
NL100AK – AC Pre-amplifier Headstage



The NL100AK AC pre-amplifier headstage is a differential input, low noise, high impedance buffer amplifier suitable for extracellular recording. The headstage is supplied as standard with a removable 6.4mm diameter stainless steel manipulator mounting rod. Power is normally supplied by the NL104A AC pre-amplifier via a 4 way Lemo plug and socket, however, this headstage can also be used in conjunction with older NeuroLog amplifiers (NL103, NL104, NL107), as well as the NL109 Bridge Amplifier, please specify with your order. Each NL100AK headstage is supplied with an NL973A accessory kit which contains 1mm and 2mm plugs, a U-shaped input jumper and an allen key.

Electrode Connections

Where possible, it is recommended that micro-electrodes are attached directly to the NL100AK input so that the lead length between the NL100AK input and the electrode is minimised; even a few centimetres of lead may result in substantial mains interference (pick-up).

Metal Micro-electrodes

Metal microelectrodes may be connected by using an electrode holder (part no: NL04). Alternatively the user can adapt the 2mm connector (supplied) to suit the particular electrode used. A common solution is to use a short length (5-10mm) of hypodermic needle tubing soldered to the pin (keep this connection as short as possible for low interference).

When the NL100AK HEADSTAGE is used in conjunction with the NL104AAC PREAMPLIFIER it is important that the "A-B" position is selected on the NL104A input selector switch. This will reduce interference from external sources and match offset components inherent to the low noise, high input impedance stage in the NL100AK.

Single ended recordings can be accomplished by grounding the "B" input of the NL100AK with the input cable having the "U" shaped 1mm jumper (supplied); the "U" shaped plug is pushed into the "B" and "GND" inputs and the flying lead is used to provide the ONLY ground connection for the preparation. (See catalogue application note entitled 'Avoiding Ground Loops'). In this way any common-mode interference picked up at both the "A" and "B" inputs of the NL100AK can be summed out by the NL104A.

A DC path must be provided from each input of the NL100AK to the system ground. This DC path may of course be through a high resistance microelectrode. It is also essential, for the best noise performance, to make the ground connection to the biological preparation through the GND terminal of the NL100AK. If the NL100AK is used differentially, with both A and B inputs connected through electrodes to the preparation, a connection to the NL100AK GND should still be made to the preparation.

Fluid Filled Pipette Electrodes

When using fluid filled pipette electrodes it is recommended that a compatible electrode chamber with a 2mm pin is used.

Differential Recordings

Although the NL100AK Headstage is most frequently used with high resistance microelectrodes, its very low noise allows it to be used with low resistance electrodes (eg for differential recordings of action potential through gross electrodes).

WARNING - It should be pointed out that if the input device of, or cable to, the headstage should fail there is a possibility of current flowing through the preparation to ground causing an inadvertent lesion¹. This is limited by the design to approximately 650mA. Should this be a problem (and it is a remote possibility) please contact Digitimer for advice.

ALSO - make certain that the NL900 power switch is on before connecting the preparation to the active inputs of the NL100AK (or NL104A). Do NOT switch the NL900A power on or off while a preparation is connected to the NeuroLog™ System.

Do NOT attempt to use oversize plugs with the headstage sockets, as pins greater than 1.00/2.00mm diameter will damage the socket.

NOTE: if the NL100AK is required to plug into the NL103 amplifier which is fitted with an input socket without locating keyway, the NL100A (first stage) should be ordered to ensure that the correct mating plug is fitted to the connecting cable.

(1)-Recording of Brain Potentials with FET-Circuits: Hazard of Inadvertent Lesions, by J. A. W. M. Weijnen and N. Chedhade in Brain Research Bulletin, Vol. 18, pp617-618.

Specifications

- **Input resistance:** 100MΩ
- **Gain:** x1
- **Input noise:** <2μV (peak to peak) with inputs shorted, <25μV for typical tungsten microelectrode in saline, <30μV with a 1MΩ resistor between inputs (bandwidth in all three cases, 10Hz to 10kHz)
- **Dimensions:** 35.6mm x 9.5mm diameter
- **Cable length:** 2m
- **Connections:** +IN (2mm socket) for non-inverting input (accepts plugs supplied and optional NL101 electrode chambers), -IN (1mm socket) for inverting input connection to reference electrode or via U connector (supplied) to ground socket (GND). GND (1mm socket) connected to mains earth.

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