

# Encapsulation Unit – Var V1



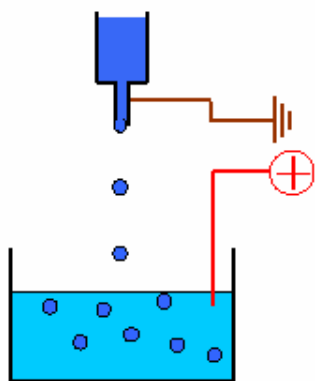
**Nisco Engineering AG**  
Dufourstrasse 110  
CH-8008 Zurich, Switzerland

Tel: +41 44 380 06 30  
Fax: +41 44 380 06 31  
e-mail: [mailbox@nisco.ch](mailto:mailbox@nisco.ch)  
<http://www.nisco.ch>

*under license of FMC Polymer a.s., Oslo, Norway*

In most applications involving immobilisation of living cells or other biological materials the bead size needs to be small (<1 mm) and carefully controlled. The reason for this is mostly because of diffusion limitations of nutrients within hydrogel beads. A convenient way for production of small alginate beads in a controllable manner is the use of an electrostatic bead generator. The basic principle of the instrument is the use of an electrostatic force to pull droplets from a needle tip into a gelling bath. The Nisco instrument is designed for research uses production of smaller quantities of spherical alginate beads ranging in size from around 200 to 1000 µm.

The bead generator mainly consists of a power unit of 0-10 kV, a switch for fine tuning of the voltage magnitude, an autoclavable needle holder, and a safety cage with an electrical safety switch. The alginate (or other) solution may be fed into the instrument from a syringe using a syringe pump. A magnet stirrer is placed underneath the gelling bath to keep the beads separated during gelling. Needles used in the instrument are made of stainless steel, and are available in different diameters. The instrument is shipped with needles of 0.17 mm and 0.40 mm inner diameter. The instrument is designed to produce up to 2'400 capsules with single nozzle/min, approximately 24'000 capsules /min with a 10 nozzle head. The production rate depends on the matrix and the parameters. The standard deviation of the bead diameters in one batch has been found to be around 3-6% on the average value. The bead generator has been used successfully in several studies involving immobilisation of living cells.



**Principle of electrostatic bead generator**



Bead size will be dependent of the following parameters: voltage and distance between the needle tip and the gelling bath, solution viscosity, flow rate of the solution as well as needle diameter. A suitable distance between the needle tip and the gelling bath for this instrument is around 10 mm. The appropriate bead size is selected by voltage adjustment. Bead diameter decreases with smaller needle diameters and increasing voltage.

To operate the unit, a syringe and syringe pump (or equivalent) is required (not included in scope of supply).

Included in scope of supply are:

- 2 nozzles (Ø 0.17 / 0.40)
- Beakers
- Magnetic stirrer
- Silicon hose

Options available:

- Syringe pump
- Peristaltic pump