

OPERATING INSTRUCTIONS AND SYSTEM DESCRIPTION FOR THE

HVA-100

HIGH VOLTAGE AMPLIFIER MODULE FOR EPMS SYSTEMS



VERSION 1.8

npi 2017

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1. Safety Regulations

VERY IMPORTANT: Instruments and components supplied by npi 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. npi electronic disclaims any warranties for such purpose. Equipment supplied by npi 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 npi electronic, D-71732 Tamm, Germany.

- 1) **GENERAL:** This system is designed for use in scientific laboratories and must be operated only by trained staff. General safety regulations for operating electrical devices should be followed.
- 2) **AC MAINS CONNECTION:** While working with the npi 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.
- 6) **The output voltage of this device is 100 V DC. Do not touch the output pins or wires from the output cable!**

2. EPMS-07 Modular Plug-In System

2.1. General System Description / Operation

The npI EPMS-07 is a modular system for processing of bioelectrical signals in electrophysiology. The system is housed in a 19" rackmount cabinet (3U) has room for up to 7 plug-in units. The plug-in units are connected to power by a bus at the rear panel.

The plug-in units must be kept in position by four screws (M 2,5 x 10). The screws are important not only for mechanical stability but also for proper electrical connection to the system housing. Free area must be protected with covers.

2.2. EPMS-07 Housing

The following items are shipped with the EPMS-07 housing:

- ✓ EPMS-07 cabinet with built-in power supply
- ✓ Mains cord
- ✓ Fuse 2 A / 1 A, slow (inserted)
- ✓ Front covers

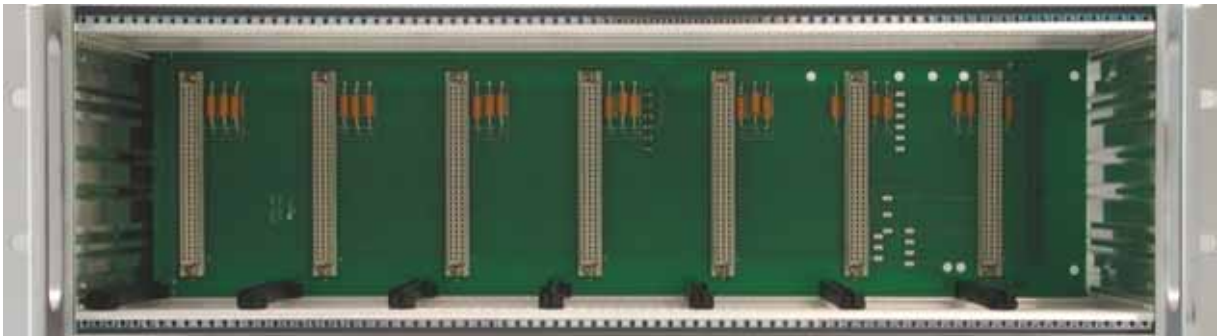


Figure 1: Left: front view of empty EPMS-07 housing.

In order to avoid induction of electromagnetic noise the power supply unit, the power switch and the fuse are located at the rear of the housing (see Figure 2, right).

2.3. EPMS-H-07 Housing

In addition to the standard power supply of the EPMS-07, the EPMS-H-07 has a built-in high voltage power supply. This is necessary for all MVCS / MVCC modules, the HVA-100, HV-TR150 and HVC-03M modules. The output voltage depends on the modules in use.

2.4. EPMS-E-07 Housing

The following items are shipped with the EPMS-E-07 housing:

- ✓ EPMS-E-07 cabinet
- ✓ External Power supply PWR-03D
- ✓ Power cord (PWR-03D to EPMS-E-07)
- ✓ Mains chord
- ✓ Fuse 1.6 A / 0.8 A, slow (inserted)
- ✓ Front covers

The EPMS-E-07 housing is designed for low-noise operation, especially for extracellular and multi channel amplifiers with plugged in filters. It operates with an external power supply to minimize distortions of the signals caused by the power supply.

2.5. EPMS-03

The following items are shipped with the EPMS-07 housing:

- ✓ EPMS-07 cabinet with built-in power supply
- ✓ Mains cord
- ✓ Fuse 0,4 A / 0,2 A, slow (inserted)
- ✓ Front covers



Figure 2: Left: front view of EPMS-03 housing. Right: rear panel detail of EPMS-03 and EPMS-07 housing.

In order to avoid induction of electromagnetic noise the power supply unit, the power switch and the fuse are located at the rear of the housing (see Figure 2, right).

2.6. PWR-03D

The external power supply PWR-03D is capable of driving up to 3 EPMS-E housings. Each housing is connected by a 6-pole cable from one of three connectors on the front panel of the PWR-03D to the rear panel of the respective EPMS-E housing. (see Figure 3, Figure 4). A POWER LED indicates that the PWR-03D is powered on (see Figure 3, left). Power switch, voltage selector and fuse are located at the rear panel (see Figure 3, right).

Note: The chassis of the PWR-03D is connected to protective earth, and it provides protective earth to the EPMS-E housing if connected.



Figure 3: Left: PWR-03D front panel view. Right: PWR-03D rear panel view.

Note: This power supply is intended to be used with npi EPMS-E systems only.

2.7. System Grounding

EPMS-07/EPMS-03

The 19" cabinet is grounded by the power cable through the ground pin of the mains connector (= protective earth). In order to avoid ground loops the internal ground is isolated from the protective earth. The internal ground is used on the BNC connectors or GROUND plugs of the modules that are inserted into the EPMS-07 housing. The internal ground and mains ground (= protective earth) can be connected by a wire using the ground plugs on the rear panel of the instrument. It is not possible to predict whether measurements will be less or more noisy with the internal ground and mains ground connected. We recommend that you try both arrangements to determine the best configuration.

EPMS-E-07



The 19" cabinet is connected to the CHASSIS connector at the rear panel. It can be connected to the SYSTEM GROUND (SIGNAL GROUND) on the rear panel of the instrument (see Figure 4).

The chassis can be linked to PROTECTIVE EARTH by connecting it to the PWR-03D with the supplied 6-pole cable **and** by interconnecting the GROUND and PROTECTIVE EARTH connectors on the rear panel of the PWR-03D (see Figure 3). Best performance is generally achieved without connection of the chassis to protective earth.

Important: Always adhere to the appropriate safety measures.

Figure 4: Rear panel connectors of the EPMS-E-07

2.8. Technical Data

EPMS-07, EPMS-E-07 and EPMS-H-07

19" rackmount cabinet, for up to 7 plug-in units

Dimensions: 3U high (1U=1 3/4" = 44.45 mm), 254 mm deep

EPMS-07 and EPMS-H-07

Power supply: 115/230 V AC, 60/50 Hz, fuse 2 A / 1 A slow, 45-60 W

EPMS-E-07

External power supply (PWR-03D) 115/230 V AC, 60/50 Hz, fuse 1.6/0.8 A, slow

Dimensions of external power supply: (W x D x H) 247 mm x 180 mm x 90 mm

EPMS-03

Power supply: 115/230 V AC, 60/50 Hz, fuse 0.4 A / 0.2 A slow

Maximum current supply: 500 mA

Dimensions: 3U high (1U=1 3/4" = 44.45 mm), 245 mm deep, 265 mm wide

3. HVA-100

3.1. HVA-100 Components

The following items are shipped with the HVA-100 system:

- ✓ Amplifier module for the EPMS-07 system
- ✓ Output connector with cable
- ✓ User manual

3.2. System Description

The HVA-100 module is a high voltage amplifier designed to drive piezo or bimorph actuators or other loads with a high capacity. The output range is 0-100 V / max. 40 mA. The output is connected through a high voltage 8-pole DIN connector and a shielded cable.

A green ON LED indicates that the high voltage supply is turned on.

Caution: The output voltage of this device is 100 V DC. Do not touch the output pins or wires from the output cable!

The output voltage can be controlled either by a signal applied to the INPUT BNC or by the ten-turn OFFSET control. Both signals are added internally.

The signal coming from the INPUT BNC connector is passed through a gain stage with an amplification of x10 or x20 to allow adaptation to A/D or TTL systems.

3.3. Description of the Front Panel

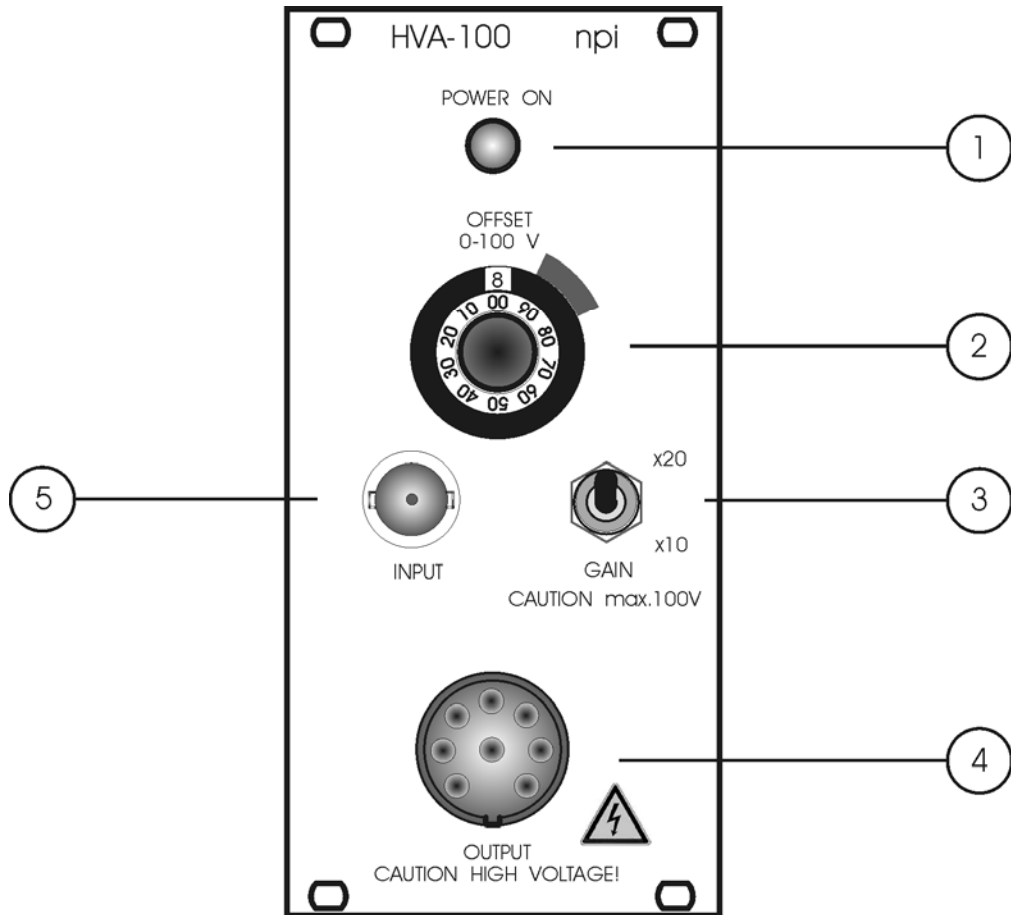


Figure 5: HVA-100 front panel view

In the following description of the front panel elements each element has a number that is related to that in Figure 5. 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 ON LED

LED indicating that power is ON.

(2) OFFSET potentiometer

10-turn potentiometer for setting an OFFSET.

Note: Both signals from the INPUT connector and the OFFSET potentiometer are added internally!

(3) GAIN X10 / X20 switch

Switch setting the GAIN of the INPUT signal.

(4) OUTPUT connector

8-pole DIN connector for connecting the bimorph or piezo actuator.

Caution: The output voltage of this device is 100 V DC. Do not touch the output pins or wires from the output cable!

(5) INPUT connector

BNC connector for connecting the INPUT signal (± 10 V maximum) that controls the OUTPUT signal.

3.4. Operation

The output voltage can be controlled either by a signal applied to the INPUT BNC connector (± 10 V maximum) or by the ten-turn OFFSET control (range 0-100 V). Both signals are added internally, i.e. a certain offset can be preset from the OFFSET control that defines a “zero” position for the actuator, while the voltage applied to the INPUT BNC yields a movement relative to this “zero” position.

Note: If the OFFSET is not needed, it must be set zero.

The signal coming from the INPUT BNC connector is passed through a gain stage with an amplification of x10 (0-10 V input range) or x20 (0-5 V input range) to allow adaptation to A/D or TTL systems.

4. Technical Data

Power requirements:	± 15 V / ± 10 V / +110 V provided from EPMS system
Input range:	± 5 V or ± 10 V maximum (@Gain 10 or 20)
Input impedance:	100 k Ω
Input gain:	x10 or x20, selected by toggle switch
OFFSET range:	0-100 V, ten-turn control
Output range:	0-100 V, max. 40 mA
Size:	front panel 12 HP (60.6 mm) x 3U (128,5 mm), 7” (175 mm) deep