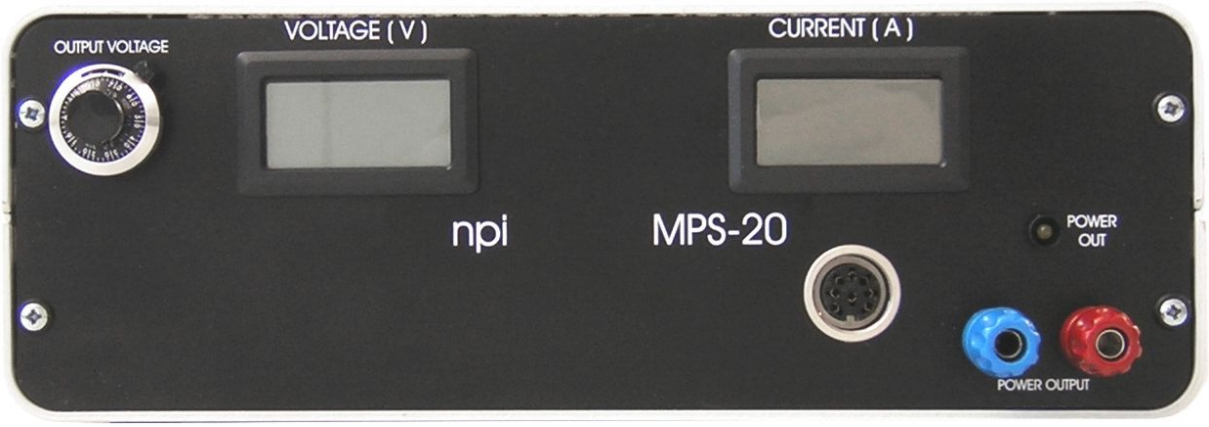
Electronic Instruments for the Life Sciences

made to measure

OPERATING INSTRUCTIONS AND SYSTEM DESCRIPTION FOR THE

MPS-20

DC POWER SUPPLY for TEMPERATURE CONTROL SYSTEMS



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1. Safety Regulations

<u>VERY IMPORTANT</u>: 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 by trained staff only. 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.

2. MPS-20 Components

The following items are shipped with the MPS-20 system:

- ✓ MPS-20 desktop cabinet
- ✓ Power cord
- ✓ User manual

Optional accessories:

- Recording chamber
- Heated perfusion cube
- Thermal foil
- Objective heater

3. MPS-20 System

3.1. System Description

The MPS-20 power supply is designed for heating or cooling purposes in electrophysiological experiments. They can be used in addition to npi temperature controllers as MTC-20/2SD, TC-10 etc. The MPS-20 system is housed in small desktop cabinet that can be placed close to the microscope, with built-in power supply and cooling elements for the power devices. The system guarantees low noise.

Each system incorporates a low-noise DC power supply with two digital displays for VOLTAGE and CURRENT and a set-point control with direct readout (0-100%). The output is connected to a high-power regulated stage (DC, continuous operation) for resistive loads. The power output is short circuit protected, the output power is limited electronically. Maximal output voltage is approximately 12 V, the current is limited to 1.0 A.

Several thermal elements are available (see also **Optional accessories** in chapter 2). Please contact npi for details.

3.2. Description of the Front Panel

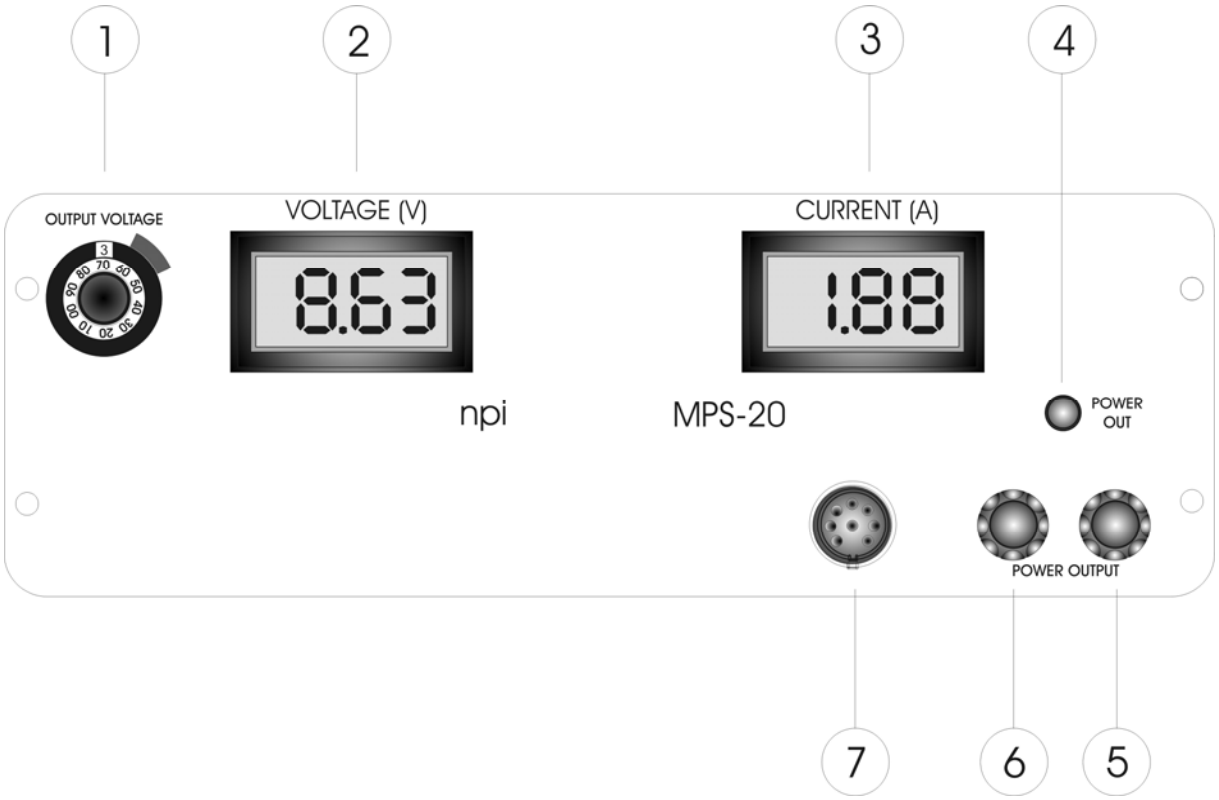


Figure 1: MPS-20 front panel view

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**) **OUTPUT VOLTAGE** potentiometer

10-turn potentiometer to set the OUTPUT VOLTAGE of the MPS-20. The preset value is monitored on display A (**2**).

(**2**) **VOTAGE (V)** display

Digital display to indicate the OUTPUT VOLTAGE at POWER OUTPUT (**5** / **6**).

(3) CURRENT (A) display

Digital display to indicate the OUTPUT CURRENT at POWER OUTPUT (**5** / **6**).

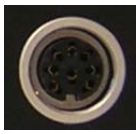
(**4**) **POWER OUT** LED

This LED indicates the status of the POWER OUTPUT (**5** / **6**) (LED on = heating).

(5) / (6) POWER OUTPUT banana connectors

Banana jack connector for the heating unit. This output supplies a maximum voltage of 12V DC and a maximum current of 1.0 A.

(7) POWER OUTPUT DIN connector



8-pole DIN connector for connecting a heating unit with DIN connector, e.g. ALA HPT-2A. This output supplies a maximum voltage of 12V DC and a maximum current of 1.0 A.

Note: The sensor is not connected.

3.3. Rear Panel Elements

POWER: The POWER push button turns on/off the power supply (115/ 230 V AC, max. 50 W). The selector for the line voltage and the connector for the power cord are also located on the rear panel of the instrument.

FUSE: Line fuse: 0.5 A slow (115 V) or 0.25 A slow (230 V). It must be replaced only by specified type. Please disconnect mains power plug when replacing fuse.

Caution: The instrument may be damaged if the wrong line fuse is installed, e.g. 0.4 A if the MPS-20 is operated at 115 V!

To avoid ground loops, the internal ground of the system is floating, i.e. it is not connected to the protective earth of the mains while the cabinet is always connected to protective earth (green / yellow wire). The system can be grounded either via the black connector (GROUND = internal ground) or via the green / yellow connector (PROTECTIVE EARTH).

4. Operation

The operation of this device corresponds to the “DIRECT” mode of the MTC-20/2S or TC/PTC systems. A DC voltage is applied directly to a heating / cooling device and the power to obtain a certain temperature change is regulated with the OUTPUT VOLTAGE control (ten turns, 0-100 %). The output voltage and current are displayed digitally.

The MPS-20 system is designed with an unipolar output (0-12 Volt DC). If a resistive load is used, the system can be used for heating purposes.

If a PELTIER device is connected to the output, the system can be used either for heating purposes (”hot” side of the Peltier device in contact with recording chamber) or for cooling (”cold” side of the Peltier element connected to recording chamber). If a Peltier device is used for cooling purposes, the ”hot” side of the Peltier element must be connected to an adequate heat sink.

Important: An automatic transition from heating to cooling is not possible. Cooling is possible only by changing the polarity at the PELTIER devices.

5. Technical Data

Digital displays:	4 digits, XX.XX V (voltage at POWER OUTPUT) or 3 digits X.XX A (current at POWER OUTPUT)
POWER OUTPUT:	DC 12 V / 1.0 A, short circuit protected,
Power requirements:	115 / 230V AC, 60 / 50 Hz, fuse 0.5 / 0.25 A, slow
Dimensions:	desktop cabinet, 246 mm, 260 mm, 90 mm