Nano Fiber Electrospinning Unit with Horizontal & Vertical Spinning

Model : HO-NFES-043

Holmarc's (HO-NFES-043 model) Electro-spinning equipment is a compact version for Nano fiber Electro spinning.

In this model, motorized XY movement is provided for needle tip. The needle tip can be arranged in horizontal or vertical fashion for spinning. Collector bowl for liquid targets is also provided along with the system.

It is used to make nano and micro fibers ranging from 50nm to 5 microns in diameter. Many kinds of polymers like Protein nanofibers, carbon nanotubes, inorganic nanofibers etc. can be synthesized using our nano fiber electrospinning unit. Our equipment uses horizontal spinning when compared to other equipments available in the market. This technology assures the quality of the spun fibers with no dip and uneven diameter. It's user friendly software, task oriented design, ease of operation and competitive pricing are certain features that place our equipment ahead of other products available in the market.

Holmarc's HO-SPLF4 model syringe pump render a smooth and uninterrupted flow enabling uniform spinning. HMPSKV30 model high voltage power supply delivers 0-30 KV output voltage range with a maximum current capacity of 0.5 mA. A stationary target, an XY moving target and Rotating mandrels of six different diameters are supplied along with the unit.

HO-FH-04 model fume hood provides the compact unit an enclosed atmosphere with 3 transparent side walls to monitor the electro spinning process. The hood also has features like exhaust fan, granite work surface and optional features like high bright halogen lighting, exhaust port of custom dimension to be connected to an exhaust duct available onsite etc as with the other model. This model uses a microprocessor based control unit that interfaces the operations of the syringe pump and Mandrel.

KEY FEATURES

- Cabin Heating : Upto 45°C using 1000 watt coil heater
- The chamber is provided with Residual Charge Discharge Stick which is used for static charge removal.
- Safety switch provided to switch off H.V. Power supply when door is opened.
- LED cabin lighting and back light to view Needle tip and electro spin process.
- Exhaust fan is provided for solvent vaporization. It is also used for cooling down the equipment after spin process.
- Emergency stop is provided on the control panel to stop the equipment whenever required.
- Coaxial spinneret: Our Nano fiber electrospinning unit is equipped with coaxial spinneret which helps to produce hollow nanofibers and core / sheath nanofibers. This technology can also be used to combine different characteristics of each polymer into one fiber.
- Graduation scale provided on the granite surface in X & Y direction which helps the end-user to achieve repetitive results by marking the positions of syringe pump and target.
- User friendly software enables PC interfacing that helps the regulation and control of various features like Rotating mandrel speed, Spin Duration, Syringe pump flow rate, XY target movement etc.
- Rotating Mandrel targets of varying diameters, Stationary target and Reciprocating XY target provided with the system.
- System hood has features like exhaust fan, halogen lighting and transparent door for monitoring electrospinning process.
- Built-in short circuit protection.

SPECIFICATION

I High Voltage Power Supply

HOLMARC's HO-NFES-043 comes with HMPSKV30 model high voltage power supply. It has 0 - 30kV output voltage range with maximum current capacity of 0.5mA. Output voltage and current can be set using front panel knobs and readout from the digital panel meters.

Specifications :

- 0 - 30kV single output, 0.5mA max current
- Digital voltmeter and current meter
- Static removal device - shorting stick
- Constant current / constant voltage mode of operation
- Built-in short circuit protection.

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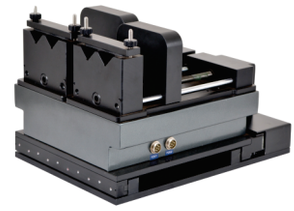
II Independently Controlled Dual Channel Syringe Pump

The speed and flow rate can be changed on both syringes to achieve custom fabrications of fibers. The Syringe pump can also be moved to and fro in X axis. The maximum travel distance is 200mm. The movement is controlled through PC.

- To dispense from standard disposable or glass syringes of volume ranging from 5 to 20ml
- Syringe holder made of insulating material to work under high voltage conditions.
- Motor control through micro controller to control and indicate flow rate
- Four syringe dispensing system
- PC based control with documentation of parameters like syringe diameter, flow rate, spray duration etc.



III Rotating Mandrel

Rotating mandrels which comes with the electrospinning unit can be used as a target to get an aligned continuous mesh of nanofiber. It has a speed range of 300rpm to 4000rpm suitable for electrospinning. Grounding of the mandrel to the HV power supply is attained through a carbon brush contact.

- Stainless steel drums of different sizes
- Rotational Speed : 300 - 4000 rpm
- Grounding facility : Available
- Actuator : Microprocessor controlled BLDCmotor with hall sensor feedback
- Speed stability : +/-1%

IV Y Plate Collector & Stationary Target

This collector can be used as stationary target or as Y plate collector. The stationary target which acts as a collector of electro spun nanofibers, is made of stainless steel and can be held vertically on a table top. It also has a connector for grounding. By using a stationary target alone, one cannot attain a uniform density of fibers, as most of the fiber is collected around the point orthogonal to the syringe needle.

- Plate Dimension 250 x 175 x 3mm
- Plate Material : Stainless Steel
- Grounding Facility : Available
- Programmable Y motion profile to control the nano fiber deposition characteristics
- PC based motion control with documentation of parameters like speed, traverse, motion profile and duration

Needle Spinneret

Co axial Spinneret

V Spinneret

a. Needle spinneret : The Flat tipped metal needles are provided for the easy flow of nano fibers. The high voltage is connected to the tip of the needle using metal clips.

b. Co axial Spinneret : The Coaxial spinneret provides simultaneous flow of two different solutions. This helps to produce hollow nanofibers and core / sheath nanofibers.

VI Fume Hood

HOLMARC's HO-FH-04 model fume hood provides an enclosed atmosphere for electrospinning. An enclosed chamber is necessary to protect the user from polluted air caused by solvent evaporation during the process. It comes with an exhaust fan attached or optionally with a duct of custom dimension which can be connected to an exhaust duct available onsite. HOLMARC's Fume Hood also has an option for in-built heater capable of providing a temperature up to 45°C.

- Standalone unit with in-built power supply and wiring for the heater, lighting and exhaust
- Transparent glass windows on three sides for monitoring the electrospinning process
- Foot print: 1000mm x 800mm x 1950 mm
- Construction material: stainless steel, aluminium & glass
- Epoxy coated for electrical insulation
- Ambient to 40°C temperature control
- Exhaust fan ventilation at the top of the hood which can be connected to an exhaust inlet available at the customer's facility.

VII Accessories

- Normal glass syringe
- Glass syringe with tube connector
- Spare needle
- Teflon tube

VIII UV Curing Lamp (Optional)

- A special 10W 254nm UV light can be added on top of the rotating collector drum which helps to cure the spun fibers.
- It can be switched on during the operation or when fiber spun is completed on the collector drum.
- As the UV light is harmful to our skin and eye, the glass surfaces of the chamber is protected with special coatings to reflect maximum UV.
- The controller is also provided with an ON/OFF switch for the UV lamp.