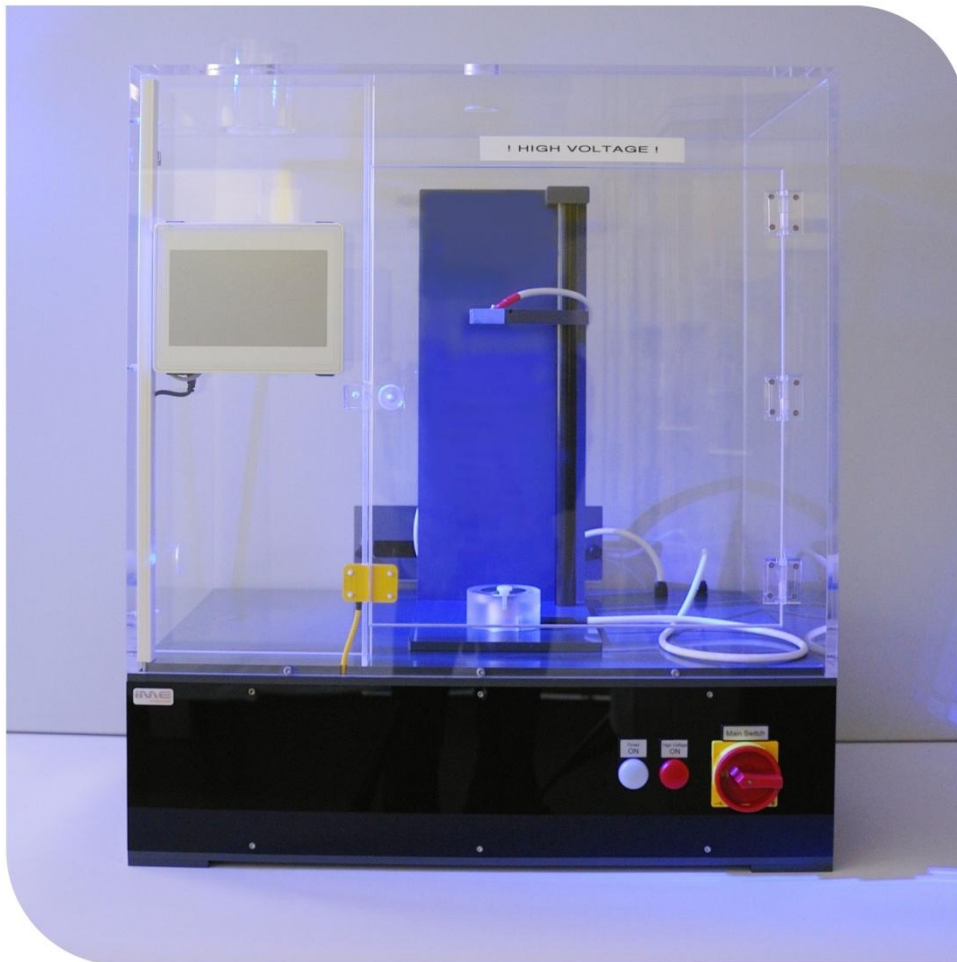


Electrospinning Equipment



Brochure 2011

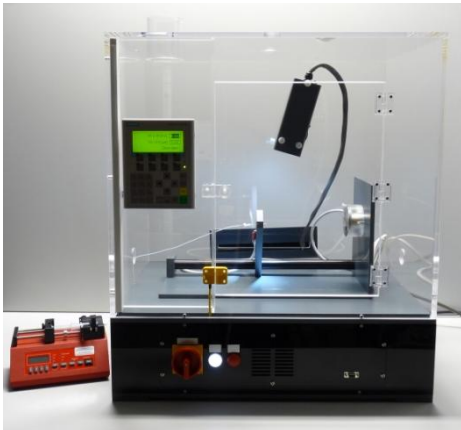
Company profile

IME Technologies is a full subsidiary of the Eindhoven University of Technology (TU/e). Over the past years the highly skilled and ambitious staff of IME Technologies has transformed the company from a small R&D service provider into a successful R&D equipment OEM.

IME Technologies develops and delivers specialized R&D equipment for material characterization and processing to both academic and industrial research laboratories worldwide.

Our R&D equipment is

- Versatile* – providing means to explore a wide variety of research areas
- Reliable* – providing accurate and reproducible results whenever needed
- User-friendly* – providing results fast with minimal distraction from research goals



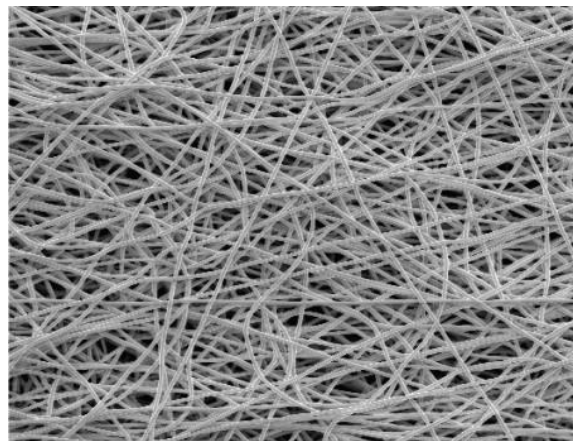
Through continuous participation with the TU/e in ongoing and new research projects we assure that our product portfolio reflects the state-of-the-art in materials characterization and processing equipment. Next to delivering our products, we support our customers in all phases of their research with sampling, support, upgrades, and after-sales services.

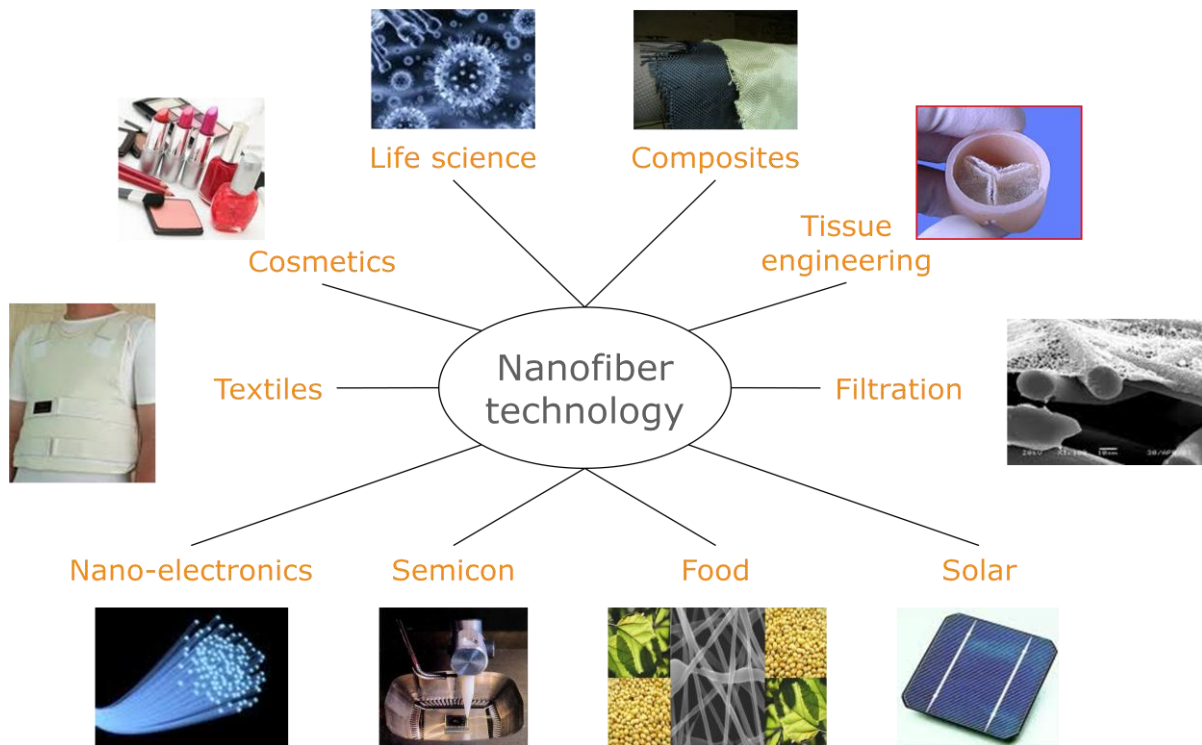
The mission of IME Technologies to enable our clients to improve and accelerate their research is reflected in our motto:

'Excellerating Your Research'

Electrospinning

The interest in nanofibers has increased drastically over the past years. Due to their extremely high surface to weight ratio, nanofibers exhibit special properties that has opened up a wide range of potential applications. Nanofibers can be used in filtration, medical applications like drug delivery, tissue engineering and wound dressing, protective materials like sound absorption and chemical resistant fabrics, functional textiles, cosmetics, energy applications like solar cells and batteries, but also in nanoelectronics and food applications.





One of the main techniques to produce nanofibers is the process of electrospinning. Although known for almost a century, there are still numerous challenges remaining in the development of electrospinning techniques. Together with the required research and development of nanofiber applications, there is an increasing need in versatile, efficient and state-of-the-art electrospinning R&D equipment. IME Technologies aims to fulfill this need by providing unique, reliable, and user-friendly electrospinning equipment.

Our design philosophy

In our philosophy electrospinning R&D equipment should adhere to four design principles:

Safety

Any electrospinning system should contain adequate safety features to provide a safe working environment for people and the environment.

Reproducibility

Any electrospinning system should minimize the influence on the relevant process parameters and environmental conditions to provide reliable and reproducible results.

User-friendly

Any electrospinning system should be user-friendly to minimize the time and skills required to operate it and maintain it.

Versatility

Any electrospinning system should be versatile and expandable to facilitate and accelerate the advancement of electrospinning research.

Electrospinning Apparatus

IME Technologies has developed a safe, reliable, versatile and user-friendly platform for electrospinning research and nanofiber product development. Whether you are doing fundamental materials research or you want to develop good manufacturing practices for nanofiber production, the Electrospinning Apparatus will enable you to do the job. Furthermore, the system can be equipped with a variety of add-in modules to extend the possibilities for state-of-the-art electrospinning research and new application development.

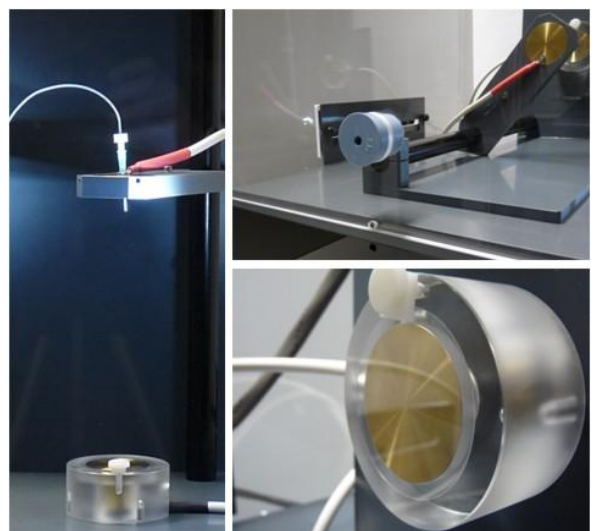


Features

- Designed for the laboratory environment
- Minimal setup time and maximum flexibility
- Transparent protective cover
- Integrated safety system
- Multi-functional nozzle and collector stand
- Large and easily accessible working area
- Adjustable high voltage source
- Adjustable spinning distance
- Accurate fiber current measurement
- Integrated cabin temperature sensor
- Minimal maintenance
- Full CE compliance

Benefits

- Stable spinning conditions to provide reproducible results
- Safe and easy-to-use system that enables fast experimentation
- System can be equipped with plug & play control and spinning modules
- Upgradable basic version with analog controls and fully digital version available



Control System Upgrade

IME Technologies understands how the demands and requirements for R&D equipment change as research evolves. Hence, IME Technologies designs its electrospinning equipment in such a way that it can be expanded and upgraded. In this way we are able to provide an optimal solution in terms of functionality and price for each phase of your electrospinning research.

Digital control module

The basic Electrospinning Apparatus ESC-A has a modular design that allows the installation of our control system upgrade module. By replacing the analog controls with this module the Electrospinning Apparatus instantly offers the advanced functionality of the ESC-D.

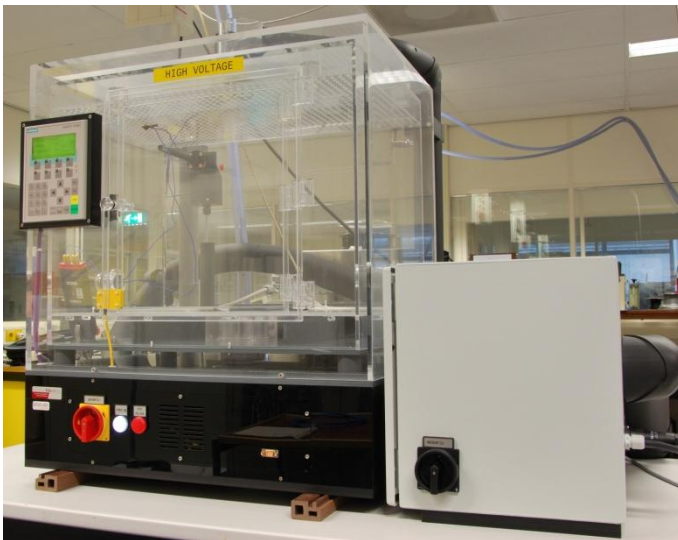
Next to the digital control and full-color touch panel interface to operate the Electrospinning Apparatus, the module also enables you to install our dedicated add-in modules, control and adjust syringe pump settings, automate electrospinning sequences for batch production, record and store process data and more.

Features and benefits

- Plug & play installation in ESC-A
- Installation offers full functionality of ESC-D
- Digital control via touch panel interface
- Advanced programming functions
- Possibility to distribute equipment investments in line with evolving research needs
- Possibility to install dedicated add-in modules that require digital control

Climate-controlled Electrospinning

Electrospinning of nanofibers is a delicate process where the electric field, material viscosity, spinning distance and other parameters have to be balanced. Moreover, temperature and relative humidity are shown to be of great influence on the process. To provide control over these environmental variables, IME Technologies has developed a Climate-controlled Electrospinning Apparatus. This state-of-the-art electrospinning platform offers unprecedented control over temperature and humidity during electrospinning experiments. The unique capabilities of our patented Climate-controlled Electrospinning Apparatus will bring your electrospinning research to a new level.

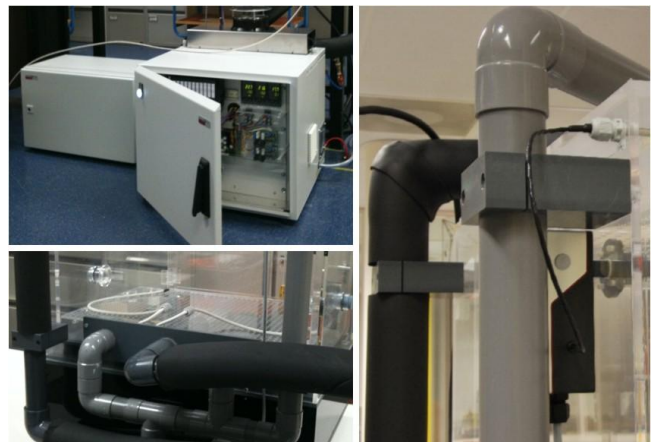


Features

- Designed for the laboratory environment
- Minimal setup time and maximum flexibility
- Based on proven electrospinning platform
- System only needs water and power
- Temperature control 20 – 45 °C, ± 0.5 °C
- Humidity control 10 – 95 %, ± 1 %
- Isolated chamber to prevent condensation
- Integrated water purification system
- Minimal maintenance
- Full CE compliance

Benefits

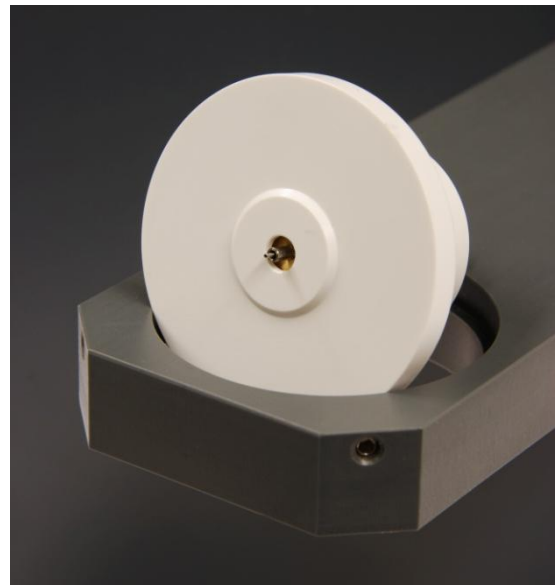
- Stable spinning conditions to provide reproducible results
- Safe and easy-to-use system that enables fast experimentation
- User-selectable temperature and humidity level inside spinning chamber



In 2010 the prototype of the Climate-controlled Electrospinning Apparatus has passed field testing. The first commercial system is currently in production. Contact us if you want to learn more about our climate-control options for advanced electrospinning research.

Co-axial Electrospinning

Next to producing single, solid nanofibers, the electrospinning process can also be used to produce coaxial nanofibers. These fibers consist of a core and sheat that are made out of different materials. There are many interesting applications of coaxial nanofibers such as encapsulation, catalysis, reinforcement of materials and many more. IME Technologies has developed a special spinneret for the electrospinning of coaxial fibers. This dedicated nozzle is versatile and easy-to-use in a variety coaxial electrospinning experiments.



Features

- High quality coaxial spinneret
- Installable in multifunctional nozzle stand

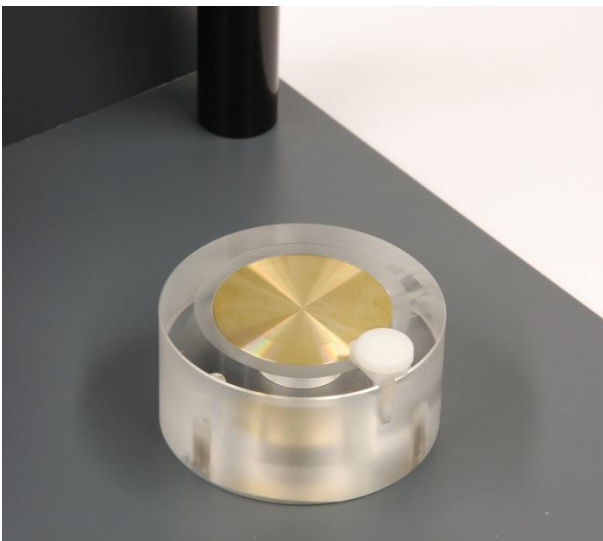
- Inner diameter core nozzle 0.4 mm
- Inner diameter sheat nozzle 1.2 mm

- Other nozzle diameters on request
- Adjustable height of core nozzle

- Nozzle placed in insulating holder
- Shielding gas connection and outlet

Fiber collection modules

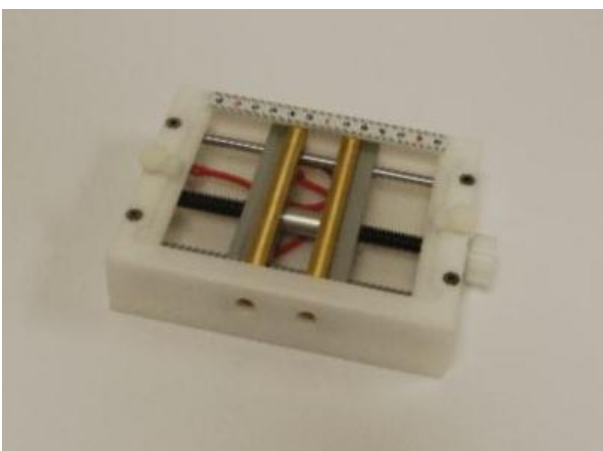
Standard circular collector



Features

- Stationary circular collector plate
- Collector can be fixated on nozzle stand
- Discs of Ø50, 100 and 150 mm available
- High voltage ground lead connection
- Clamp for fiber collection object discs
- Minimal maintenance

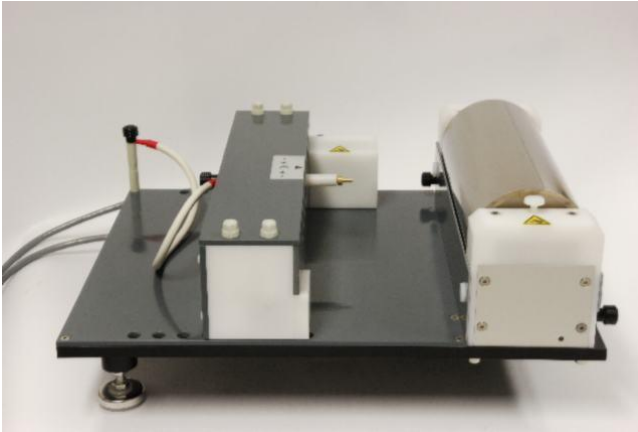
Parallel plate collector



Features

- Collector with parallel conducting strips
- Collector can be fixated on nozzle stand
- Strip length of 100 mm
- Gap between strips 20 – 100 mm
- Precise adjustment of gap between strips
- High voltage ground lead connection
- Clamp for fiber collection and cover plates
- Minimal maintenance

Rotating drum collector

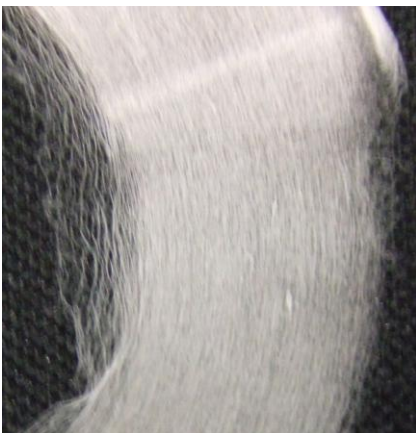


Features

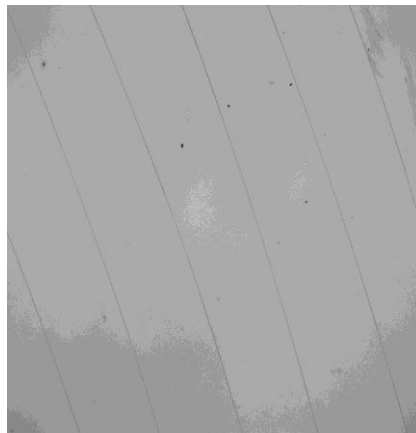
- Rotating drum collector with nozzle actuator
- Semi-aligned fiber collection
- Adjustable spinning distance 40 – 200 mm
- Drum dimensions $\text{\O}100 \times 220$ mm
- Drum rotating speed 0 – 2500 rpm
- Nozzle translation speed 0 – 350 mm/s
- Separate motor electronics module
- System control via HMI of ESC-D

Semi-oriented fiber collection

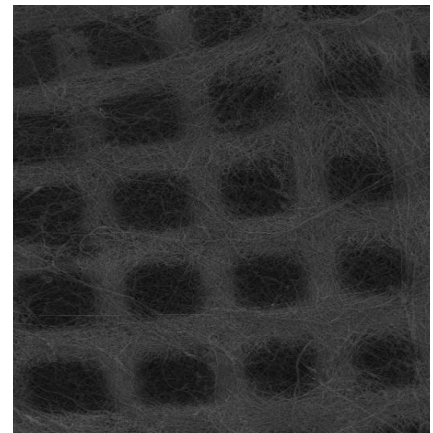
IME Technologies is active in the development of new methods and devices for oriented electrospinning. Our aim is to provide full control over the deposition point of the electrospun fibers. The ability to produce meshes of aligned fibers will significantly increase the functionality, performance and usability of the nanofiber structures in a wide range of application. Currently, some processes are under development for the production of semi-oriented circular meshes and highly-aligned square meshes. Contact us if you want to learn more about our oriented electrospinning capabilities.



Semi-oriented circular mesh



Spiral of single fiber



Highly aligned square mesh

Camera system



Features

- High performance digital camera system
- Insulating housing and flexible mount
- Gigabit Ethernet connection
- Integrated LED lightning
- ON/OFF switch and power supply
- ProStream camera software license

Syringe pumps

In order to feed the polymer solution to the nozzle, typically a syringe pump is used. IME Technologies offers two different syringe pumps, a standard pump and a high precision pump for more accurate flow rate control. Furthermore, IME Technologies can provide a small-volume injection system. In this system a small syringe pump is integrated in the nozzle stand itself, reducing the amount of fluid that is lost in the length of tubing between the syringe and nozzle.



Contact information

If you want additional information about our products or services or when you want to obtain a quotation for a specific system, please contact us.

Postal address:

IME Technologies
Building WL 1.56
P.O. Box 513
5600 MB Eindhoven
The Netherlands

Visiting address:

IME Technologies
Building WL 1.56
Den Dolech 2
5612 AZ Eindhoven
The Netherlands

Tel: +31 (0)40 247 3337

Fax: +31 (0)40 247 4452

E-mail: sales@imetechnologies.nl

Website: www.imetechnologies.nl