Industrial Nanofiber Production Line (INFL)

FNM Industrial Nanofiber Production Line (INFL) is a polymeric/ceramic nanofibers producer machine in industrial scale for various applications. INFL uses 1 to 8 electrospinning units, based on the customer requirement.

In the industrial production line, the electrospinning parameters and conditions such as spinneret and collector parameters, working distance, linear movement speed of the used substrate, working temperature and operation time could be controlled using an integrated advanced control system. The machine offers excellent safety for users with respect to the handling of high voltage power supplies and chemical solvents.

Using this production line, nanofibers could be deposited on different substrates in industrial scale. INFL is widely used for producing nano-filters and nano-respiratory facemasks. Depending on the number of electrospinning units, nanofiber coating rate will be about 50-800 square meters per hour.

INFL8100

FNM INFL nomenclature:

INFLXYYY

X: Number of electrospinning units (1, 2, 4, 6 or 8)

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

INFL4100: Industrial Nanofiber Production Line, 4 units, width: 100 cm

INFL6160: Industrial Nanofiber Production Line, 6 units, width: 160 cm

INFL160: Industrial Nanofiber Production Line, 1 unit, width: 60 cm

Specification

Flexibility

- Various polymers and composites have the potential to be electrospun.
- High output in compare with ordinary needle and needle-less electrospinning machines
- Different product specifications such as porosity, morphology, diameter, and ability to load beads can be obtained.
- The process is easy and economical.
- Different polymer types such as synthetic, biodegradable and natural polymers and/or polymer/composite may be processed.

Easy operations and convenient functions:

- Electrospinning parameters could be fully controlled through a user-friendly HMI panel.

Nanofiber diameters:

- 60 to 500 nm

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
- Using both positive and negative high voltage power supplies to obtain optimum electrospinning condition
- Blown system:
  - Control the air pressure
- Scan system:
  - Control the scan speed
  - Control the start and end position of the spinnerets
- Control the temperature of the electrospining chamber
- Indicating the humidity of the chamber (control is optional)
- Advanced digital high voltage control systems
- Emergency stop button
- easy-to-use

Input power

- 380 volts, three phases, 50-60 Hz

Power consumption:

- Heater System: maximum 2.25 kW
- Dryer: maximum 2.25 kW
- Control and HVPS: maximum 3 kW

High voltage:

- 0-40 kV DC, positive polarity, precisely adjustable
- 0-40 kV DC, negative polarity, precisely adjustable
- Digital voltage monitoring and control (accuracy: 0.1 kV)
- Independent positive and negative voltage control of each unit
- HMI control system
- HV current limit to minimize the risks

Electrospinning Units

- 1 (INFL160), 4 (INFL 4100), 6 (INFL 6100) and 8 units (INFL 8100)

Collector:

- Stainless steel plate (static collection of fibers) or rotating drum (coating a desired substrate)
- Working distance: 5-17 cm
- Rotating speed: 0-50 RPM (Synced by substrate speed)
- Diameter: 17 cm

Heating system

- Room temperature up to 45 °C

Ventilation

- Removing solvent from the chamber by a ventilation fan with a scheduled operation time

Dryer system:

- Substrate dryer chamber with temperature control

Substrate winder

- Servo motor control system
- Substrate speed: 10 to 800 m/h
- Maximum substrate width: 60, 100 or 160 cm (depending on the model)
- Edge control system
  - Tension control system
  - Substrate cutting section (Optional)

Case

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

Dimension

- Length: 300 - 800 cm
- Height: 220 - 250 cm
- Width: 210 - 230 cm

Weight

- Depends on the model and the number of electrospinning units (a machine with 6 electrospinning units: about 4500 kg)

INFL160