



Twin-screw extrusion

Thermo Scientific Energy 11 PROTECT Glovebox Solution

A bench-top twin-screw extruder seamlessly integrated into a glovebox, designed to deliver superior processing of battery pastes under an inert argon atmosphere.

Setup

Lithium-ion battery materials need to be processed under dry or even inert conditions to protect the sensitive chemicals involved. The Thermo Scientific™ Energy 11 PROTECT Glovebox is a complete solution to this challenge, combining twin-screw extrusion capabilities and a precisely controlled argon atmosphere within a user-friendly setup for easy handling.

The established MBraun LABmaster glovebox was adapted to fit the precise size of the Energy 11 Twin-Screw Extruder and provide streamlined handling options when processing battery materials. From conventional slurry mixing using NMP (N-Methyl-2-pyrrolidone solvent) to free standing dry electrode films, the setup promotes low material consumption and efficient workflow.

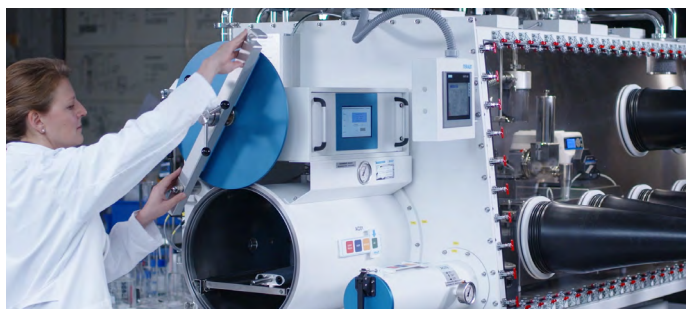
The whole setup comes pre-assembled and tested for airtightness and functionality. This greatly limits technical obstacles that could arise from DIY attempts to acquire components individually and assemble a system on-site.

Widen your research

Due to its wide range of accessories, the Energy 11 PROTECT integrated glovebox solution allows users to develop and produce cathode and anode slurries as well as electrolytes for solid-state batteries. Its high dispersive and distributive mixing capabilities also make possible the processing of dry electrodes under an argon atmosphere.

All extruder product contact parts can be disassembled completely and quickly for easy and thorough cleaning and to prevent cross contaminations. Rapid changes to experiment conditions are enabled by this feature as well.

Whatever your material requirements are, a range of feeding options for solid and liquid materials, all controlled by the extruder's control panel, make sure that all ingredients go into the process precisely. Being a continuous process by design, the mixing done by the Energy 11 Extruder eliminates batch to batch variations and always delivers a thoroughly homogenous final product.



The antechambers of the glovebox are designed for fast and easy transfer of extruder parts, to change from wet to dry processing. If desired, the HAAKE™ Viscotester™ iQ Rotational Rheometer can also be transferred into the box to perform rheological characterization in-line.

Applications

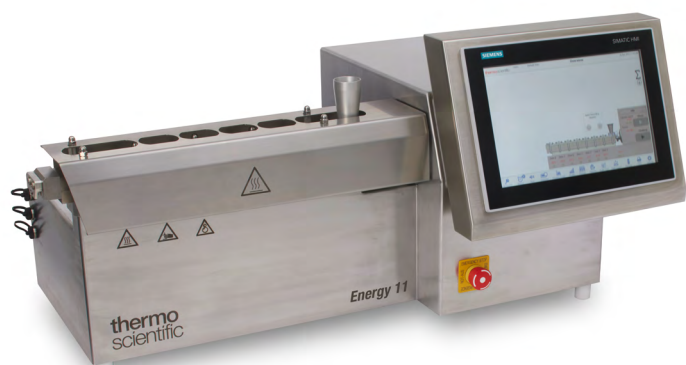
- All solid-state battery material mixing
- Handling of pure lithium anodes
- Separator film extrusion
- Lithium-ion electrode slurry mixing
- Solvent reduced mixing and dry cathode processing

Technical data twin-screw extruder

Barrel diameter	11 mm
Barrel length	40 L/D
Barrel material	CPM® 10V
Screw material	CPM 9V
Screw speed	10 to 1000 rpm
Temperature range	15 to 280 °C (8 individual zones)
Maximum torque	6 Nm / shaft
Maximum pressure	100 bar
Dimensions (L x W x H)	890 x 490 x 425 mm
Weight	70 kg
Power supply	230 V, 16 A, 50/60 Hz

Technical data glovebox

- Inter atmosphere with < 1 ppm O₂ and < 1 ppm H₂O using argon (1–10 mbar overpressure)
- Optional nitrogen removal: < 1 ppm N₂
- Solvent filter for NMP removal in box atmosphere
- Adapted antechambers for all Energy 11 Extruder / Viscotester iQ Rheometer parts
- Antechamber purging with fresh argon for removal of hazardous volatiles inside
- Integrated vacuum cleaner system
- Optional endless liner to transfer parts and material out in sealed plastic bags
- Dimension (L x W x H): 3200 x 1400 x 2400 mm
- Power supply: 16A, 400 V / 50–60 Hz
- Argon supply pressure: 6 bars



Energy 11 Twin-Screw Extruder

Learn more at thermofisher.com/Energy11PROTECT

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