

General Catalog 2024

Where
Innovative Technology
Begins

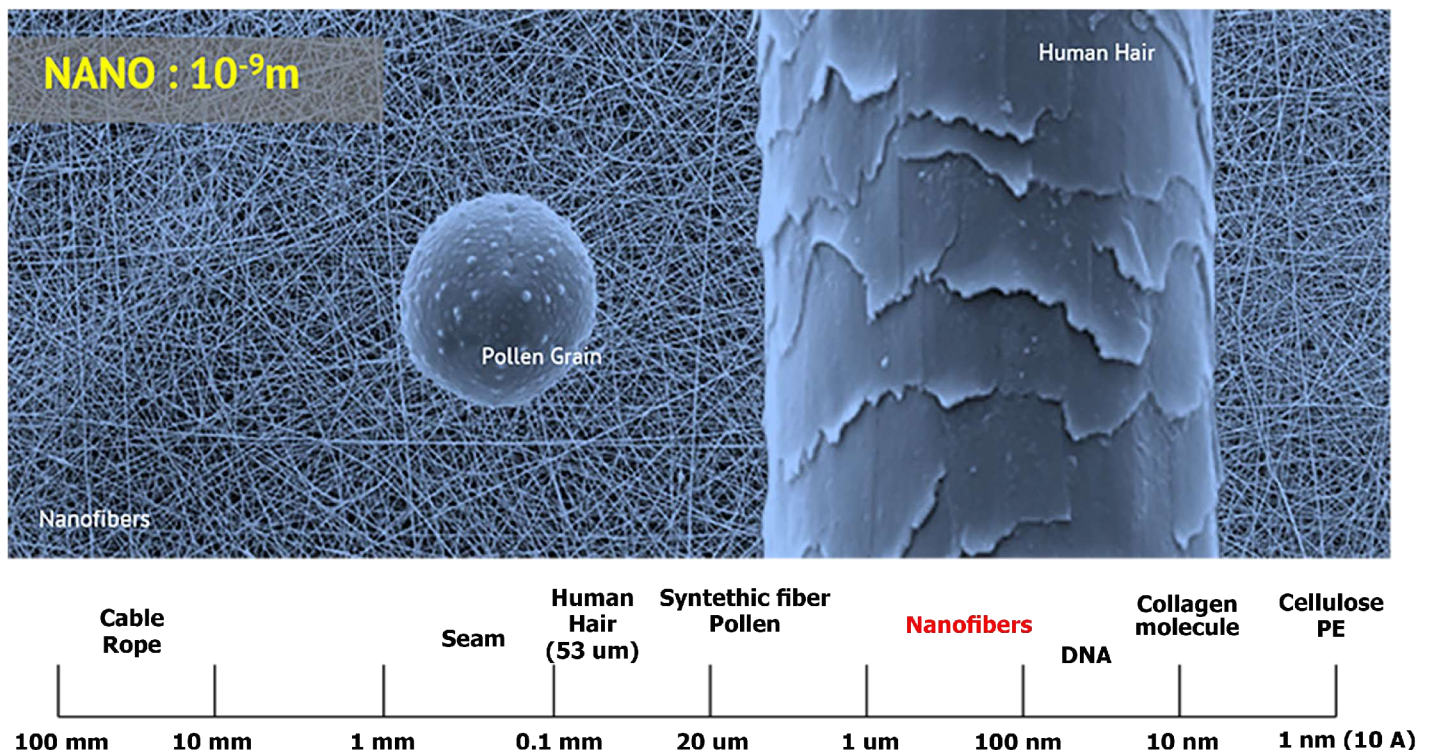


FNM CO.
Electrospinning and
Nanofiber Company

Introduction to the Electrospinning Process

Electrospinning is a manufacturing technique involving electrostatic driven process used to create electrospun fibers. The diameter of these fibers typically ranges between tens of nanometers to a few micrometers. One of the main advantages of the electrospinning technique is its versatility of processing to create fibers with multiple arrangements and morphological structures. The popularity of the electrospinning technique has allowed multiple technologies such as new filters, tissue engineering, regenerative medicine,

and encapsulation of bioactive molecules, to emerge and evolve over the past decade. These days the electrospinning technique is not just for academic research, but one with real commercial applications. Currently, multiple industries around the world have adopted this technique in the development of new product innovations. Some of the applications where electrospinning is being currently used are tissue engineering, drug delivery, food encapsulation, insulating materials, energy conversion and storage, air and water filtration, among others.





- ISO 9001:2015; ISO 10002:2014; ISO 14001:2015; BS OHSAS 18001:2007
- CE mark for lab-scale electrospinning machine
- VTT, DMT approved air filtration tests
- Nano scale certificates from INIC
- Third laureate of 25th Khwarizmi International Award, 2012 Tehran, Iran
- Prize of academy of science in developing countries (TWAS); UNESCO, 2012
- Second rank in Technology at 6th National Nano-Awards Festival, October, 2011, Tehran, Iran
- First laureate nano products award at 11th National Nano-Awards Festival, October, 2016, Tehran, Iran
- Award for high tech export at 12th and 13th National Nano-Awards Festival, 2017 and 2018 Tehran, Iran
- Award of the inventions and technology in the 27th Razi Research Festival awards winners on Medical Sciences (2021)
- Selected Company in the 25th IRAN National Exports Day ceremony (2021)
- First prize of International Technology Transfer Award, of the D8 Group in Turkey, 2022.
- Selected as one of the top 6 five-star (highest rank) knowledge-based export companies in Iran, 2022.



FNM Co. Ltd., established in 2004, is a knowledge-based company at the forefront of advancing nanofiber technology and its diverse applications. We design and manufacture electrospinning machines for lab and industrial scales, along with blown electrospinning systems, complete with essential accessories such as high-voltage power supplies and syringe pumps, ensuring comprehensive solutions for our clients. Our lab-scale electrospinning machines are ideally suited for R&D in ceramic, polymer, and composite nanofibers, offering competitive pricing without compromising quality. In large-scale applications, our technology plays a key role in coating filter papers with polymeric nanofibers, enhancing filtration efficiency and extending filter lifespan without increasing pressure levels. These machines have been successfully exported worldwide, and our nanofilters meet rigorous quality standards, which are certified by respected institutions such as VTT (Finland) and DMT (Germany). FNM's expertise encompasses the production of respiratory face masks, air and oil filters for power plants and automotive applications, window screens, vacuum cleaner bags, cosmetic face masks, wound dressings, and more—all utilizing electrospun nanofibers. Our cutting-edge research and development department is equipped with state-of-the-art tools, including Scanning Electron Microscopes (SEM) and advanced electrospinning machines, allowing us to continuously drive innovation in nanofiber technology. This commitment to innovation ensures that every product we deliver meets the highest standards of quality and performance.

High Voltage Power Supply

High voltage power supplies (HVPS), manufactured by FNM Co., are designed to be compact and lightweight, making them suitable for demanding laboratory and OEM applications such as capacitor testing, free-electron lasers, ion implantation, physical vapor deposition, capillary electrophoresis, electrospinning, ion-beam assisted deposition, and ion sources. These power supplies also feature a 1000:1 voltage monitor that is compatible with most common handheld voltmeters. Additionally, the capacitors are fully encapsulated in solid resin to protect against humidity and environmental factors.

FNM HVPSs series

D-RC Series	OC Series	OV Series
HV35P D-RC	HV35P OC	HV35P OV
HV50P D-RC	HV50P OC	HV50P OV
HV35N D-RC	HV35N OC	HV35N OV
HV50N D-RC	HV50N OC	HV50N OV

HV35P OC: High Voltage 35kV, Positive, OC series

- The **OV Series** only has an output voltage indicator with an accuracy of 0.1 kV.
- The **OC Series** includes an output voltage indicator (accuracy = ± 0.1 kV) and an output current display (accuracy = ± 1 micro-amp).
- The **D-RC Series** is equipped with a standard USB connector for digital remote control via the Windows Operating System, offering 10-bit resolution. This means that a maximum voltage of 50 kV is divided into 1024 segments, resulting in approximately 50 V per bit (50,000 V / 1024).

Typical Applications

- Electrospinning
- Capillary electrophoresis
- Capacitor testing
- CRT display testing
- Free-electron lasers
- Photomultipliers
- Ion sources
- Biasing
- Dielectric Testing
- Piezoelectric Drivers
- Electrostatic Chucks
- Sealing Applications
- Inkjet Printers
- Photo Detectors

Features:

High-Frequency Switch-Mode Circuit Design: The HVPS design topologies are based upon switch mode power conversion technology while operating at high frequencies. The "switcher" is the preferred design for many industrial and medical applications due to its desirable combination of high efficiency, small size, low weight, and increased safety for high-voltage supplies.

Arc Sensing Circuitry (Optional): Proprietary arc sensing circuitry will suppress arcing conditions that can occur in high-voltage applications, providing maximum safety and protection for both the power supply and the user.

Software: The D-RC Series High Voltage Power Supply includes control software and accessories, providing all the connectivity right out of the box. After installing the control software on a Windows-compatible computer, the D-RC HV unit is "plug and play". The user simply enters the desired output voltage and clicks the start button. The power supply is activated, and continuous read-back of the high voltage is displayed. The USB interface is accessed via a Windows USB driver through a standard communications port.

Specifications:

Weight: About 5 kg

Output: Continuous, stable adjustment, from 0 to the desirable voltage by panel-mounted 10-turn potentiometer (OC and OV series) or by a digital volume (D-RC Series).

Dimensions: OC and OV: 34 × 38 × 12 cm, D-RC: 34 × 43 × 12 cm

Input: 100-240 V AC, single-phase

Power: 25 Watt

Working Temperature: -5 to +45 °C

Voltage Monitoring: Accuracy: 0.1 kV

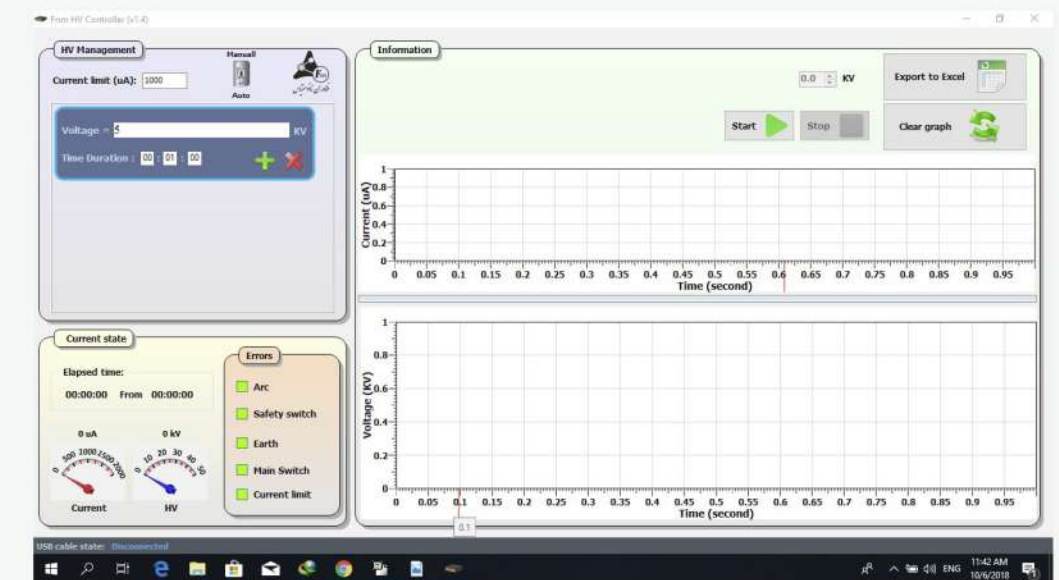
Current Monitoring (OC and D-RC series): Accuracy: 1 μ A

Arc detector: in D-RC series

Polarity: Available either positive or negative

Warranty: 1 year for manufacturing defects

These HVPS are not suitable for producing sparks and plasma.



DRC Series



OV Series



OC Series

Syringe Pump

FNM syringe pumps are designed as a low-cost unit, capable of holding 1 to 6 syringes of any make from 100µl to 60ml. These syringe pumps are ideal for delivering accurate and precise amounts of fluids for a multitude of syringe pump applications including electrospinning, infusing calibration into a mass spectrometer or reaction chamber, long term drug infusion to animals and general infusion applications.



SP102 TPH



SP102 LPM



SP204 TPH

Software Description (windows platform)

The programming functions of HSM series provide powerful capabilities for advanced experiments. While in program mode, the pump could perform the following tasks at a predetermined time or when prompted by a signal from an external device:

- Start or stop pumping (injection)
- Change pumping (injection) direction (infuse-withdraw)
- Change flow rates
- Pump (Inject) a precise volume and stop
- Ramp up or down flow rates
- Inject in a desired formula

In the “Program” mode, the above-mentioned tasks could be linked together into powerful programs to simplify your automation projects. (commands are available)

	SP102	SP102	SP102	SP106	SP101	SP102	SP106	SP202	SP203	SP204
	LOM	LPM	LSM	LPM	TPH	TPH	TPH	TPH	TPH	TPH
Number Of Mechanical Systems	1					2				
Control and Monitor	Micro/LCD (4-line, 20-character)					PLC/HMI (4.3" Touch Screen)				
Internal Programming / Autofill / Refuse	-	P	P	P	P	P	P	P	P	P
Computer Connection (USB)	-	-	P	-	-	-	-	-	-	-
Maximum Syringe Numbers (Channels)	2	2	2	6	1	2	6	1 + 1	1 + 2	2 + 2
Linear force (kg to each pedal)	25	25	25	25	50	50	50	50	50	50
Micro steps per one rev.	25600					20000				
Pedal resolution per step (µm/µstep)	0.05					0.15				
Minimum Syringe Diameter (mm)	1	1	1	1	5	1	1	5	1	5
Maximum Syringe Diameter (mm)	29	29	29	29	46	29	29	46	46	46
Maximum Syringe length (mm)	130	130	130	130	130	130	130	130	130	130
Minimum Flow Rate (ml/h)	0.001	0.001	0.001	0.001	0.05	0.01	0.01	0.05	0.01	0.05
Maximum Flow Rate (ml/min)	100	100	100	100	450	180	180	450	450	450
Size (cm)	22×21×16	22×21×16	22×21×16	22×31×16	26×24×19	26×24×19	26×34×19	26×37×19	26×37×19	26×37×19
Weight (kg)	4	4	4	5	6.7	6.7	7.5	11	11	11
Warranty (Months)	18	18	18	18	18	18	18	18	18	18

FNM Syringe Pump nomenclature:

SP~~X~~YY ABC

X: one mechanical system (**1**), two mechanical systems (**2**)

YY: Max. Syringe lines (**1, 2, 4 or 6**)

A: PLC control with touch screen (**T**), micro control with LCD (**L**)

B: Not programmable (**O**), Internal programmable (**P**), Software and internal programmable (**S**)

C: Medium pressure (**M**), High pressure (**H**)

Common and Best-Selling Syringe Pump Models:

SP102 LPM: Syringe pump with 1 motor, maximum 2 syringes, micro control and LCD, internally programmable, medium pressure

SP102 TPH: Syringe pump with 1 motor, maximum 2 syringes, PLC control, and touch screen, internally programmable, high-pressure

SP204 TPH: Syringe pump with 2 mechanical systems, maximum 4 syringes, PLC control, internally programmable, high-pressure

SP101 TPH: Syringe pump with 1 mechanical system, maximum one syringe, PLC control, internally programmable, high-pressure

SP202 TPH: Syringe pump with 2 mechanical systems, maximum 2 syringes, PLC control, internally programmable, high-pressure

Specifications:

Input Power: 100-240V AC, 50-60 Hz.

Number of Syringes: Up to 1 (SP101 series) / Up to 2 (SP102 series) / Up to 6 (SP106 series)

Display: 4 lines, 20 characters LCD display or 4.3 Touch screen panel

Nonvolatile Memory: Stores syringe inner diameter, rate, target volume, programs and settings

Syringe Type: Plastic, metal or glass

Minimum Flow Rate: 1 µl/hr using a 10µl syringe (barrel diameter: 1 mm)

Maximum Flow Rate: 100 ml/min and 450 ml/min

Linear Force (Max): 25 kg (in M series); 50 kg (in H series); measured at the 120 ml/hr injection rate

Drive Motor: 1.8° Stepper Motor

Motor Drive Control: Microprocessor with 1/128 micro stepping

Connectors: USB (S Series)

Operating Temperature: 0 – 45 °C

Storage Temperature: 0 – 45 °C

Method of Operation: Continuous

Warranty: 18 months

Not for clinical uses

Typical Applications:

- Cell injection
- Controlled drug injection
- Electrospinning
- Controlled reactive injection into the reactor
- Lab on a chip



SP110 LPM



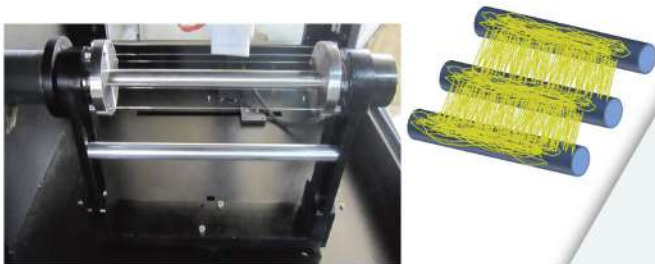
Electrospinning Accessories



Rotating Cylindrical Collector
In electrospinning, a rotating collector is employed to produce a uniform nanofibrous mat. This collection module features a rotating drum equipped with a rotation speed control and a display unit. By utilizing this type of collector, randomly/oriented nanofibers are deposited onto the surface of the drum.



Disk Collector
Using this collector, nanofibrous threads or highly aligned nanofibers can be formed. Additionally, the impact of linear speed on fiber formation can be investigated.



Rotating Parallel Wire Collector
The rotating Parallel wire collector is utilized to produce aligned nanofibers. It consists of thin stainless-steel wires arranged equidistantly from the axis of the rotation. When the collector rotates at very low speeds, fibers are also deposited between the conductive wires. The mechanism for forming aligned fibers is similar to that of a static patterned collector. At higher speeds, the combination of electrostatic and mechanical forces enhances the alignment of individual fibers.



Mandrel Collectors
The mandrel collector is a device designed for producing tubular nanofibrous mats. It consists of a stage, a controller, and a set of interchangeable mandrels. The rotating mandrel collector can function as a standalone unit or could be integrated into a lab-scale electrospinning machine. This product includes six mandrels with diameters of 2, 4, 6, 8, and 10 mm.



Wet Collector
The wet collector is designed for electrospinning of polymers that cannot be dissolved in conventional solvents. A typical example of such polymers is cellulose. The common solvent for cellulose is liquid crystals, which do not evaporate during the jet's travel. Instead of evaporation, a coagulation mechanism is employed to produce nanofibers from the electrospinning jet. To achieve this, a solution bath is used in conjunction with the rotating drum to solidify the jet and yield the final fibers.



Rotating Cylinder Collector Connected to High Voltage with Negative Polarity
In electrospinning, a cylindrical drum collector connected to a high voltage source with negative polarity is utilized to enhance the collection and alignment of nanofibers. This collector consists of a rotating drum that allows for the deposition of electrospun fibers onto its surface, creating a uniform nanofibrous mat. The application of negative voltage facilitates the attraction of positively charged polymer jets, ensuring efficient collection of the fibers as they are emitted from the electrospinning nozzle.

Specifications*					
Collector type	Cylinder Collector	Disk Collector	Wet Collector	Wire Collector	Mandrel Collector
Application	Producing uniform nanofibrous mat	Producing parallel (aligned) fibers/fibrous threads	Wet electrospinning of polymers such as cellulose	Producing parallel (aligned) fibers	tubular structures (artificial vessel, etc.)
Input power	100-240 V AC; 50-60 Hz				
Rotation speed	300 to 3000 rpm	300 to 3000 rpm	5 to 50 rpm	250 to 2500 rpm	250 to 2500 rpm
Length of collector	30 cm	N/A	16 cm	25 cm	20 cm
Collector diameter	8 cm	19.8 cm	10 cm	8 cm	2, 4, 6, 8 and 10 mm
Speed control	10-turn potentiometer				
Display	2 × 16 character LCD				

Lab-Scale Electrospinning Machine (Electroris)

Electroris is a lab-scale electrospinning machine designed to prepare polymeric, carbon, and ceramic nanofibers with a diameter range of 50 nm to several microns. There are two models available: The Standard model and the Dual Pump model (Side by Side Electroris).

The Standard model is equipped with a single syringe pump, making it suitable for straightforward electrospinning applications. In contrast, the Dual Pump model features two syringe pumps positioned on either side of the rotating collector drum. This configuration allows for the simultaneous electrospinning of two different materials, enabling the production of composite nanofibers.

For example, polymeric materials can be electrospun from one side while delivering additives, such as medications, from the other. This versatility makes the Dual Pump model particularly well-suited for pharmaceutical, medicinal, and biological applications.

Both models are designed with a metallic body and include a syringe pump, spinneret system, collector system, and high-voltage power supply. The machines are equipped with a touchscreen panel for controlling various electrospinning parameters, including injection rate, electrospinning distance, collector drum speed, working temperature, and operational time. Additionally, Electroris incorporates advanced safety features to ensure user safety when handling high-voltage power supplies and chemical solvents.



Main Features

- Advanced safety features
- Easy operation and maintenance
- Reliable performance
- Modular design
- 4.3- touch screen HMI panel
- Emergency stop button to halt the machine in any unexpected situation

General Features

Chassis: Metallic body with three doors for easy access

Input power: 100-240 V AC/50-60 Hz

Ventilation: A programmable fan adjustable by HMI panel

Heating system: Adjustable from ambient temperature up to 45°C through the HMI panel

Heater: 1000W, 4A

Safety: Voltage cut-off in case of door opening

Dimensions (L×W×H):

- **Standard:** 88 × 76 × 87 cm
- **Dual pump:** 131 × 80 × 96 cm

Weight: Standard: 110 kg; Dual pump: 160 kg



Spinneret

Number of syringes:

- **Standard:** 1 or 2;
- **Dual pump:** Up to 4 syringes

Configuration: Horizontal (No need for hose)

Scanning rate: 0-30 mm/s

Scanning range: 0-30 cm

Syringe pump injection rate: 10 µl/h to 500 ml/h

Usable syringe size: 1-25 mm (Inner Diameter)

Accessories (Optional): Co-axial nozzle with tube

Collector

Type: Rotating drum (wire, cylinder, mandrel, and disk collectors are optional)

Material: Stainless steel

Rotation speed: 300-3000 rpm

Spinning distance: 5-20 cm

Size:

- Cylinder: 8(ø) cm × 30(L) cm
- Plate: 25(L) cm × 25 (W) cm
- Wire (Optional): 8(ø) cm × 25(L) cm
- Disk (Optional): Diameter: about 20 cm
- Mandrel (Optional): Length: 25 cm; Diameter: 2, 4, 6, 8 and 10 mm
- Negative Collector: Attachable to negative high voltage power supply up to -35 kV (Optional)

High voltage power supply

Model: HV35P OV

Max. output voltage: 35 kV

Power: 25 Watt

Voltage monitoring: Digital, Accuracy: 0.1 kV

Body: Durable metal casing

Two high-voltage power supplies are installed for the dual pump series

Control

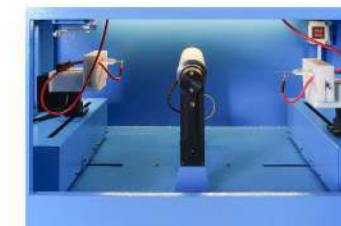
Type: PLC

HMI: 4.3" touch screen

- Start and end position of the nozzle(s)
- The injection rate of a syringe pump(s)
- Electrospinning distance(s)
- Electrospinning time
- ON/OFF timer for ventilation fan
- Drum ON/OFF switch (RPM controller) in standard series, and RPM control from HMI in dual pump series
- Temperature control
- Humidity indicator (Dual pump series)
- Alarm after completing the desired injection volume or running out the solution in the syringe (after the operation of the syringe pump switch)



Single pump electrospinning machine



Dual pump electrospinning machine

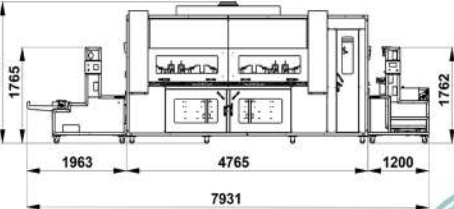
Industrial Electrospinning Machine



Industrial Nanofiber Production Line (INFL)

FNM Industrial Nanofiber Production Line (INFL) is an industrial-scale machine designed to produce polymeric and ceramic nanofibers for a variety of applications. It can accommodate 1 to 6 electrospinning units based on the customer requirements. The INFL allows for precise control of electrospinning parameters, including spinneret and collector settings, working distance, substrate linear movement speed, working temperature, and operation time, all managed through an integrated

advanced control system. The machine offers excellent user safety in handling high-voltage power supplies and chemical solvents. Using this production line, nanofibers can be deposited onto various substrates at an industrial scale, making it particularly effective for producing nano-filters and nano-respiratory facemasks. The nanofiber coating rate ranges from approximately 50 to 800 meters per hour depending on the number of electrospinning units utilized.



INFL6100B

FNM INFL nomenclature:

INFLXXXX

X: Number of electrospinning units (1, 2, 4 or 6)

YYY: Maximum electrospinning width (60, 100 or 160 cm)

Z: (B) Blown System; (C) Cartridge System

INFL260C: Industrial Nanofiber Production Line, 2 units, Max width: 60 cm, Cartridge System

INFL4100B: Industrial Nanofiber Production Line, 4 units, Max width: 100 cm, Blown System

INFL6160B: Industrial Nanofiber Production Line, 6 units, Max width: 160 cm, Blown System



Model	Units	Width (cm)	Nozzels	Autofill	Dryer section	Coating Speed for F8 Filter (m/h)	Coating Speed for F9 Filter (m/h)	Coating Speed for PFE80% (m/h)	Coating Speed for PFE95% (m/h)	media for 80% mask Per an hour (pcs)	media for 95% mask Per an hour (pcs)
INFL260B	2	60	8	✗	✗	220	150	150	100	2250	1500
INFL2100B	2	100	16	✓	✓	210	140	140	95	3500	2375
INFL4100B	4	100	32	✓	✓	400	290	290	190	7250	4750
INFL4160B	4	160	48	✓	✓	380	270	270	180	10800	7200
INFL6100B	6	100	48	✓	✓	620	420	420	280	10500	7000
INFL6160B	6	160	72	✓	✓	580	400	400	260	16000	10400

* PFE: filtration efficiency for 0.3 µm NaCl particles

* F9: Initial filtration efficiency for 0.4 µm NaCl particles is more than 80%

Systems, Control Systems, and Panels:

- PLC system for controlling operating conditions
- Two 10" Human Machine Interfaces (HMI)
- Independent control of electrospinning parameters for each spinning unit
- Utilization of both positive and negative high voltage power supplies to achieve optimal electrospinning condition
- Blown System:
 - Controls air pressure
- Scan System:
 - Controls scan speed
 - Controls the start and end position of the spinnerets
- Displays humidity in the chambers
- Advanced digital high-voltage control systems
- Emergency stop button for safety

Input Power:

- 380 volts, three phases, 50-60 Hz
- Single Phase: Optional

Power Consumption:

- Heater System: Maximum 2.25 kW
- Dryer: Maximum 2.25 kW
- Control and High Voltage: Maximum 3 kW

High Voltage:

- 0-35 kV DC, positive polarity, precisely adjustable
- 0-35 kV DC, negative polarity, precisely adjustable
- Digital voltage monitoring (accuracy: 0.1 kV)
- Independent control for each unit
- Control by HMI
- HV's current limit to minimize the risks

Collector:

- Stainless steel plate for static fibers collection or rotating drum for coating desired substrates
- Working distance: 7-17 cm
- Rotating speed: 0-50RPM (synchronized with substrate)
- Diameter: 17 cm

Heating System:

- From room temperature up to 45 °C

Ventilation:

- Solvent removal from the chamber using a ventilation fan with a programmable operation time

Dryer System:

- Substrate dryer chamber with temperature control

Substrate Winder:

- The servo motor control system
- Substrate speed: 1 to 50 or 50 to 800 m/h
- Maximum substrate width options: 60, 100, or 160 cm
- Edge control system
- Tension control system
- Substrate cutting section (Optional)

Case:

- 6 doors for easy access to all parts of the system

Weight:

- Varies by model and (from about 1500 for INFL260 to about 4000 kg for INFL6100)

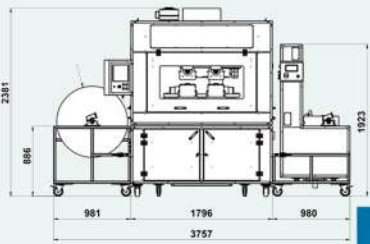
Dimension:

Varies by model:

- Length: 370 - 800 cm
- Height: 220 - 260 cm
- Width: 210 - 250 cm

Nanofiber Diameters:

- 60 to 500 nm



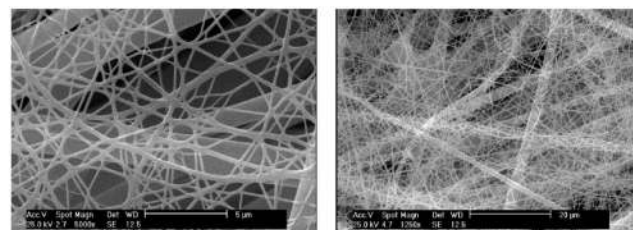
INFL260B



We design and produce in order to support you

High level technical consulting
Cross competences in several industrial sectors for an effective problem-solving

Nanofibers coated on a substrate



**Over 14 years of know how
in design and production**

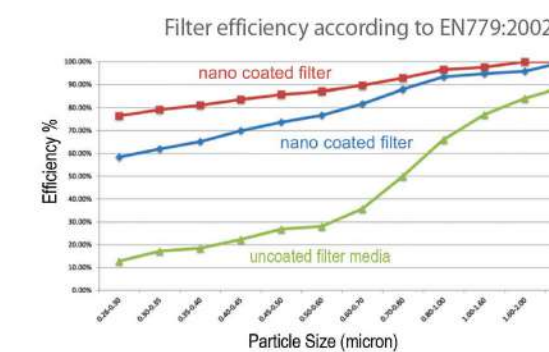
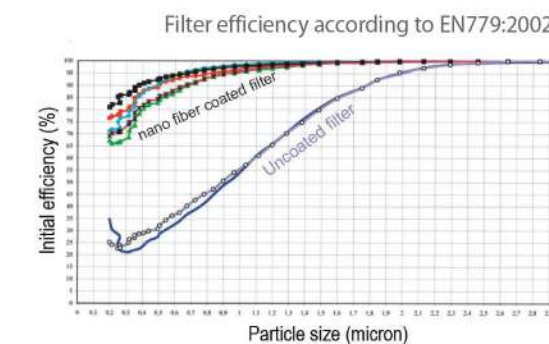
Collaboration

Values

Solutions

Applications

From a full range of standard products to fit-to-customer solution for best performance





VIT KEMPET SERVICES LTD

TEST REPORT NO. VTT-05-0145-12

Ap

EN 779:2002. AIR FILTER TEST RESULTS

GENERAL

Test no.	122476	Test date	28.6 and 16. 17.2012	Inspector	RIHO
Test requested by	Behrman Filter Co.			Device notation	
Device delivered by	Behrman Filter Co.				16.5.2012

DEVICE TESTED

Model	Gas Turbine Air Filter V90-2	Manufacturer	Behrman Filter Co.	Construction	Cylindrical filter
Type of media	Hot adhesive filtering mat				Filter dimensions (diameter x length) (The length dimension is optional)
	90-40 EPE K WEG G NANO		19 m ²		325 mm x 524 mm

TEST DATA

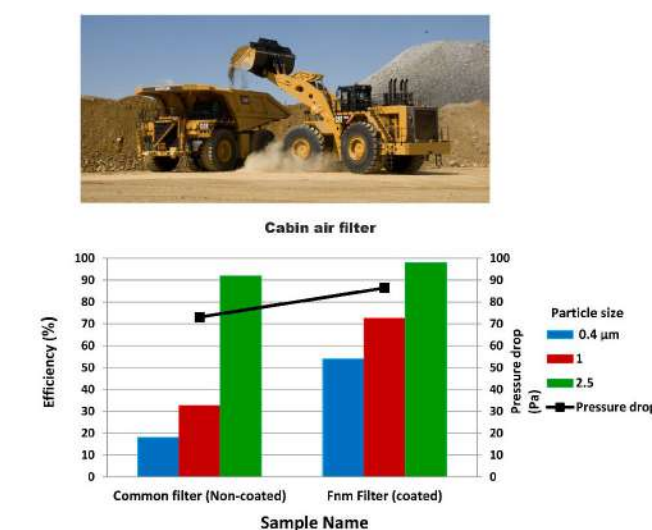
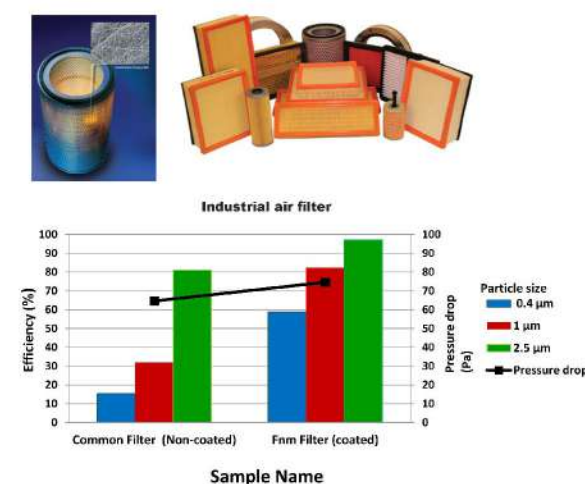
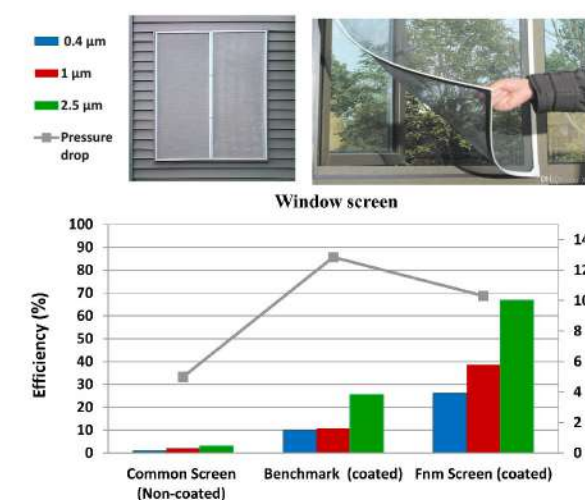
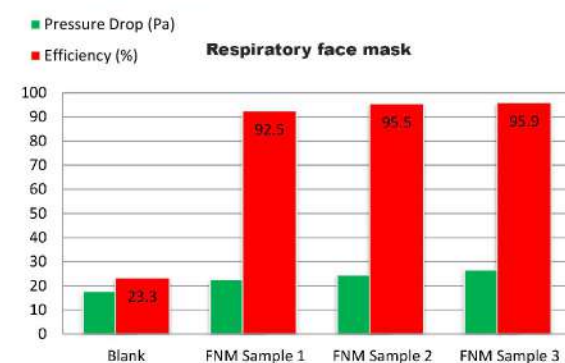
Test air flow rate	0.347 m ³ /s	Test air temperature	24 - 25 °C	Test air relative humidity	38 - 43 %	Test dust	DEHS	Sampling rate	ASHRAE
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RESULTS

Initial pressure drop	230 Pa	Initial temperature	-046 °C	Initial efficiency (0.3 µm)	22 %	Test holding capacity	8 / 2282 / 504 g	Extremal dust discharge	Low efficiency (0.3 µm)
Final pressure drop	220 / 230 / 450 Pa	Average temperature	-099 / -099 / -099 °C	Average efficiency (0.3 µm)	79a / 97 b / 99b-0 %	Filter dust (100 Pa)	F9 (0.347 m ³ /s)	Extremal dust capture	Non Applicable

NOTE:

The performance results given by themselves be quantitatively applied to predict filter performance in service.



Filter Test Machine/Air Permeability Tester

FNM's filter test machines (FT150PA, FT200PO and FT200PS) can determine the efficiency, pressure drop and air permeability of different flat sheet filter media using oil / salt aerosols or atmospheric dust. Our filter test machines can be employed for testing different flat sheet media which are used to produce respiratory face masks and air filters.



Technical Specifications of Air Permeability Tester Machine

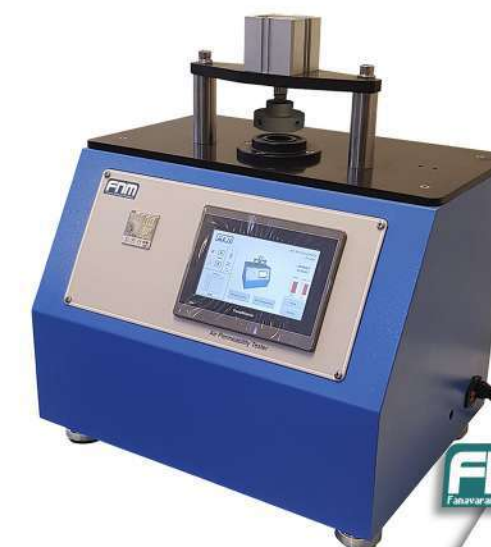
Specification	Acceptance Criteria
Tests	1. Pressure drop (respiratory resistance) 2. Air permeability Flat sheet with maximum area of 5 cm ²
Aeration measurement range	1..... 1666 l/m ² /s @ 2 cm ²
Displayable units	l/min, CFM, l/m ² /s, cm/s, ft ³ /ft ² /s
Calibration method	Manual
Aerosol generator flow	Adjustable from 1 – 20 l/min through the panel
Design	Minimum leakage, ergonomic
Sensors	Temperature, relative humidity, pressure
Sample fixture (cm ²)	Flat sample (circular holder with area of 1, 4 and 5 cm ²)
Differential pressure sensor range (Pa)	0 – 1000 Pa
Control	PLC
User interface	HMI (7" touch screen)
Data report	Display on the HMI screen, the machine is able to print the reports (printer is optional)
Presentable information	Flow rate, temperature, relative humidity, pressure drop, air permeability
Chassis	Steel profile with electrostatic paint
Body	Steel sheet with electrostatic paint
Time of the first test	Less than 1 minute
Continuous test operation cycle (hours)	24 hours / 7 days
Compressed air source requirements	Air compressor (tank capacity: 50 l)
Input power	110-240 V, single phase, 50 – 60 Hz

Filter/Mask Test Specifications

		FT150EA	FT200PO	FT200PS
Test Modes	Pressure drop test	✓	✓	✓
	Air permeability test	✓	✓	✓
	Filtration efficiency test	Atmospheric	Atmospheric and oil aerosols	Atmospheric, oil and salt aerosols
	Bubble point	Optional	Optional	Optional
Control	PLC	✓	✓	✓
	HMI (Touch Screen)	7"	7"	7"
Air flow	Mass Flow	1 - 150 l/min	1 - 200 l/min	1 - 200 l/min
	Digital control	✓	✓	✓
Media Holder	Test area	4.9, 20, 25, 38, 50 and 100 cm ²	4.9, 20, 25, 38, 50 and 100 cm ²	4.9, 20, 25, 38, 50 and 100 cm ²
	Temperature	✓	✓	✓
Sensors (Transmitters)	Relative humidity	✓	✓	✓
	Digital tank pressure control	✗	✓	✓
Air Compressor	Tank pressure	1 – 8 bar	1 – 8 bar	1 – 8 bar
	Pressure drop	0 – 1000 Pa	0 – 1000 Pa	0 – 1000 Pa
Pressure Drop	Digital control	✓	✓	✓
	Airline trap	✓	✓	✓
Air Dryer	Dryer system	Optional	Optional	Optional
	Laser particle counter	1	1	1
Particle Counter	Channels	four-channels	four-channels	four-channels
	Channel sizes	0.3, 0.5, 1.0, 3.0 µm	0.3, 0.5, 1.0, 3.0 µm	0.3, 0.5, 1.0, 3.0 µm
	Flow rate	2.8 L/min	2.8 L/min	2.8 L/min
Aerosol Generator (Oil)	Generator	✗	✓	✓
	Particle dilution	✗	100:1	100:1
Aerosol Dilutor	Type of aerosol challenge	✗	Paraffin, PAO, DOP	Paraffin, PAO, DOP
	Generator	✗	✗	✓
Aerosol Generator (Salt)	Neutralizer	✗	✗	✓
	Printer	Optional	Optional	✓
Respiratory Face Mask Holder (3D masks)	Optional	Optional	Optional	✓
	Input Power	Single phase, 220 V, AC	Single phase, 220 V, AC	Single phase, 220 V, AC
Weight	About 170 kg	About 180 kg	About 180 kg	About 180 kg
Size (cm) (Length × Width × Height)	94×92×163	94×92×163	94×92×163	94×92×163

Standards

BS EN 149
BS EN 779
US 42 CFR 84
ISO 16890
ISO 16900-3
ISO 11155-1
ISO 5011



Capillary electrophoresis

Capillary electrophoresis (CE) is a separation and analytical method of which the differential migration rates of sample components is caused by an applied electrical field within a capillary, small-diameter polyimide coated fused silica capillary tube usually. "On-column" UV spectrometric or fluorescence analysis is usually used for detection of sample components through a "window" in the capillary. CE is a powerful technique having a wide range of applications including; analysis of proteins, peptides, chiral compounds, pharmaceuticals, inorganic ions, and specially sizing and characterization of nanomaterials.

Fnm's Capillary electrophoresis (CE) is designed based on its minimal sample and solvent requirements, rapid analysis time and high efficiency and resolution useful in many

laboratories. It covers a broad range of applications in a wide variety of industries. Some of its main application fields include: i) food analysis, ii) pharmaceutical analysis, iii) bioanalysis, iv) environmental pollutants analysis, and v) nanomaterial analysis.

Principle of operation

Capillary electrophoresis (CE) is a family of related separation techniques that use narrow-bore fused silica capillaries to separate a complex array of large and small molecules.

High voltages are used to separate molecules based on differences in charge, size and hydrophobicity. Injection into the capillary is accomplished by immersing the end of the capillary into a sample vial and applying pressure, or voltage. Separated solutes are quantitatively detected at the capillary outlet by high sensitive optical system based on UV-Vis absorbance.

Features and Benefits

- High separation efficiency
- Short analysis time
- Low sample and electrolyte consumption
- Low waste generation
- User friendly Software: Complete control of the instrument from a PC



Powerful software package

- Increased flexibility in performing analyses of various complexity
- Any kind of complex runs are possible including those with pre-programming of changes in analysis conditions
- Customized report, data export to other programs

Extended instrumental options

- Spectra scanning facilitates peak identification
- Broad range of controlled pressure injection permits analysis of viscous samples

Analytical characteristics

Power voltage range

- Adjustable 1 to 20 kV high voltage power supply
- Operation under constant voltage
- Show current (μA)

Autosampler

- A 16-position carousel.
- All vials are randomly accessible from electrodes end of capillary.

Detectors

- CE 1000 is equipped with variable wavelength UV-detector
- Wavelength range 200 - 1100 nm.

Light source

- Halogen lamp (Visible and near IR)
- Deuterium lamp (UV light)

Vials

- Standard 1.5 ml
- Minimum sample volume 500 μl .

Injection modes

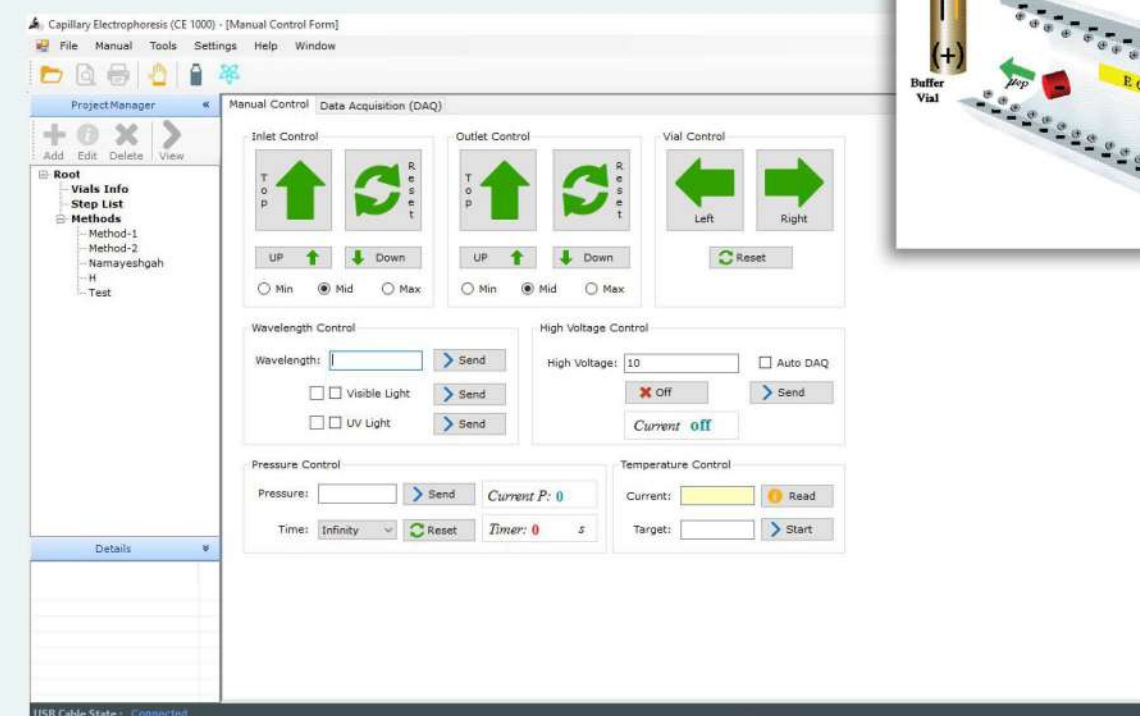
- Controlled pressure profile injection with variable peak pressure, programmable peak pressure range being 20 - 100 mbar
- Electrokinetic (1-5kV)
- Programmable injection time

Pressure system

- Programmable with 20-100 mbar for injection, washing and flushing with maximum 1 bar.

Analysis

- Voltage range settable from 1 to 20 kV
- Current from 0 to 500 μA



Software features

- Real time electropherogram visualization
- electropherogram data processing
- Computation of electrophoresis system parameters
- Customized report output (hard copy and file), data exchanges with worksheets, databases and word processors
- Wave scan

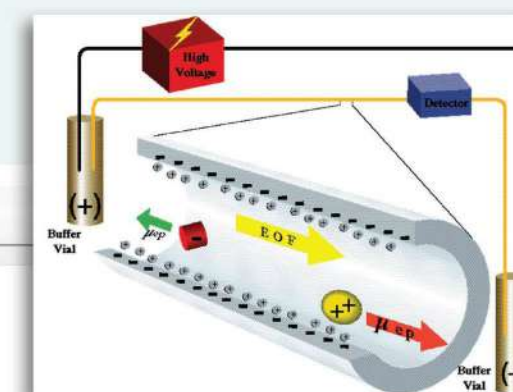
Safety features

Disabling high voltage function:

- Over current limit
- Earth detection system
- Arc detection system
- Safety sensors at cover

Areas of application

- Food analysis
- Environmental pollutants analysis
- Chemical industry
- Pharmaceutical analysis
- Bioanalysis



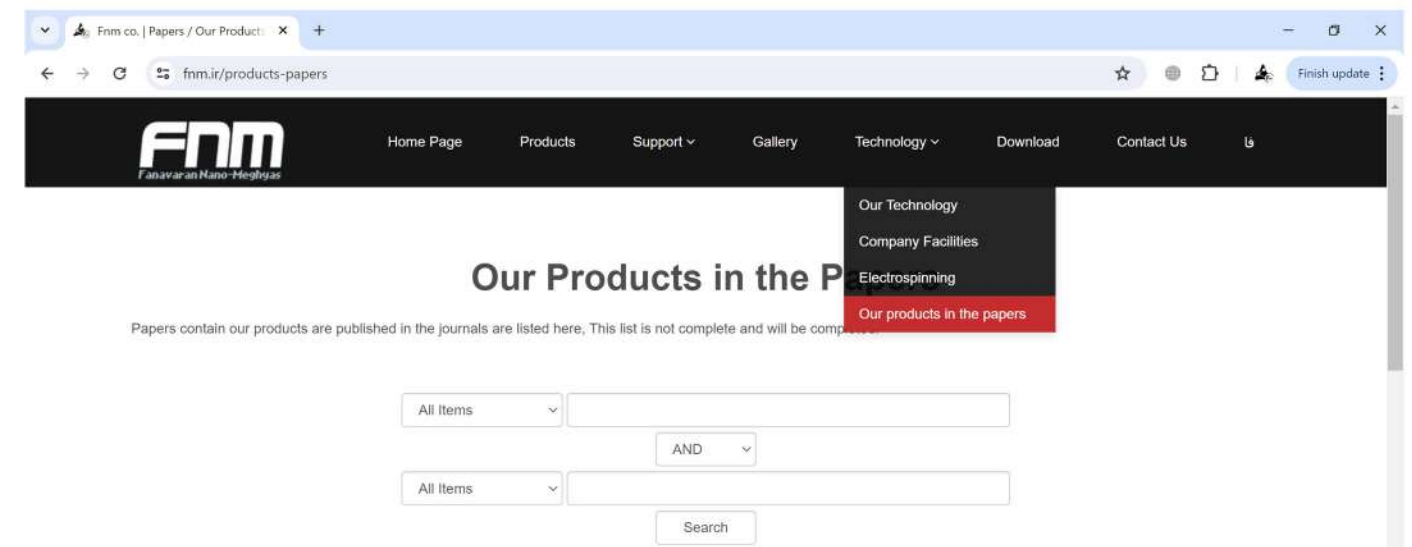


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