

High Voltage Power Supply

(Model: NNC(ESN)-HV60/ESN-HV30/ESN-HV30N)

(+)60kV-2mA(Portable Type)

(+)30kV-2mA(Portable Type)

(-)30kV-2mA(Portable Type)

How to operate HV Power Supply



(Front Part of HV Power Supply)

(The appearance of the equipment may be different depending on specifications.)



(Rear Part of HV Power Supply)

※Please insert HV cable into the socket of UHF connector, and then turn and tighten it.

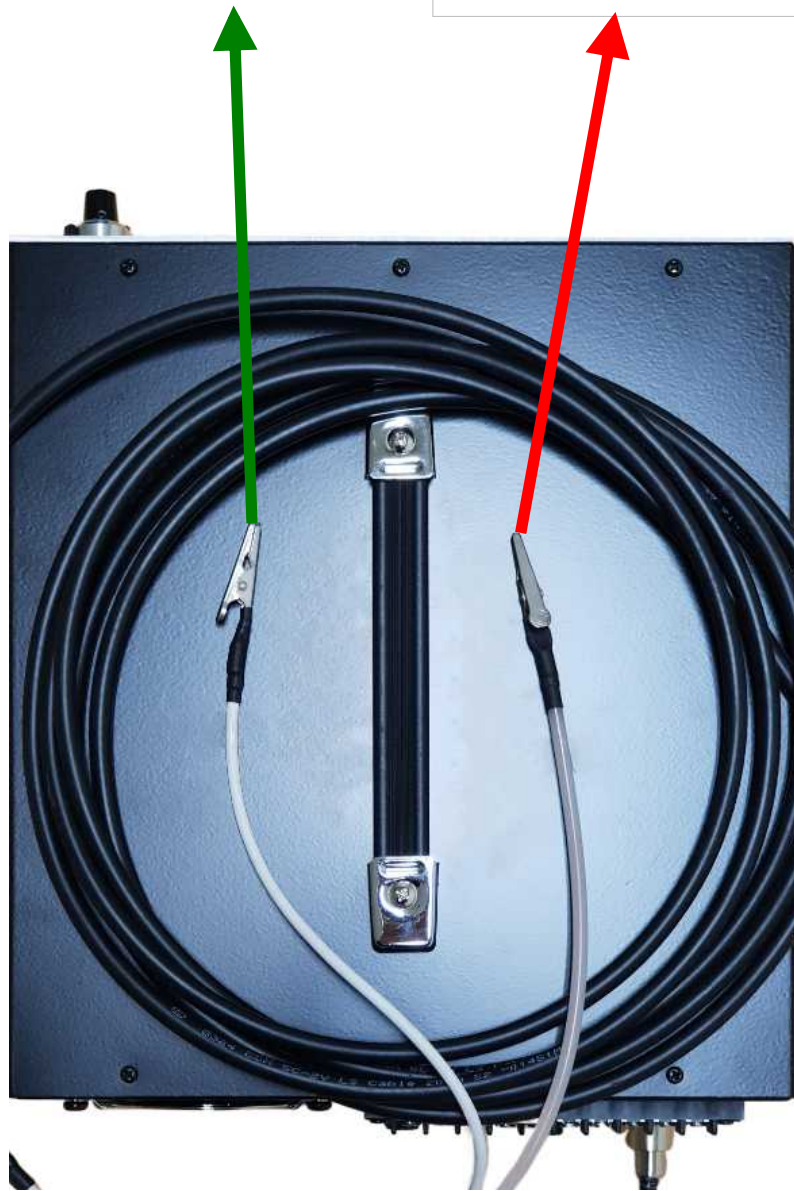


※Grounded Shield of HV cable
(connection to collector)

Please connect to collector
(※flat plate collector, or drum(roll) collector
etc.)

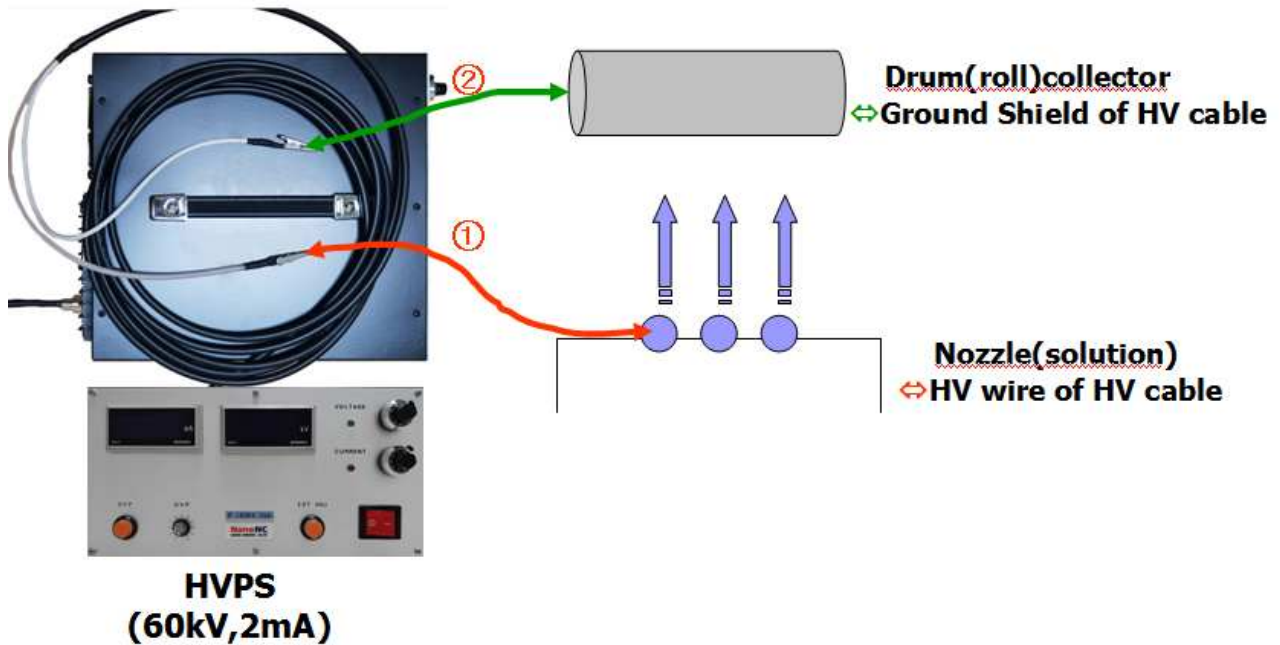
※HV Electric Wire of HV cable
(connection of needle extruding
asolution)

Please connect to spinning needle or spray
needle



<connection diagram>

A. Operating method of the equipment



(connection of HV cable)

※ Items to be verified before the use of the equipment ※

1. HV electric wire (alligator clip) of HV cable should be connected to needle (the above figure: ①)

Before powering on, it should be checked whether the "alligator clip on a high voltage cable" is connected to "spinning needle (nozzle or nozzle adapter or nozzle plate)".



(spinning needle: nozzle)



(nozzle adapter)

2. ground shield wire of HV cable should be connected to collector (the above figure: ②)

3. "CURRENT" lever should be turned to number about "5".

Before powering on, it should be checked whether the "CURRENT" lever is turned in the clockwise direction to the maximum value (or about number "5"). Set the number of volumetric current lever to **approximately "5" (about 1 mA)**.

※ **Generally, since the current consumed during the experiment is just several hundred μA or below, this current value may not be displayed.**

4. "VOLTAGE" lever should be turned to number "0".

The "VOLTAGE" lever should be turned in a counterclockwise direction and set as zero (0).

5. "EXT-ADJ" button should be protruded for "ADJ" state.

It should be verified whether the "EXT-ADJ" button is set to protrude for an "ADJ" state.

※ During the experiment, the "EXT-ADJ" button can be used as a ON-OFF button for applying a high voltage.

(Note : if it is necessary to control a high voltage by an external controller, the "EXT-ADJ" button should be pressed to maintain the "EXT" state.)

※ (Note) "EXT_ADJ" is utilized as a switch having ON-OFF function for applying a high voltage.

During the experiment, the EXT-ADJ may be pressed to turn "OFF" the high voltage for a moment. At this moment, the OCP must turn off.

When "EXT-ADJ" button is set to protrude, the high voltage value shown in the voltage indicator window falls down to "0". When the button is pressed again, it will recover the original voltage value set

6. "OCP" button should be protruded.

It should be verified whether the OCP (Over-Current Protection)" button is set to protrude to the maximum, namely in an "OFF" state.

※ On the experiment, press the OCP button for the safety of the machine.

(For the operation of HV power supply to start the experiment)

7. To start the high voltage equipment, turn on the power S/W.

8. Turn the "VOLTAGE" lever in the clockwise direction.

9. On the experiment, press the OCP button for the safety of the machine.

※ If the voltage reaches an optimal voltage, the polymer solution shakes seriously and produces nanofibers (the electrospinning process). Meanwhile, the solution with no viscosity becomes atomized in the atmosphere (the electrospray process).

etc:

[Explanation of the "OCP" state]

OCP (Over Current Protection) is an over-current protection device. If the set current value is beyond the upper or lower limit, the OCP automatically turns "OFF" and generates an alarm (the displayed voltage value becomes "0").

@ **Measure** : Firstly, power off the equipment, turn "OFF" the OCP, and then turn on the equipment again after several seconds.

B. Equipment Configuration



1. VOLTAGE is a voltage-variable VR (volume regulator), and CURRENT is a current-variable VR (volume regulator).
 2. "EXT-ADJ" is a voltage-variable (current-variable) internal/external shifting switch.
 - o. ADJ direction : controlled by a voltage volume regulator (VR) and a current VR at the front panel of the equipment.
 - o. EXT direction : controlled by an input terminal (EXT-CONTROL) at the rear panel of the equipment (external control).
 - ※ The external control may be performed by an output power 0~5V of a D/A converter or an external VR (volume regulator).
- ※ Rear terminal
- . The "VOL" terminal at the rear panel is an 0~+5V input terminal for voltage control.

- . "GND" at the rear panel is always connected to the side panel.
- . The "CUR" terminal at the rear panel is an 0~+5V input terminal for current control.
- . "+5V" at the rear panel is connected to the inside to always output a constant voltage +5V which is a reference voltage for controlling.

※ **In case of voltage control by 5V of the D/A converter**

o. First, "CUR" and "+5V (R3 terminal)" are connected to each other by jumping at the rear terminal.

The output 5V of the D/A converter is connected to "VOL (voltage control terminal)", and G is connected to "GND"(GROUND).

Voltage adjustment is controlled by applying 0~5V. At this time, the voltage is varied to 0~maximum value.

※ **In case of current control by the output 5V of the D/A converter**

o. First, "VOL" and "+5V (R3 terminal)" are connected to each other by jumping at the rear terminal.

The output 5V of the D/A converter is connected to "CUR (current control terminal)", and G is connected to "GND (GROUND)".

Current adjustment is controlled by applying 0~5V. At this time, the current is varied to 0~maximum value.

※ **In case of control by VR (VR is separately installed at the outside)**

Number 1 of the voltage control (or current control) VR is connected to "GND", Number 2 of the VR is connected to "VOL" (or "CUR"), and Number 3 of the VR is connected to +5V.

3. **The HVG terminal at the rear panel is a GND terminal with HV power.** The HVG terminal is electrically connected to the coating of the high voltage power cable and connected to the case by means of a condenser of 0.22 μ F and a transistor (TNR).
4. **OCP-SW is an Over-Current Protection setting.** The OFF state (a protruding state) represents a constant current control state, and in the ON state (a pressed state), the equipment entirely stops if the CURRENT VR comes to a set current value. At this time, if an alarm is generated, the equipment returns to a normal state by turning off the power S/W and then turning ON after three seconds.
5. **OVP-VR is an Over-Voltage Protection setting.** The maximum value of the OVP-PR in the right is about 115%, and if suitably set, the equipment completely stops when voltage reaches the set value (fixed).
6. **The REMOTE-POWER SW at the rear panel** is an ON/OFF terminal for remote control. The MAIN-S/W is in an ON state, and only the control circuits turns

ON/OFF (220V/0.1A).

7. **The EMERGENCY TRIP terminal at the rear panel** is an emergency stop signal terminal. When an over-voltage or over-current is set, if voltage or current reaches the value, the emergency trip operates and a relay point COM, NC(B), NO(A) occurs.

C. Followings should be noted when handling the product

1. This equipment is a high voltage power device, and the high voltage generated from this equipment may harm the human body.
2. The ground must be verified before use.
3. After the equipment powers OFF, the high voltage terminal must be grounded before handling the equipment.
Since the condenser in the equipment is not yet discharged, a high voltage may be generated even after the equipment powers OFF.
4. If noise occurs during discharging, the equipment must be inspected.

Product AS and Contact

The warranty period for this equipment is one year from the date of purchase. However, during the warranty period, if the equipment is damaged due to a mistake of a customer, it is needed to pay for the repair.

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