

NanoGen 3

Smart HV Pulses Generator



Technical Presentation

Author : Fabrice BOUTERIGE

Date : 26/03/2018

Version 1.0



I. Table of Contents

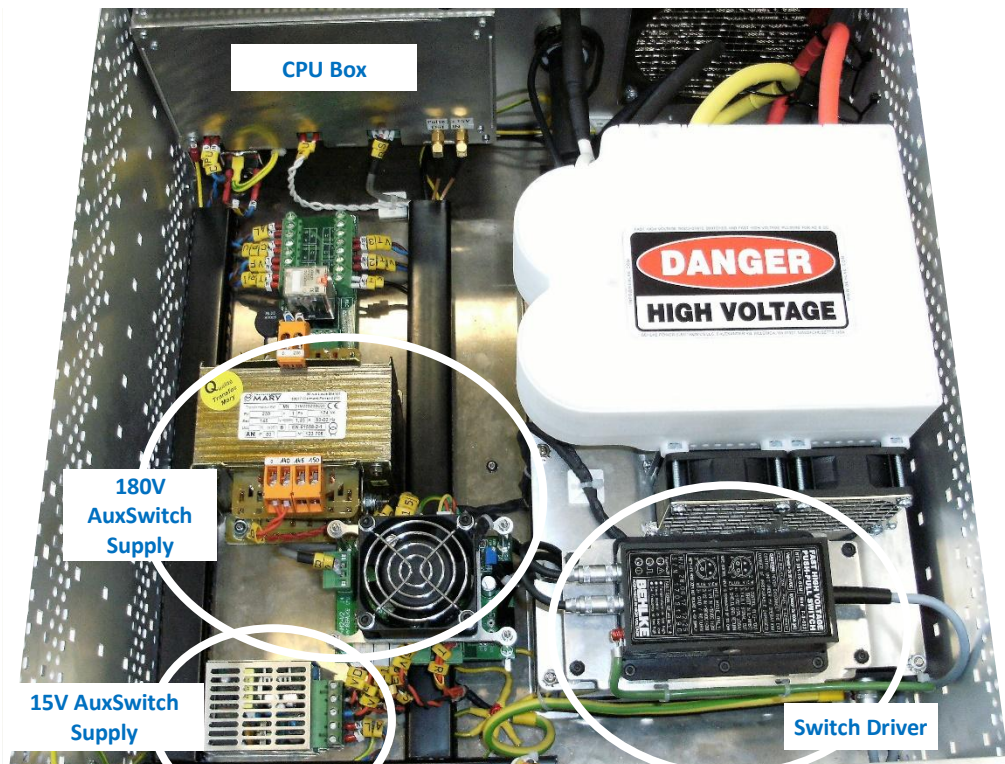
I. Table of Contents	2
II. NanoGen3 Presentation.....	3
II.1. Main Features.....	3
II.2. Internal Wiring.....	3
II.3. Description of Front Panel.....	4
II.4. Description of Rear Panel	4
II.5. Global Wiring.....	5
III. CPU Board	6
IV. HV Power Switch Board	7
V. Oscillograms	8
VI. NanoGen 3 HMI.....	9
VII. Maximum Power Limitation.....	10

II. NanoGen3 Presentation

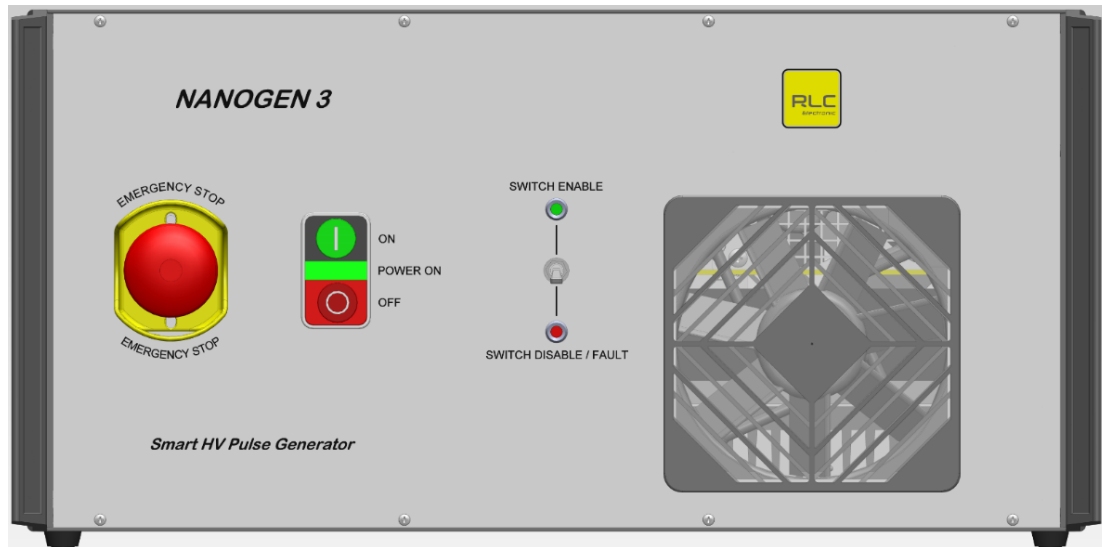
II.1. Main Features

Voltage Adjust	0-30 kV
Pulse Frequency	1Hz - 100 kHz
Pulse Width	250 ns - 25 μ s
Duty cycle	0.1% - 50%
Output Current max	50A at Fmax = 1 kHz, pulse width max = 10 μ s or duty cycle max = 1 %

II.2. Internal Wiring

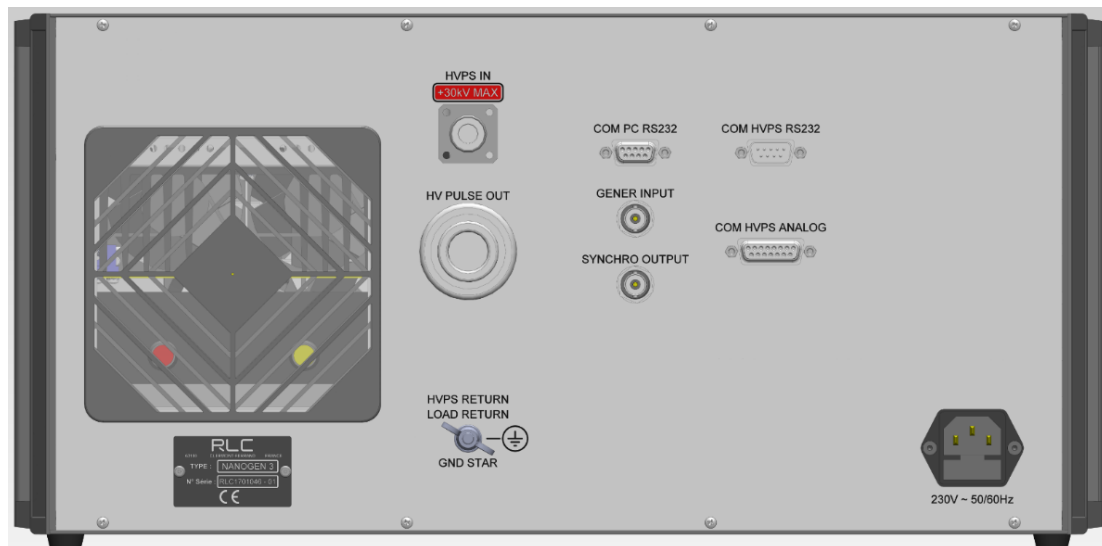


II.3. Description of Front Panel



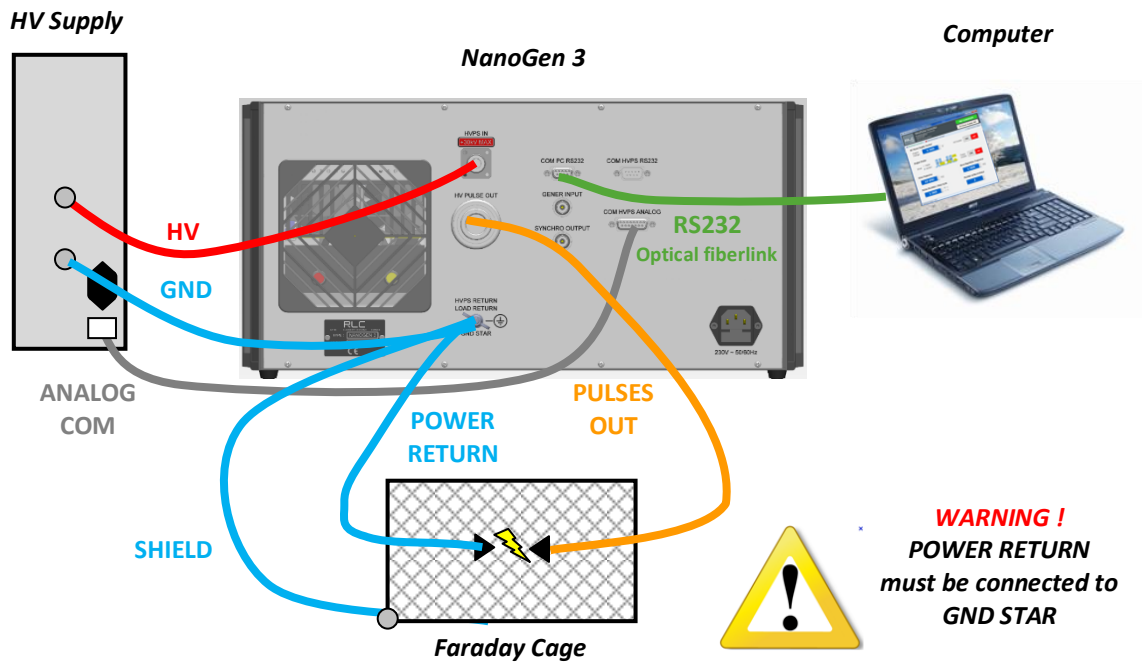
- Switch « **EMERGENCY STOP** »
- Switch « **POWER ON / OFF** » and LED « **POWER ON** »
- Switch « **SWITCH ENABLE** » : this switch enables or disables the HV Pulses Output
- Green LED « **SWITCH ENABLE** » : LED is on if the HV Pulses Output is enabled
- Red LED « **SWITCH DISABLE / FAULT** » : LED is on if the HV switch is disabled or in fault state

II.4. Description of Rear Panel



- Input Connector « **HVPS IN** » : HV Supply Input (30kV max)
- Output Connector « **HV PULSE OUT** » : HV Pulse Outputs
- GND Connector « **GND STAR** » :HV Ground
- SUBD9 Connector « **COMPC RS232** » :RS232 Communication with Optical Fiber adaptor
- SUBD15 Connector « **COM HVPS ANALOG** » :HV Power Supply Analog Control Interface
- BNC Connector « **GENER INPUT** » :Input from External Generator
- BNC Connector « **SYNCHRO OUTPUT** » :Synchronization Output

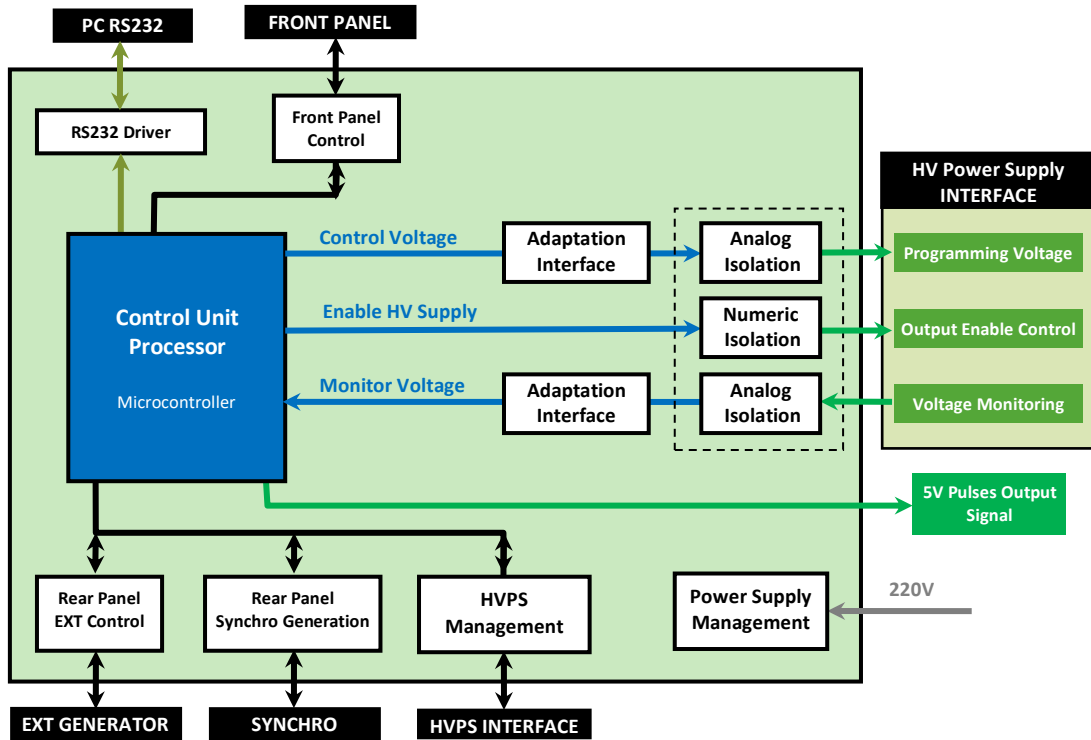
II.5. Global Wiring



III. CPU Board

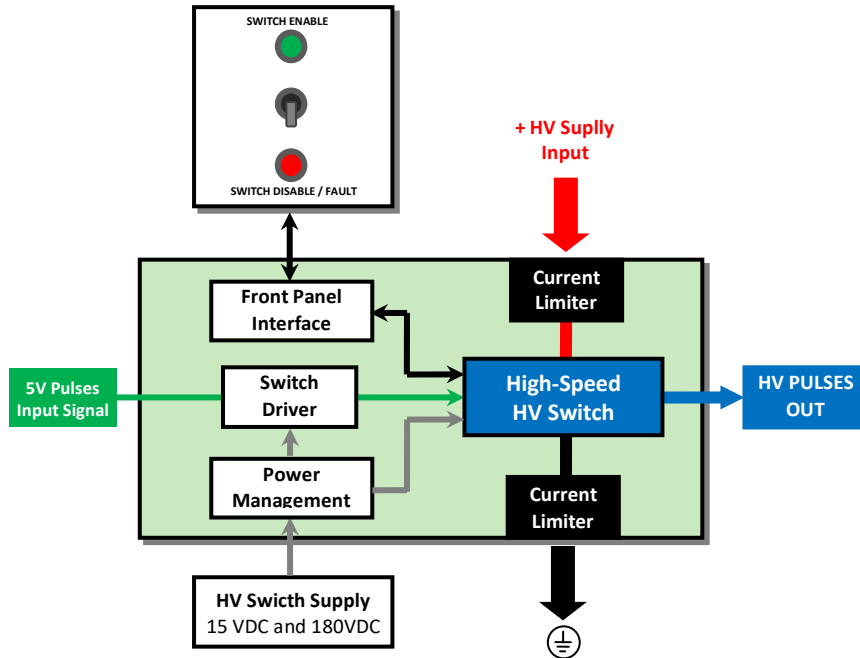
The CPU Board:

- manages the RS232 communication with the PC
- controls the external HV Power supply
- generates the PWM or BURST signal to control the HV Power Switch



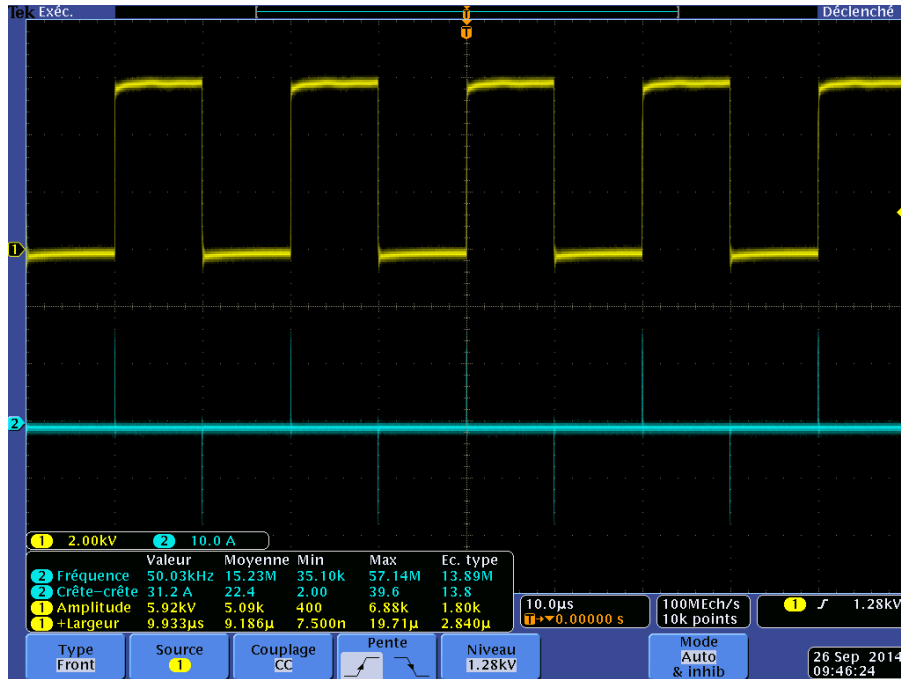
IV. HV Power Switch Board

The **HV Power Switch Board** is based on the BELHKE fast high voltage transistor switch HTS 301-10-GSM.



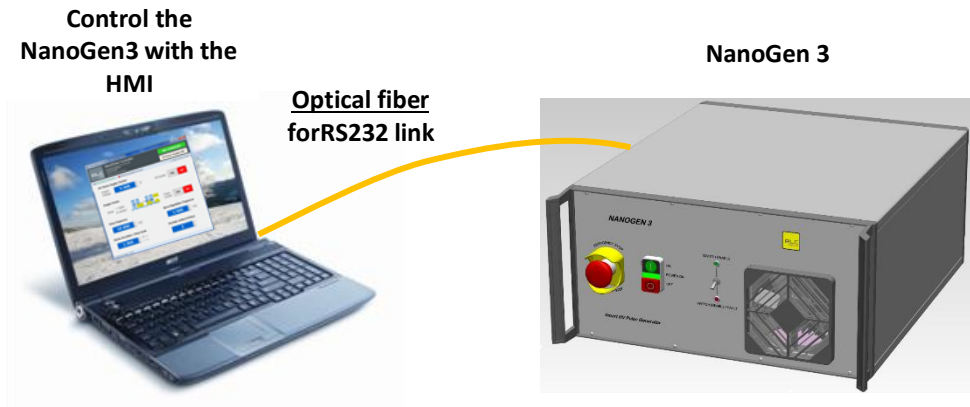
V. Oscillograms

HV Output Pulses



VI. NanoGen 3 HMI

The **NanoGen3** is controlled by a « Human-Machine Interface », developed by RLC, that can be installed on any PC or on a laptop.



The **NanoGen 3 HMI** controls :

- The external HV Power Supply Output Voltage / ON / OFF
- The PWM or BURST Output Pulses parameters Pulse Frequency / Pulse duration...

The screenshot shows the RLC NanoGen 3 HMI software interface. At the top, it displays the RLC logo and company information: "NanoGen 3 RLC CLERMONT-FERRAND FRANCE Copyright © 2017". The HV Power Supply section shows a setpoint of 7000 V, with "ON" and "OFF" buttons. A green "NO DANGER" indicator is present, and a status bar shows "HV Power Supply OFF". The interface is divided into "PULSE OUTPUT" and "PULSE Parameters" sections. The "PULSE OUTPUT" section includes a "Mode" selector (PWM selected, BURST unselected) and a "Pulses Generator" ON/OFF switch. The "PULSE Parameters" section includes a "Frequency" input set to 15000 Hz and a "Pulse Width / Duty Cycle" input set to 20, with radio buttons for ns and % (ns is selected). A "BURST Parameters" section includes "Repetition Frequency" (0 Hz) and "Number of Pulses" (0). A diagram titled "Output Pulses Configuration" shows a pulse waveform with labels for "Pulse Frequency" and "Pulse Duration". The bottom of the window shows "Copyright © 2016 Embedded Firmware Version : V1.0".

VII. Maximum Power Limitation

The yellow line represents the maximum power limitation. The safety area is under this line. Thanks to the new software, the user can not go beyond the maximum power limits.

