

# OPERATING INSTRUCTIONS AND SYSTEM DESCRIPTION FOR THE **REL-08 B** **ELECTRODE RESISTANCE METER**



VERSION 1.3  
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## 1. Safety Regulations

**VERY IMPORTANT:** Instruments and components supplied by npí electronic are **NOT** intended for clinical use or medical purposes (e.g. for diagnosis or treatment of humans), or for any other life-supporting system. npí electronic disclaims any warranties for such purpose. Equipment supplied by npí electronic must be operated only by selected, trained and adequately instructed personnel. For details please consult the **GENERAL TERMS OF DELIVERY AND CONDITIONS OF BUSINESS** of npí electronic, D-71732 Tamm, Germany.

- 1) **GENERAL:** This system is designed for use in scientific laboratories and must be operated by trained staff only. General safety regulations for operating electrical devices should be followed.
- 2) **AC MAINS CONNECTION:** While working with the npí systems, always adhere to the appropriate safety measures for handling electronic devices. Before using any device please read manuals and instructions carefully.  
The device is to be operated only at 115/230 Volt 60/50 Hz AC. Please check for appropriate line voltage before connecting any system to mains.  
Always use a three-wire line cord and a mains power-plug with a protection contact connected to ground (protective earth).  
Before opening the cabinet, unplug the instrument.  
Unplug the instrument when replacing the fuse or changing line voltage. Replace fuse only with an appropriate specified type.
- 3) **STATIC ELECTRICITY:** Electronic equipment is sensitive to static discharges. Some devices such as sensor inputs are equipped with very sensitive FET amplifiers, which can be damaged by electrostatic charge and must therefore be handled with care. Electrostatic discharge can be avoided by touching a grounded metal surface when changing or adjusting sensors. **Always turn power off when adding or removing modules, connecting or disconnecting sensors, headstages or other components from the instrument or 19" cabinet.**
- 4) **TEMPERATURE DRIFT / WARM-UP TIME:** All analog electronic systems are sensitive to temperature changes. Therefore, all electronic instruments containing analog circuits should be used only in a warmed-up condition (i.e. after internal temperature has reached steady-state values). In most cases a warm-up period of 20-30 minutes is sufficient.
- 5) **HANDLING:** Please protect the device from moisture, heat, radiation and corrosive chemicals.

## 2. REL-08 B

### 2.1. Components

The following items are shipped with the REL-08 B system:

- Ø Electrode Resistance Meter (REL-08 B)
- Ø User manual
- Ø System Bus cable

### 2.2. System Description

The REL-08 B unit is designed to measure the resistance of micro electrodes. It only works in combination with the EXT-02 B system, to which it is connected via the system bus.

The measurement is performed by applying triangle voltage pulses through the system bus to one of the headstages of a EXT-02 B system. The triangle pulses are transformed into square current pulses in the headstage and applied to the electrode that is connected to the headstage (frequency approx. 160 Hz). The voltage deflection caused by this current injection is recorded, sent back to the REL-08 B via the system bus and processed to get a direct reading of the electrode resistance in  $M\Omega$  on the digital display. The system can be triggered manually with a switch or via TTL pulse with an external device. An analog resistance monitor is provided as well.

**Important:** For correct resistance measurement make sure that the the EXT-02 B is powered on. At the STIMULUS CONTROL of the EXT-02 B the switch has to be in OFF position and no TTL HIGH input signal must be applied. Also the INPUT MODE switch of the EXT-02 B must be in SINGLE or DIFF position. Also the NOTCH filter has to be turned OFF.

### 2.3. Description of the Front Panel



Figure 1: REL-08 B front panel view

In the following description of the front panel elements, each element has a number that is related to that in Figure 1. The number is followed by the name (in uppercase letters) written on the front panel and the type of the element (in lowercase letters). Then, a short description of the element is given.

**(1) POWER LED**



LED indicating that the EXT-02 B is powered on and that the REL-08 B is properly connected to the EXT-02 B.

**(2) POWER switch (optional)**



Switch for turning the REL-08 B ON (upper position) or OFF (lower position). If this switch is installed, the POWER LED (#1) will only light up if the EXT-02 B is properly connected and the switch is in ON position.

**(3) RESISTANCE TEXT switch**



Switch for enabling the resistance test function.

upper position: resistance test is applied to the electrode selected with the channel select rotary switch (#5).

lower position: resistance test not active, TTL enabled (#7)

**Important:** For correct resistance measurement STIMULUS INPUT and NOTCH filter have to be turned OFF!

**(4) ELECTRODE RESISTANCE (MΩ) display**



This display shows the measured resistance of the electrode in MΩ while the resistance test is activated. (XX.XX MΩ, max 10 MΩ)

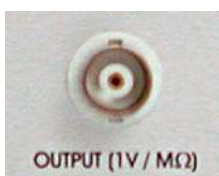
With inactive resistance test, the display will read 00.00 MΩ .

**(5) CHANNEL SELECT rotary switch**



8-position switch for selecting the channel to which the electrode resistance pulse will be applied.

**(6) OUTPUT (1 V/MΩ) connector**



This connector provides an analog output voltage corresponding to the measured resistance at the electrode. Scaling at this output is 1 V/MΩ.

While the resistance test is not active, the output voltage is 0 V.

This output has the same functionality as the RESISTANCE connector (#2) on the rear panel.

**(7) TTL IN connector**

BNC connector for an external trigger signal, TTL (HI = resistance is measured, LOW = resistance is not measured)

**(8) GROUND connector**

Banana plug providing ground. The plug is connected internally to the shields of the BNC connectors.

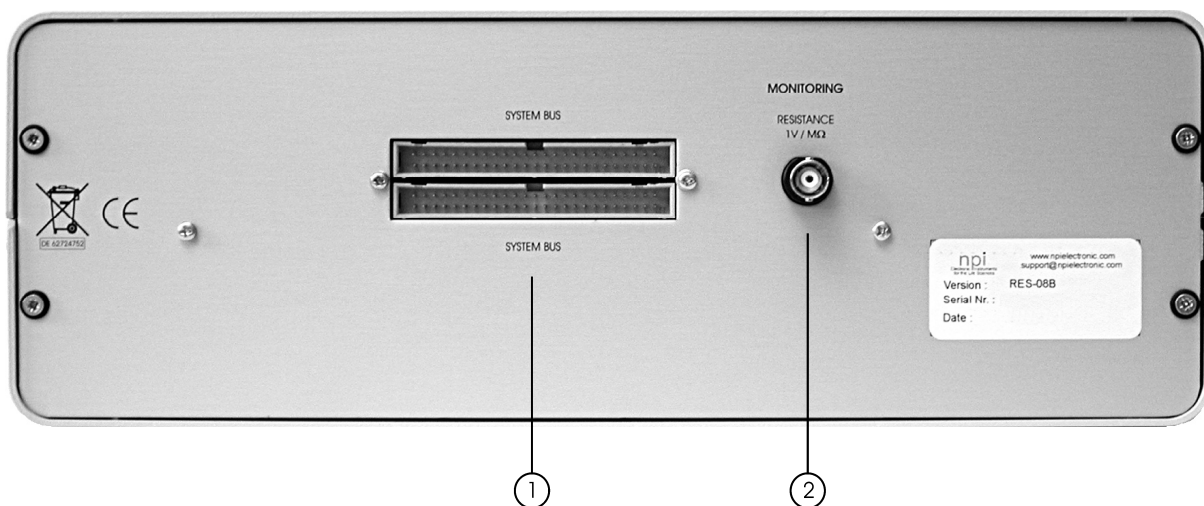
**2.4. Description of the Rear Panel**

Figure 2: REL-08 B rear panel view

**(1) SYSTEM BUS connector** (see also chapter 2.5)

50-pin connector providing power lines and data lines for connection of the REL-08 B to a EXT-02 B system. Three EXT-02 B in slave configuration can be connected to one EXT-02 B in master configuration. One electrode resistance meter (REL-08 B) and one audio monitor (AUD-08 B) can also be connected via this system bus.

**(2) RESISTANCE 1V/MΩ connector**

This connector provides an analog output voltage corresponding to the measured resistance at the electrode. Scaling at this output is 1 V/MΩ.

While the resistance test is not active, the output voltage is 0 V.

This output has the same functionality as the OUTPUT 1V/MΩ connector (#6) on the front panel.

## 2.5. *System Bus – interconnecting devices*

### Connecting multiple devices

The System Bus interconnects all amplifiers (EXT-02 B in master and slave configuration) and monitoring devices (REL-08 B, AUD-08 B). It provides both power lines and all signal lines. The number of signal lines depends on the number of connected amplifiers.

All devices of the B-series (EXT-02 B, REL-08 B, AUD-08 B) have two SYSTEM BUS connectors at the rear panel (#5, Figure 2). To interconnect two or more devices, simply use the provided cable and plug it into one of the SYTEM BUS connectors of each device.

This will result in a chain of devices, which has a maximum length of six (1 x EXT-02 B master, 3 x EXT-02 B slave, 1 x AUD-08 B, 1 x REL-08 B). The order in which the devices are chained up is not important. Since it is a bus system, all positions are treated equally.

### Channel addresses

When using monitoring devices (REL-08 B, AUD-08 B) it is important, that each recording channel has its dedicated address, i.e. that there is no more than one channel on a single address number. This can be achieved by selecting a channel's address number with the CHANNEL ADDRESS rotary switch (#3, Figure 2) on the rear panel of the EXT-02 B in slave configuration.

The EXT-02 B in master configuration does not have a CHANNEL ADDRESS rotary switch. Its recording channels will always addressed to 0 for channel A and 1 for channel B. Therefore the selectable addresses for the EXT-02 B in slave configuration begin at 2 and go up to 7.

Each recording channel can be monitored either acoustically with the AUD-08 B or its electrode resistance can be measured with the REL-08 B. These devices have a CHANNEL SELECT rotary switch on their front panel, whose numbers correspond to the channel address number selected at each channel of the EXT-02 B.

**Important:** For correct resistance measurement make sure that the the EXT-02 B is powered on. At the STIMULUS CONTROL of the EXT-02 B the switch has to be in OFF position and no TTL HIGH input signal must be applied. Also the INPUT MODE switch of the EXT-02 B must be in SINGLE or DIFF position.

Also the NOTCH filter has to be turned OFF.

### 3. Technical Data

Output:	range: $\pm 10$ V; impedance: $50\ \Omega$
Display:	XX.XX M $\Omega$ , max. 10 M $\Omega$
Dimensions:	305 x 180 x 105 mm <sup>3</sup> (W x D x H)