

The HAAKE MiniLab needs a sample volume of 7 ml only. Compounding expensive materials such as nano-composites, bio-polymers or pharmaceuticals is therefore no longer a problem. Simultaneously the rheological properties can be recorded to document structural changes. By using the optional force feeder, continuous extrusion with very small volumes is possible. The separately available mini-injection molding machine allows you to create specimens for material testing.

## HAAKE MiniLab

Few ingredients – Great results



### Main features

- co- and counter rotating twin screws
- integrated viscosity measurement
- automatic bypass operation for circulation/extrusion
- pneumatic feeding
- LCD screen for graphical data display
- manual or computer control

### The concept

The HAAKE MiniLab micro compounder was specially developed for the compounding of small volume (7 cc) samples. This miniaturized high-tech tool is perfect for research in material science, testing of expensive additives and the development of new formulations. The system is based on a conical twin-screw compounder with an integrated backflow channel. Due to the backflow channel and the integrated bypass valve, which enables the recirculation of the melt, the residence times are well defined. Two pressure transducers that are integrated in the backflow channel allow the simultaneous measurement of the (relative) viscosity of the melt up to 350°C (optionally 420°C). The HAAKE MiniLab can be used with co- or counter-rotating screws and is equipped with an inert gas flush system for the feeding area and the barrel.

### Applications

The HAAKE MiniLab is ideal for the precisely controlled reactive extrusion of high viscous melts. By running the instrument in re-circulation mode, the required reaction time for the reaction mixture (e.g. a monomer polymer and catalyst) can be controlled easily. At the end of the test the re-circulation is stopped by opening the bypass valve and extruding the sample as a rod. By measuring the torque of the drive motor and the pressure in the backflow channel the reaction process can be monitored effectively.

Because of the small sample volumes required and the resulting short reaction times the combination of the HAAKE MiniLab and the HAAKE ForceFeeder is a powerful tool for the quick analysis of a test series of samples. Performing the same test with a standard lab extruder would take much longer.

# HAAKE MiniLab

## Instrument control

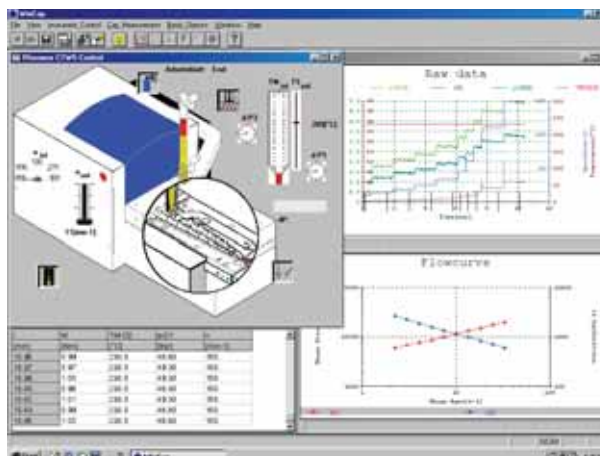
The HAAKE MiniLab can be controlled by using the separate manual control box which includes a LCD screen for graphical data display or using the versatile application software. The manual control box features:

- easy handling with a clear menu structure
- numerical and graphical data monitoring
- storage of up to 10 test setups
- flexible positioning of the display

The application software features:

- Instrument control via standardized RS232 interface
- storage of test setup and test results in one file
- flexible data documentation
- advanced evaluation methods and documentation of rheological data (viscosity, shear stress).

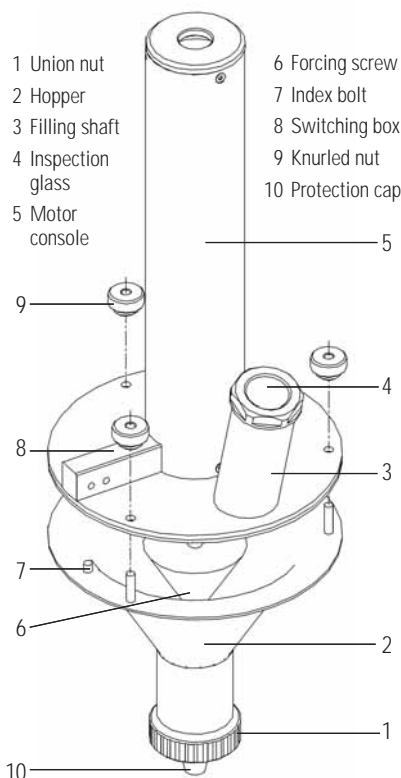
## Software



Application example: Drop of the melt viscosity due to the degradation of the polymer at long residence time

## Feeding systems

Three different feeding systems are available for the HAAKE MiniLab: A pneumatic feeding system comes as standard equipment, optionally a manual feeder and the new HAAKE ForceFeeder are available. The HAAKE ForceFeeder is specially designed for the HAAKE MiniLab to enable continuous sample feeding. With an attached rod or slit die the constant production of small strands or bands is possible. The cooled feeding zone avoids the melting of material in the feeder funnel. For sensitive samples the sealed funnel can be purged with inert gas. Output rates are in the range of 2 g of material per minute.



## Technical specifications

### HAAKE MiniLab

#### Drive

Motor power	400 W
Speed range	1 ... 360 rpm
Max. torque	5 Nm per screw
Power supply	240 V ± 10 %, 50/60 Hz 110 V ± 10 %, 60 Hz

#### Extruder

Design	conical co & counter rotating
Temperature	350 °C or 420 °C
Barrel	stainless steel 1.4122 TiN coated additional standard sensor port (optional)
Screws	stainless steel 1.4122
Cooling	air / water for 350 °C version air for 420 °C version
Pressure	up to 200 bar
Volume	7 cc (equivalent to 5 g PE)
Bypass	automatic
Feeding	pneumatic ram (standard) manual feeding (optional) force feeder (optional)

### HAAKE ForceFeeder

Max. torque	4 Nm
Max. rotating speed	30 min <sup>-1</sup>
Diameter	10,5 mm / 57 mm
Material	stainless steel 1.4122 Cr coated
Power supply	230 V / 50 - 60 Hz / 1.6 A 110 - 115 V / 50-60 Hz / 3.2 A

## Thermo Electron Corporation

### Material Characterization Business

#### International/Germany

Thermo Electron (Karlsruhe) GmbH  
Dieselstr. 4  
76227 Karlsruhe  
Tel. +49 (0) 721 4 09 44 44  
info.mc.de@thermo.com

#### Benelux

Thermo Electron B.V.  
Takkebijsters 1  
4817 BL Breda  
Tel. +31 (0) 76 5 87 98 88  
info.mc.nl@thermo.com

#### France

Thermo Electron S.A.  
16 Avenue du Québec - Silic 765  
91963 Courtaboeuf Cedex  
Tel. +33 (0) 1 60 92 48 00  
info.mc.fr@thermo.com

#### United Kingdom

Thermo Electron  
Emerald Way, Stone  
Staffordshire ST15 0SR  
Tel. +44 (0) 1785 81 36 48  
info.mc.uk@thermo.com

#### USA

Thermo Electron  
25 Nimble Hill Rd.  
Newington, NH 03801  
Tel. 603 436 9444  
info.mc.us@thermo.com