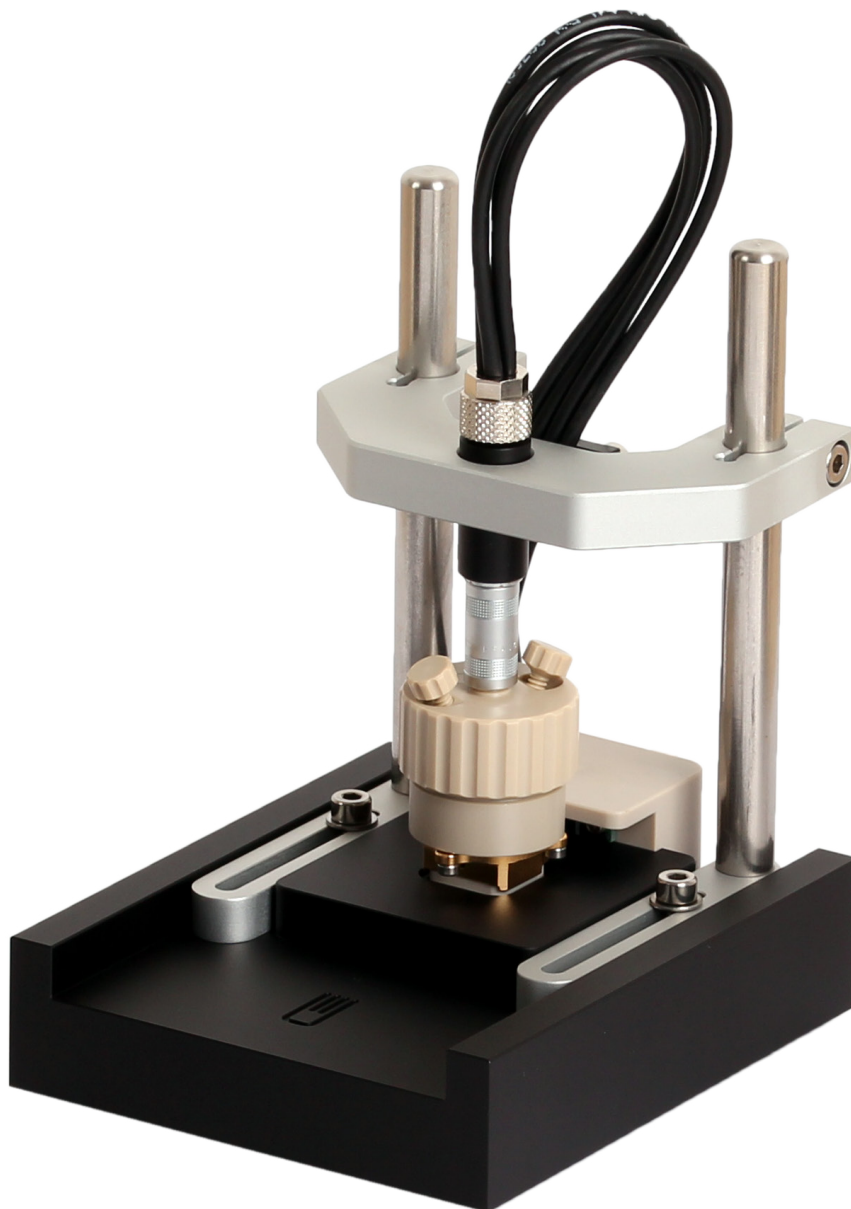


# Passive Cell Holder User Manual



Version 1.3



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# General information

Thank you for your confidence in our products and services. We wish you pleasure and success with your new measuring system. This measuring system has especially been developed for professional electrochemical material characterization.

- » **Please read these instructions carefully before using the device for the first time. It includes everything you need to know to avoid physical injuries and damages.**
- » **Please pay attention to all safety notes in this instruction manual.**
- » **Please keep this manual safe. In case of selling or leaving the device to third parties, please do not forget to hand this manual over as well.**
- » **The operation of the setup should only be performed by properly trained and experienced members of staff.**
- » **The setup has been designed only for electrochemical measurements. This setup should not be used for any other purposes.**
- » **To avoid unstable operating conditions, the Microcell HC setup, the Passive Cell Holder and the individual components should not be used if**
  - **they are not free of noticeable damages,**
  - **they were stored or operated under unapproved conditions (see Operational conditions, storage and rated values),**
  - **they were exposed to high mechanical stress exceeding normal usage for a prolonged period of time,**
  - **they were altered by members of staff not authorized by rhd instruments.**
- » The instructions in this manual were carefully checked for correctness; however, liability for any mistakes in form and content will not be assumed. Additionally, rhd instruments GmbH & Co. KG (in the following rhd instruments) reserves the right to change the setup and design of the products presented and described within this manual. Such changes are necessary to guarantee the continuous development of the products and thus the improvement of product quality and reliability.
- » Markings in this manual

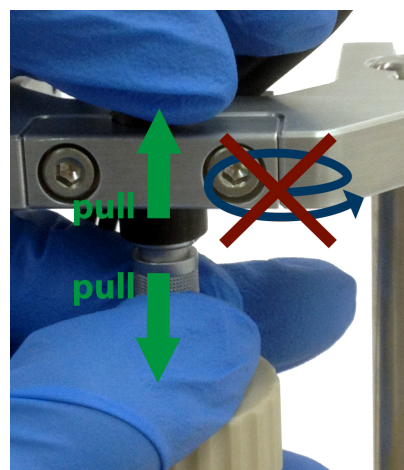
Marking	Meaning
	Indicates the handling and consequences of safety notes.
 <b>WARNING</b>	Indicates a hazardous situation, which, if not avoided, could result in a serious injury or death.

 <b>CAUTION</b>	<p>Indicates a hazardous situation, which, if not avoided, may result in minor or moderate injury.</p>
 <b>ADVICE</b>	<p>Indicates potential physical damages and other important information in connection with your device.</p>

## Important general safety notes

- » Please only follow the instruction manual for cleaning your device.
- » Prevent your device from falling-off. In case of falling-off, please inform rhd instruments before using it again.
- » Never repair the device on your own. The device should only be repaired by either rhd instruments or by staff authorized by rhd instruments.
- » Please follow this instruction manual for maintaining your device.
- » Please use only original spare parts delivered by rhd instruments.

» The measuring cells are connected by a 4-wire LEMO to BNC cable (**cell cable**). There is just one possible configuration for establishing the connection. Do not apply any excessive force. In case of physically disconnecting the measuring cell, please note that you have to pull down the outer casing of the LEMO plug situated at the cell's cap simultaneously while slightly removing the cable to unlock the connection. **As it is a push-pull connector you must not twist it!**



**ADVICE: Connect and unplug any cable connection carefully.**



**ADVICE: Handle chemicals with care.**

- » When handling chemicals during preparation and performance of measurements with the Passive Cell Holder, the usual safety advice in accordance with the H, EUH, and P statements (in the European Union: rating principles according to the CLP regulation) and appropriate safety measures have to be observed. This also applies to subsequent cleaning and decontamination.



**ADVICE: Sufficient cleaning increases lifetime of your system.**

- » After using the Passive Cell Holder for electrochemical measurements, all components in contact with chemicals have to be thoroughly cleaned. Insufficient cleaning, decontamination, and drying of the components of the Passive Cell Stand can result in damage due to corrosion and thus possibly in falsification of the measurement results.



**ADVICE: Be careful when bringing chemicals in contact with parts of your system.**

- » When operating your Passive Cell Holder with compatible measuring cells please be advised to only use samples that are chemically inert towards the materials the measuring cell parts are made of (e.g., platinum, polyether ether ketone (PEEK) and soda-lime glass). **Caution:** Fluorine-containing electrolytes can release hydrofluoric acid (HF) when decomposing.
- » In general, the Passive Cell Holder is only allowed to be operated under conditions that correspond to the specifications described in this manual and under which the main components of the measuring cell used are stable.

## Components of a Passive Cell Holder

- » Please unpack your device carefully.



**ADVICE: If your items have been shipped in a tool case, keep the case for future storage and transportation.**

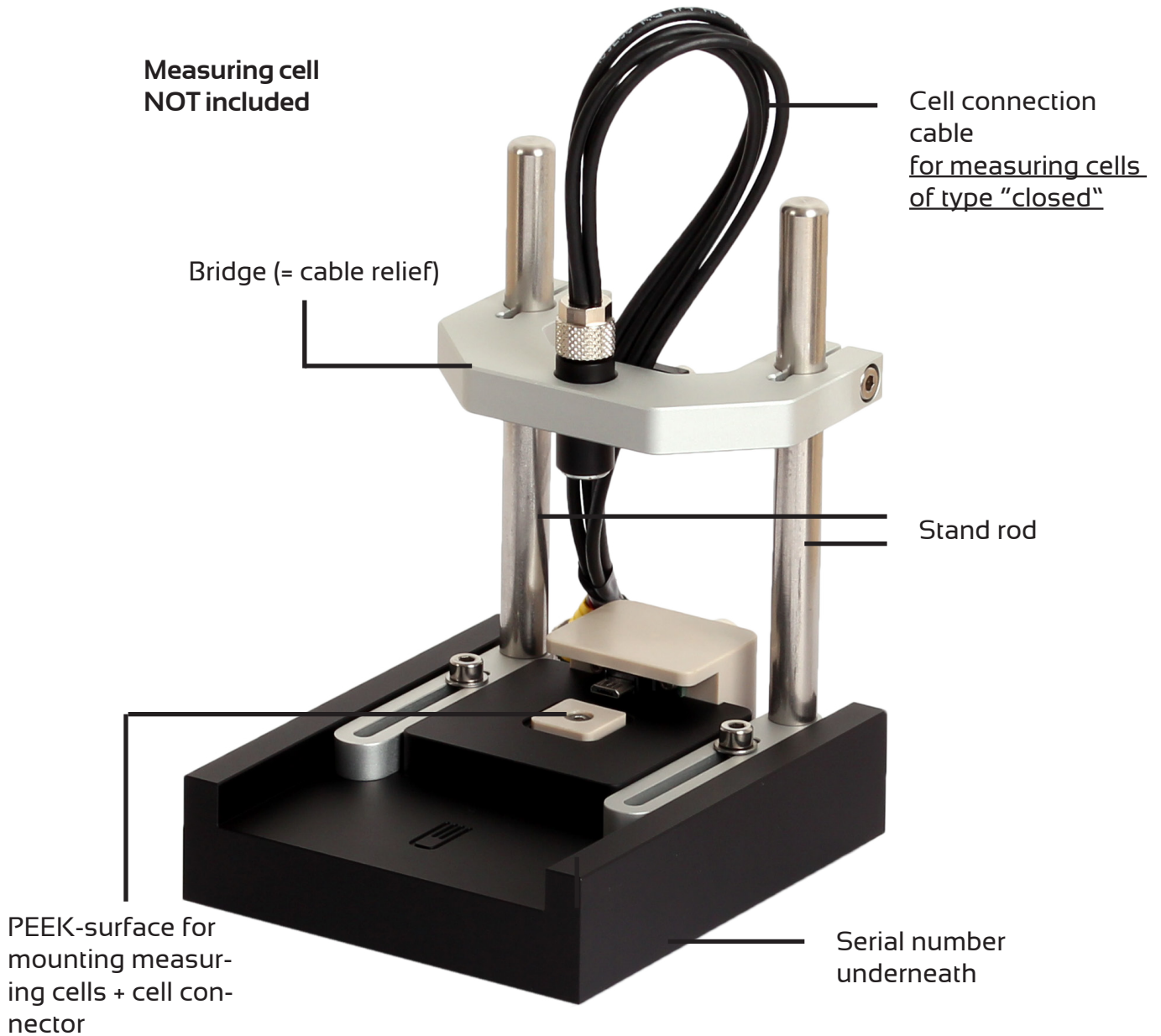
- » Please check if the delivery is complete:
  - 1 x Passive Cell Holder
  - 1 x Cell connection cable type 4-pole LEMO to 4 x BNC (female, separate)
  - 1 x Adapter Box 4 x BNC to 4 x banana + 3 x BNC-cable (30 cm each, male-male)
  - 1 x manual „Passive Cell Holder “ and 1 x manual „Measuring Cells“ (both printed)
  - 1 x hexagon key 1.5 mm
  - 1 x hexagon key 3.0 mm
- » Please check if the delivered items are undamaged.



**ADVICE: If the delivered items should be incomplete or damaged please contact us either via e-mail ([support@rhd-instruments.de](mailto:support@rhd-instruments.de)) or via our hotline (+49 6151 8707187)**

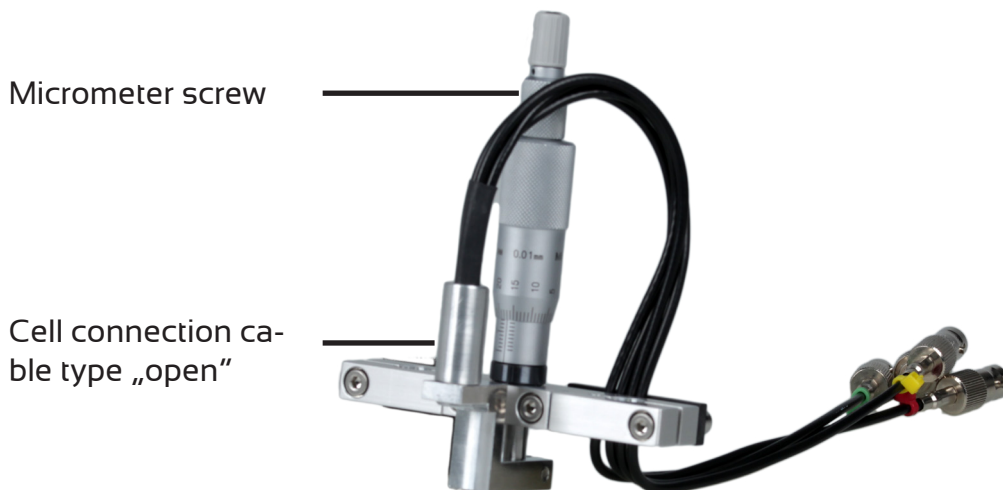
**In case accessories of other manufacturers are used, rhd instruments will accept no liability.**

## Passive Cell Holder



## Positioning unit (optional)

for measuring cells of type "open"





# Operation conditions, storage and rated values

- » Temperature range during operation  
(environment):  $T = 0\text{ °C to }+75\text{ °C}$
- » Temperature range during storage:  $T = +10\text{ °C to }+30\text{ °C}$
- » Relative humidity (RH) for working  
and storage area: (non-condensing) 0 to 90% RH
- » Atmosphere during storage: non-corrosive
- » Maximum electrode potential:  $U = \pm 30\text{ V}$
- » Maximum operational pressure for  
sealed measuring cell:  $p = 5\text{ bar}$
- » Rated values of the cell stand: 11.3 cm x 9.5 cm x 25 cm (L x W x H)
- » Total weight (cell stand, cables): 1 kg

# Product description

The measuring setup based on the Passive Cell Holder is suitable for the **electrochemical characterization** of liquids, gels, and polymers as well as solid samples and heterogeneous systems. Depending on the measuring cell, the measurements can be performed in both a two- and three-electrode setup. Only a small sample volume (milligram range) is required, which allows for electrochemical analyses of substances that are only available in small amounts and/or extremely expensive.

Already **established applications** of the setup are the measurement of the **conductivity** of ionic liquids, polyelectrolytes, and polymer electrolytes, electrochemical impedance spectroscopy for the characterization of the **interface** ionic liquid/electrode, cyclic voltammetry for a large variety of electrochemical systems (e.g. dyes solved in organic solvents), and charge/discharge experiments on **Li-ion battery** systems. For more examples and detailed description of exemplary measurements please see the application notes accessible on our website: <https://rhd-instruments.de/en/support/downloads>.

Especially cyclic voltammetry experiments, but also in general measurements utilizing a three-electrode setup, require a **reference electrode**. If it is not planned to use a specially fitted quasi- or pseudo reference electrode, the small sample volumes represent a challenge as commercially available reference electrodes are too large and thus not suitable. For electrochemical measurements of ionic liquids, a micro-reference electrode developed by rhd instruments can be used. We will further advance the development of the micro-reference based on the specific requirements of our customers. For measurements of battery electrolytes, a clamp mounting is available, which allows the usage of a lithium reference electrode.

## Essential features at a glance

- » Measurement of volatile samples when using a sealed measuring cell
- » Small sample volume, varying with the design of the measuring cell
- » Fast and comfortable assembly
- » Quick exchange of the reference electrodes
- » Measurements possible outside or inside a glove box
- » Compatible with a large number of electrochemical measuring instruments of various manufactures (among them, but not conclusive, Novocontrol, BioLogic, Ivium, Ametek, Zahner, **Metrohm Autolab**)

### Note:

If you have questions, for example with regard to the compatibility of your measurement devices, do not hesitate to contact us (see Contact and Technical Support).

# Quick installation of the Passive Cell Holder

- » Fix both stand rods. Use the screws (M4 hex bolt AF 3 mm; fixed to the cell stand by default factory configuration) and tool included in the package.
- » Slide the measuring cell carefully along the guide onto the PEEK surface until the USB connector engages.
- » Make sure that the position of the bridge has been optimized for the setup you want to use. In case of setups using measuring cells of type „closed“ the hole in the bridge (cable relief) has to be above the upper electrode connector of the measuring cell's cap. In case of setups using measuring cells of type „open“ the connector for fixing the upper electrode should be above the lower electrode or sample mount.
- » Slide the bridge along the stand rods. Adjust the final height to allow for sufficient space to connect the measuring cell. You will have to adapt the height whenever switching to another measuring cell type (e.g. from *TSC 1600* closed to *TSC battery*). Tighten the screws for fixing the position.

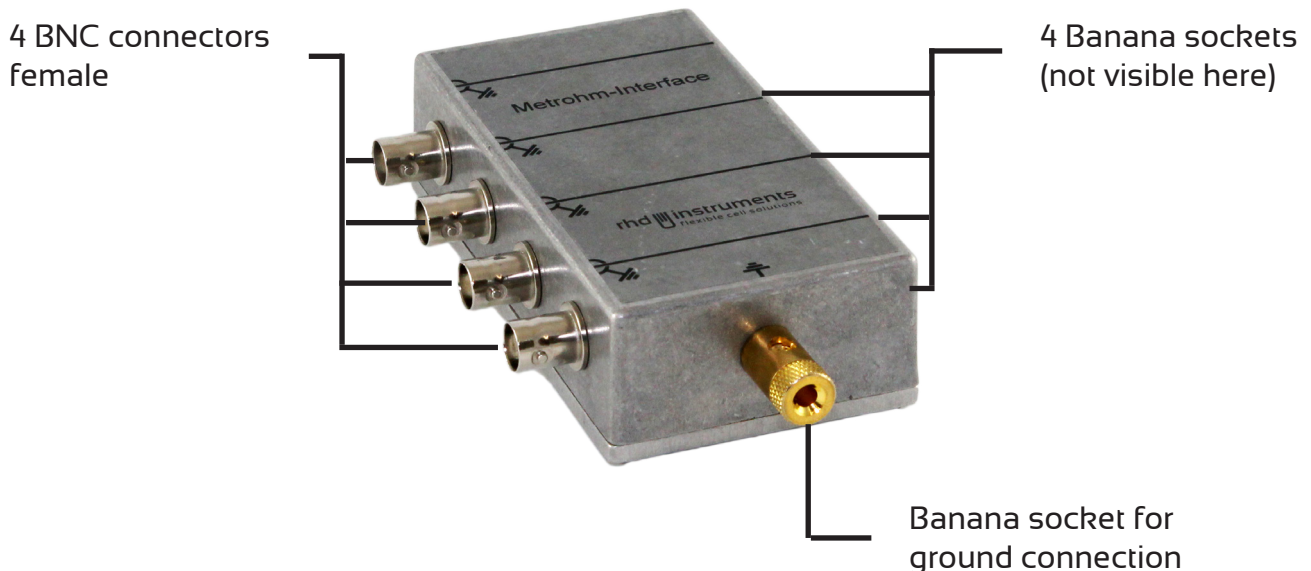


**ADVICE:** Please do not modify your measuring cell after having positioned it on top of PEEK surface by e.g. screwing the cap since lateral forces might damage the measuring cell as well as the cell stand.

# rhd adapter boxes

All connections to measuring cells used with the Passive Cell Holder come with cables offering BNC connectors (female) for establishing the connections to a measuring device. Also the cell stand has a BNC connector (female) at its back side for connecting the lower cell part. However, many manufacturers of measuring devices offer other connector types, e.g. banana plugs. Therefore, a suitable adapter is required. Besides offering an elegant way for connecting the measuring cell to your measuring device, the adapter boxes provide an additional ground connector thus reducing the noise of your measurement signal. rhd instruments can provide you with these items which are well-adapted for your situation. In case you want to use measuring devices purchased from METROHM Autolab B.V., from Bio-Logic SAS or from Zahner-Elektrik GmbH & Co. KG, we already have boxes with a suitable design on stock. In the following, the adapter box designed for usage with devices manufactured by Autolab is presented.

## Best choice for Autolab devices: adapter box type „PS“



The box arrives at your site with at least 3 BNC cables with 2 BNC connectors (male) per cable. These cables should be used to connect BNC connectors (female) of the cell cable (4 x BNC to 4-pole LEMO) and the BNC connector (female) of the cell stand.

In principle, two different configurations are commonly used for performing electrochemical experiments, depending on the method applied. These are either a 2-electrode or a 3-electrode configuration. For Autolab devices, schematic sketches showing both options are depicted on the following page.

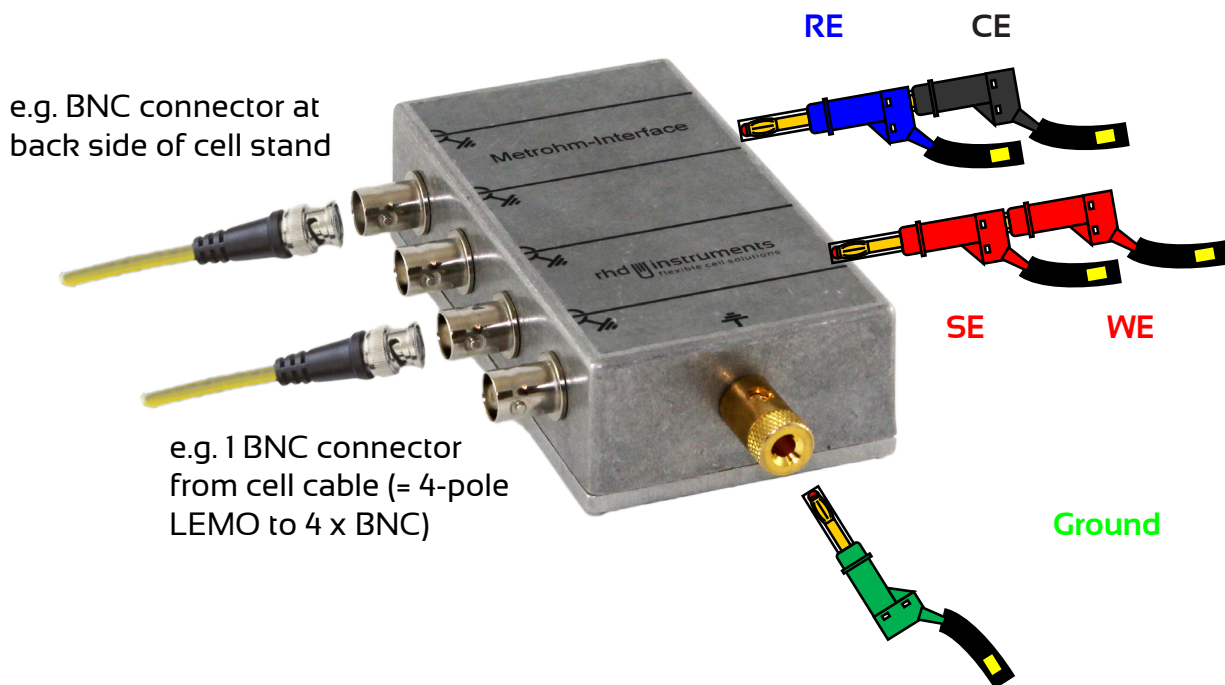


**ADVICE:** The exact configuration of the connection of the adapter box to your measuring cell depends on the method applied as well as on the chosen measuring cell. The pictures only show an exemplary configuration which can be used e.g. in cases when a TSC 1600 closed combined with a cap offering 4 separate platinum electrodes is used.

## 2-electrode configuration

To Passive Cell  
Holder equipped with  
measuring cell

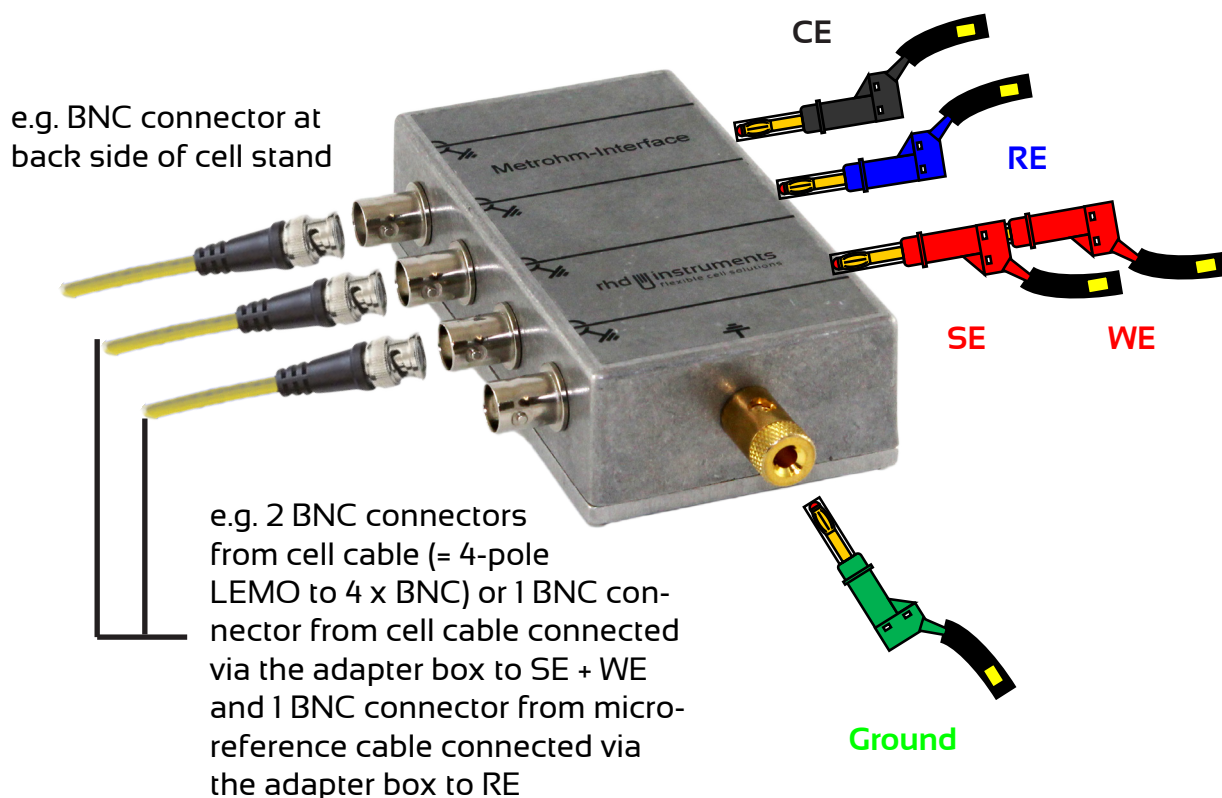
To Autolab measur-  
ing device, e.g. PG-  
Stat204



## 3-electrode configuration

To Passive Cell  
Holder equipped with  
measuring cell

To Autolab measur-  
ing device, e.g. PG-  
Stat204



# Settlement

Explicitly left out from warranty are parts that are subject to premature wear and tear due to use or other natural wear and tear (such as, for example, the micro-reference electrode and the respective fittings, the regeneration electrolyte for the micro-reference electrode, the mount for the lithium reference electrode, electrodes in general, and all sealing materials). These components are regarded as consumables.

The costs for sending repaired or exchanged goods to the customer will be paid for by rhd instruments.

rhd instruments has to be notified of apparent defects and damages that already occurred during production or delivery within 14 days after receiving the delivery. If notification of apparent defects and damages does not occur within this period of time, the goods shall be deemed to have been accepted; as a result, the order will be assumed to be completed and approved.

Please note: Only workshops authorized by rhd instruments are allowed to perform repairs on the devices. If the mechanical or electronic components of the products are altered by the customers themselves or by unauthorized workshops, a claim for warranty against rhd instruments is also forfeited.

In case of a claim or sending back goods for repairs to be performed, please ask for the decontamination form beforehand, in which you certify that the product has been decontaminated. In general, rhd instruments must be contacted via e-mail or phone prior to any shipping of damaged goods.

# Contact and Technical Support

For any questions with regard to our products, orders, or request for repairs please contact rhd instruments:

info@rhd-instruments.com

Phone: +49 6151 8707187

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