±6kV, ±10mA / 20mA_p
PRECISION PROGRAMMABLE HIGH VOLTAGE AMPLIFIER
OPTIONALLY WITH INTEGRATED SIGNAL GENERATOR

**FEATURES**
- ±6000V / ±10mA
- Programmable Current Limit
- Optional Integrated DDS/ARB Signal Generator
- High Precision, High Stability
- Low Noise
- High Speed
- Inhibit Input
- V/I Monitor Outputs
- Interlock Input and HV OFF Button

**APPLICATIONS**
- General High Voltage Testing
- EAP
- ER Fluids
- Emulsion separation
- Electrophoresis
- Ion Beam Deflection
- Electro Optics

The **HA61-6B10** is a fast precision high voltage amplifier with an optionally integrated signal generator in a 19” rack mountable case. This single channel amplifier provides output voltages of -6000V to +6000V at ±10mA (static) and 20mA_p (dynamic). The dynamic output current is available for signal frequencies down to 10Hz. The amplifier’s power bandwidth is 5kHz.

The amplifier features high precision, high stability and very low noise. It is suitable to drive capacitive and resistive-capacitive loads. The output is stable with any capacitive load and also stable at no load conditions. It can easily drive loads like EAP actuators, electrorheological fluid elements, electrostatic deflection electrodes and many other loads.

Power bandwidth and slew rate depend on the actual load capacitance.

A differential ±10V amplifier input prevents any ground loops and provides excellent noise suppression. The voltage gain is fixed to 600. Voltage and current monitor outputs and a TTL compatible INHIBIT input are provided.

The maximum output current can be limited to programmable values and programmable behavior. When the output current reaches the threshold, the output will either shut down or the output current will be limited to the set value.

Internal high voltage sources feed the output stage. The output stage is protected against overload, short circuit, over temperature and high voltage arcing. The amplifier output is made available via a high voltage connector on the rear. Operational and overload conditions are displayed on the front panel.

A safety interlock circuit is provided to integrate the unit into an emergency shutdown circuit. When the interlock loop is opened, the internal high voltage sources are shut down. In addition to the interlock input a red HV OFF palm button is available on the front panel. The red indicator lamp HV ON signals that the internal high voltage sources are switched on.

A command interface is available via USB and Ethernet interfaces to control the amplifier. Monitor values of output voltage, output current as well as internal operational parameters can be read.

An implemented DDS/ARB signal generator is optionally provided (in HA61-6B10-G) to generate standard waveforms like sine wave, trapezoid, square wave, pulse, sawtooth and noise as well as fully arbitrary wave shapes. Parameters like waveform, amplitude, frequency, duty cycle, rise/fall time, offset, DC value, current limit and further functional parameters are controllable via the command interface.

The internal waveform generator can be synchronized to other generators or signal sources.

Customized and full custom models are available on request.
• **SPECIFICATIONS**

  - **Output Voltage:** -6000V ... +6000V
  - **Output Current:** ±10mA / ±20mA
  - **Full Power Bandwidth:** > DC ... 5kHz @ C_L=50pF (1% distortion limit) *
  - **Small Signal Bandwidth:** > DC ... 30kHz @ C_L=50pF *
  - **Slew-Rate:** > 400V/μs @ C_L=50pF *
    - > 200V/μs @ C_L=50pF *
  - **Noise:** < 50mV RMS @ C_L=500pF (10Hz ... 50kHz) *
  - **Control Input:** ±10V (10V = 6000V), BNC, R_i = 50kΩ
  - **DC-Gain:** 600 ±0.3%
  - **Offset Voltage (RTO):** < ±100mV
  - **Monitor Output (V):** ±10V (10V = 6000V ±0.3%), BNC
  - **Monitor Output (I):** ±10V (10V = 40mA ±0.5%), BNC
  - **Interlock:** 24V, internally fed, Combicon on rear panel
  - **INHIBIT Input:** TTL compatible, BNC
  - **SYNC I/O:** 500, BNC
  - **Trigger Input:** TTL compatible, BNC
  - **Ethernet Interface:** RJ45
  - **USB Interface:** USB-B
  - **Output Connector:** HC51 series HV Connector on rear panel, An output cable of 2m length is included.

Output GND is connected to the chassis and protective earth

- **Cooling:** temperature controlled fans
- **Line Voltage:** 100 - 240V, ±10% 50/60Hz
- **Power Consumption:** ca. 180VA (12000Vpp, 20mA, C_L = 50pF)
- **Ambient Temperature:**
  - Operation: 0 - +40°C
  - Storage: -25 - +70°C
- **Dimensions (d x w x h):** ca. 450 x 449/480 x 133mm³ (19" / 3U)
- **Weight:** ca. 15kg
- **Safety:** according to EN 61010-1
- **EMC:** according to EN 61326-1

* Bandwidth, slew rate and output noise are depending on the size of the capacitive load. The coaxial output cable is part of the capacitive load and will reduce slew rates and large signal bandwidth. A typical coaxial cable has a capacitance of approx. 100pF/m. Increasing the load capacitance reduces output noise.

• **MODEL OVERVIEW**

  - **HA61-6B10-U**
    - HV Amplifier with simple command interface via USB and Ethernet
  - **HA61-6B10-G**
    - HV Amplifier with integrated DDS/ARB signal generator and SCPI based command interface via USB and Ethernet

**Disclaimer**

The information given in this data sheet is technical data, not assured product characteristics. It has been carefully checked and is believed to be accurate; however, no responsibility is assumed for inaccuracies. The user has to ensure by adequate tests that the product is suitable for his application regarding safety and technical aspects.

**Safety Advice**

Design, installation and inspection of machinery and devices carrying high voltage require accordingly trained and qualified personnel. Appropriate safety rules and directives must be complied with. Improper handling of high voltage can mean severe injuries or death and may cause serious collateral damage!