

# OPERATING INSTRUCTIONS AND SYSTEM DESCRIPTION FOR THE

## RG-01

# RAMP GENERATOR for TEMPERATURE CONTROL SYSTEMS



VERSION 1.2  
npi 2019

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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 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. RG-01 Components

The following items are shipped with the RG-01 system:

- ✓ RG-01 desktop cabinet
- ✓ Power supply
- ✓ User manual

### Optional accessories:

- ⇨ Temperature controller
- ⇨ Recording chamber
- ⇨ Heated perfusion tube
- ⇨ Thermal foil

## 3. RG-01 System

### 3.1. System Description

The RG-01 ramp generator produces voltage ramps for use as a command for npi temperature controllers. The RG-01 system is housed in small desktop cabinet and has an external power supply.

Each system incorporates two digital potentiometers for setting start and end temperature of the ramp and a third digital potentiometer for setting the slew rate. A digital display shows the actually set temperature in °C.

Push buttons are for starting, continuing or stopping the ramp, and for resetting the system. The COMMAND OUTPUT has 10 mV/°C witch fits perfectly to the COMMAND INPUT of npi temperature controllers.

### 3.2. Description of the Front Panel and Operation

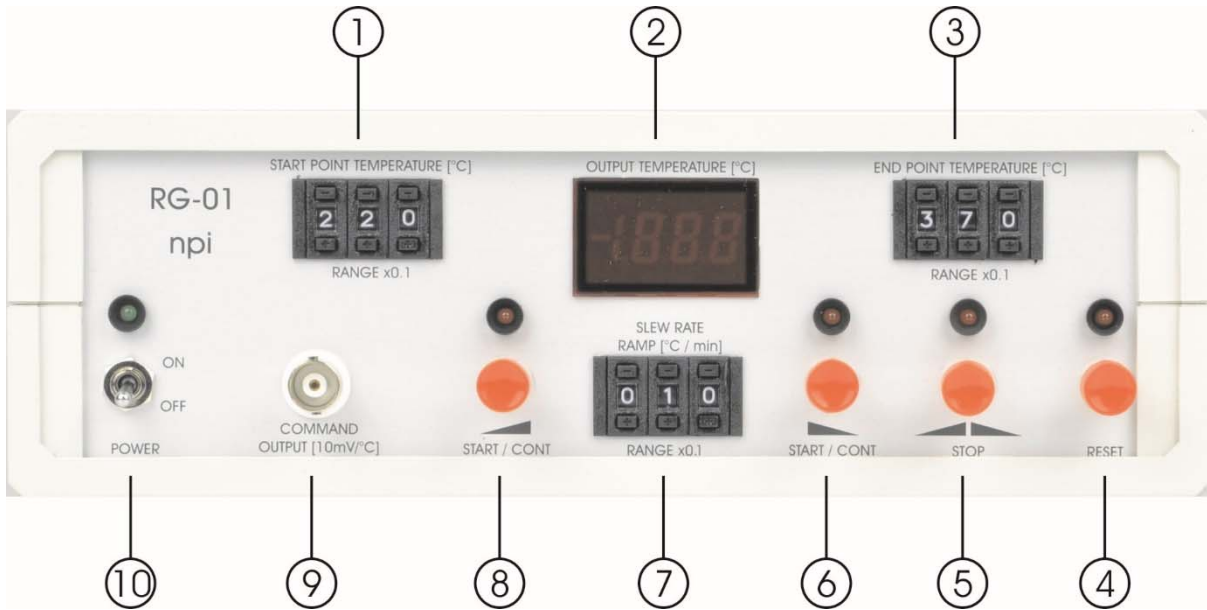


Figure 1: RG-01 front panel view

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) START POINT TEMPERATURE (°C) potentiometer**

Digital potentiometer to set the START POINT of the increasing voltage ramp; scaling  $\times 0.1^{\circ}\text{C}$ .

**(2) OUTPUT TEMPERATURE (°C) display**

Digital display indicating the actually set temperature in  $^{\circ}\text{C}$ . The display shows the progress of the ramp.

**(3) END POINT TEMPERATURE (°C) potentiometer**

Digital potentiometer to set the END POINT of the voltage ramp; scaling  $\times 0.1^{\circ}\text{C}$ .

**(4) RESET push button**

Push button for resetting the system. If values at #1, #2 or #7 are changed, the user has to push this button in order to transfer the new values to the electronics of the RG-01. The red LED indicates that RESET is pushed.

**(5) STOP push button**

Push button for stopping the RG-01. Push this button if you want to stop the system before the END POINT TEMPERATURE is reached. STOP is indicated by the red LED.

**(6) START / CONT.** push button

Digital potentiometer to set the START POINT of the decreasing voltage ramp; scaling  $\times 0.1^{\circ}\text{C}$ .

**(7) SLEW RATE RAMP ( $^{\circ}\text{C} / \text{min.}$ )** potentiometer

Digital potentiometer to set the SLEW RATE of the ramp, scaling  $0.1^{\circ}\text{C}$  per minute; maximum slew rate is  $99^{\circ}\text{C} / \text{min.}$

**(8) START / CONT.** push button

Push button for starting the RG-01 voltage ramp. The system then starts at the START POINT TEMPERATURE and puts out a command voltage for the temperature controller with the SLEW RATE set by #7 until the END POINT TEMPERATURE is reached.

If the RG-01 has been stopped using the STOP button (#5) the system continues to work as soon as the START / CONT. push button is pressed. The red LED indicates that the system is working.

**(9) COMMAND OUTPUT ( $10\text{mV}/^{\circ}\text{C}$ )** connector

BNC connector providing the command voltage for the temperature controller. Connect this output to the COMMAND INPUT  $10\text{mV}/^{\circ}\text{C}$  connector at the temperature controller.

**(10) POWER ON/OFF** switch

Switch to power the RG-01 ON or OFF.

### 3.1. Description of the Rear Panel

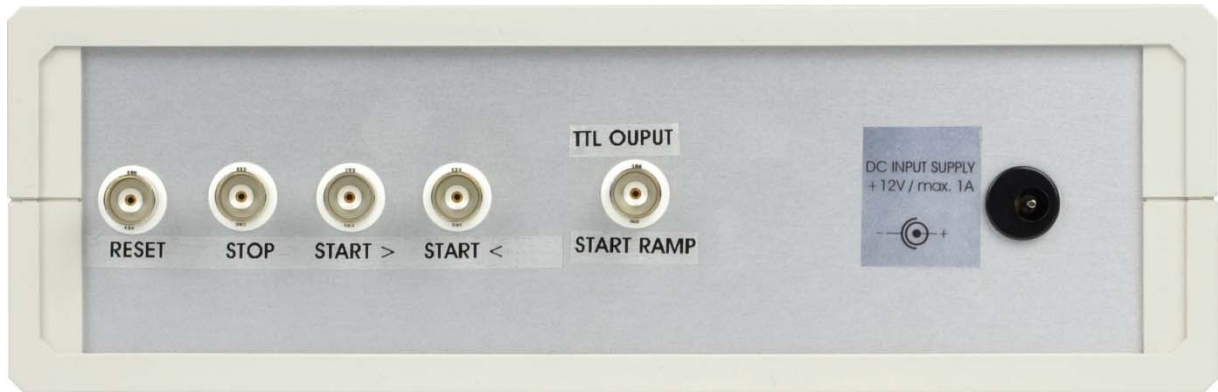


Figure 2: RG-01 rear panel view.

The red pushbuttons at the front panel (START <, START >, STOP, RESET) can be remotely controlled via TTL signals going into the respective BNC connectors at the rear panel. These inputs are activated by a rising edge from TTL LOW to TTL HIGH

Furthermore, there is a TTL output provided as BNC connector (START RAMP). This output is normally in TTL LOW and gives a TTL HIGH pulse when the ramp is starting.

## 4. Technical Data

Temperature range:	00.0 °C to 99.9 °C, accuracy: 0.1 °C
Slew rate range:	0.1 °C / min. to 99 °C / min.
Digital display:	current command output, 3 digits, XX.X °C
Power Supply:	DC 12 V / 0.3 A
Dimensions:	desktop cabinet, 200 mm, 220 mm, 75 mm