Model NHQ202M to NHQ206L
Dual High Voltage Power Supplies

Features

- **Dual HV supplies in single NIM packages**
- **Regulated 0 to + 2kV, 3kV, 4kV, 5kV and 6 kV DC, output current - see table**
- **programmable HV-ramp 2 .. 255 V/S and 500 V/S ramp hardware settable, up and down**
- **LCD Display 4 digits with sign for voltage and current.**
- **Resolution of voltage indication: 1V**
- **Resolution of current indication: 1uA**
- **Frontpanel LED indicators for polarity**
- **Low noise and ripple for high resolution detectors: ≤ 2 mVpp typical, 5mVpp max.**
- **Settable voltage and current limiting**
- **Short circuit and overload protected**
- **Programmable HV parameter setting and polling of actual values via RS232C interface**
- **Continuous setting of HV over full range with 10 turn Helipot**
- **Easy access to manual polarity switch**
- **External input for HV shutdown**

Description

The Models NHQ 202M-206L HV supplies are a two channel high voltage version in a NIM chassis. Modern patented circuit principles in connection with the latest SMT manufacturing technologies permit the design and construction of very compact high voltage supplies with excellent specifications.

All NHQ models are 1 slot wide, and offer either manual control or operation via RS232 Interface. The use of this interface supports more then the manual control functionality.

The high voltage supplies provide high precision output voltages together with very low ripple and noise, even under full load. Separate 10%-step hardware switches enable to set voltage and current limits. An INHIBIT input provides instant shutdown to protect sensitive detector devices.

Additionally, the maximal output current per channel is programmable via the interface. The high voltage outputs protected against overload and short circuit. The output polarity can be selected by manual rotary switches accessable from the side of the module without having to take the side-cover off.

The output polarity can also be set by software through the RS232C interface. The chosen polarity is displayed by a

LED on the front panel and a sign on the LCD display. It is not allowed to change the polarity under power! An undefined switch setting (not at one of the end positions) will cause no output voltage.

For effective protection of connected devices the maximum output voltage and current can be selected in 10%-steps with the rotary switches V_{max} and I_{max} (switch dialed to 10 corresponds to 100%). An output voltage or current exceeding the set limit is signalled by the red front panel error LED.
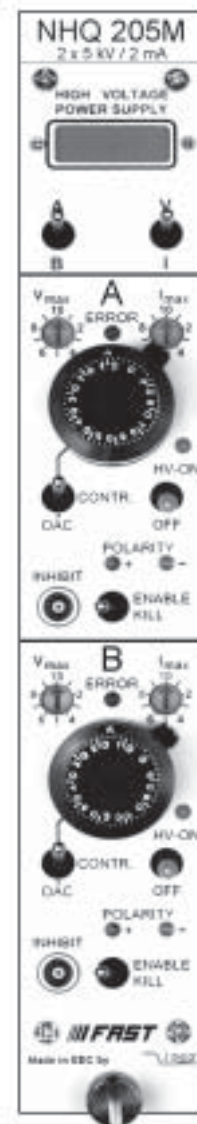
The range of NHQ 200 series HV supplies

Model	Output Voltage	Outp. Current per channel	Ripple typical	LCD res. current	LCD res. voltage	Power req. +/- 24V	Power req. +/- 6V	Type	Order Number
NHQ 202M	0 .. 2 kV	0 .. 6 mA	< 0.5 mV pp	1 µA	1 V	< 800 mA	< 100 mA	NIM	HVI202
NHQ 203M	0 .. 3 kV	0 .. 4 mA	< 0.5 mV pp	1 µA	1 V	< 800 mA	< 100 mA	NIM	HVI203
NHQ 204M	0 .. 4 kV	0 .. 3 mA	< 1 mV pp	1 µA	1 V	< 800 mA	< 100 mA	NIM	HVI204
NHQ 205M	0 .. 5kV	0 .. 2 mA	< 2 mV pp	1 µA	1 V	< 800 mA	< 100 mA	NIM	HVI205
NHQ 206L	0 .. 6 kV	0 .. 1 mA	< 2 mV pp	1 µA	1 V	< 500 mA	< 100 mA	NIM	HVI206

Function of the KILL switch:
Switch to the right position: (ENABLE KILL)
The output voltage will be shut off permanently without ramp on exceeding V_{max}, I_{max} or in the presence of an INHIBIT signal (Low=active). Restoring the output voltage is possible after operating the switches HV-ON or KILL or reading "LAM status" and then "Start voltage change" by DAC control.

Note: When capacitance is effective at the HV-output or when the rate of change of output voltage is high (hardware ramp) at high load, then the KILL function will be released by the current charging the condenser. In this case use a small rate of output change (software ramp) or select not until output voltage is set voltage.

Switch to the left position: (DISABLE KILL)
The output voltage will be limited to V_{max}, output current to I_{max} respectively; INHIBIT shuts the output voltage off without ramp, the previous voltage setting will be restored with hard- or software ramp on INHIBIT no longer being present.

Operation under RS232 control
The most important parameters of the high voltage supply can be set and read under computer control via the RS232 interface. An optional VI (virtual instrument) is available for easy setting of parameters by simple mouse click.

RS232 control mode

1st Write function: set voltage; ramp speed; maximal output current (current trip); auto start

2nd Switch function: output voltage = set voltage, output voltage = 0

3rd Read function: set voltage; actual output voltage; ramp speed; actual output current; current trip; auto start; hardware limits current and voltage; status

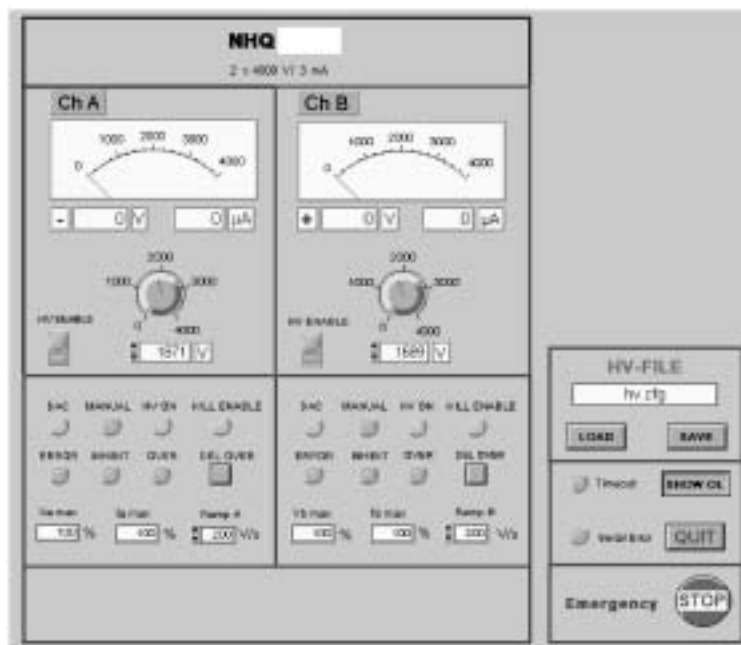Front panel switches are having priority over software control.

Manual control mode
While the unit is operated in manual control mode, RS232 read cycles are interpreted only. Commands are accepted, but do not result in a change of the output voltage.

Options
NHQ 04 Supply voltage $\pm$ 24V (<900 mA)
CAN-Bus interface instead of RS232C interface

Example of a VI Virtual Instrument (optional, ask factory for details of current version)

Specifications

Model	NHQ	202M	203M	204M	205M	206L
Output voltage V_0	kV	0 ... 2	0 ... 3	0 ... 4	0 ... 5	0 ... 6
Output current per channel	mA	0 ... 6	0 ... 4	0 ... 3	0 ... 2	0 ... 1
Stability (no load / load)	ΔV_0	$<5 \times 10^{-5}$				
Stability	$\Delta V_0 / \Delta V_I$	$<5 \times 10^{-5}$				
Temperature coefficient	/K	$<5 \times 10^{-5}$				
Ripple	mVp-p typ.	< 2				
	mVp-p max.	5				
LCD Display		4 digits with sign, switch controlled voltage display in [V] current display in [µA]				
Res. of current measurement		1 µA				
Res. of voltage measurement		1 V				
Accuracy current measurement		$\pm$ (0,05% I_0 +0,02% $I_{0\,max}$ + 1 digit) for one year				
Accuracy voltage measurement		$\pm$ (0,05% V_0 +0,02% $V_{0\,max}$ + 1 digit) for one year				
Voltage control	CONTROL switch in:	upper position: 10 - turn potentiometer lower position (DAC): control via serial interface				
Rate of change of output voltage	hardware ramp:	500 V/s (on HV-ON/ -OFF)				
	software ramp:	2 . . . 255 V/s				
Protection		- separate current and Voltage limit (hardware, rotary switch in 10%-steps) - INHIBIT (ext. signal, TTL-level, Low=active) - programmable current trip (software)				
Power requirements V_{INPUT}	± 24 V	< 800mA	< 800mA	< 800mA	< 800mA	< 500mA
	± 6 V	< 100mA	< 100mA	< 100mA	< 100mA	< 100mA
Case		NIM-Standard module: NIM #1				
Connectors		NIM: 3-pin, Interface: 9-pin female D-Sub connector				
HV Connector		SHV (module rear panel)				
INHIBIT Connector		LEMO (module front panel)				
Operating temperature		0 ... +50 °C				
Storage temperature		-20 ... +60 °C				