

E-Fiber

Modular electrospinning/electrospraying platform



EF200 - Electrospinning/electrospraying system with Filtration Unit

EF200 is an electrospinning/electrospraying complete plug & play solution for research and development applications and for users who require a modular upgradeable setup, with an embedded certified filtration unit for exhaust solvent and vapor.

EF200 is a fully-customisable electrospinning/electrospraying platform consisting of injection stages and application-specific collectors (static or movable), for laboratory-scale manufacturing of polymeric nanofibrous matrices.

EF200 is equipped with a TUV certified fume-hood with an active carbon filtered system (customizable for specific solvents and chemical agents), that allows users to have a real Desktop system, with no need to connect the extraction to any exhaust or filtration system.

This device provides a powerful and highly versatile technique for the creation of various fibrous architectures with controlled fiber diameter and orientation. Its technology minimizes influence on the electrospinning process.

E-Fiber EF200 offers various technological solutions to accurately control each process guaranteeing batch-to-batch reproducibility and precise control of fiber parameters such as diameter, orientation and texture.

Its enclosure with sealed chamber and filtration unit, has 2 independent safety doors, 1 for normal operations, 1 for hood operations. EF200 is the perfect solution for the most demanding R&D applications.

The equipment is user-friendly and safe thanks to the automatic safety devices that protects the operator during operations.

E-Fiber EF200 is a real Desktop system (easily movable, doesn't require any external connections) includes:

- cabinet with filtration unit
- high voltage power supply 0-30 kV or 0-40kV
- control system with touch screen
- programmable 1-channel syringe pump
- manual distance adjusting up to 300 mm
- multispinneret support up to 3 needles
- 200x200mm flat plate collector
- camera system
- disposable kit

Disposable kit includes 2 stainless steel spinnerets of 2 different diameters, 100 syringes, tygon/ptfe tubing (7.5m), polypropylene male and female luer connectors (15+15).



Each EF200 is equipped with a digital microscope, with embedded visualization on the touch screen, allowing the user an easy and immediate control over the process parameters, the needle tip and the formation of the Taylor cone.



Filtration system

Our certified fume-hoods with activated carbon filters allows you to immediately start electrospinning/spraying in any situation, without risks related to the solvent vapor used.

The activated carbon filters can be customized for specific solvents and chemical agents, according to customer's needs.

EF200 avoids connection to an extraction fume system, and the electrospinning can be used inside every lab or clean room without any arrangement or connection, for a real Desktop equipment that can be easily moved to different labs or rooms.

Filtered air flow rate : 320 m³/h , made of epoxy coated stainless steel.

ACTIVATED CARBON ADSORPTION CAPACITY TABLE

1. Substances with high adsorption capacity by activated carbon (20-50%)

Acetate methylcellosolve	Dichloronitroethane	Naphtha
Acetophenone	Dichloropropane	Naphthalene
Acetic anhydride	Dichlorotetrafluoroethane	Nicotine
Acrylic acid	Diesel fumes	Nitrobenzene
Acrylonitrile	Diethylketone	Nitroethane
Adhesives	Dimethylaniline	Nitroglycerine
Aldehyde atrica	Dioxane	Nitromethane
Amilacetato	Dipropiketone	Nitropropane
Amyl Alcohol		Nitrotoluene
Amyl acetate	Ether dichloethyl	Nonane
Amyl ether	Ethylacetate	Octane
Aniline	Ethylalcohol	Odor of putrefaction
Antiseptics	Ethylacrylate	Ozone
Argon	Ethylbenzene	
Aromas of food	Ethylbenzol	Paint fumes
Asphalt fumes	Ethylene	Palmitic
	Ethylformiate	Paradichlorobenzene
Benzaldehyde	Ethylsilicate	Pentanone
Benzene	Ethylsulfide	Perchloroethylene
Benzyl alcohol	Ethylene dichloride	Pesticides
Benzol		Phenol
Body odors	Fertilizers	Pyridine
Bromoform	Freon 11	Propylacetate
Bromine	Freon 12	Propylalcohol
Butanol	Freon 114	Propylchloride
Butylcellosolve	Fruit	Propylether
Butylacetate	Furfural	Propylmercaptan
Butylalcohol		Propyonic acid
Butylchloride	Gasoline	Putrescine
Butylether		
Butyricacid	Heptene	Quinoline
	Heptane	
Camphor		Resins
Capril acid	Iodoform	Sewer odors
Caproaldehyde	Isopropyl acetate	Smells liquor
Carbolic acid	Isopropyl alcohol	Smells of hospitals
Carbon disulfide	Isopropyl ether	Smells of fish
Carbon tetrachloride		Styrene
Cellosolve	Kerosene	Styrene Monomer
Cellosolve acetate		Sulphide composites
Charter deteriorated	Lactic acid	
Cyclohexane	Liquid fuels	Tar
Cyclohexanol	Lysol	Tetrabromoethane
Cyclohexanone	Lubricants, greases, oils	Tetrachloroethane
Cyclohexene		Tetrachloroethylene
Chlorobenzene	Menthol	Thiophene
Chlorobutadiene	Mercaptans	Toluene
Chloroform	Mesityloxi	Toluidine
Cigarette smoke	Methylacetate	Turpentine
Cloronitropropane	Methyl	Trichloroethane
Chloropicrin	Methylacrylate	Trichloroethylene
Combustion odors	Methylcellosolve	
Cooking smells	Methylchloroform	Urea
Creosol o / m / p	Methylcyclohexane	Uric acid
Crotonaldehyde	Methylcycloesanol	
	Methylcyclohexanone	Valeraldeide
Dean	Methylethylketone (butanone)	Valeric acids
Detergents	Methylformate	Vinegar
Dibromoethane	Methylmethacrylate	
Dichlorobenzene	Methylene chloride	Xylene
Dichlorobenzol	Methyloxi	Xylolo
Dichlorodifluoromethane	Monochlorobenzene	
Dichloroethane	Mono fluorine	
Dichloroethylene		
Dichloromethane		
Dichloromono fluoromethane		

2) Substances with good adsorption capacity by activated carbon (10-25%)

Acetone Acetic acid Anidride sulfur Arsenic Butadiene Butiraldehyde Carbon disulphite Carbon disulphide Chlorine Dichlorodifluoromethane Dichlorotetrafluoroethane Diethylamine Dimethyl Dimethyl sulphate	Esilene Ethanol Ether Ethyl Ethylbromide Ethylchloride Ethylether Ethylene glycol Ethylmercaptan Fluorinetrichloromethane Formic acid Freon Furan Hexane Hydrocyanic acid Hydrogen sulphid Iodidcric acid Isopropanol Lead	Mercaptonezene Methylalcohol - methanol Methylbromide Methylacetate Methylchloride Methyl ether Methylformate Methylmercaptan Monofluorine Pentane Phosgene Propionic aldehyde Pyridine Pyrrole Propionaldehyde Rubber Smells of slaughter Solvents Vinyl chloride
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3) Substances with little adsorption capacity by activated carbon (< 15%)

Use impregnated carbon:

Aldeyde e derivatives (5/15%)

Mercury (5/15%)

Acid Gases (5/15%)

Ammonia (5/15%)

Iodine (5/15%)

Acetaldehyde (aldehyde and derivatives) Acetonitrile (ammonia and derivatives) Acrolein (aldehyde and derivatives) Amines (ammonia and derivatives) Ammonia (ammonia and derivatives) Arsine gas (acid gases) Bromopropane (acid gases) Butane gas (acid gases) Butene (acid gases) Carbon dioxide (acid gases) Carbon monoxide (acid gases)	Diethylamine (ammonia and derivatives) Dimethylamine (ammonia and derivatives) Ethidium bromide (acid gases) Ethylamine (ammonia and derivatives) Ethylene oxide (acid gases) Formaldehyde (formaldehyde and derivatives) Hydrobromic acid (acid gases) Hydrochloric acid (acid gases) Hydrofluoric acid (acid gases) Hydrogen selenide (acid gases) Hydrogen sulfide (acid gases)	Iodine (iodine) Nitric acid (acid gases) Nitrogen dioxide (acid gases) Phosphine gas (acid gases) Propane gas (acid gases) Propene (acid gases) Propylbromide (acid gases) Sulfide gas (acid gases) Sulfuric acid (acid gases) Sulphur dioxide (acid gases) Valeric aldehyde (aldehyde and derivatives)
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4) Substances not adsorbed by activated carbon

Acetylene Carbonic acid Carbon monoxide	Ethane Ethylene Hydrogen	Methane Methylbutylketone Sulfur trioxide Sulphur dioxide
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Accessories and upgrade

E-Fiber can be equipped and upgraded with a variety of accessories to extend and best fit user requirements and applications.

COLLECTOR SYSTEM

EFA010 - Interchangeable size rotating collector

Rotating collector used to electrospin cylindrical or big planar structures with oriented and non-oriented fibers (depending on rotation speed). This version can house cylindrical collectors (mandrels) with different diameters and lengths and, because it is highly flexible and versatile, it is ideal for research applications. Entirely made with insulating materials, in order to avoid interferences with the electrical field and electrospinning process. Electronic feedback for a precise control over speed rotation, in order to grant highly reproducible batch-to-batch conditions. Supplied with 5 collectors of different diameters.

Standard parameters : adjustable speed between 50-1200 rpm, collectors up to 250mm length and 100mm diameter.

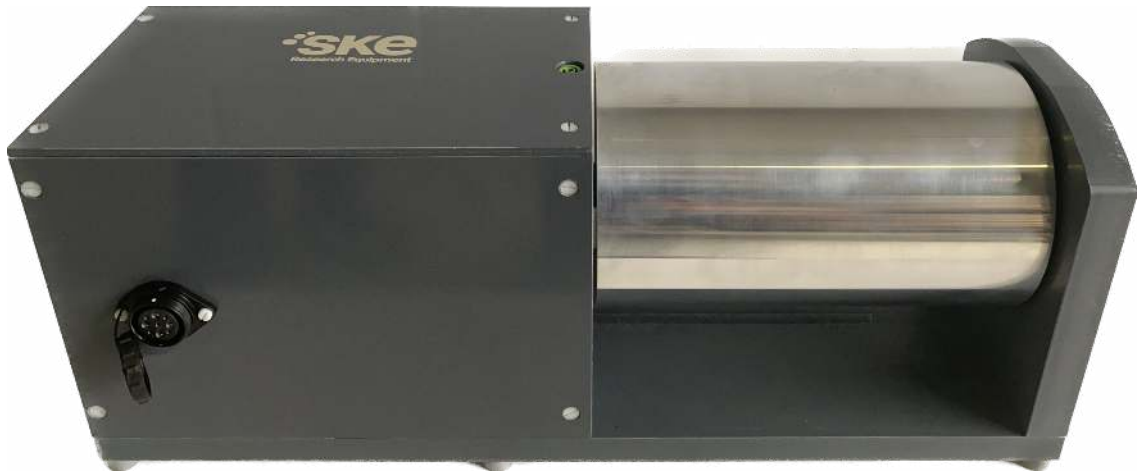


EFA015 - High speed rotating collector

A motor-driven cylindrical collector, used for electrospinning cylindrical or big planar structures with oriented and non-oriented fibers: this model can reach very high rotation speed.

Entirely made with insulating materials, in order to avoid interferences with the electrical field and electrospinning process. Electronic feedback for a precise control over speed rotation, in order to grant highly reproducible batch-to-batch conditions.

Standard Parameters : adjustable speed between 50-3000 rpm, collector 250mm length and 150mm diameter.



SPINNERET SYSTEM

EFA035 - Coaxial spinneret nozzle

Coaxial spinneret needle made of two coaxial needles, used to simultaneously electrospin up to two different polymers. This is generally used to create fibers whose core and shell are made of different materials. Ideal for research purposes. Detachable options for easy cleaning operations. Minimum dead volume.

Fully customizable and made according to customer specifications (need at least a dual channel syringe pump or 2 single channel syringe pumps).



EFA040 - Triaxial spinneret nozzle

Triaxial spinneret needle, made of three coaxial needles, used to simultaneously electrospin up to three different polymers. Generally used to create fibers with cores and shells made of different materials. Ideal for research purposes. Detachable options for easy cleaning operations. Minimum dead volume.

Fully customizable and made according to customer specifications. (need at least a six channel syringe pump).



EFA045 - Quadriaxial spinneret nozzle

Quadriaxial spinneret needle, made of four coaxial needles, used to simultaneously electrospin up to four different polymers. Generally used to create fibers with cores and shells made of different materials. Ideal for research purposes. Detachable options for easy cleaning operations. Minimum dead volume.

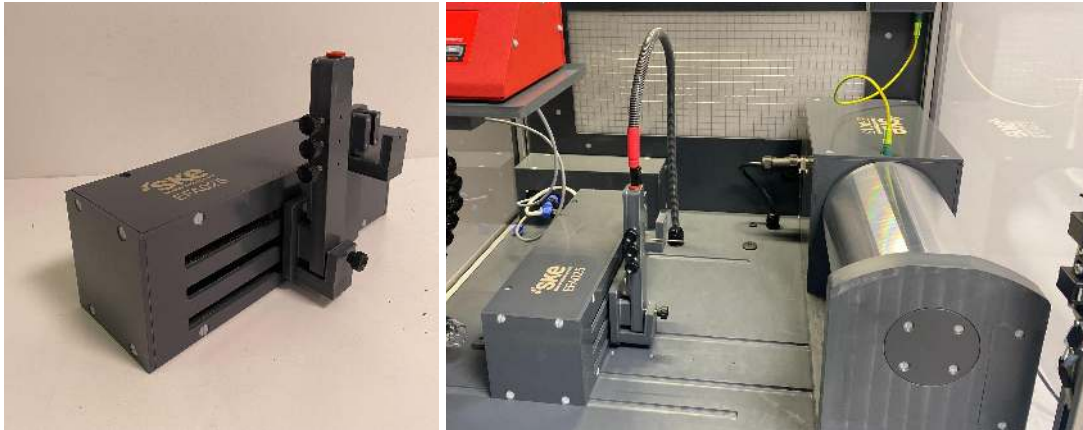
Fully customizable and made according to customer specifications. (need at least a six channel syringe pump).



EFA025 - Scanning motion spinneret

Linear Motion Spinneret System is used for superior uniformity in nanofibers or nanoparticles deposition during electrospinning process. Highly flexible and versatile, ideal for research applications, can house multiple spinneret needles in 21 different positions, both standard and coaxial.

The Linear Motion Spinneret System allows greater collector surface coverage, with optimal deposition uniformity. It is used to electrospin large planar formats (for example, A4 size or bigger) or long tubes. Ideal for scaling-up application.



ENVIRONMENTAL CONTROLLERS

EFA130 - Climate control unit - Full environmental control unit

E-Fiber EF100 system can be equipped with an external full control module, in order to control environmental parameters on your working area, with a real time monitoring. This module controls temperature and humidity of the air of the working area, and keeps it constant during your electrospinning session. You can directly manage your setpoint of °C and RH% on the control user interface.

Parameters :

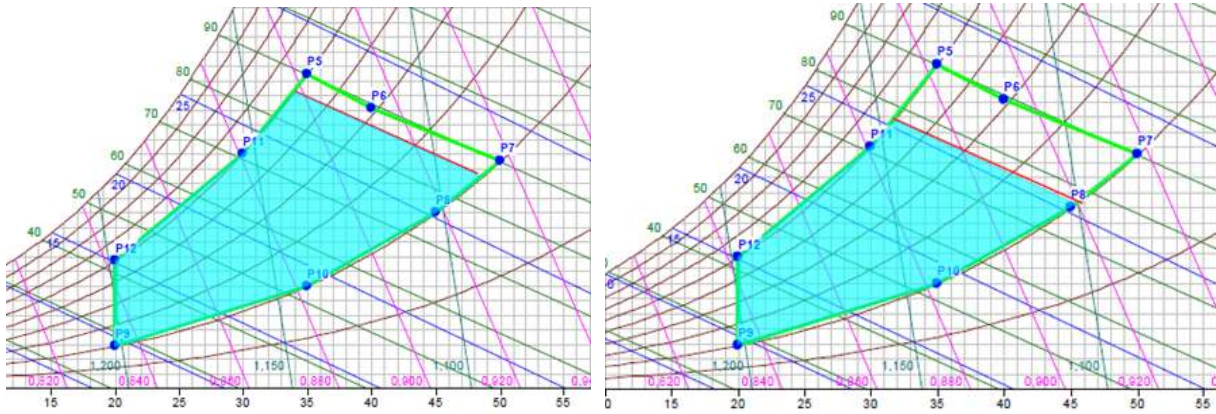
Setting Range: Tenv/+35°C – 20/60 % RH,

Working range: +18/+25°C – 40/80% RH,

Heating power: 3 kW, Dehumidification power: 2kW,

Air volume effective: 150 m3/h





EFA140 - Climate control unit - Heater

E-Fiber EF100 system can be equipped with an external heater module, in order to control environmental parameters on your working area, with a real time monitoring. This module can heat the air of the working area, and keeps it constant during your electrospinning session. Temperature is directly visualized on the control user interface. It is equipped with its own control panel, and eventually can be integrated in your E-Fiber also in a second time.

Parameters : PID controller of Temperature, heating of electrospinning area up to 40 °C.



EFA145 - Climate control unit - Humidity reduction

E-Fiber EF100 system can be equipped with an external humidity reduction module, in order to control environmental parameters on your working area, with a real time monitoring. This module dehumidifies the air of the working area, and keeps it constant during your electrospinning session. Humidity is directly visualized on the control user interface. It is equipped with its own control panel, and eventually can be integrated in your E-Fiber also at a later time.

Parameters : humidity reduction up to 20% RH, working range: 0 – 100% RH, Dehumidification performance 1.6 kg/h @ 60% RH.

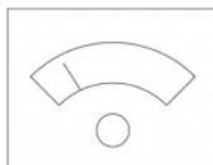


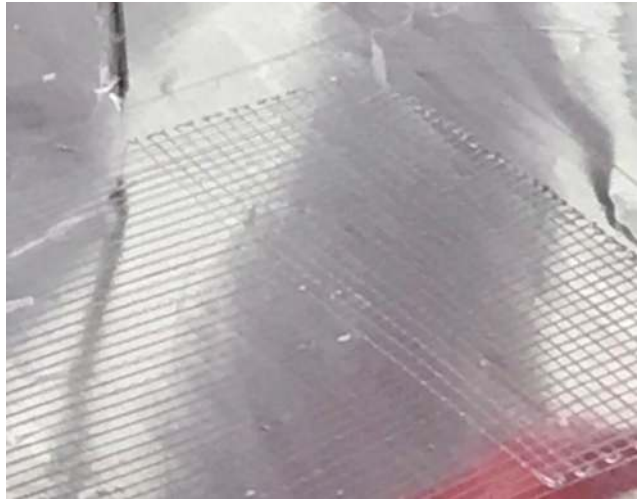
EQUIPMENT UPGRADES

EFA170 Negative High Voltage (dual polarity configuration)

All SKE E-Fiber models can be upgraded with a second High Voltage Power Supply, with Negative potential. The HV generator can be integrated within the equipment. The Negative HV Power Supply increase the efficiency of the electrospinning/spraying system, and allows to have a more versatile device and focusing more effectively the electrospinning jet on the collector.

Dual High-Voltage Source
Negative potential





EFA350 - Disposable kit

The disposable kit includes:

- 2 stainless steel nozzles of different diameters
- 100 syringes
- tygon/ptfe tubing (7.5m)
- polypropylene male and female luer connectors (15+15).



TECHNICAL DATA

General Information

Dimensions	800 mm x 820 mm x 1300 mm (W x D x H)
Weight	Approx. 90 kg (standard equipment)
Cable Length	AC power supply 1.5 meters
User interface	Touch Screen with User Interface
Emergency Button	Yes
Safety switch (interlock)	Yes, two (1 for each door)
Main power	110-220 Vac ~ 50/60Hz

High-voltage power supply

Voltage *	Single High Voltage power supply 0÷40kV or (higher voltage on request)
Polarity *	Positive (default) Negative can be added as accessory (dual polarity)
Power *	40W for high voltage power supply (higher power on request)
Current *	1 mA max
Arc and Short-circuit protection	Yes
Safety Interlock	Yes
Voltage Accuracy	± 2%
Voltage Stability	0,01% per 8h
Regulatory Approvals	Compliant to 2004/108/EC EMC Directive Compliant to 2006/95/EC Low Voltage Directive

* Fully customizable features

Syringe pump

Channels	1
Syringe	up to 60 mL
Infusion rates	from 0.73µL/hr (1mL syringe) to 1500mL/hr (60mL syringe)
Dispensing accuracy	+/- 1.00 %

Collector

Shape	square
Size	200[W] x 200 [D] mm
Material	stainless steel
Spinning Distance	50 ÷ 300 mm

Spinneret

Spinneret type	Single spinneret
Spinneret range size*	30G up to 10G
Length*	50 mm
Material	stainless steel

* Fully customizable features

Safety

Interlock system	On door opening, Safe/Normal mode
Emergency button switch	Mushroom red button
Fume extraction connection	NOT NEEDED
Filtering unit	TUV certified fume-hood with active carbon filter Maximum filtered volume 300 m ³ /h
In Force legislations	LVD 2014/35/UE 2006/42/CE

ORDERING DETAILS

Product code	EF200
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