ROBOTIC ELECTROSPINNING MACHINE

TL-Pro-BM

SHENZHEN TONG LI TECH CO LTD
ROBOTIC ELECTROSPINNING MACHINE, TL-PRO-BM

BOTH POSITIVE & NEGATIVE HIGH VOLTAGE DEVICES PROVIDED.

TL-HV, a high-voltage power supply specially designed for electrospinning, is perfectly combined with the spinning machine, with stable high-voltage output. Its internal is modular circuit design, safe to use, easy to maintain the power supply, flexible and convenient to operate, long-term stable operation, high reliability, strong anti-interference performance, high conversion efficiency, continuous adjustable output voltage, high accuracy of digital monitoring and display of output voltage and current. At the same time, it also has over-voltage, short circuit protection and soft start function.

CLEAN CHAMBER.

Clean Chamber. All joints on the inner wall of the case are smooth design, which can be easily cleaned after spinning. There is not any place out of sight to be cleaned. All nozzles can be removed and cleaned, and the collectors can be taken out independently, or the whole nozzle can be removed and cleaned. All spinnerets and collectors are changeable.

EQUIPPED WITH VARIOUS SPINNERETS & COLLECTORS.

Equipped with single nozzle, coaxial nozzle, multi nozzle and other nozzles; Equipped with plate collector, high-speed rotating collector, can other collectors. There are more than 20 kinds of spinnerets and collectors can be upgraded.

CAN MAKE NANOFIBERS WITH STABLE QUALITY

Ten years of spinning machine manufacturing experience ensures that the quality of nanofiber membrane prepared each time is stable, the experiment is repeatable, and precious research time is saved.

NO ADDITIONAL ELECTRIC FIELD INTERFERENCE INSIDE

The design of the chamber is reasonable, all the functional components are treated specially, the interference electric field is effectively shielded, the voltage during spinning is stable. It can be used to prepare over 500 μm ultra thick fiber film.

30+ OPTIONS, ONE FOR YOU

Based on the experience of more than 600 universities in the world for ten years, more than 30 kinds of functional accessories have been designed to meet different research requirements in various fields. More special customized services, provide a full range of technical support.
### ROBOTIC ELECTROSPINNING MACHINE, TL-PRO-BM

<table>
<thead>
<tr>
<th>High Voltage supply device</th>
<th>4 Channel syringe pump</th>
<th>Spinneret holder</th>
</tr>
</thead>
</table>
| • Positive: 0-50KV, Digital display;  
  • Negative: 0~ -20KV, Digital display.  
  • Negative: 0~ -50KV. (Option) | • Specially designed for electrospinning, can be used for high viscosity liquid, compatible to work with high voltage.  
  • 4 channels can be controlled independently. | • 100 stainless steel needles.  
  • All standard metal needles can be used.  
  • Equipped with various nozzle holder.  
  • The spinning angle and receiving distance can be adjusted freely. |
| Triaxial spinneret | V-spinneret | Tubeless spinneret |
| • Both outside & inner needles are changeable.  
  • Super long needle, low voltage needed.  
  • Good coaxiality. | • Improve the output  
  • High uniformity of film formation.  
  • 4 needles working at the same time.  
  • The influence of mutual electric field is the least.  
  • Spinning angle is adjusted. | • No waste.  
  • No soft tube.  
  • High efficiency.  
  • Wide applications. |

### ELECTROSPRAY

This machine is also used for Electrospray coating onto a substrate. Various shape of collectors are available for coating on different surface. Compared to Electrospinning process, electrospray coating requires a lower viscosity solution and higher voltage.
**Side by side**

- Side by side spinneret can be used for making mixed nanofibers, 2 different nanofibers can stick to each other and form mixed nanofiber.
- Provide 1-100 microns needles.
- Equipped with special holder for needle, it can be used in various equipment.
- Needle material: glass

**Micron needle**

- Sliding distance: 400mm
- Speed: 1 ~ 40 mm/s
- Can be controlled through touch screen.
- With data recording system.

**Spinneret slider**

- Speed: 1-5000rpm ±1rpm
- Servo motor control, high precision.
- Drum Φ100mm, L = 300mm
- Material: SS316
- Can be connected to negative high voltage ≤ 20kV

**Rotating collector**

- Speed: 1-5000rpm ±1rpm
- Rotating speed: 1rpm
- Ø1, 2, 3, 4, 5, 6, 8mm, L=300mm
- Material: SS316
- Prepare tubular materials such as blood vessels.

**Aligned fiber collector**

- Ø140mm, L=50mm
- Can make supper aligned nano fibers.
- Speed: 1-5000rpm ±1rpm

**Grooved collector**

- Rotating speed: 1rpm
- Ø110mm, L=300mm
- Material: SS316
- Can be connected to negative high voltage ≤ 20kV

**Wire collector**

- Speed: 1-5000rpm, ±1rpm
- Ø1, 2, 3, 4, 5, 6, 8mm, L= 300mm
- Material: SS316
- Prepare tubular materials such as blood vessels.

**Touch screen control**

- Touch screen+push button.
- Control spinneret and collector movement.
- The parameters can be changed at any time.

Nanofibers are an exciting new class of material used for several value added applications such as medical, filtration, barrier, wipes, personal care, composite, garments, insulation, and energy storage. Special properties of nanofibers make them suitable for a wide range of applications from medical to consumer products and industrial to high-tech applications for aerospace, capacitors, transistors, drug delivery systems, battery separators, energy storage, fuel cells, and information technology.
### Items

#### Specification of TL-Pro-BM

<table>
<thead>
<tr>
<th><strong>Power source</strong></th>
<th>220V/110V, Frequency: 50/60Hz</th>
</tr>
</thead>
</table>
| **High Voltage Power Supply Devices** | • 0-50KV, digital display  
  • -20KV ~ 0 KV, digital display (Option: -50KV for conjugate spinning.)  
  • Output Current: < 1 mA  
  • Continuously adjustable |
| **4-Channel Syringe Pump** | • Micro-controller based with menu to control the flow rate, time, etc.  
  • Compatible to work under high voltage. |
| **Various Spinnerets** | |
| **Inner Diameter of Single Nozzle** | 0.1-1.6mm |
| **Coaxial spinneret Both external & inner nozzles are changeable** | ID = ≤ 0.7mm  
  OD = 1.6mm |
| **V-Shape spinneret** | Increase spinning quantity and improve fiber thickness homogeneity. |
| **Conjugate Spinnertes (Option)** | For conjugate spinning. |
| **Tubeless Spinneret** | Tubeless spinneret for small amount solution. Min. for 0.5ml solution. |
| **Tri-axial spinneret** | External, middle and inner needles are changeable. |
| **Tri-channel spinneret** | Needles for every channel are changeable. |
| **V-shape spinneret (2 or 4 needles)** | • For conjugate electrospinning (2 needles);  
  • For making an uniform fiber sheet (4 needles). |
<p>| <strong>Multi-nozzle spinnerets</strong> | 4-8 nozzle spinneret in linear array or in a circle. |
| <strong>Side by side spinneret</strong> | Diameter: changeable |
| <strong>Auto-clean device</strong> | The needles can be cleaned automatically |
| <strong>Slide unit for spinneret</strong> | Moving distance: 400mm; Speed: 1 ~ 40 mm/s |
| <strong>Rotating Collector</strong> | |
| <strong>Drum Rotation Speed</strong> | 1-5000 rpm, Accuracy: +/- 1 rpm |
| <strong>Grooved Drum</strong> | ( \text{D=110mm} ) (with low rotating speed, for making aligned fibers.) |
| <strong>Drums</strong> | ( \text{D=100mm, L= 300mm} ) |
| <strong>Mandrel</strong> | ( \text{D=2mm, 3mm, 4mm, 5mm, 6mm, 8mm, 6 Nos in total, L= 300mm} ) |
| <strong>Drum for super aligned fibers</strong> | ( \text{D= 140mm, L=50mm} ) |</p>
<table>
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<tr>
<th>Items</th>
<th>Specification of TL-Pro-BM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flat collector</td>
<td>Size: 150mm X 150mm, spinning angle changeable.</td>
</tr>
<tr>
<td>X-Y platform</td>
<td>Work as flat collector holder, made from insulation materials. Computer control system.</td>
</tr>
</tbody>
</table>
| Roll to Roll collector (For continuous collecting nano fibers) (Option) | • Winding width: max= 250mm  
• Winding diameter: max= 65mm  
• Inner diameter of winding Roller: 28–48mm  
• Inner diameter of unwinding Roller: 20–48mm  
• Winding length: 50–100m  
• Winding speed: 1–40mm/s                                                                 |
| Heating device                            | External heater, with good heating Homogeneity.                                                                                                           |
| Humidity control ( control the humidity of the room) | • Hot air blower (Included in our equipment)  
• Industrial dehumidifier  
• Industrial humidifier  
• The dehumidifier and humidifier are normal equipments, you can buy them locally to save shipping charge, therefore, the dehumidifier and humidifier are not included in our price quotation. |
| Spinning chamber                          | • Iron chamber with resistant coating  
• Insulation inner chamber.  
• Front door & windows made of Tempered glass.  
• Humidity display meter.  
• Temperature control & display. Room temp. to 80°C  
• Exhaust fan.  
• Observing lamp.  
• Gas inlet.                                                                                           |
| Dimension                                 | 850mm 长 * 1100mm 宽 * 950mm 高。净重 150kg; 毛重 250kg                                                                                                             |
| Safety                                    | • HV power supply switches off automatically when door is opened.  
• Static removing system.  
• Emergency stop.  
• Grounded chamber.                                                                                   |
| Touch Screen Controller with PLC          | ✤ Control movement of the spinnerets.  
✦ Control movement of the collectors.                                                                   |

Notes:  
• The user shall ensure that the power supply is well grounded.  
• This configuration may be changed at any time. Please contact us in advance if you need to order.
PTFE tubing

PTFE TUBING, PP luer locak connectors.
Suitable for all kinds solvents at room temperature.
100m tubing for free.

The solvent used for electrospinning can usually dissolve common plastics. General PVC, PC and ABS connector cannot be used for electrospinning. After careful selection, we chose the material of PTFE + PP joint and made the specical tubingt for electrospinning. All devices of TONG LI machines are equipped with PTFE tubing,

Length changeable

Anti sticking paper

As the carrier of nanofiber, the fiber membrane can be easily peeled off.

More nanofiber carriers:
- Aluminum foil
- Plastic film
- Non-woven fabrics
- Stainless steel
- Glass and others

Polyvinyl alcohol standard spinning solution, PVA

Molecular weight: 80000, concentration: 10% wt.
Specially customized spinning materials.

More solutions:
- PAN
- PCL
- PI
- PU
- More

Provide standard spinning solution with reference

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http://www.electro-spinning.com (English)
## TL-Pro-BM Electrospinning Machine Upgradeable Accessories

<table>
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<tr>
<th>No.</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Monitoring and feedback system</td>
<td>Positive high voltage power supply Monitoring and feedback system</td>
</tr>
<tr>
<td>2</td>
<td>Triaxial spinneret</td>
<td>Super long needles. The inner, middle and external needles can be replaced at will.</td>
</tr>
<tr>
<td>3</td>
<td>Multi channel coaxial spinneret</td>
<td>Provide multi-channel coaxial nozzle to improve the production efficiency of coaxial fiber.</td>
</tr>
<tr>
<td>4</td>
<td>Multi channel spinneret</td>
<td>The multichannel spinneret can be used to make more than three kinds of composite fibers. The composite fiber with similar cable shape can be prepared.</td>
</tr>
</tbody>
</table>
| 5   | Multi-needle spinneret | • Linear multi-needle spinneret.  
• Circular multi-needle spinneret.  
• Matrix arrangement multi needle spinneret. |
<p>| 6   | Air assisted single nozzle spinneret | Greatly improve production efficiency |
| 7   | Air assisted multi nozzle spinneret | Any number of multiple nozzles with air assisted system can greatly improve the production efficiency. |
| 8   | Needleless spinneret | Without the use of needles, the spinning volume is larger. |
| 9   | Near field spinning collector | The high-precision X-Y platform can move according to the set track and speed, and the equipment can be upgraded to a simple near-field direct writing machine. |
| 10  | Conjugate spinning holder | Used for conjugate spinning, carries more than 4 needles for conjugate spinning. |
| 11  | Parallel electrode collector | For collecting aligned nanofibers. |
| 12  | Magnetic electrode collector | For making hollow aligned nanofibers. |
| 13  | Octahedral collector | It can collect large area directional fiber or well shaped structure fiber. |
| 14  | Drying oven | After continuous spinning, the fiber needs to be dried. This drying oven is used in combination with the roll to roll collector. |</p>
<table>
<thead>
<tr>
<th>No.</th>
<th>TL-Pro-BM electrospinning machine upgradeable accessories</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>Online video observation system</td>
</tr>
<tr>
<td></td>
<td>Because the diameter of electrospinning fiber is very small, it needs special light source and special viewing angle to see the spinning state. The on-line video monitoring system developed by Tongli micro nano can directly observe and record the spinning process through the display or computer, which provides valuable process recording data for the experimental research of electrospinning.</td>
</tr>
<tr>
<td>17</td>
<td>Water bath collector</td>
</tr>
<tr>
<td></td>
<td>The water bath collector has a static water bath collector and a dynamic water bath collector. The static water bath can be used to prepare oriented fibers, and can also receive other forms of fibers. Dynamic water bath has different design schemes according to the use requirements.</td>
</tr>
<tr>
<td>18</td>
<td>High temp. Spinneret</td>
</tr>
<tr>
<td></td>
<td>Heating temperature: room temperature ~ 120 °C. The nozzle can be connected with high voltage.</td>
</tr>
<tr>
<td>19</td>
<td>Melt spinneret</td>
</tr>
<tr>
<td></td>
<td>Heating temperature: room temperature ~ 400 °C. The nozzle can be connected with high voltage.</td>
</tr>
<tr>
<td>20</td>
<td>UV curing lamp</td>
</tr>
<tr>
<td></td>
<td>In the process of high-voltage electrostatic spinning, UV light is sometimes used to irradiate the spinning jet or fiber, forming part or all of the crosslinking and curing. We specially equipped the corresponding UV lamps for various types of spinning machines for users to choose.</td>
</tr>
<tr>
<td>21</td>
<td>Nanoyarn collector</td>
</tr>
<tr>
<td></td>
<td>It can be used to collect continuous nanoyarns.</td>
</tr>
<tr>
<td>22</td>
<td>Filament collector</td>
</tr>
<tr>
<td></td>
<td>Filament diameter ≥ 0.1mm</td>
</tr>
<tr>
<td>23</td>
<td>Zigzag fiber collector</td>
</tr>
<tr>
<td></td>
<td>Collect interlaced fibrous membranes. The thickness is controllable.</td>
</tr>
<tr>
<td>24</td>
<td>Observation lamp with adjustable angle</td>
</tr>
<tr>
<td></td>
<td>The angle can be adjusted to help you see the finer fibers with the naked eye.</td>
</tr>
</tbody>
</table>

More details, please view [http://www.electro-spinning.com](http://www.electro-spinning.com)
2020 NEW CONFIGURATION, VARIOUS UPGRADE PLANS, WAITING FOR YOUR CHOOSE!

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