).

   The multimeter must display 0 Ω (tolerance ± 0.2 Ω) during the test.

6.3 Checking the test device for correct function before and after each use

Check the 2-pole test device on a safe voltage source. The voltage source must be identical to those to be tested (AC or DC voltage).



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6.4 Checking the measuring adapter before each measurement

6.4.1 For damages

Before each use, make sure

- that the sockets are clean and dry.
- that the housing, the sockets and the HV cable are not mechanically damaged.
- that the warranty seals on both sides of the measuring adapter are not damaged.

NOTICE

Damaged measuring adapter

If damaged, the measuring adapter must be labelled as defective and removed from the production environment. The measuring adapter must be repaired by the manufacturer.

6.4.2 For correct function

Before starting the actual measurement, use the recommended Fluke ‘175 true RMS’ multimeter to ensure that the measuring adapter has no faults.

The contacts (pins) on the high-voltage plug and on the high-voltage socket are each labelled «A» or «B».

Proceed as follows for the check:

1. Set the multimeter to resistance measurement.
2. Check the measuring adapter for short circuit, thereby checking all three connections against each other. The multimeter must indicate “Open Load” for all three tests.

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3. Check the resistance of the positive terminal in the measuring adapter. To do this, plug a test contact from the multimeter into the + test socket and plug the other test contact into pin A of the test socket on the measuring adapter and then into pin A of the high-voltage plug on the cable.

   The resistances must each be in the range 100 kΩ ± 10 kΩ.


4. Check the resistance of the negative terminal in the measuring adapter. To do this, plug a test contact from the multimeter into the measuring socket - and plug the other test contact into pin B of the test socket on the measuring adapter and then into pin B of the high-voltage plug on the cable.

   The resistances must each be in the range 100 kΩ ± 10 kΩ.


5. Check the resistance of the earth terminal in the measuring adapter. To do this, insert a test contact from the multimeter into the measuring socket ⏚ and hold the other test contact to the housing of the measuring socket on the measuring adapter and then to the housing of the high-voltage connector on the cable.

   The resistances must each be in the range 100 kΩ ± 10 kΩ.


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If one or more resistances are outside of the indicated range, implement the following steps:

- Check the settings on the multimeter
- Check the connections
- Check the cables

If an error was found: Correct the error, repeat the measurements.

If no error is found, the measuring adapter must be replaced.

6.5 Voltage measurement with the measuring adapter

WARNING

Risk of injury from electric shock

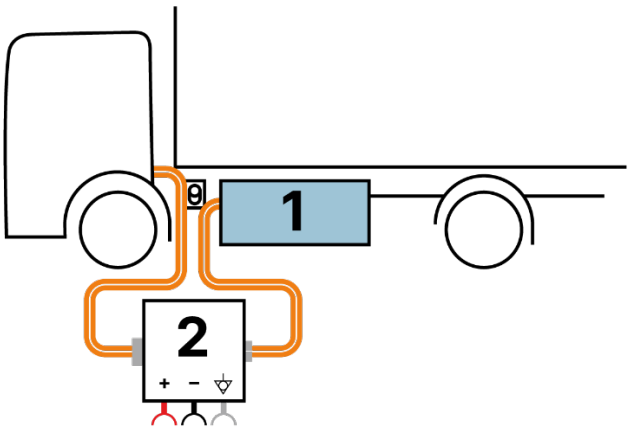
If the condition of the HV components is unclear, we recommend wearing the Personal Protective Equipment while handling HV plugs.

Prerequisits:

During the voltage measurement, the battery to be checked is usually in the truck and the truck is out of service, see also the listed documents in chapter 3.

For the voltage measurement, proceed as follows :

1. Disconnect the outer (most accessible) vehicle HV plug on the HV battery. Connect this plug to the measuring adapter socket.
2. Connect the measuring adapter plug to the now free socket of the HV battery.



1 HV battery

2 Measuring adapter

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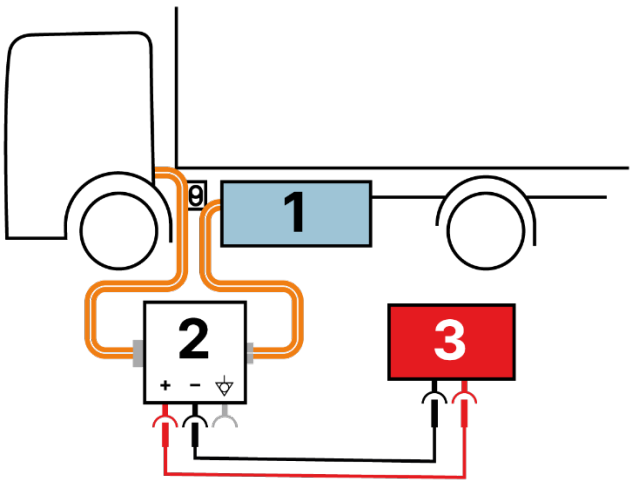
3. Measure the voltage between the following contacts on the measuring adapter using the "DusPol" type tester for one minute or until the voltage is < 50 VDC.

- **+ and –:**

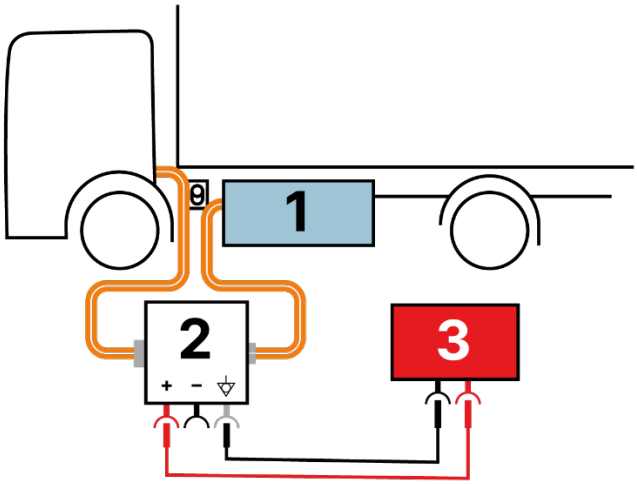


1 HV battery

2 Measuring adapter

3 2-pole test device

- **+ and ⏚:**

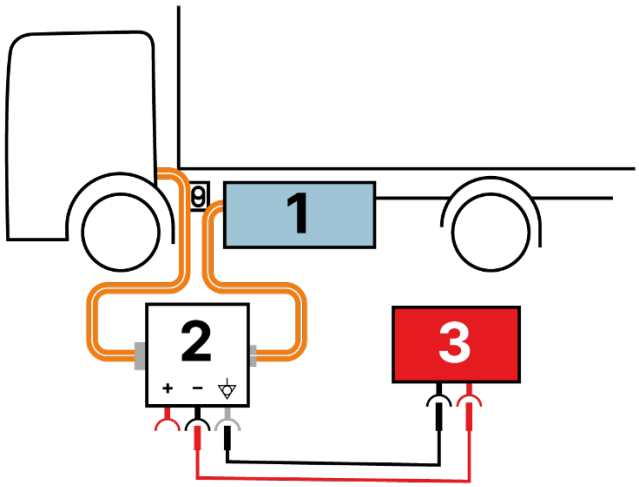


1 HV battery

2 Measuring adapter

3 2-pole test device

- **- and ⏚:**



1 HV battery

2 Measuring adapter

3 2-pole test device

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If there is still residual voltage (> 50 VDC) after 1 minute of testing, wait 10 minutes and repeat the process.

If a residual voltage (> 50 VDC) is still present during a new measurement, contact technical support.

4. Remove the measuring adapter from the high-voltage battery.
5. Check the measuring and the test device for correct function again, see chapter 6.2 and 6.3.

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7 Maintenance

The measuring adapter must be checked and cleaned regularly by qualified personnel.

7.1 Yearly check

- Check as described in chapters 6.4.1 and 6.4.2.

7.2 Cleaning

Clean the measuring adapter with a dry or damp cloth and, if necessary, a suitable cleaning agent to remove any dirt.
The measuring adapter must not be cleaned with high-pressure water.

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8 Technical data

Designation	Specification/Unit
Article number	105150
Dimensions HxBxT	160 x 160 x 91 mm
Cable length	ca. 1 m
Tare weight	3 kg
Operating and storage temperature	from -20 °C up to +50 °C
IP protection	IP20

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9 Disposal

	**INFORMATION**
	If the measuring adapter is no longer functional, it must be disposed of in accordance with local regulations.

9.1 Materials used

Housing: Plastc

Cable: Copper / plastic

High voltage connections: Brass / plastic

Internal fastening material: Steel, partly nickel-plated

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