

TL-Pro

Electrospinning System

Professional Laboratory Unit

SHENZHEN TONGLI TECH CO LTD



System Features



01

Versatile Configuration

A wide range of spinnerets and collectors for high-quality nanofiber membranes.

02

Bipolar High Voltage

Coordinated positive and negative HV for diverse fiber morphologies and composites.

03

Intuitive Control

Touchscreen and quick-access buttons for straightforward operation.

04

Uniform Electric Field

External components reduce field interference and improve membrane uniformity.

05

Easy-Clean Chamber

Accessible chamber surfaces minimize dust buildup and hard-to-clean areas.

06

Service & Support

One-year full warranty followed by a two-year limited warranty, lifetime maintenance support.

Enclosure Design

01

Metal enclosure with a corrosion-resistant coating and insulated inner walls

02

Viewing windows on two sides for easy observation of the spinning process

03

External components promote a uniform electric field

04

Imported 10-inch touchscreen and quick-access control buttons

05

Temperature and humidity control with displays and integrated lighting

06

Air inlet and exhaust system for uniform airflow



Bipolar HV Power Supplies

±30–50 kV

Multiple Protections



Regulated HV | Adjustable output | Fault protection



Compact, stable and precise
Integrated touchscreen
or standalone control



Continuously adjustable
linear output
Metal enclosure
for electrical shielding



Overvoltage, overcurrent,
arcing and
short-circuit protection



Local or remote computer
control and monitoring,
with start/stop functions



Low EMI and strong
interference immunity

Touchscreen Control System

Centralized settings, process monitoring and parameter logging

01

Controls HV supplies, syringe pumps and spinneret motion

02

Controls the rotating collector

03

Adjusts operating parameters while the system is running

04

Logs process parameters and coordinates motion units

05

Stows at the side of the enclosure when not in use



Dual-Channel Insulated Syringe Pump

Servo-driven, independent channels for stable solution delivery



Effective electrical insulation for reliable operation under high voltage



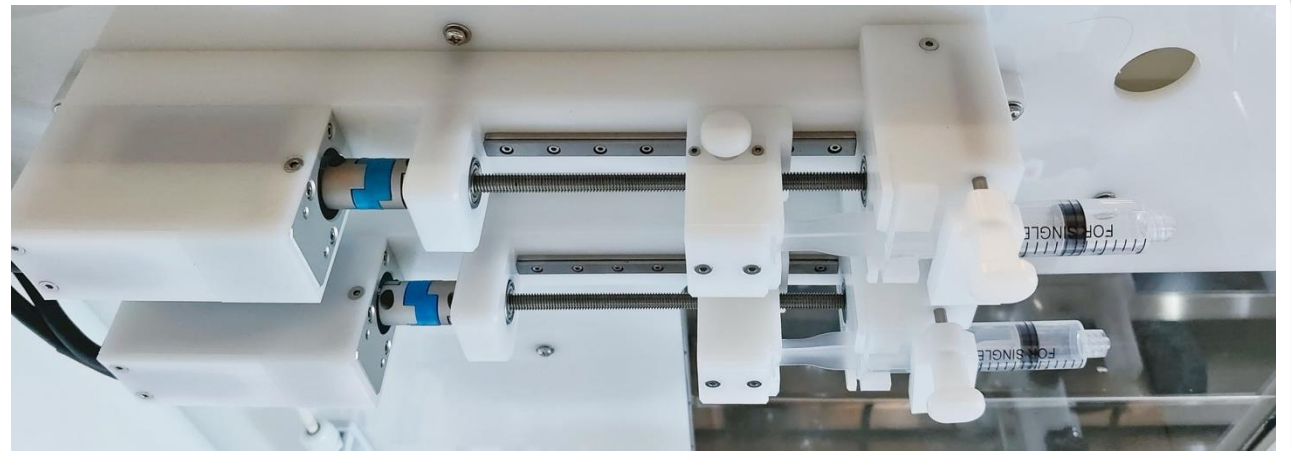
Precision servo drive with high thrust for high-viscosity liquids



Two independent channels with individually adjustable feed rates



Internal or external syringe pump configurations available



Optional upgrade: 4–8 pump channels

Dehumidification System

Gentle dry-air delivery stabilizes the spinning environment

01

Compact compressor
with effective dehumidification

02

Standard dehumidifier: down to approx.
30% RH at room temperature

03

Enhanced dehumidifier:
down to approx. 20% RH

04

Enhanced dehumidifier
available as an extra-cost option



Mist-Free Humidifier

Optional

01

Evaporative humidification reduces droplet deposition on the collector

02

Quiet, energy-efficient operation with germicidal protection

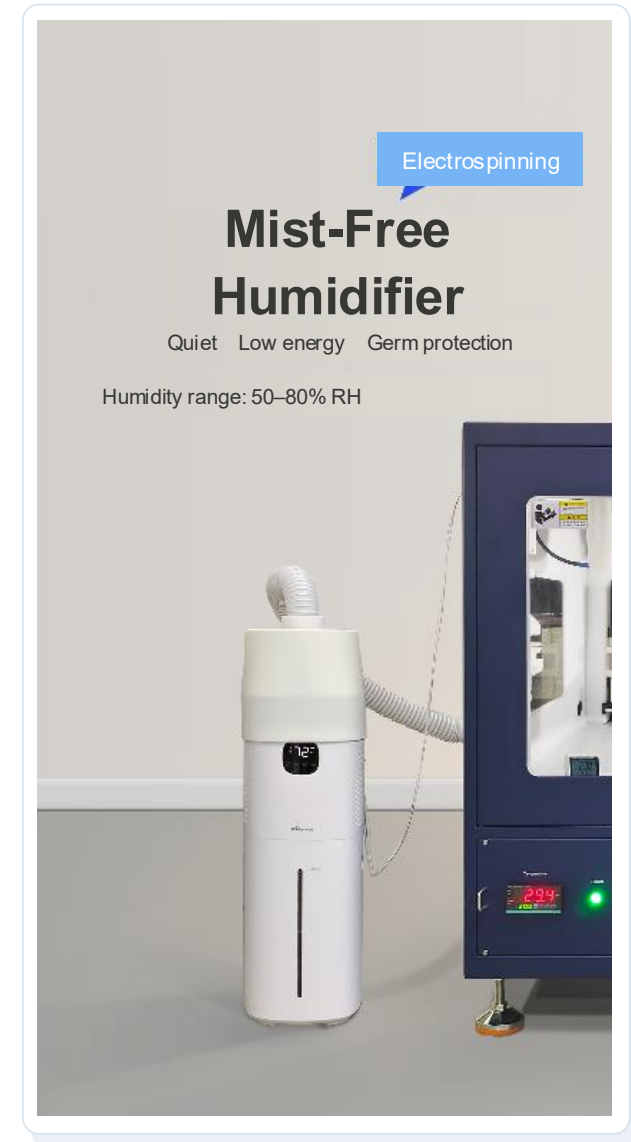
03

Humidity control range: 50–80% RH

04

Maintains uniform humidity throughout the chamber

Dimensions: 214 × 214 × 545 mm



Infrared Heater

A uniform, controlled thermal environment for electrospinning

01

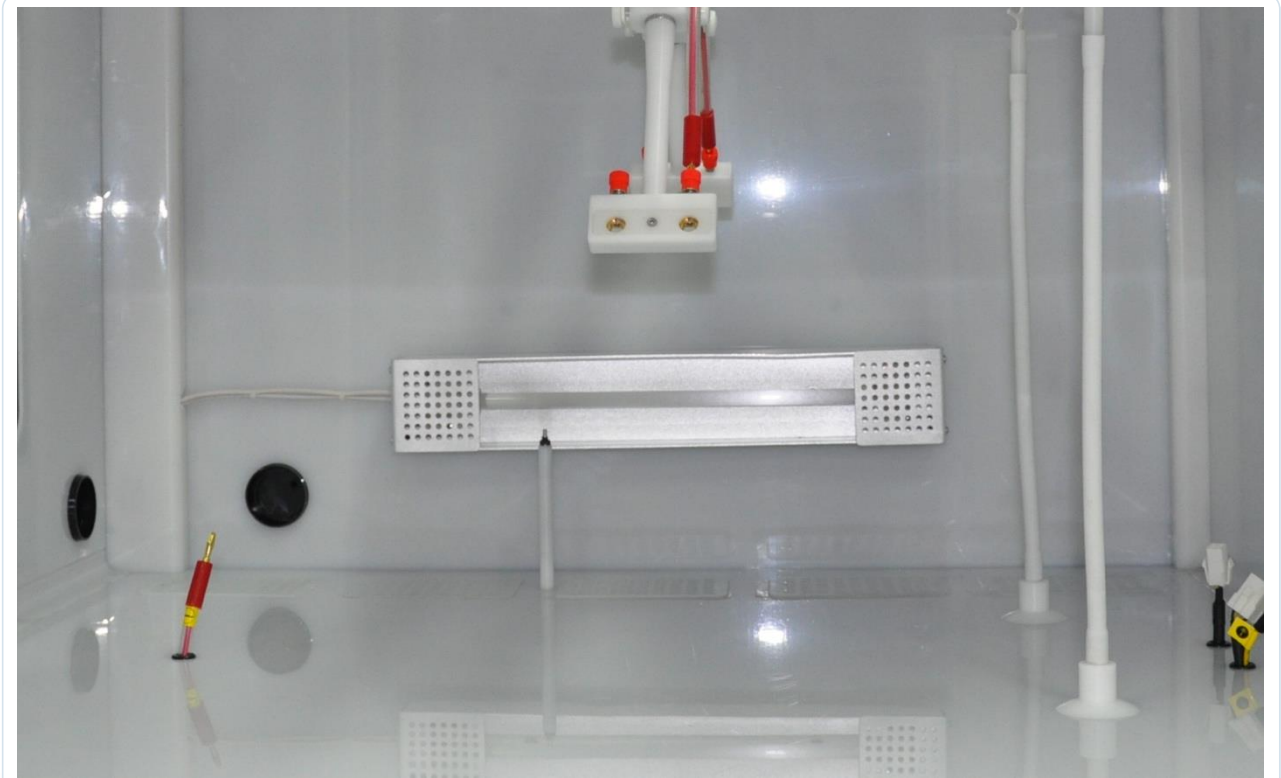
Infrared heating with precise temperature control

02

Rapid, uniform heating

03

Heating range: ambient to 45°C



Versatile Spinneret System

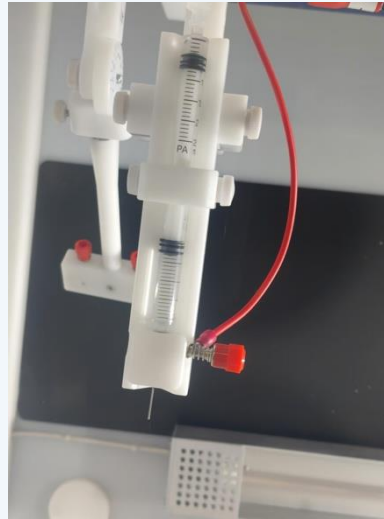
Interchangeable spinnerets for a wide range of processes

Dedicated insulating holders for all spinnerets

Integrated intelligent spinneret motion control



Single-Needle Spinneret



Low-Volume Spinneret



V-Shaped Dual Spinneret

Single-Needle Spinneret

01

Includes 100 stainless-steel needles in various sizes

02

Compatible with standard metal needles

03

Dedicated spinneret holder

04

Adjustable spinning angle and spinneret-to-collector distance



Glass Microcapillary Needles

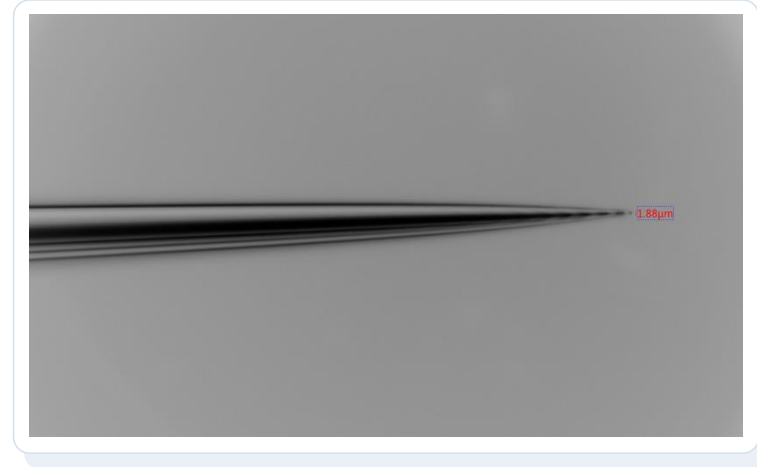
Ultrafine fibers and near-field direct writing

Microchannel sizes available: 1–45 μm

Hollow glass needles with an inner diameter as small as 1 μm

For low-viscosity fluids and small-volume experiments

Ultrafine fiber fabrication, micro/nanoscale patterning and near-field direct writing



Low-Volume Spinneret

Reduced sample consumption for research with valuable materials

01

Direct syringe-to-needle connection without tubing

02

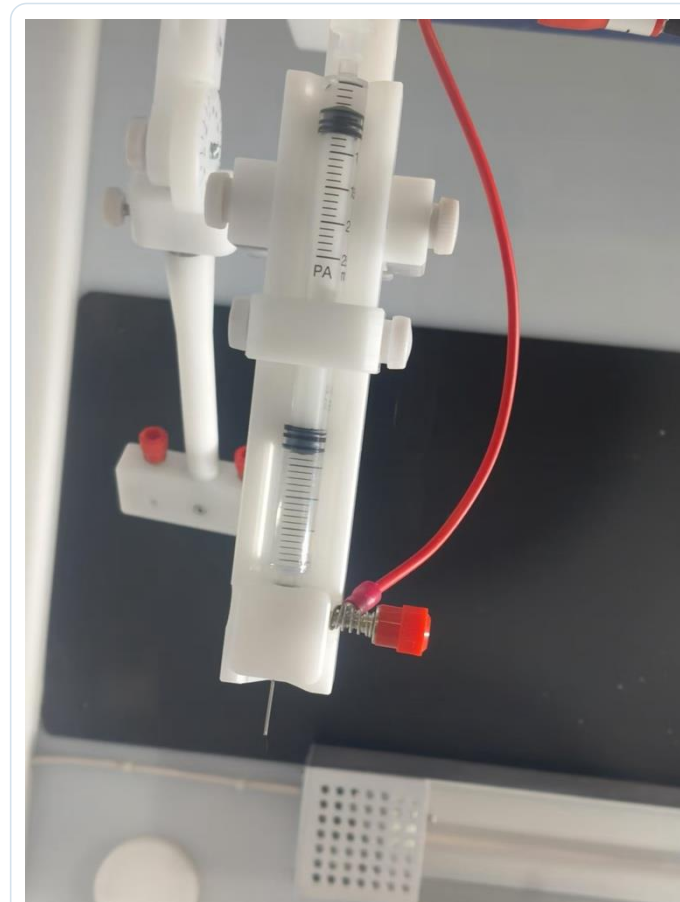
Electrospinning experiments with approx. 0.5 mL of solution

03

Minimizes solution consumption and costly material use

04

Optional simultaneous operation of two low-volume spinnerets



Coaxial Spinneret

Stable fabrication of core-shell fibers

- Five sets of inner and outer needles in different sizes

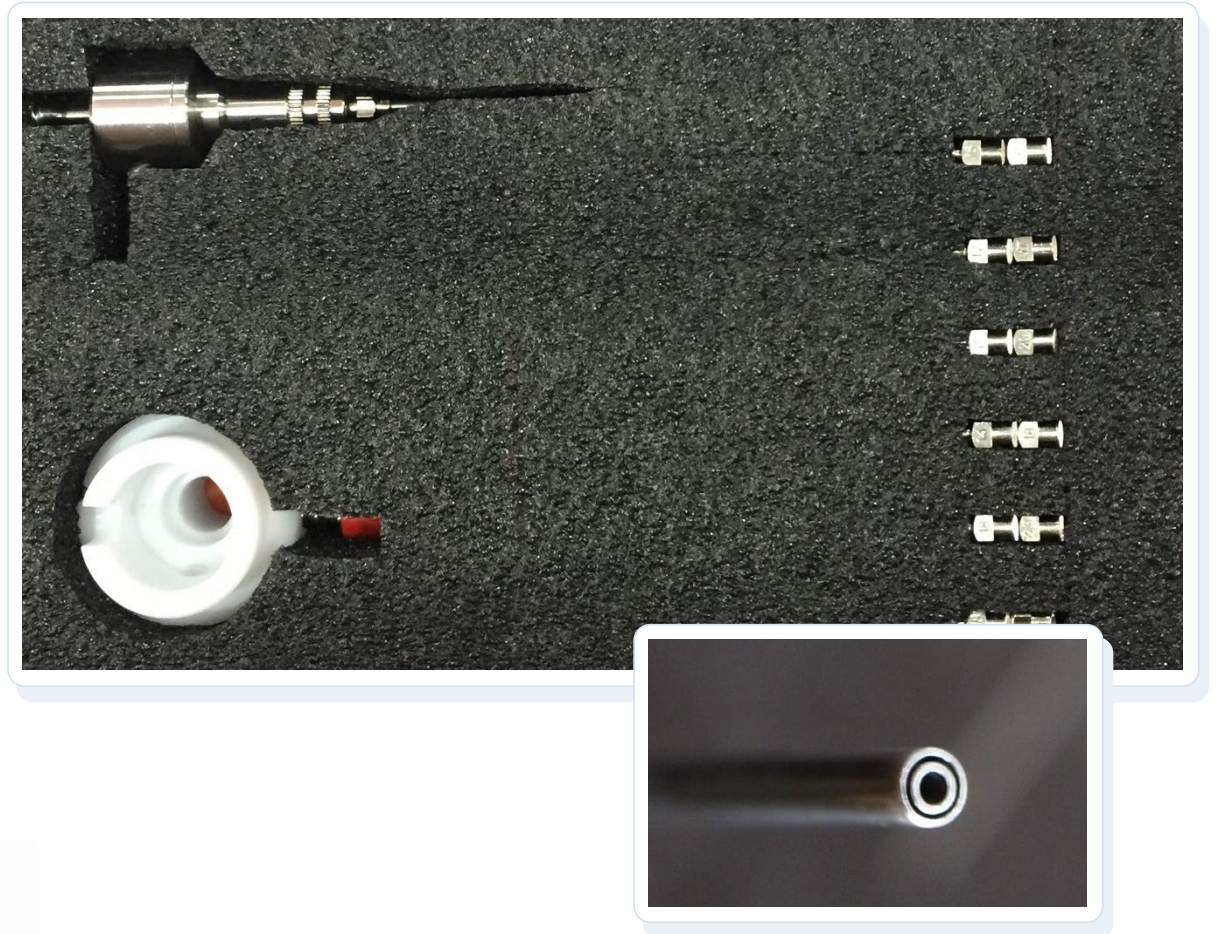
- Inner and outer needles detach and interchange independently

- High concentricity supports a stable jet

- Custom needle lengths available

- Compatible with gas-assisted spinning

- Uses a two-channel syringe pump



V-Shaped Dual Spinneret

Two coordinated needles improve throughput and membrane uniformity

- V-shaped dual needles can operate at the same or different applied voltage

- Opposite needle polarities enable conjugate electrospinning

- Optimized needle arrangement reduces mutual interference

- Adjustable spinning angle and collector distance

- Scales record angle and position accurately



Conjugate Electrospinning Spinnerets

Opposite-polarity jets for specialty fiber structures

- Two parallel needles connect to positive and negative HV supplies
- Reduces charge buildup on the collector for more closely packed fiber layers
- Simultaneous spinning of two materials for composite fiber membranes
- For nanofiber yarns and other specialty materials
- Reduced inter-spinneret interference improves process stability



Side-by-Side Spinneret

Independent dual-material delivery for bicomponent fibers



Independent flow-rate control for both channels



Simultaneous spinning of two materials for composite membranes



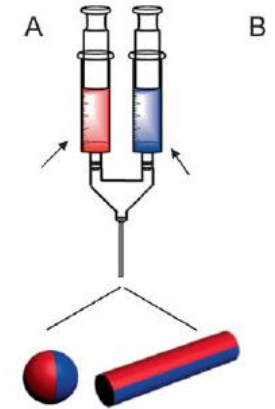
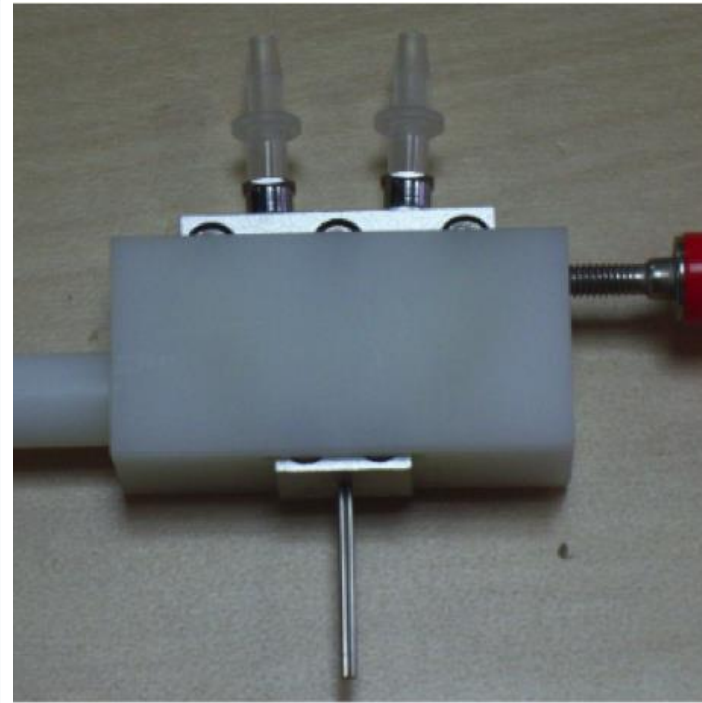
Five needle sets in different sizes



Compatible with all standard needle sizes



For Janus, self-crimping and functional composite fibers



Multi-Needle Spinneret Arrays

Optional



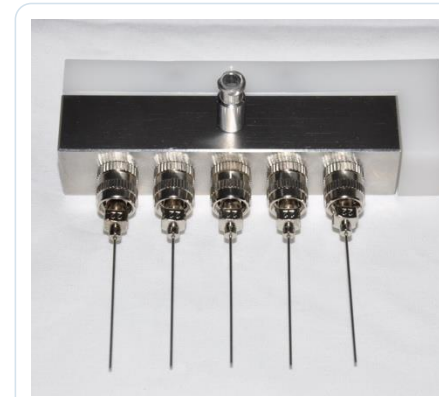
One inlet feeds
multiple outlets
for increased throughput



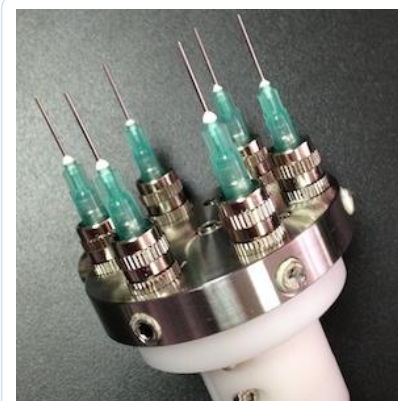
Custom needle count,
arrangement and spacing



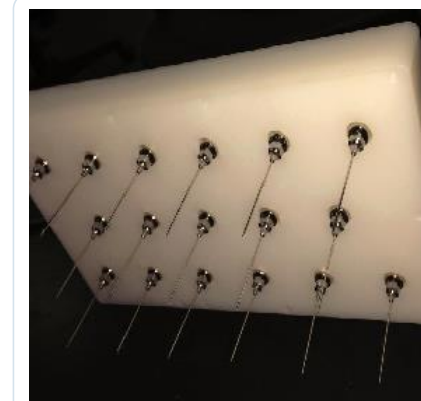
Optimized layout improves
membrane uniformity



Linear



Ring



Array

Automatic Needle Cleaning

Reduced clogging for stable, continuous electrospinning



For systems using volatile solvents



In-process needle cleaning
without stopping the system



Cleaning frequency adjusts to
solvent evaporation characteristics



Automatic needle cleaning available
for all spinneret types listed above



Spinneret Motion System

Axial scanning for uniform nanofiber coverage



Motorized X-axis traverse
along the collector drum axis



Scan travel: 400 mm



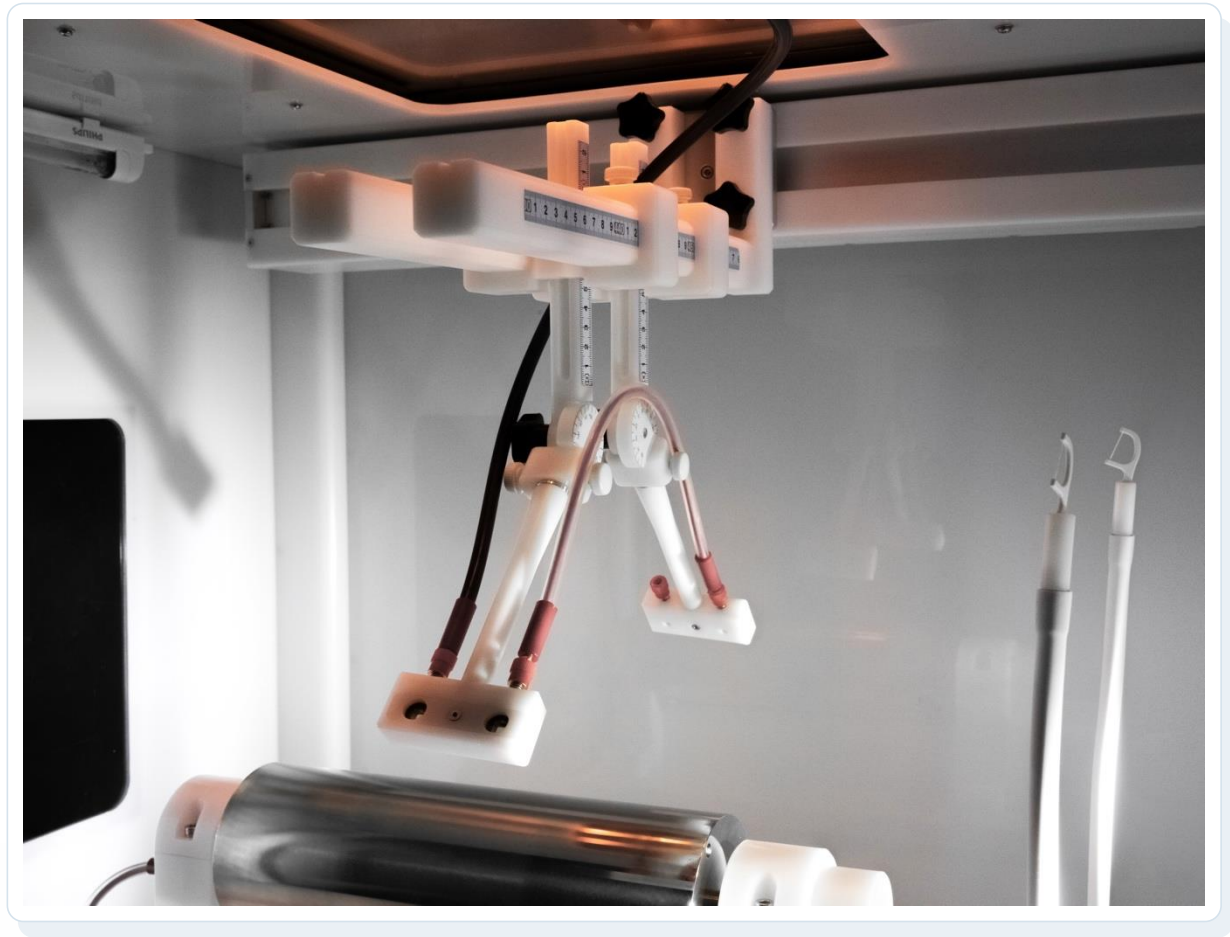
Scan speed: 1–40 mm/s



Touchscreen adjustment
and access to operating data



Manual Y- and Z-axis
adjustment with position scales

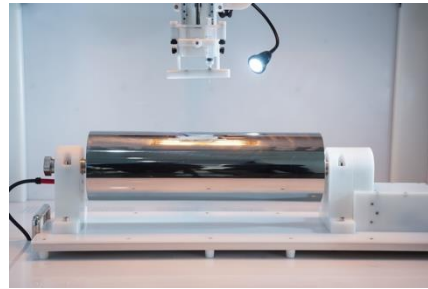


Nanofiber Collectors

Rotating collectors for uniform flat and tubular membranes

Adjustable-angle plate collectors for rigid, non-rollable substrates

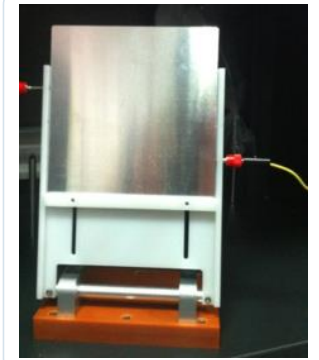
More than 20 collector options for different experiments and processes



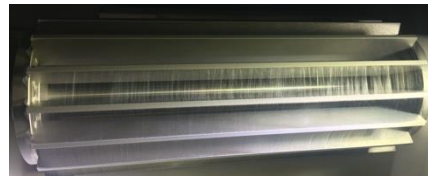
Rotating Drum



Tubular Membranes



Flat Plate



Cage Electrodes



Spiral Yarn



Thick 3D Mats

Rotating Drum Collector

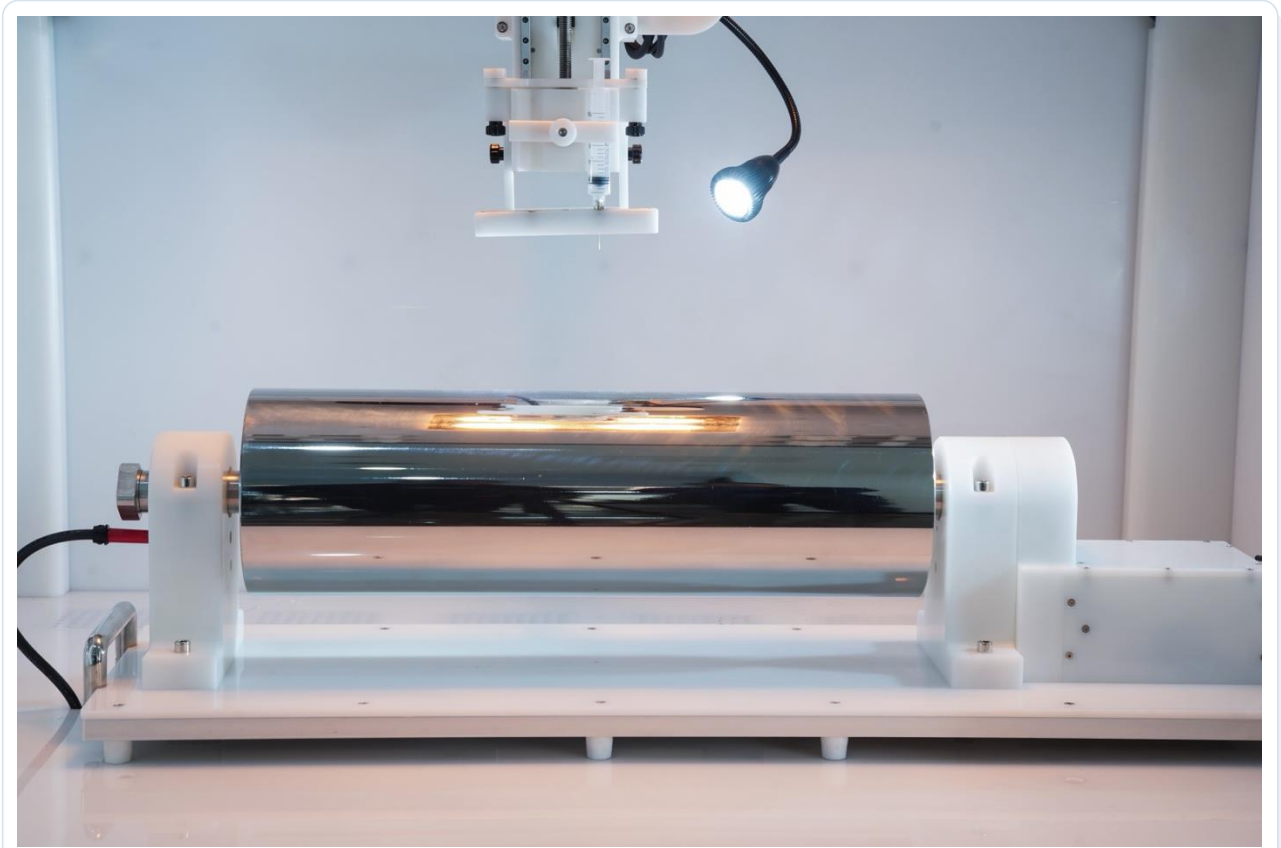
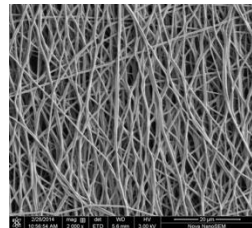
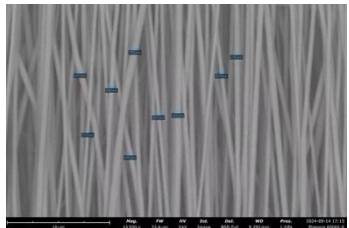
Flat membranes with random or aligned fiber deposition

High-speed collection of aligned fibers

Rotation speed: 1–5000 rpm

Speed accuracy: ± 1 rpm

Drum diameter	100 mm
Drum length	300 mm
Unwrapped mat size	300 × 314 mm



Rotating Disc Collector

Highly aligned fibers on the disc edge



Collects nanofiber ribbons on the disc edge

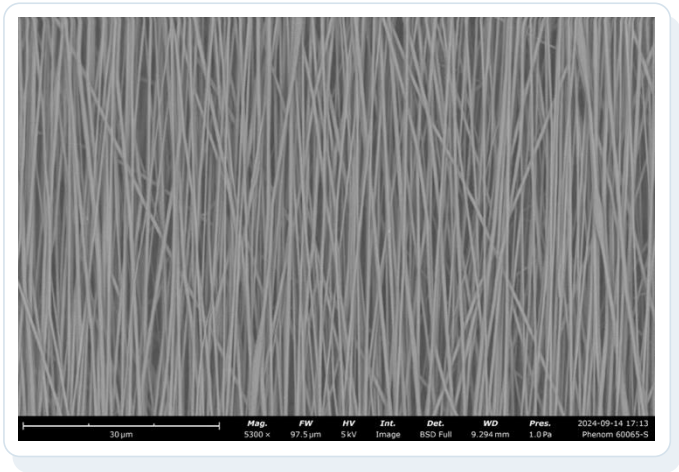


For narrow, highly aligned fiber ribbons



Sharp or flat edge configurations available

Rotation speed	1–5000 rpm
Speed accuracy	±1 rpm
Disc diameter	140 mm
Unwrapped ribbon length	439 mm



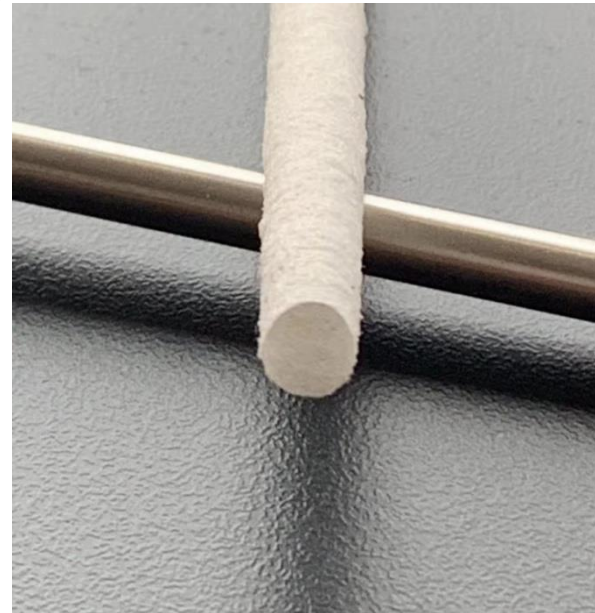
Rotating Mandrel Collector

Fabrication of tubular nanofiber structures

Collects hollow tubular membranes

For vascular grafts and tubular scaffolds in various diameters

Mandrel diameter	1–30 mm
Mandrel length	300 mm
Tube wall thickness	1 μm to several mm
Fiber diameter	100 nm–1 μm



Highly Aligned Fiber Collector

Stable collection of narrow, highly aligned fiber mats



High-speed rotation aligns fibers in narrow, flat membranes



For highly aligned membranes and fiber bundles

Rotation speed	1–5000 rpm
Speed accuracy	±1 rpm
Drum size	Ø140 × 50 mm
Unwrapped mat size	439 × 50 mm



Parallel-Electrode Cage Collector

Aligned fibers at low rotation speeds

01

Low-speed rotation
collects aligned nanofibers

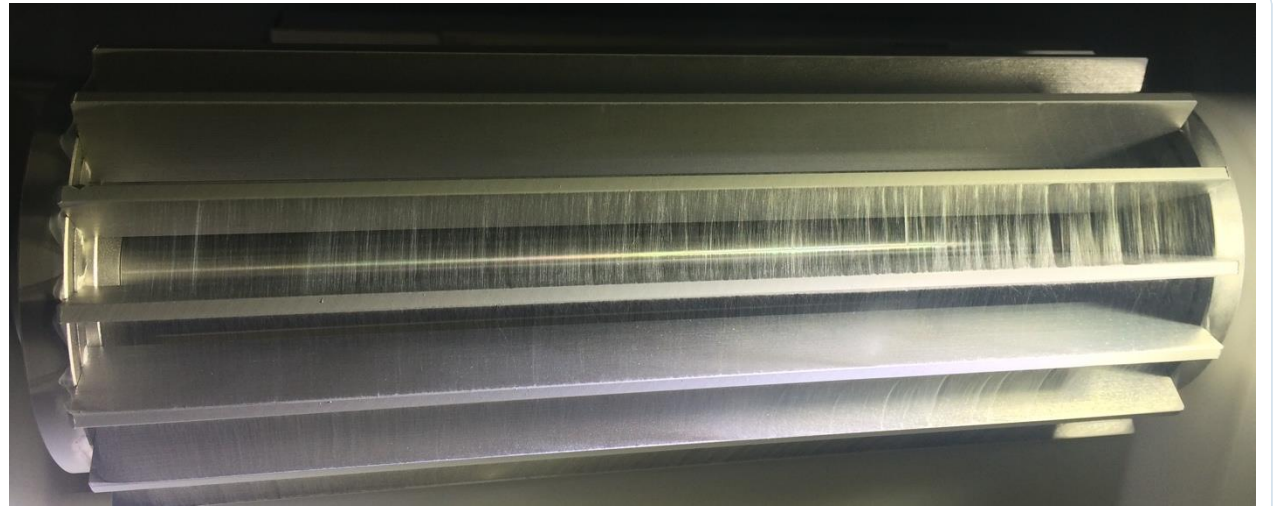
02

Collected fibers transfer
to other substrates

03

Electrode spacing can be customized

Diameter × length	Ø110 × 300 mm
Rotation speed	1–150 rpm
Speed accuracy	±1 rpm

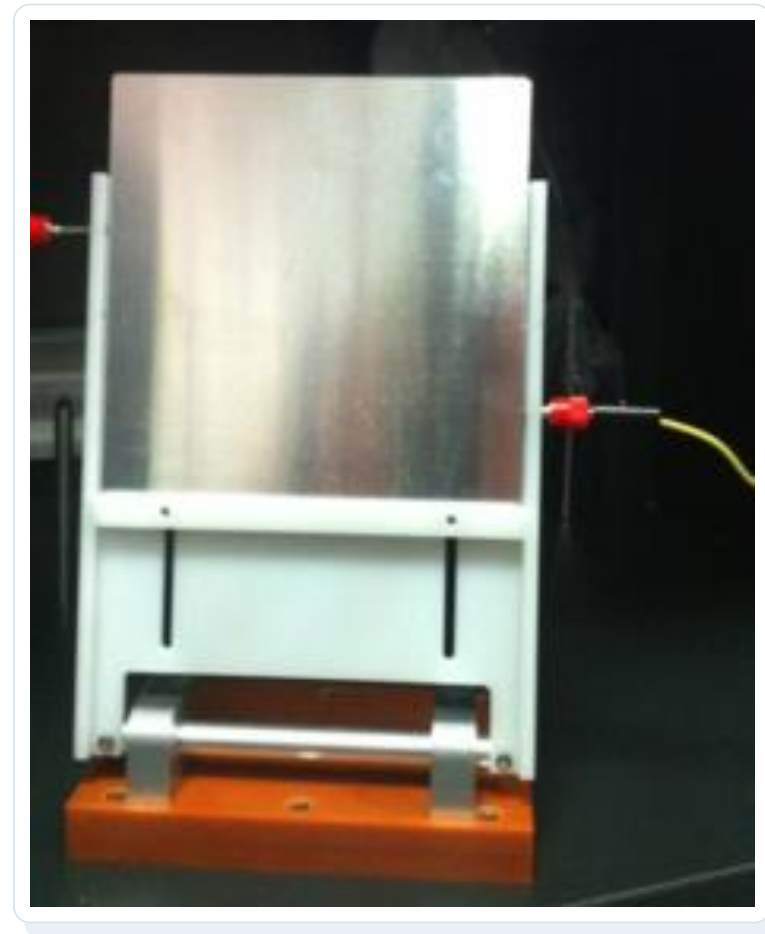


Flat Plate Collector

Rapid experiments and deposition on rigid substrates

- 01 | Type 316 stainless steel
- 02 | Adjustable collection angle
- 03 | Nanofiber deposition on rigid, non-rollable surfaces
- 04 | Optional X-Y motion stage

Plate size: 150 × 150 mm



Recommended Options



01

Heated Spinneret

Ambient to 150°C for thermally assisted electrospinning and melt electrowriting.

02

Gas-Assisted Electrospinning

Produces cotton-like 3D nanofiber structures.

03

Nanoparticle Collection

Collects nanoparticles or fibers dispersed in a water bath.

04

Yarn & Thick-Mat Collection

Produces nanofiber yarns and thick 3D fiber mats.

05

X-Y Motion Stage

Deposits nanofibers on rigid, non-rollable substrates.

06

Cross-Aligned Fiber Module

Builds alternating orthogonal fiber layers.

Heated Spinneret

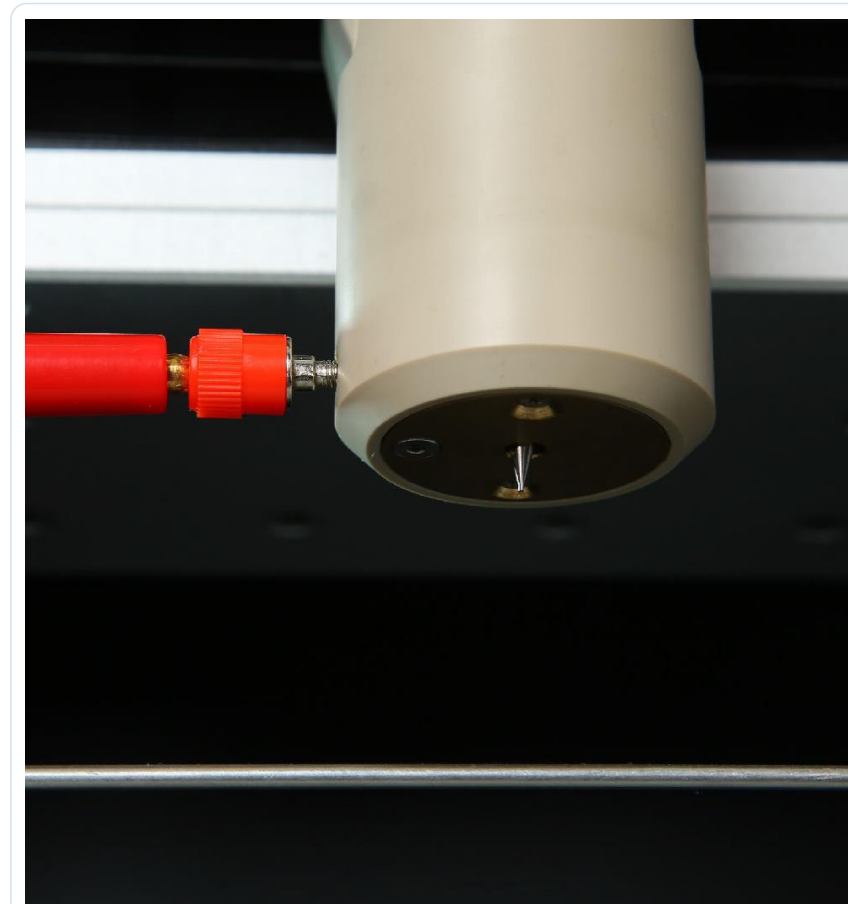
Optional melt electrowriting and heated small-volume solution spinning

- 01 | Heated electrospinning and direct writing of low-melting materials
- 02 | Heats small solution volumes to reduce viscosity
- 03 | Standard interface for easy installation and replacement

Operating temperature **Ambient to 150°C**

Positive high voltage **≤25 kV**

Syringe **5 mL glass syringe**



Roll-to-Roll Collector

Continuous production and collection of nanofiber membranes



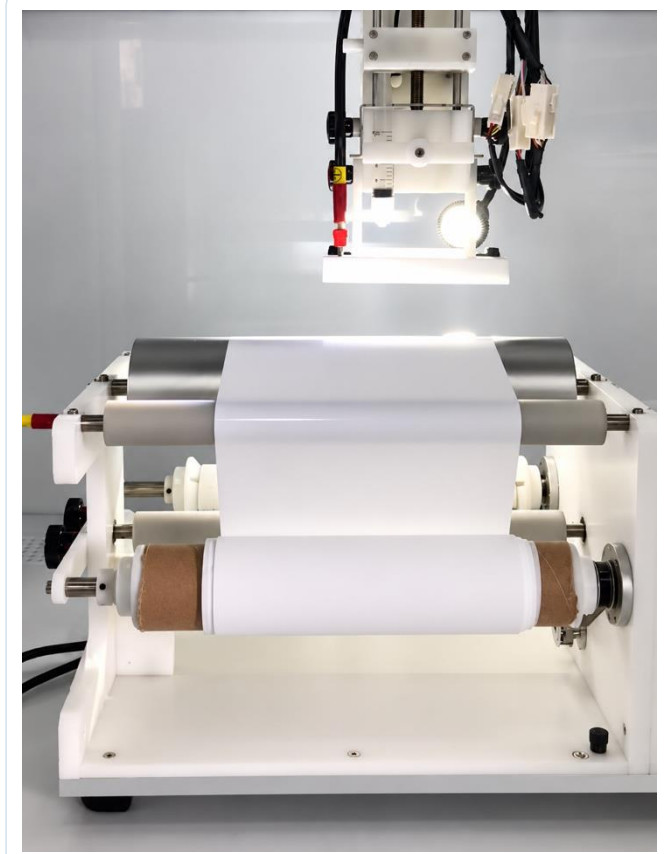
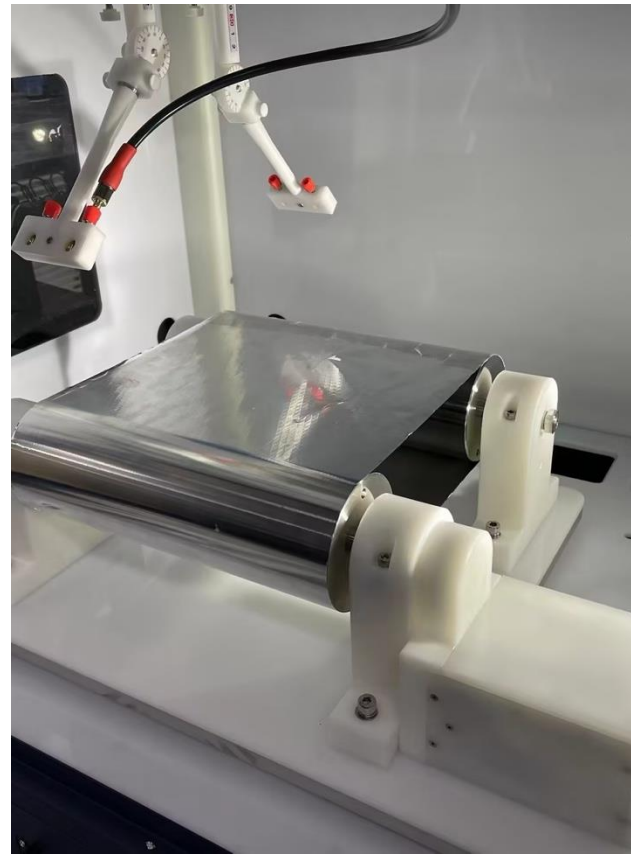
Continuous fiber
membrane collection



Take-up speed adjusts to the
required membrane thickness

Collection width	250 mm
Reel diameter	Max. 65 mm
Continuous length	50–100 m
Take-up speed	1–40 mm/s

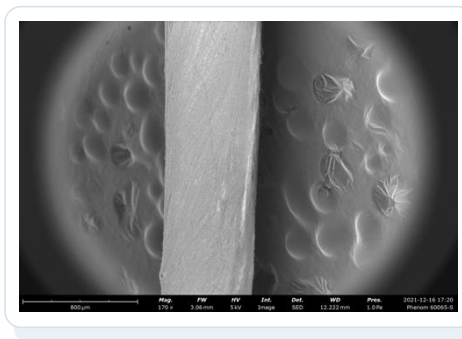
Fixed-length version: approx. 800 mm long



Spiral Nanofiber Yarn Collector

Continuous core and coreless nanofiber yarns

- 01 | Spiral drawing continuously converges fibers into yarn
- 02 | Interchangeable core materials for core and coreless yarns
- 03 | Continuous deposition builds 3D fiber mats
- 04 | Process duration controls fiber-mat thickness



Nanofiber Yarn Microstructure

Spiral Thick-Mat Collector

Thick, porous 3D fiber structures

- 01 Continuous buildup of 3D fiber mats
- 02 Thickness adjusts with spinning time and process settings
- 03 High porosity with a continuous fiber network
- 04 For filtration, adsorption, electrode materials and tissue-scaffold research



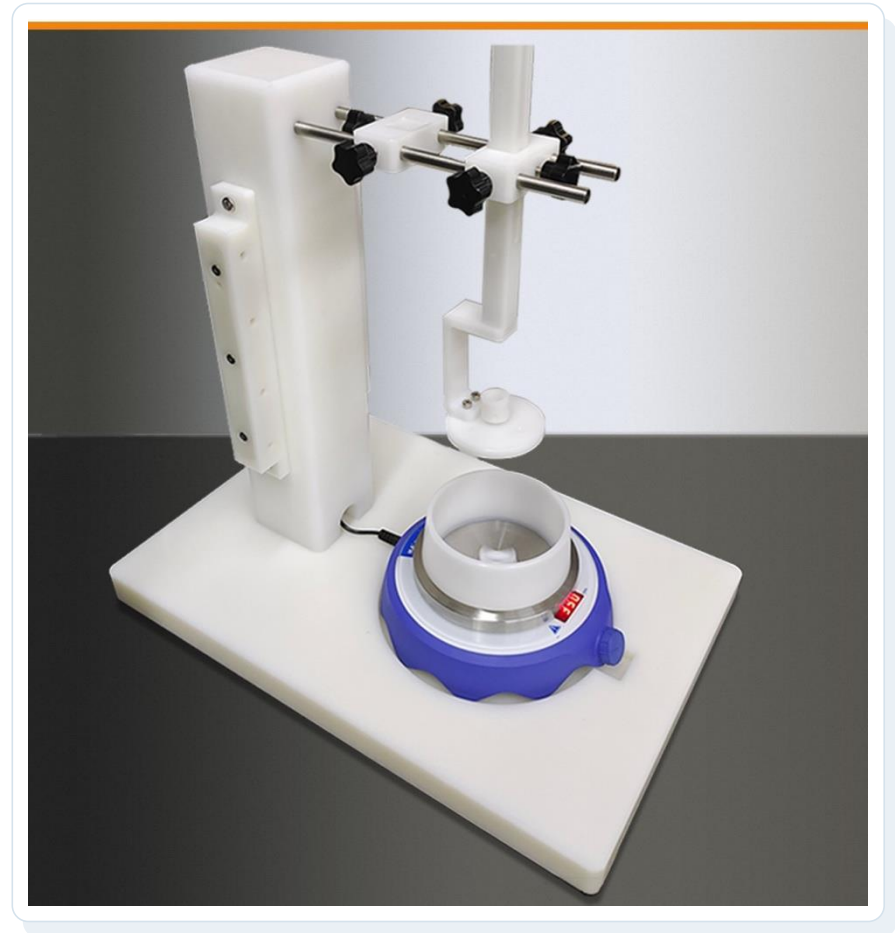
Nanoparticle & Microsphere Module

Uniformly dispersed nanospheres,
short fibers and other fibrous structures

- 01 | Magnetic stirrer
and insulating base
- 02 | Microsphere nozzle, dedicated
holder and auxiliary electrode
- 03 | Liquid-bath collection reduces
particle agglomeration
- 04 | Includes two rotating
water-bath vessels

Bath diameter **Ø130 mm, Ø180 mm**

Bath height **55 mm**



Microwire Coating Collector

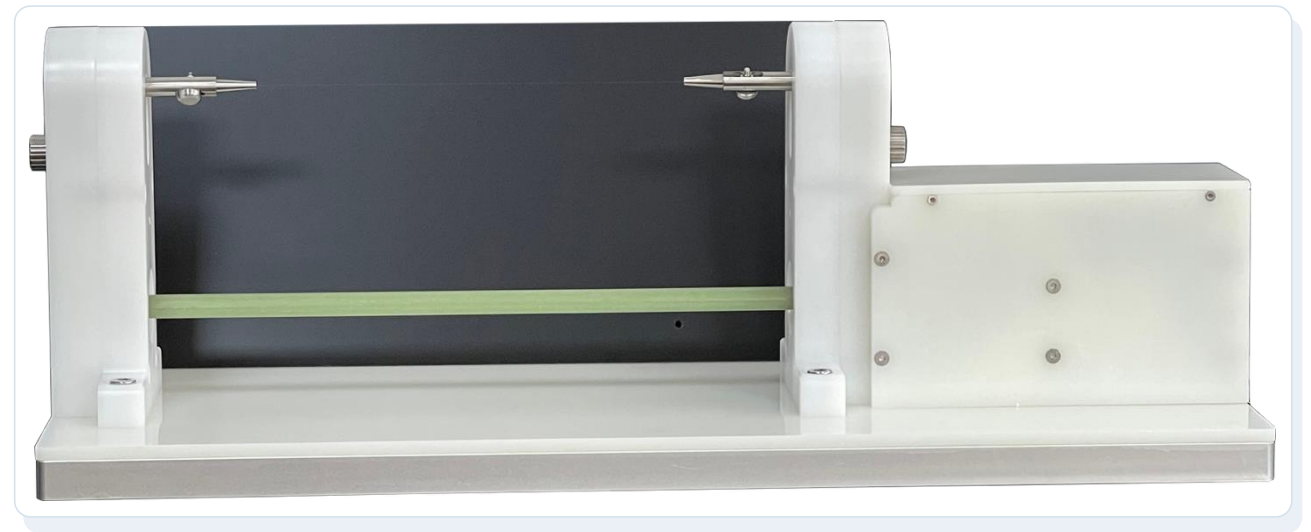
Nanofiber coatings on fine wire surfaces

Dual-motor drive maintains
stable wire rotation

Coats micrometer-scale wires
with nanofiber membranes

Independent controller
with stepless speed adjustment

Wire diameter	10–1000 μm
Rotation speed	1–5000 rpm
Speed accuracy	± 1 rpm



Gas-Assisted Electrospinning

Airflow and electrostatic forces improve fiber formation



Output can substantially exceed conventional electrospinning



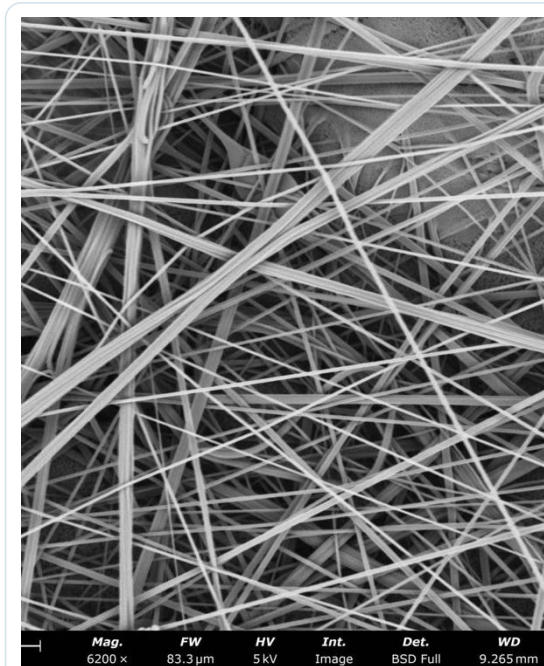
Produces highly lofted fiber mats



Supports cotton-like 3D fibers and short nanofibers



Compatible with solutions and diverse polymer systems



**Membranes, lofted mats, cotton-like
3D fibers and short fibers**

Cross-Aligned Fiber Module

Regular fiber structures with alternating 0° / 90° alignment

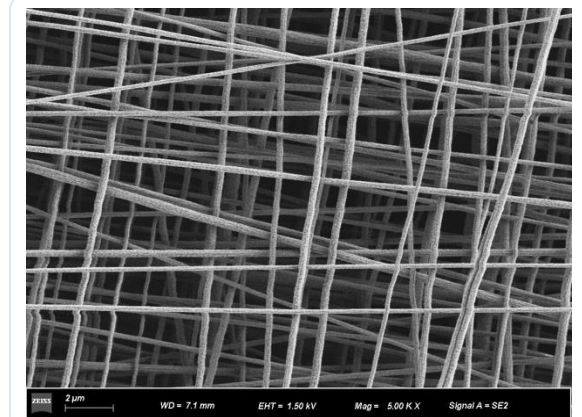
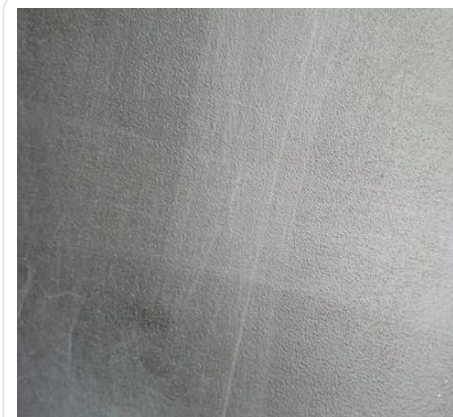
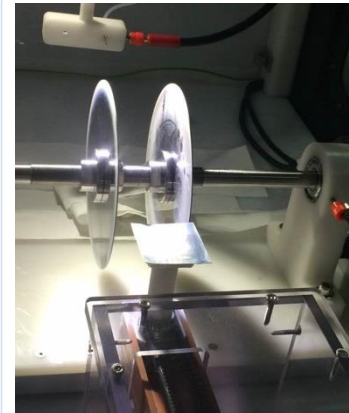
- Unidirectional or cross-aligned multilayer fiber membranes

- Dedicated spinneret and rotating dual-disc collector

- Synchronized discs for repeatable orthogonal fiber deposition

- Independent digital control unit

- For tissue engineering and composite reinforcement



UV Curing Lamp

In-situ curing without removing the sample for post-treatment

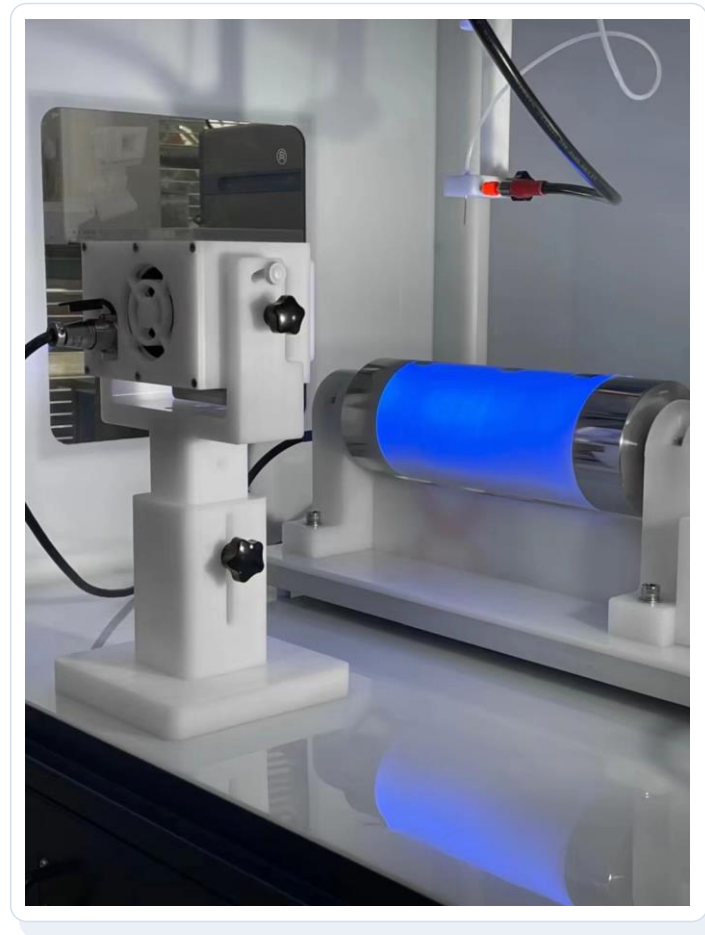


Automatic in-situ UV curing



Uniform irradiation reduces sample transfers and process steps

Peak wavelength	365 nm
Emitting area	30 × 25 mm × 2
UV irradiance	≥420 mW/cm²
Lamp / installed power	240 W / 290 W
Cooling	Air cooling



Centrifugal Electrospinning

Centrifugal and electrostatic forces for high-throughput fiber production



Centrifugal and electrostatic forces draw the polymer solution

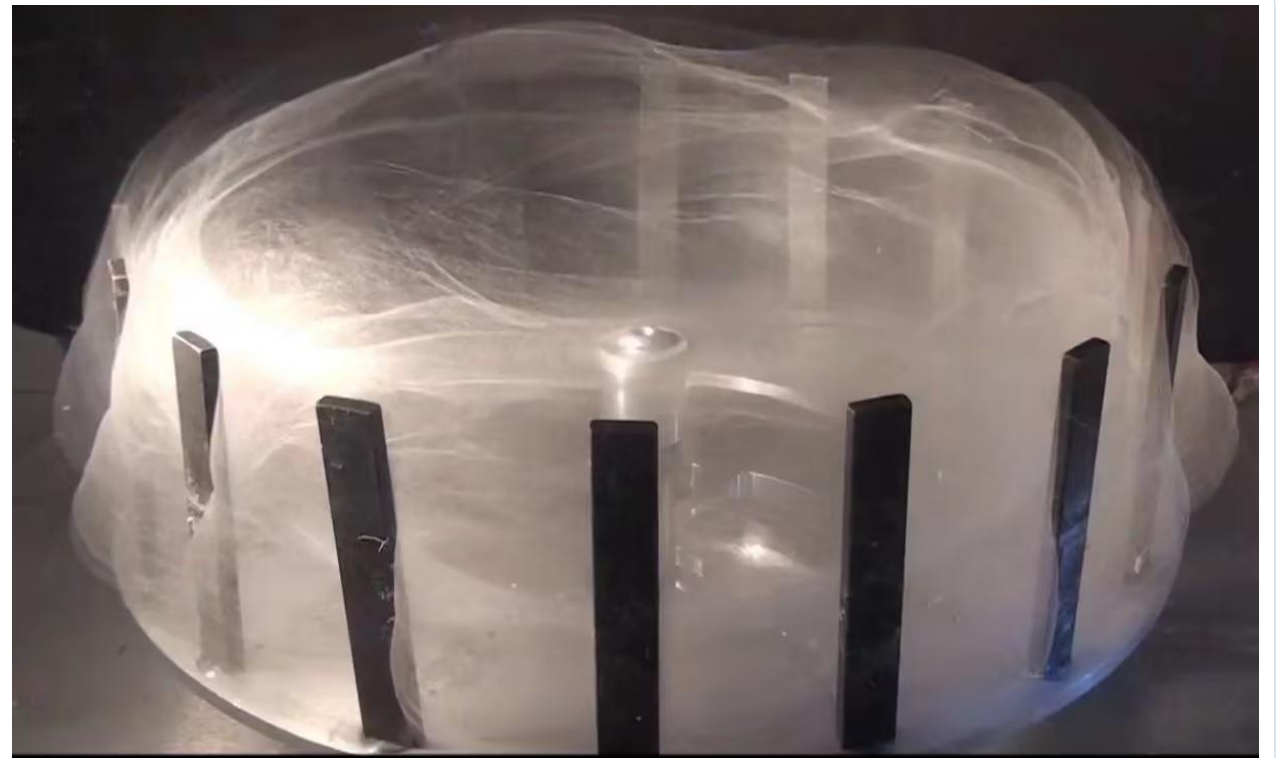


Jets form nanometer- or submicrometer-scale fibers



Improves fiber formation efficiency and stability

Spinning disc diameter: 650 mm



Rotating Flat Plate Collector

High-speed plate rotation for aligned fiber membranes



Servo control for random or aligned fiber membranes



Collects highly aligned fiber membranes



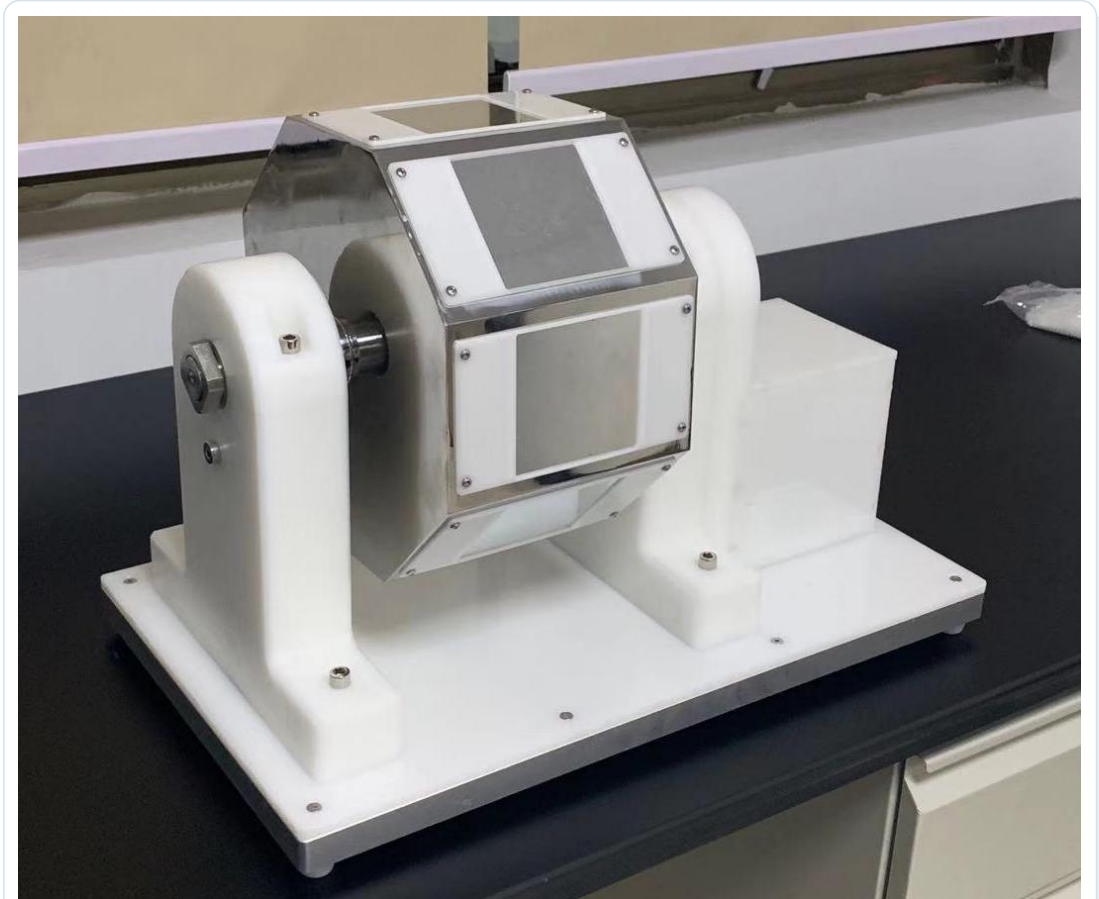
Custom plate angle to suit the application

Rotation speed

1–5000 rpm

Plate size

80 × 80 × 0.5 mm



X-Y Motion Stage

Two-axis motion control with a flat plate collector

- CAD file import and programmed input

- Handheld controller and control box

- Timing-belt drive with stepper motors

- Insulating plastic construction

Travel	200 × 200 mm
Repeatability	<50 µm
Speed range	0–30 mm/s
Power supply	220 V, 50/60 Hz



Ionizing Air Blower

Neutralizes static buildup and improves fiber deposition



Positive and negative ions regulate charge distribution and airflow



Reduces fiber adhesion and flyaway fibers



Improves membrane uniformity and consistency



Improves fiber morphology and reduces bead defects



Promotes solvent evaporation and supports environmental control



Reduces static buildup and stabilizes the process



Safety Features

Multiple safeguards for operators and equipment

01

Emergency stop
Easy to reach for rapid shutdown



02

Automatic power protection
Overvoltage and overcurrent cutoff



03

Door interlock
HV shuts off when the door opens



04

Multi-point grounding
Enclosure, HV supplies,
pumps and collectors



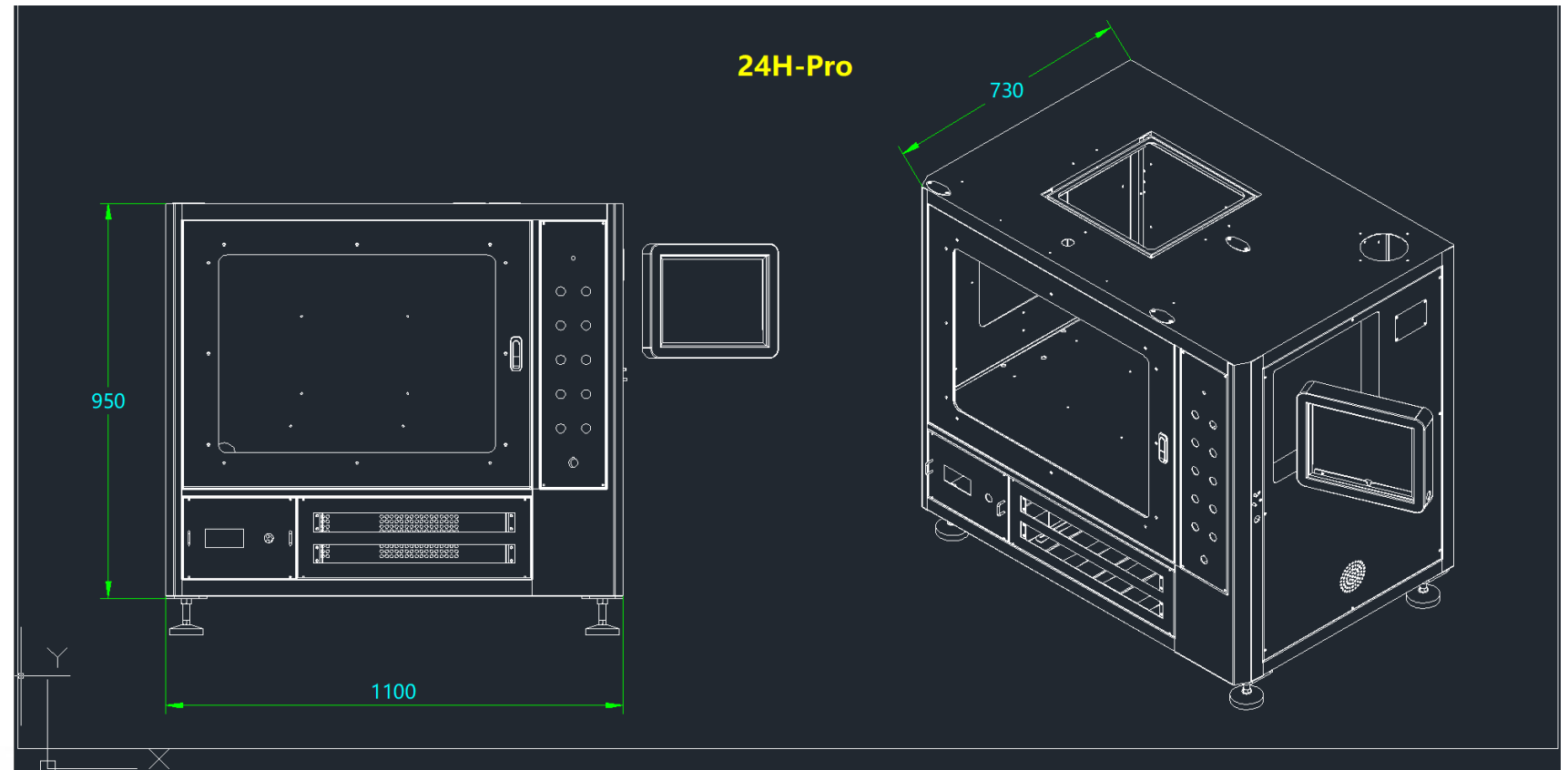
System Dimensions

Overall Dimensions

Width **1100 mm**

Depth **730 mm**

Height **950 mm**



1100 × 730 × 950 mm

TL-Pro

Professional Electrospinning System

Micro & Nano Innovation.
Endless Possibilities.

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