ELECTROSPINNING FROM THE LABORATORY

Produced by the Biomedical Division of Linari Engineering S.r.l..

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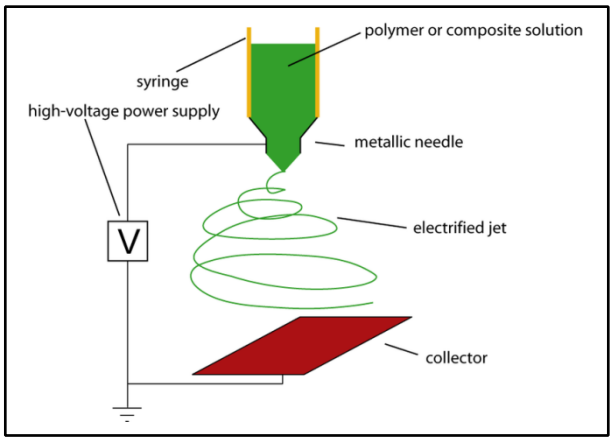
Linari Engineering proposes a complete kit to create a professional Electrospinning system from the laboratory, starting from liquid solutions according to the classic scheme shown in the figure.

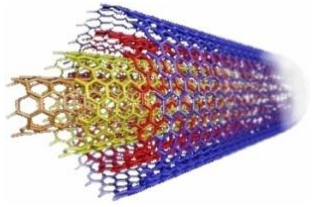


Parameters that mainly affect the electrical drawing of polymers in liquid solution:

- ✓ Molecular weight and structure of the polymer (linear, ramified...);
- ✓ Physical properties of the solution (viscosity, electrical conductibility and surface tension);
- ✓ Environmental parameters (pressure, humidity, temperature);
- ✓ Applied potential difference;
- ✓ Distance between the end of the syringe needle and the collector;
- ✓ Configuration of the electrical field lines around the syringe;
- ✓ Syringe solution capacity;
- ✓ Collector speed (translation and/or rotation).

Appliance components

- Control unit base on OMRON industrial electronics (PLE & Drivers);
- Software with graphic monitoring interface and deposition programming based on SCADA;
- Linear sliding guide with run equal to 250 mm and maximum speed of 1 m/s and resolution of 0.1 mm;
- Rotating axis in two directions up to 4500 rpm.
- Diameters 0.2



Safe, easy installation

All the electrical equipment is powered by mains voltage.
RT Collector originates pre-set up for connection to the HV generators supplied by Linari Engineering in our starter kit, or to existing devices. The system has been designed to provide maximum protection against the high voltages that may be used in the work area of the RT Collector with the use of insulating materials and specific construction techniques.
To guarantee that access to the equipment takes place in absolute safety, a safety switch must be attached to the access door to the work area, which also intervenes on the high voltage generator, turning it off.
A light with 5 m pre-cabled cable will notify the operator of the function condition of the experiment.

Customisation and service

All our kits are packaged and tested to comply with the specific customer requirements.
The following are available on request:

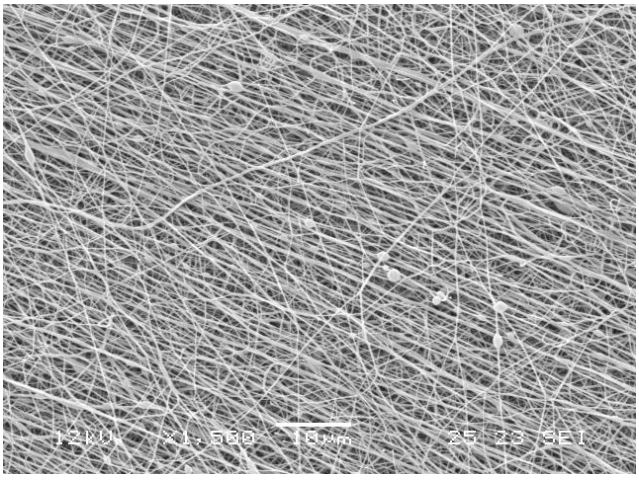
- Increased run (up to 1 m);
- Rotation speed up to 50000 rpm;
- Collectors in geometries and materials on request;
- Remote control of the high voltage generators towards existing analogue or digital type systems;
- Systems controlling room air temperature and solution;
- Inverter systems to partition hood suction;
- Development of mechanical and electrical interfaces for experiments or existing plants.

Technical assistance and installation service managed directly by Linari Engineering staff, with no agents or intermediaries.

Applications

Given the facility and flexibility of use and integration of the machine within the articulated experiments, the RT Collector can be used in all applications today involving the use of electrospinning.

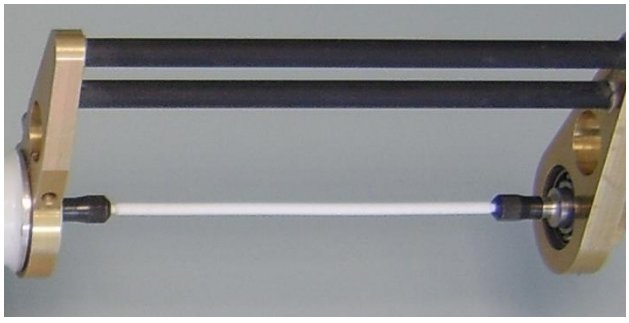
- Fabric engineering and regenerative medicine;
- Study of nano spun fibre polymer materials;
- Scaffold production;
- Spun fibre production;
- Production of filters and membranes;
- Production of innovative nano materials;



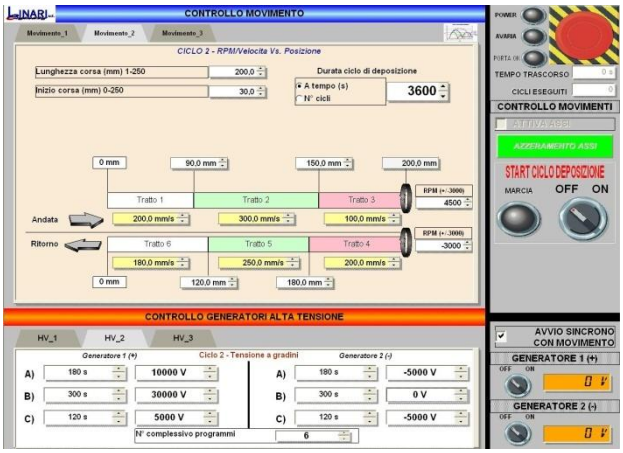
PVA fibres aligned at 3000 rpm on mandrel Ø4 mm

Method of use

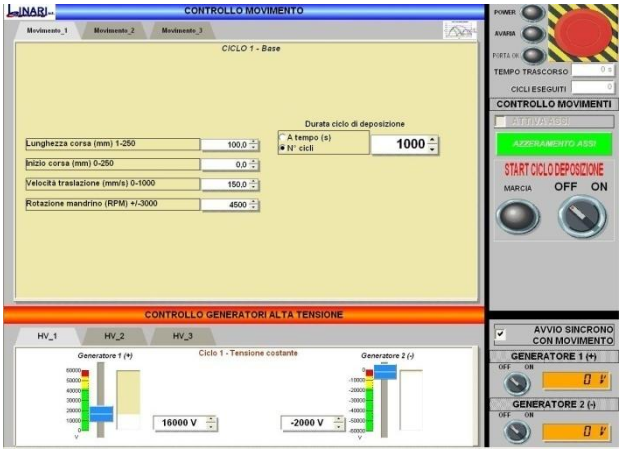
The system can be used both as a simple sliding system by removing the end arch, illustrated below in the figure, and fixing a plate in its place by means of the specific callipers.



The system, including the HV generators, is entirely controlled by the specific software that provides a monitoring of operative conditions and the programming of complex deposition cycles, that can last several hours, through intuitive wizards designed for the production of tubular structures.



To implement the deposition parameters, all system parameters can also be 'manually' managed by simple commands that are safe, thereby guaranteeing a successful outcome of tests and the safety of people and machinery.



Technical data

Sliding movement	Unit	Value	Notes
Power supply	Volts	230 V	110 V on request
Enabling	Type	Brushless AC	
Feed speed	mm/s	0 .. 1000	
Transmission type	…	Toothed belt	Direct socket on engine
Sliding guide	…	Steel wheels	Tempered steel guides
Mechanical run	mm	0 .. 250	
Useful run	mm	0 .. 200	constant speed
Position accuracy	mm	+/- 0.1	
Total mobile mass	Kg	2.0	at maximum speed
Rotation movement			
Power supply	Volts	230 V	110 V on request
Enabling	Type	Brushless AC	
Rotation speed	Rpm	-4500 .. +4500	Optional up to 50000 rpm
Speed accuracy	Rpm	+/- 1	
Rotating axis support	…	Ball bearings	Life lubricated

 SUPPORT ARCH AND COLLECTION SYSTEMS	Unit	Value	Notes
Net sample length	mm	50 – 100 – 150 – 200	150 standard
Rotating mandrel collection system	…	Self-centring or Dremel® callipers	Customised on request
Diameter that can be clutched	mm	0.2 .. 3	Customised on request
Rotating diameter in the arch	mm	0 .. 70	Customised on request
Electrical connection on mobile arch	…	YES	M3 x 6
Dismountable arch	…	YES	
Interchangeable grip mandrels	…	YES	Dremel®

 CONTROL SYSTEM	Unit	Value	Notes
Controller	…	Industrial PLC	Omron®
Communication interface		RS232 (RS485 a rec.)	HostLink
0..10V output for HV generators control	No.	2	Opto-isolated
0..10V inputs for monitoring	No.	4	Feedback V and I generators
PC-controlled digital inputs	No.	2..16	*Option*
PC-controlled digital outputs	No.	2..16	*Option*
Light warning system	…	YES	
Software for PC Windows 2000/XP	…	YES	1 license included
Languages available for software	No.	3	Italian, English, Spanish
PC - controller connection cable	m	5	USB

 DEPOSITION PROGRAMMES AVAILABLE	Unit	Value	Notes
Movement management strategies	No.	3	
Voltage management strategies	No.	3	
Combination of movement & voltage strategies	…	Any	9 combinations

Linari Biomedical Division

www.linaribiomedical.com

PRODUCTION

- **Electrospinning equipment**
  - Starter kit
  - Rotary-sliding mandrel system RTCOLLECTOR
  - High voltage modular syringe pumps
  - Air and syringe heating systems up to 400°C
  - Shaped collectors and screens for directing electrical field
  - Fitting out of complete systems and hoods for experiments on request
- **Bioreactors for cell culture**
  - Perfusion with innovative flexible flow system
  - Rotating walls with single and dual culture chamber
  - Digital peristaltic pumps adjustable up to 1/100,000 of maximum capacity.
- **Incubators for cell culture with heating at solid state and load from above**
  - 60 litres with load from above
  - 60 litres with CO_2 control IR measurement with compensation of environmental pressure

Contact us

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