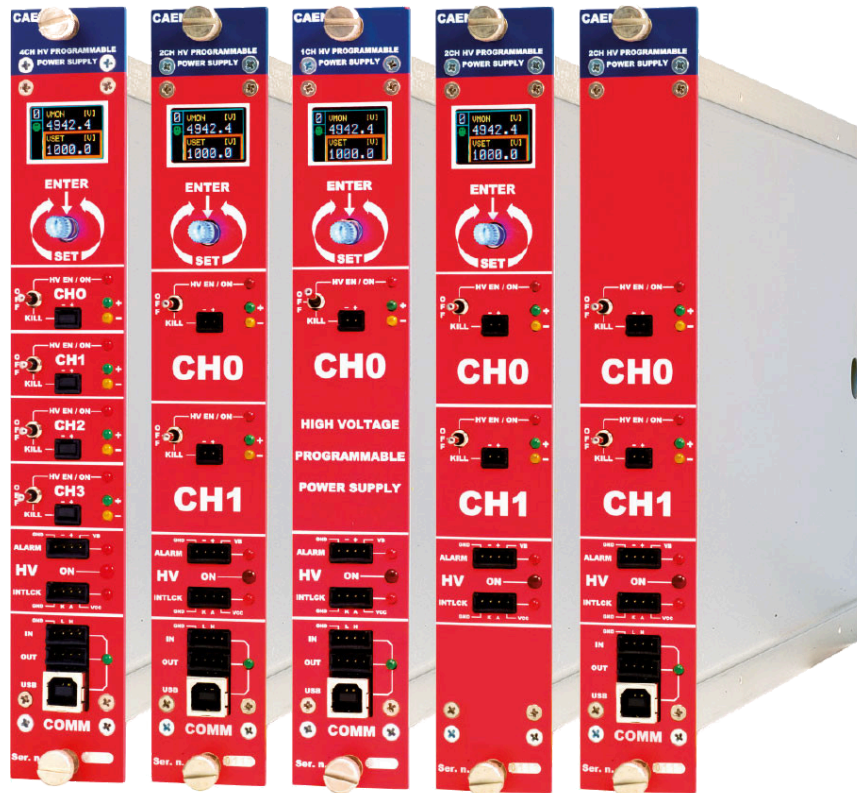


# N1470

## 4 Ch Reversible 8 kV/3 mA (8 W) NIM HV Power Supply Module (USB)



## Features



- 4 independent channels in 1U NIM module (2 & 1 channel versions also available)
- 8 kV / 3mA output range
- Max output power:
  - 9 W (<3 kV output)
  - 8 W (>3 kV output)
- Channels with individually selectable positive or negative polarity
- SHV output connectors
- Common floating return
- Low Ripple
- Under/over-voltage alert, overcurrent and max. voltage protection
- Interlock logic for board enable and Individual channel kill
- 5 nA Current monitor resolution (with x10 Imon-Zoom: 500 pA)
- Graphic color display
- Local and Remote control (USB2.0/RS485/RS232)
- Daisy-chain capability
- Optional DC Input Power Equalizer
- Software Tools for easy channel management

## Description

The CAEN **Mod. N1470** provides **4** independent High Voltage channels in a single width NIM mechanics. Two and one channel versions (N1470A and N1470B) are also available. Each channel can provide a **±8kV** max voltage, a **3 mA** max current and a 9 W max power (8 W max power when output voltage is larger than ±3 kV). The output polarity is independently selectable for each channel.

### SHV connector

NIM single width, 4 channels for Mod. N1470, N1470B (1 Ch), N1470A, N1470AL, N1470AR (2 Ch)  
Consult our **connectors reference page** for technical information.

Channels have **common floating return** (common return insulated from the crate ground); HV outputs are delivered through SHV connectors.

The HV output Ramp-up and Ramp-down rates may be selected independently for each channel in the range 1÷500 V/s in 1 V/s steps. The module features 50nA Iset/Imon resolution. Features include Imon Zoom, increasing resolution to 5 nA.

Power supply control can be performed either **locally**, assisted by a Graphic color display or **remotely**, via **USB, RS232** or **RS485**, the latter allowing to build a daisy chain network of modules N14XX. It is also controllable via **TCP/IP** by the Smart Fan Unit of CAEN **NIM8301**.

A complete set of **free software Tools** is available to control this unit: **GECO2020** with user friendly GUI and **CAEN HV Wrapper library** for custom SW development. **EPICS** and **LabVIEW** also supported.

Safety features allows the module to perform as a current generator and includes:

### Overvoltage and Undervoltage warning

when the output voltage differs from the programmed value by more than 2% of set value (minimum 10V).

### Overcurrent detection

when a channel attempts to exceed the programmed current limit, it signalled to be in "overcurrent" and enter in a TRIP status. The output voltage is varied to keep the current below the programmed limit for a programmable TRIP time, then the channel is switched off. If TRIP is set to "constant current mode", the channel behaves like a current generator.

### VMAX

programmable VMAX protection limit.

### Safety Board Interlock

Common Interlock logic for channels enable/disable and individual inputs signal for channel Kill function.

Module control can take place either locally, assisted by a Graphic colour display, or remotely, via USB (1) or RS485 (1). It is also controllable via TCP/IP (2) by the Smart Fan Unit of CAEN NIM8301 crate:

### Special versions available:

- 2 channels version (**N1470A**)
- 1 channel version (**N1470B**)
- 2 channels Low Cost version only locally controllable (**N1470AL**)
- 2 channels Low Cost version only remotely controllable (**N1470AR**)
- 4 channels, 2U NIM module with 220/110 Vac plug for desktop operation equipped with **2.8" Touchscreen, Ethernet** and **USB interface (NDT1470)**
- 4 channels, 2U NIM module equipped with **2.8" Touchscreen, Ethernet** and **USB interface (N1470ET)**

### Available Options:

- **A1480** DC Input Power Equalizer.

N14xx modules are provided with a USB VCP interface and can be programmed via PC by connecting the PC USB port with the N14xx USB B-type port; the featured controller (FT232BM chip) requires a driver available on **this page** or at **www.ftdichip.com**

## Technical Specifications

### Packaging

Single width NIM unit

### Output channels

4 / 2 / 1 channels, Common Floating Return, SHV connector Positive or Negative Polarity (requires internal setting)

### Output ranges

8 kV / 3 mA (IMonRange = High)  
8 kV / 300  $\mu$ A (IMonRange = Low) - Imon Zoom Active

### Max. Ch. Output Power

9 W (Vset < 3 kV)  
8 W (Vset > 3 kV)

### Vset Resolution

200 mV

### Vmon Resolution

200 mV

### Iset Resolution

50 nA

### Imon Resolution

- 50 nA (IMRANGE = High)
- 5 nA (IMRANGE = Low) - Imon Zoom Active

### Vmax

0 ÷ 8100 V Absolute maximum HV level that the channel is allowed to reach, independently from the preset value Vset. Output voltage cannot exceed the preset value Vmax. The accuracy is 1 %  $\pm$  5 V

### Vmax resolution

$\pm$  1 V

### Alarm output

Open collector, 100 mA maximum sink current

### Interlock input

Low: < 1 V; current~5mA; High: 4÷6 V

### Ramp Up/Down

1÷500 Volt/s, 1 Volt/s step

## Trip

- Max. time an “overcurrent” can last (seconds). A channel in “overcurrent” works as a current generator; output voltage varies in order to keep the output current lower than the programmed value.
- “Overcurrent” lasting more than set value (1 to 9999) causes the channel to “trip”.
- Output voltage will drop to zero either at the Ramp-down rate or at the fastest available rate, depending on Power Down setting; in both cases the channel is put in the OFF state.
- Trip range: 0 ÷ 999.9 s; 1000 s = INFINITE. Step = 0.1 s (If trip= INFINITE, “overcurrent” lasts indefinitely).

## Voltage Ripple

### 20 ÷ 1000 Hz

- 3kV/200  $\mu$ A. Typical: 20 mVpp / Maximum: 25 mVpp
- 3kV/3 mA. Typical: 20 mVpp / Maximum: 30 mVpp
- 8kV/800  $\mu$ A. Typical: 25 mVpp / Maximum: 30 mVpp

### 1 ÷ 20000 kHz

- 3kV/200  $\mu$ A. Typical: 5 mVpp / Maximum: 10 mVpp
- 3kV/3 mA. Typical: 5 mVpp / Maximum: 10 mVpp
- 8kV/800  $\mu$ A. Typical: 10 mVpp / Maximum: 15 mVpp

## Vmon vs. Vout Accuracy

$\pm 0.02\%$  of read value  $\pm 2V$

## Vset vs. Vout Accuracy

$\pm 0.02\%$  of read value  $\pm 2V$

## Imon vs. Iout Accuracy

- $\pm 2\%$  of read value  $\pm 2 \mu A$  (IMRANGE = High)
- $\pm 2\%$  of read value  $\pm 200 nA$  (IMRANGE = Low) - Imon Zoom Active

## Iset vs. Iout Accuracy

- $\pm 2\%$  of read value  $\pm 2 \mu A$  (IMRANGE = High)
- $\pm 2\%$  of read value  $\pm 200 nA$  (IMRANGE = Low) - Imon Zoom Active

## Humidity range

0 ÷ 80%

## Operating temperature

0 ÷ 45°C

## Storage temperature

-10 ÷ 70°C

## Vout / Temperature coefficient

max. 50 ppm/°C

## Imon / Temperature coefficient

max 100 ppm/C°; max 300 ppm/C° with Imon X10 zoom

## Long term stability Vout vs. Vset

$\pm 0.02\%$  (after one week @ constant temperature)

## Ordering Options

Code	Description	
WN1470A08AAC	N1470A - 2 Ch NIM Programmable HV Power Supply ( $\pm 8\text{kV}$ , 3mA, 50nA res.)	RoHS
WN1470ALCLAA	N1470AL - 2 Ch Low Cost NIM Locally Programmable HV Power Supply ( $\pm 8\text{kV}$ , 3mA, 50nA res.)	RoHS
WN1470ALCRAA	N1470AR - 2 Ch Low Cost NIM Remotely Programmable HV Power Supply ( $\pm 8\text{kV}$ , 3mA, 50nA res.)	RoHS
WN1470B08AAC	N1470B - 1 Ch NIM Programmable HV Power Supply ( $\pm 8\text{kV}$ , 3mA, 50nA res.)	RoHS
WN1470X08AAC	N1470 - 4 Ch NIM Programmable HV Power Supply ( $\pm 8\text{kV}$ , 3mA, 50nA res.)	RoHS

## Accessories

### A1480



DC Power Input Equalizer for N14XX Family

### HV CABLES



High Voltage Cable Assemblies

### A1481



Kill Signal Adapter for N14XX series

### A1484

Inhibit - Kill Signal BNC Adapter for HV Power Supply Modules

### A148x



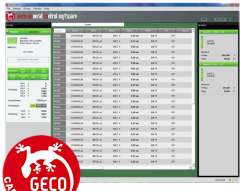
Inhibit - Kill Signal BNC Adapter for HV Power Supply Modules

Inhibit - Kill Signal BNC Adapter for HV Power Supply Modules

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## Related Software

### GECO2020



General Control Software for CAEN HV Power Supplies

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## Related Software Libraries

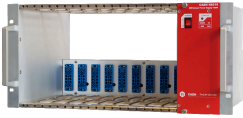
### CAEN HV Wrapper Library



Library for CAEN Power Supply Control

## Related Products

### NIM8302



5U 10 slot 150 W Compact Crate

### NIM8304



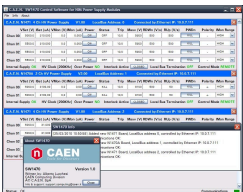
7U 12 slot smart fan unit Switching 2000 W Crate

### NIM8306



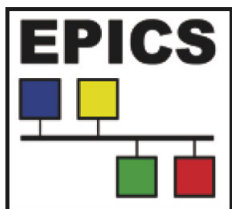
2 Slot Switching 750 W Mini Crate

### SW1470



Control Software for NIM Power Supply Modules

## EPICS IOC (PSM Power Supply Modules)



EPICS IOC for Power Supply Modules

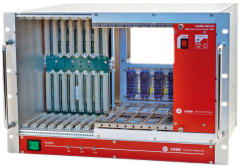
## NIM8305



2 Slot Switching 450 W Mini Crate

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## NV8020A



7U CRATE VME/NIM 8 slot VME64 365W, 5 slot NIM 150W

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## NIM8303



5U 12 slot 300/600 W Crate

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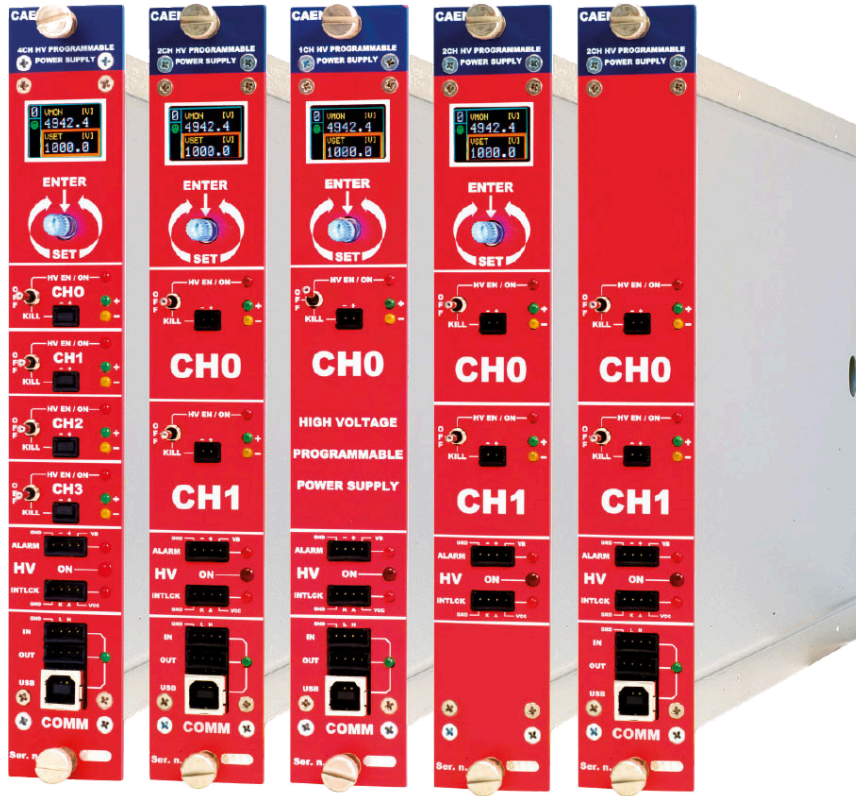
## LabVIEW Driver (PSM - Power Supply Modules)



LabVIEW Instrument Driver for Power Supply Modules

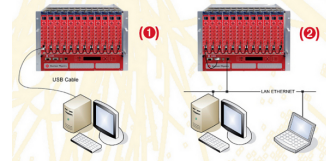
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# Gallery



**Voltage & Current  
analogue monitor  
HV-ON LED**

Module control can take place either locally, assisted by a Graphic colour display, or remotely, via USB (1) or RS485 (2). It is also controllable via TCP/IP (3) by the Smart Fan Unit of CAEN NIM 8301 crate



**New innovative local  
control:** encoder and  
colour display will  
make the setting  
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