

- product news & industry applications

## New modular rheometer platform for R&D

all industries

The new Thermo Scientific HAAKE MARS III rheometer combines the advantages of HAAKE MARS II as one of the most modular rheometers in its class with several of the latest scientific innovations including specification upgrades, new accessories such as temperature modules, measuring geometries with a focus on intuitive handling and design changes for ease of use.

The HAAKE MARS III offers a comprehensive portfolio of application accessories for industry applications as follows:

### Polymers

- Controlled Test Chamber from - 150°C to +600°C
- Solid Clamps for DMA tests
- SER tool for elongation measurements
- Disposable measuring geometries and sample loading tool for pellets

- RheoScope Module for observation of polymer melting behaviour
- Additional Software tools such as TTS, Spectrum, MWD

The viscoelastic properties of polymer melts or solids can be measured as a function of shear, elongation, time, frequency, temperature etc - not only under shear but also under elongation strain.

### Petrochemicals

- Most comprehensive pressure cell line up to 300°C and 400 bar made of Titanium or Hastelloy including accessories for isobar measurements in pressure cells
- RheoScope module for e.g. crystallisation behaviour studies ("Waxing")
- SHRP cell for characterisation of Bitumen
- Tribology Cell for friction measurements of lubricants and fats

For temperature and pressure dependent measurements, there is a comprehensive range of measuring cells in various materials, suitable for up to 400 bar and 300°C. Cylindrical geometries or vane rotors are available as measuring geometries to simulate the starting



**rheotalk**  
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behaviour of pipelines. Isobaric measurements can be done using an automated pressure controller while performing temperature ramps. Simultaneous measurements of rheological properties with microscopic observation of structure formation allows for the study of the crystal growth in the crude oil. Several application-based measuring cells for petroleum processing and refining, such as the rheological testing of bitumen or for tribological and rheological testing of oils and lubricants are available.

### Paints and inks

- Sample hood including solvent traps
- A range of UV curing measuring cells incl. thermal assisted curing

*continued on page 3* ▶▶



*A comprehensive portfolio of application accessories for the Petrochemical, Pharmaceuticals and cosmetics, Paints and inks and Polymer industries is available*

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# Mal

*19 March 1996 to 15 September 2009*

Mal the devoted, loving and gentle member of our team sadly was euthanised on a warm and sunny Tuesday in September. He appeared calm, relaxed and understood that this was his time.

Mal was an integral part of our life in every way and his death has left us, everyone at Rheology Solutions and all that have met him with a deep sense of loss. He leaves us with many happy memories and contributions to our lives. These, his handsome face and welcoming smile are etched in our hearts forever.

**Lessons we learnt from our dog:**

- Never pass up the opportunity to go for a ride.
- Allow the experience of fresh air and the wind in your face to be pure ecstasy.
- When loved ones come home, always run to greet them.
- When it's in your best interest, always practice obedience.

- Let others know when they've invaded your territory.
- Take naps and always stretch before rising.
- Run, romp, and play daily.
- Eat with gusto and enthusiasm.
- Be loyal.
- Never pretend to be something you're not.
- If what you want lies buried, dig until you find it.
- When someone is having a bad day, be silent, sit close by and nuzzle them gently.
- Delight in the simple joy of a long walk.
- Thrive on attention and let people touch you.
- Avoid biting when a simple growl will do.
- On hot days, drink lots of water and lie under a shady tree.
- When you're happy, dance around and wag your entire body.
- No matter how often you are criticised, don't buy into the guilt thing and pout. Run right back and make friends.

*Author unknown* •



*With Evie - his constant companion*



*One of the early lessons for Evie - rest and relax*

• in this issue

## Specific Industry Key

- all industries** Pg. 1, 4, 17, 20
- polymer industries** Pg. 1, 4, 9, 11, 12, 13, 14, 15, 17, 18, 20
- food industries** Pg. 1, 4, 9, 16, 17, 18, 20
- mining industries** Pg. 1, 4, 17, 20
- construction & building industries** Pg. 1, 4, 17, 20
- surface coatings industries** Pg. 1, 4, 17, 18, 20
- pharma, cosmetic & allied industries** Pg. 1, 4, 10, 14, 17, 18, 19, 20
- chemical & allied industries** Pg. 1, 4, 13, 17, 18, 20

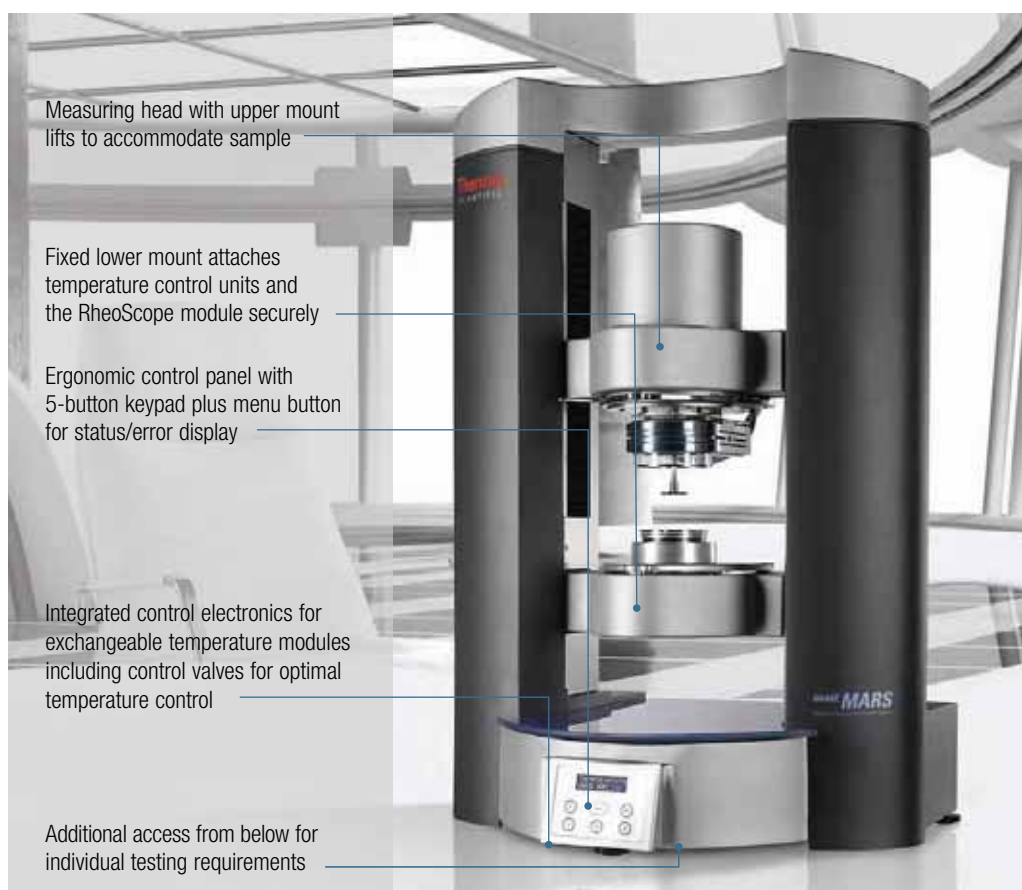
◀ continued from page 1

- Special measuring geometries such as double cone, ring rotor, disposable geometries
- Rheometer for elongational measurements (Thermo Scientific HAAKE CaBER)
- Dynamic contact angle measurement

### Pharmaceuticals and cosmetics

- Comprehensive temperature modules range
- RheoScope measurement for stability testing, crystallisation, etc.
- DüNoüy Ring for interfacial rheology
- Special holder for Microtiter plates or original binds
- Submersion flow cell
- 21 CFR part 11 tool

Whilst simple viscosity measurements can often be sufficient for evaluating raw materials, extensive rheological testing is necessary to predict and effectively adjust shelf life, sensitivity or processability. Rheological tests are essential for the development, optimisation or production of suspensions and emulsions in order to reduce product development times and optimise production processes regardless of the product being nasal sprays, creams, foams, tablet coatings, shelf life, sprays or active ingredient dosing. •



### Specifications of the RheoScope module

Lenses
• Microscope Focus and radial positioning by software-controlled servo motors
• Lens 5x, 10x, 20x and 50x
• Light source 150 W, 12 V, wave length range: 380-750 nm
• Resolution 1 µm (20x lenses)
• Field depth 5 µm (20x lenses)
• Contrast improvement Polarizer adjustable by software-controlled servo motor
• Camera Black-and-white 'progressive' scan CCD camera, with 1024 x 768 pixels, C connector and IEEE 1394 (Firewire) interface

### Data acquisition and storage

• Data acquisition Up to 30 images per second in HAAKE RheoWin 4 software
• Storage As image (3 standard image formats: TIFF, BMP, LWF) or Video sequences (configurable data compression)

### Temperature range

• Standard version -5°C – 120 °C (liquid temperature control unit)
• High temperature option -5°C – 300 °C (electrical temperature control unit)

### Measuring geometries

• Using a plate/plate and plate/cone measuring geometry with polished surface is recommended.
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### Technical data

Min. torque rotation CS	0.01 µNm
Min. torque rotation CR	0.01 µNm
Min. torque oscillation CS	0.003 µNm
Min. torque oscillation CD	0.003 µNm
Max. torque	200 mNm
Torque resolution	0.1 nNm
Motor inertia	10 µNm
Motor type	Drag cup
Bearing type Air bearing:	2x radial, 1x axial
Angular resolution	12 nrad
Step in strain	30 ms
Min. rotational speed CS	10 <sup>-7</sup> rpm
Min. rotational speed CR	10 <sup>-8</sup> rpm
Max. rotational speed	1500 (4500 <sup>o</sup> ) rpm
Step in velocity	10 ms
Min. oscillation frequency	10 <sup>-6</sup> Hz
Max. oscillation frequency	100 Hz
Min. Normal force	0.01 N
Max. Normal force	50 N
Normal force resolution	0.001 N
Max. lift travel	240 mm
Gap resolution	0.5 µm
Min. lift speed	0.02 µm/s
Max. lift speed	20 mm/s
Min. temperature	-150°C
Max. temperature	600°C
Dimensions (W x D x H)	600x600x890 mm
Weight	59 kg

### Features

CD-OSC <sup>c</sup>	Yes
OSC raw data / Lissajous	Yes
Multiwave	Yes
Gap control: Force / speed / path for squeeze - and tack test / texture analysis	Yes / Yes / Yes
Camera for image capturing	Standard (USB, Firewire)
Titanium measuring geometries with low inertia	Standard
Replaceable lower plates of various diameters / surfaces / materials	Yes / Yes / Yes
Quick couplings for temperature module recognition	Yes
Temperature module recognition	Yes

### Temperature modules

Peltier controlled plate	-60°C - 200°C
Electrically controlled hood	-40°C - 400°C <sup>e</sup>
Liquid controlled plate	-40°C - 200°C
Electrically controlled plate	-40°C - 400°C
Liquid controlled cylinder	-40°C - 180°C
Electrically controlled cylinder	Max. 300 °C *
Controlled test chamber	-150°C - 600°C

(a) True deformation control (b) Option for high shear rates (c) Depending on temperature module (e) Electrical \* When using suitable measuring geometries

- feature on temperature control solutions

## What's New... A NEW generation of advanced, configurable solutions to meet all your temperature control needs

all industries

The new Thermo Scientific temperature control systems allows you to match a specific thermostat to the particular heated or refrigerated bath that best meets your application requirement.

The thermostats are versatile and are available in two performance levels offering the features needed to configure the optimum cost-effective solution for your application.

These systems are suitable for any industry application for QA/QC, R&D, analytical instruments and general laboratory instrumentation.

### Thermostats

#### • The STANDARD (SC) Series of Thermostats

Choose from three options. These thermostats are designed for ease-of-use and energy efficiency. Powerful pumping and heating capacity for closed loop applications, this is an economical choice offering solid performance for applications ranging from -28°C to +150°C.

#### • The ADVANCED (AC) Series of Thermostats

Choose from two options. Additional features are included which provide you with greater precision, force suction pump, external temperature probe, and temperature ranges from -40°C to +200°C.



Standard SC 100  
Thermostat

Advanced AC 150  
Thermostat

Thermostat can be indexed 90° on all four sides of the bath.

Model	SC 100	SC 150	SC 150L	AC 150	AC 200
<b>Thermostat Performance</b>					
Heating cap.@ 230V	2	2	2	2	2
T max (°C)	100	150	150	150	200
Temp. stability (°C)	0.02	0.02	0.02	0.01	0.01
Max flow rate (l/min)	17	17	17	20	20
Max pressure (mbar/psi)	300/4.35	300/4.35	300/4.35	475/6.89	475/6.89
Max suction (mbar/psi)				330/4.85	330/4.85
Flow rate / pump speed steps	2	2	2	3	3
Immersion depth (mm)	75..145	75..145	75..190	75..145	75..145
<b>Dimensions/Weight</b>					
Display dimension (mm)	LCD 53x29	LCD 53x29	LCD 53x29	LCD 71x39	LCD 71x39
Overall dimensions (mm)	137 x 190 x 200	137 x 190 x 200	137 x 190 x 200	165 x 228 x 200	165 x 228 x 200
Net weight	3.3 Kg	3.3 Kg	3.3 Kg	4.2 Kg	4.2 Kg
<b>Safety &amp; Compliance</b>					
Safety class acc. DIN12876	1 / NFL	3 / FL	3 / FL	3 / FL	3 / FL
Compliance	UL/CSA/CE	UL/CSA/CE	UL/CSA/CE	UL/CSA/CE	UL/CSA/CE
IQ/OQ	Optional	Optional	Optional	Optional	Optional
RoHS	•	•	•	•	•
<b>Alarm Sources</b>					
High temperature alarm	•	•	•	•	•
Low level alarm	•	•	•	•	•
Refrigeration alarm	•	•	•	•	•
Application threshold				•	•
Application alarm (external)*	Optional	Optional	Optional	Optional	Optional
<b>Alarm indicators</b>					
Acoustic alarm	•	•	•	•	•
Optical alarm	•	•	•	•	•
<b>Connectivity</b>					
Remote sensor port				•	•
Refrigeration port	•	•	•	•	•
USB port		•	•		•
Multi function port					•
RS232		Optional	Optional	Optional	Optional
RS485		Optional	Optional	Optional	Optional
Ethernet/LAN		Optional	Optional	Optional	Optional
Analog I/O box (new) own power		•	•		•
<b>Displayed data</b>					
Temperature	•	•	•	•	•
Setpoint	•	•	•	•	•
High temperature warning				•	•
Low level warning		•	•	•	•
High level warning				•	•
Alarm notification	•	•	•	•	•
Date & Time					•
<b>Features</b>					
Energy saving mode	•	•	•	•	•
RTA	•	•	•	•	•
°C/°F/K selection	•	•	•	•	•
Auto restart	•	•	•	•	•
System temperature limits	•	•	•	•	•
Application temperature limits	•	•	•	•	•
Solenoid valve for tap water					•
3-point calibration				•	•
On/Off timer	•	•	•	•	•
Preset temperatures	5	5	5	5	5
Ramp programs					1
Real time clock	•	•	•	•	•
Multiple languages	3	3	3	8	8

## Heating bath circulators

The Thermo Scientific SAHARA heating bath circulators are available in capacities from 5L to 49L baths and the baths are constructed in transparent acrylic, polyphenylene oxide (PPO), or stainless steel. Thermostats are attached by a bath bridge and can be positioned 90° on all four sides of the bath.

### • Transparent acrylic baths

These baths are ideal for applications requiring good visibility. Temperatures are maintained from ambient plus 13°C to +60°C. •



Model		S6T heated bath circulator	S12T heated bath circulator	S19T heated bath circulator
Temp range	SC100 thermostat	Amb +13 to 60°C	Amb +13 to 60°C	Amb +13 to 60°C
Dimensions (HxWxL) mm		353 x 170 x 400	353 x 310 x 340	353 x 310 x 510
Temp range	SC150 thermostat	Amb +13 to 60°C	Amb +13 to 60°C	Amb +13 to 60°C
Dimensions (HxWxL) mm		353 x 170 x 400	353 x 310 x 340	353 x 310 x 510
Temp range	SC150L thermostat	—	—	—
Dimensions (HxWxL) mm		—	—	—
Temp range	AC150 thermostat	—	Amb +13 to 60°C	Amb +13 to 60°C
Dimensions (HxWxL)		—	388 x 310 x 340	388 x 310 x 510
Temp range	AC200 thermostat	—	Amb +13 to 60°C	Amb +13 to 60°C
Dimensions (HxWxL) mm		—	388 x 310 x 340	388 x 310 x 510
Bath capacity (liters)		4-6	8-12	12-19
Reservoir dimensions (DxWxL) mm		150 x 138 x 210	150 x 300 x 140	150 x 300 x 310
Net weight (kg)		6.3	7.3	8.7

### • Polyphenylene oxide (PPO)

An economical alternative to stainless steel, these modified polyphenylene oxide baths are thermally resistant up to +100°C and deliver exceptional temperature performance with operational savings. Temperatures are maintained from ambient plus 13°C to +100°C. •



Model		S5P heated bath	S14P heated bath	S21P heated bath
Temp range	SC100 thermostat	Amb +13 to 100°C	Amb +13 to 100°C	Amb +13 to 100°C
Dimensions (HxWxL) mm		160 x 360 x 330	330 x 400 x 380	330 x 400 x 540
Temp range	SC150 thermostat	Amb +13 to 100°C	Amb +13 to 100°C	Amb +13 to 100°C
Dimensions (HxWxL) mm		160 x 360 x 330	330 x 400 x 380	330 x 400 x 540
Temp range	SC150L thermostat	—	—	—
Dimensions (HxWxL) mm		—	—	—
Temp range	AC150 thermostat	—	Amb +13 to 100°C	Amb +13 to 100°C
Dimensions (HxWxL) mm		—	330 x 400 x 380	330 x 400 x 540
Temp range	AC200 thermostat	—	Amb +13 to 100°C	Amb +13 to 100°C
Dimensions (HxWxL) mm		—	330 x 400 x 380	330 x 400 x 540
Bath capacity (liters)		3-5	8-14	13-21
Reservoir dimensions (DxWxL) mm		130 x 160 x 297	300 x 160 x 157	300 x 160 x 347
Net weight (kg)		5.1	6.3	6.6



## Heating bath circulators

- **Stainless steel**

Powerful heating circulators with a stainless steel reservoir can be configured with different temperature ranges and volumes with efficient heating for open and closed applications. The stainless steel baths are rugged and corrosion-resistant and suitable for high temperature applications up to 200°C. Choose from space-saving vertical baths or ergonomically flat baths to fit your lab. •

Model		S3 stainless steel heated bath	S7 stainless steel heated bath	S13 stainless steel heated bath	S15 stainless steel heated bath
Temp range	SC100 thermostat	Amb +13 to 100°C	Amb +13 to 100°C	Amb +13 to 100°C	Amb +13 to 100°C
Dimensions (HxWxL) mm		387 x 228 x 409	438 x 228 x 401	455 x 392 x 652	554 x 392 x 652
Temp range	SC150 thermostat	Amb +13 to 150°C	Amb +13 to 150°C	Amb +13 to 150°C	Amb +13 to 150°C
Dimensions (HxWxL) mm		387 x 228 x 409	438 x 228 x 401	455 x 392 x 652	554 x 392 x 652
Temp range	SC150L thermostat	—	—	Amb +13 to 150°C	Amb +13 to 150°C
Dimensions (HxWxL) mm		—	—	438 x 312 x 441	455 x 392 x 476
Temp range	AC150 thermostat	Amb +13 to 150°C	Amb +13 to 150°C	Amb +13 to 150°C	Amb +13 to 150°C
Dimensions (HxWxL) mm		420 x 228 x 409	471 x 228 x 401	471 x 312 x 441	488 x 392 x 476
Temp range	AC200 thermostat	Amb +13 to 200°C	Amb +13 to 200°C	Amb +13 to 200°C	Amb +13 to 200°C
Dimensions (HxWxL) mm		420 x 228 x 409	471 x 228 x 401	471 x 312 x 441	488 x 392 x 476
With tap water cooling coil option added		+20°C to 100/150/200°C	+20°C to 100/150/200°C	+20°C to 100/150/200°C	+20°C to 100/150/200°C
Bath capacity (liters)		3-5	4-7	8-13	11-20
Reservoir dimensions (DxWxL) mm		134 x 139 x 303	185 x 143 x 345	200 x 223 x 335	202 x 303 x 370
Net weight (kg)		10.3	11.4	13.9	16.9

Model		S21 stainless steel heated bath	S30 stainless steel heated bath	S45 stainless steel heated bath	S49 stainless steel heated bath
Temp range	SC100 thermostat	Amb +13 to 100°C	Amb +13 to 100°C	Amb +13 to 100°C	Amb +13 to 100°C
Dimensions (HxWxL) mm		455 x 392 x 1002	455 x 392 x 652	554 x 392 x 652	455 x 392 x 1002
Temp range	SC150 thermostat	Amb +13 to 150°C	Amb +13 to 150°C	Amb +13 to 150°C	Amb +13 to 150°C
Dimensions (HxWxL) mm		455 x 392 x 1002	455 x 392 x 652	554 x 392 x 652	455 x 392 x 1002
Temp range	SC150L thermostat	—	Amb +13 to 150°C	Amb +13 to 150°C	Amb +13 to 150°C
Dimensions (HxWxL) mm		—	455 x 392 x 652	554 x 392 x 652	455 x 392 x 1002
Temp range	AC150 thermostat	Amb +13 to 150°C	Amb +13 to 150°C	Amb +13 to 150°C	Amb +13 to 150°C
Dimensions (HxWxL) mm		437 x 392 x 652	488 x 392 x 652	587 x 392 x 652	488 x 392 x 1002
Temp range	AC200 thermostat	Amb +13 to 200°C	Amb +13 to 200°C	Amb +13 to 200°C	Amb +13 to 200°C
Dimensions (HxWxL) mm		437 x 392 x 652	488 x 392 x 652	587 x 392 x 652	488 x 392 x 1002
With tap water cooling coil option added		+20°C to 100/150/200°C	+20°C to 100/150/200°C	+20°C to 100/150/200°C	+20°C to 100/150/200°C
Bath capacity (liters)		21-Sep	17-30	34-45	29-49
Reservoir dimensions (DxWxL) mm		151 x 303 x 546	201 x 303 x 546	301 x 303 x 546	202 x 303 x 896
Net weight (kg)		18.2	20.4	24.8	27.6

## Refrigerated bath circulators

The Thermo Scientific ARCTIC series of refrigerated circulators feature a stainless steel reservoir and are offered in a range of sizes, depths and openings. Bath capacities from 5L to 30L and units offer recessed handles and drain port opening at the front.

*Thermo Scientific ARCTIC series refrigerated circulator range*

The 3 side-ventilation means the unit can be blocked on two sides allowing flexibility when placing in your work area. •



Model		A5B refrigerated circulator	A10B refrigerated circulator	A24B refrigerated circulator	A25B refrigerated circulator	A40B refrigerated circulator
Temp range	SC100 thermostat	-5 to 100°C	-10 to 100°C	-24 to 100°C	-25 to 100°C	—
Dimensions (HxWxL)		470 x 419 x 738	470 x 419 x 913	520 x 514 x 426	739 x 324 x 541	—
Temp range	SC150 thermostat	-5 to 150°C	-10 to 150°C	-24 to 150°C	-25 to 150°C	-28 to 150°C
Dimensions (HxWxL)		470 x 419 x 738	470 x 419 x 913	558 x 514 x 426	739 x 324 x 541	810 x 415 x 550
Temp range	SC150L thermostat	—	—	-25 to 150°C	—	-28 to 150°C
Dimensions (HxWxL)		—	—	573 x 765 x 610	—	810 x 415 x 550
Temp range	AC150 thermostat	-5 to 150°C	-10 to 150°C	-25 to 150°C	-25 to 150°C	—
Dimensions (HxWxL)		503 x 419 x 738	503 x 419 x 913	606 x 765 x 610	772 x 324 x 541	—
Temp range	AC200 thermostat	-5 to 200°C	-10 to 200°C	-25 to 200°C	-25 to 200°C	-40 to 200°C
Dimensions (HxWxL)		503 x 419 x 738	503 x 419 x 913	606 x 765 x 610	772 x 324 x 541	850 x 415 x 550
Cooling capacity at 20°C 230V		200W	250W	700W	500W	900W
Bath capacity (liters)		6-15	18-30	16-26	28	10-13
Reservoir dimensions (DxWxL) mm		201 x 297 x 190	201 x 297 x 364	203 x 300 x 504	233 x 223 x 240	200 x 285 x 200
Net weight (kg)		34.6	38.6	52.5	38.1	53

Model		A10 refrigerated circulator	A25 refrigerated circulator	A28 refrigerated circulator	A28F refrigerated circulator	A40 refrigerated circulator
Temp range	SC100 thermostat	-10 to 100°C	-25 to 100°C	-28 to 100°C	-28 to 100°C	—
Dimensions (HxWxL)		606 x 220 x 414	710 x 273 x 483	710 x 273 x 483	519 x 514 x 426	—
Temp range	SC150 thermostat	-10 to 150°C	-25 to 150°C	-28 to 150°C	-28 to 150°C	-28 to 150°C
Dimensions (HxWxL)		606 x 220 x 414	710 x 273 x 483	710 x 273 x 483	519 x 514 x 426	748 x 385 x 519
Temp range	SC150L thermostat	—	-25 to 150°C	-28 to 150°C	-28 to 150°C	-28 to 150°C
Dimensions (HxWxL)		—	710 x 273 x 483	710 x 273 x 483	519 x 514 x 426	748 x 385 x 519
Temp range	AC150 thermostat	-10 to 150°C	-25 to 150°C	-28 to 150°C	-28 to 150°C	-28 to 150°C
Dimensions (HxWxL)		639 x 220 x 414	743 x 273 x 483	743 x 273 x 483	552 x 514 x 426	781 x 385 x 519
Temp range	AC200 thermostat	-10 to 200°C	-25 to 200°C	-28 to 200°C	-28 to 200°C	-40 to 200°C
Dimensions (HxWxL)		639 x 220 x 414	743 x 273 x 483	743 x 273 x 483	552 x 514 x 426	781 x 385 x 519
Cooling capacity at 20°C 230V		240W	500W	320W	320W	800W
Bath capacity (liters)		5	7-12	6-10	6-10	7-12
Reservoir dimensions (DxWxL) mm		152 x 140 x 305	205 x 176 x 374	205 x 176 x 320	205 x 176 x 320	205 x 176 x 374
Net weight (kg)		28.8	34.1	34.1	41.6	49.9

## Ultra-low refrigerated circulators

The Thermo Scientific GLACIER ultra-low refrigerated circulators are suitable for external temperature applications with simultaneous operation in the bath tank. These circulators deliver high heating and cooling capacities for rapid heat-up and cool-down times. Fitted with adjustable castors, drain port, and handles - it's a perfect fit for any environment. A heated top plate prevents condensation and icing at low temperatures.

Typical applications:

- Jacketed reaction vessels
- Analytical instrumentation
- Condensers
- Material testing
- Calibration
- Crystallisation

Model	G50 ultra-low refrigerated circulator	
Temp range	SC100 thermostat	—
Dimensions (WxHxL) mm		—
Temp range	SC150 thermostat	-28 to 150°C
Dimensions (WxHxL) mm		810 x 415 x 550
Temp range	SC150L thermostat	-28 to 150°C
Dimensions (WxHxL) mm		810 x 415 x 550
Temp range	AC150 thermostat	—
Dimensions (WxHxL) mm		—
Temp range	AC200 thermostat	-50 to 200°C
Dimensions (WxHxL) mm		850 x 415 x 550
Bath capacity (Liters)		10-13
Cooling capacity at 20°		900W
Reservoir dimensions (DxWxL) mm		200 x 285 x 200
Net Weight (kg)		53

A full range of bath and circulator accessories are available including racks, covers - lids tubing, tubing accessories, temperature sensors and heat transfer liquids for this new range of temperature control products.

## Water to water heat exchangers

Compact reliable heat exchanger provide a low energy and efficient way to remove heat from water-cooled applications.

The Thermo Scientific NESLAB System Water-to-Water Heat Exchangers provide a clean, stable, controlled, closed-loop water cooling system that rejects the process heat into an existing in-house facility water supply. This eliminates the problems associated with the direct use of in-house water such as insufficient or fluctuating flow, changing pressure, poor water quality, and temperature instability.

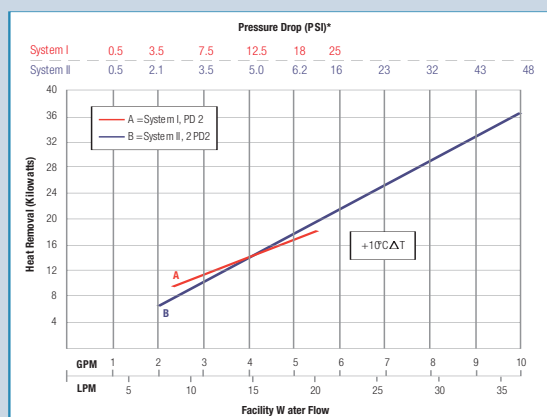
The NESLAB System series heat exchangers take advantage of an existing in-house water system for heat removal; they use less energy and cost less to operate than traditional compressor-based chillers. They offer:

- Compact footprint
- Heat load sensing valve
- Panel mounted gauges for monitoring recirculating temperature and fluid pressure (SYS-I and SYS-II)
- Flow control valve for precise setting of recirculating rate (SYS-III and SYS-IV)
- High temperature and low liquid level safety feature with status relay provides protection to temperature sensitive applications

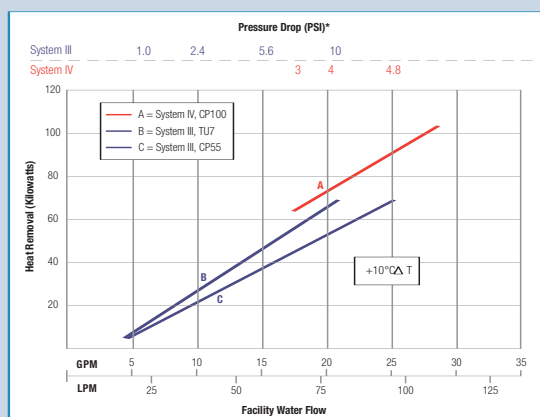


Thermo Scientific NESLAB System III

### Heat Load Removal for NESLAB System I and System II



### Heat Load Removal for NESLAB System III and System IV



Heat load removal is based on a 10°C difference between the temperature of the facility water supply and the application set point.

Heat load removal will be reduced with less than a 10°C difference between the temperature of the facility water supply and the application set point.

Please contact our application engineering department for further assistance.

\*Pressure Drop (PSI) indicates the minimum pressure differential between the Facility Water inlet and the Facility Water outlet to achieve the corresponding Facility Water Flow rate ( $Pressure_{inlet} - Pressure_{outlet} = Pressure_{drop}$ ).

An extensive range of temperature control products are available in addition to the new products highlighted. For specific temperature control applications, contact [info@rheologysolutions.com](mailto:info@rheologysolutions.com) or visit [www.temperaturescontrolbaths.com](http://www.temperaturescontrolbaths.com)



- product news & industry applications

## New modular 24mm twin-screw extruder

polymer industries

food industries

The Thermo Scientific HAAKE Rheomex PTW24-MC OS 24mm twin-screw extruder line is the next generation of modular compounders.

The versatile 24 mm twin-screw extruder line offers the flexibility in small scale continuous processing for research, development and production applications in the polymer industry.

The proven clam-shell design of the 24mm opening barrel provides immediate access to the screws for easy cleaning, quick configuration changes and an ideal evaluation of the extrusion process. The new replaceable barrel liners are easy to exchange and can be manufactured from special materials to handle various applications. Highly free volume geometry improves the feeding of low density materials.

In combination with the HAAKE PolyLab OS torque rheometer platform, the PTW24-MC-OS provides a flexible twin-screw solution.

### Typical applications for twin-screw extruders

- Compounding of master batches
- Filling and reinforcing plastics
- Metering additives and venting volatile components
- Food processing
- Colour matching of powder coatings
- Processing high performance and engineering polymers
- Extruding and mixing ceramic compounds
- Integrated rheometry with add-on melt pump and rheological dies

Twin-screw laboratory extruders have a proven record in continuous compounding with feed-dosing of different additives (liquid or solid) along the extruder barrel. The combination of a twin-screw extruder unit with additional sensors offers the ability to measure material properties of the melt during processing. The following properties and data can be derived from an experiment or test run in the early part of the lifecycle of a new product:

- Viscosity and flow behaviour
- Extrudability and scale-up data
- Predictions for the injection moulding process
- Morphology of polymer and nano-composites
- Recycling properties and re-usability of the polymer
- Influence of screw geometry on processability
- Decomposition of biopolymers. ●



Thermo Scientific HAAKE PolyLab OS RheoDrive



Docking a Thermo Scientific HAAKE PolyLab OS RheoMEX unit



Thermo Scientific HAAKE PolyLab OS with RheoMEX

### A variety of twin-screw extruders is available for these applications:

Item	PTW 16/25	PTW 16/40	PTW 24/28	PTW 24/40	CTW 100
Screw diameter	16 mm	16 mm	24 mm	24 mm	Conical
L/D	25	40	28	40	- -
Screw setup	Variable	Variable	Variable	Variable	3 options
Gear ratio	1:5.4	1:5.4	1:2	1:2	1:1
Rotating direction	Co	Co	Co	Co	Counter
Max. screw speed	1100 min <sup>-1</sup>	1100 min <sup>-1</sup>	1100 min <sup>-1</sup>	1100 min <sup>-1</sup>	250 min <sup>-1</sup>
Max. temperature	350°C (opt. 400/450°C)	350°C (opt. 400/450°C)	350°C (opt. 400/450°C)	350°C (opt. 400/450°C)	450°C
Max. pressure	100 bar	100 bar	100 bar	100 bar	700 bar
Max. torque	130 Nm	130 Nm	180 Nm	180 Nm	200 Nm
Heating zones	7	10	7	10	3
Cooling	Convection	Convection	Internal water circuit	Internal water circuit	Air
External heaters	2	2	2	2	2
Feeding zone	Cooled	Cooled	Cooled	Cooled	Cooled
Additional Feeding /Venting	2 Top	3 Top	2 Top, 1 Side	3 Top, 2 Side	- -
Sensor ports	(1/2" UNF)	(1/2" UNF)	(1/2" UNF)	(1/2" UNF)	2 (1/2" UNF)
Options	15 L/D extension, additional feeding ports, additional sensor ports	Additional feeding ports, additional sensor ports	Additional feeding ports, additional sensor ports	Additional feeding ports, additional sensor ports	Backforce sensor, additional sensor ports, venting dome

● product news & industry applications

# Rheology application package for pharmaceuticals & cosmetics

## pharmaceutical, cosmetic & allied industries

The application package HAAKE RheoStress "Pharma and Cosmetics" is the perfect fit for the rheological characterisation of pharmaceutical and cosmetic products such as emulsions and suspensions.

The knowledge of the rheological behaviour can be used to forecast or adjust characteristics such as shelf life, haptic properties, gel strength, consistency or processability. The knowledge of rheological properties is essential for the development of new products, for quality control and the optimisation of production processes. Time-temperature sweeps performed with a Peltier temperature control unit can be used to predict the stability of products. The haptic feeling is influenced by the yield point, which can be measured in controlled stress mode and analysed in a fully automated HAAKE RheoWin job routine (Fig. 1). Coating technology is used extensively in the pharmaceutical industry, e.g. for the application of non-functional or functional coatings and for controlled release of active pharmaceutical ingredients. Rheological measurements are needed for the optimisation of the thickness and homogeneity of pharmaceutical coatings [1].

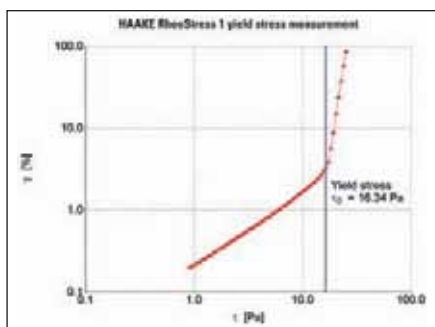


Fig. 1: Measuring and evaluation procedure for the yield point determination in CS mode

### Instrument

The HAAKE RheoStress 1 is designed to perform measurements in the CR (controlled rate), CS (controlled stress) and CD (controlled deformation) mode. The rheometer is equipped with an automatic lift for software controlled gap setting and temperature compensation. The built-in Peltier unit allows a precise and stable temperature control. A cone measuring geometries has been selected: with 35 mm and

2° cone angle made of titanium for medium viscosities.

Optional software and service packages are available in order to fulfil the strict regulations in the pharmaceutical industry. Installation procedures with IQ/OQ support and documentation are available. The measuring and evaluation software HAAKE RheoWin is extendable by using the "21 CFR part 11 tool".

### Advantages at a glance

- Robust and reliable HAAKE RheoStress 1 with air bearing and automatic lift for standard application in quality control as well as in research and development [2]
- Wide range of accessories for individual configurations
- Measuring geometry rotors out of titanium with low inertia as standard
- Optional display- and control unit for routine job operation mode without PC
- Easy-to-use, multilingual HAAKE RheoWin software for beginners and experts with
- Optional software module "21 CFR part 11 tool" [3]
- Pharma specific services such as IQ/ OQ documentation and installation support



Fig. 2: HAAKE RheoStress 1 with built-in Peltier temperature control unit for plate and cone measuring geometries

### Scope of delivery

- 379-0060 HAAKE RheoStress 1 with Peltier temperature control unit for plate/ plate and cone/ plate measuring geometries TCP/P (-40°C to +185°C, heat exchanger required), Incl. measuring and evaluation software HAAKE RheoWin 4
- 222-1211 Standard filter unit for HAAKE rheometer
- 222-1269 Cone C35/2°, D = 35 mm, cone angle 2°, low inertia (made of titanium)

### Optional accessories

- 098-5044 21 CFR part 11 tool for HAAKE RheoWin 4
- 777-5379 Installation 21 CFR part 11 tool and verification of 21 CFR part 11
- 777-5383 Documentation IQ/OQ CFR part 11 tool
- 777-0812 Installation HAAKE RheoStress 1 with IQ/OQ support
- 777-5378 Documentation material IQ/OQ for HAAKE RheoStress 1
- 222-1549 Measuring plate cover MPC35, D = 35 mm
- 222-1515 Sample cover against heat loss and solvent evaporation for cone/ plate measuring geometry made of Teflon



Fig. 3: Display and control unit for rheometer control for operation mode without PC



Fig. 4: Titanium geometry with measuring plate cover (MPC) with same diameter for optimised gap filling, with sample cover for a homogeneous temperature distribution

### Literature

- [1] T. Cech and F. Soergel: Improvement of the pharmaceutical coating process by rheological characterisation. Thermo Scientific rheology application note V-234 (2008)
- [2] Brochure HAAKE Series 1
- [3] Brochure 21 CFR part 11 tool for HAAKE RheoWin software

A copy of this Application Package is available on request by quoting D-012 •

- product news & industry applications

## Liquid analyser for transparent liquid substances

### polymer industries

The OCS Liquid Analyzer (LA20) with colour camera was developed to count and classify contaminations in transparent liquid substances.

#### Application

The system is capable of detecting contaminations like particles and fibres and sort them into different colour, size and shape classes.



#### Components

The system consists of a lighting housing and a camera housing opposite each other. The liquid is transported by a dosing pump through a flow cell in between. The 3CCD colour camera is connected to a high performance image processing computer which is integrated into a 19"- 4HE housing. The pathlength is 1mm.

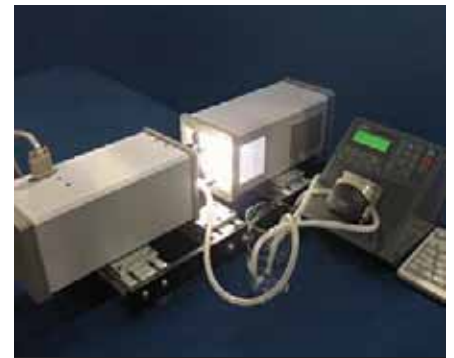
#### Mode of operation

The liquid substance is pumped through the flow cell using a high-precision dosing pump (30µl/min - 2.7l/min). It is possible to check transparent liquid substances for particles above 10µm. As the camera is installed opposite the light source, a particle is detected because it absorbs light or has a different colour than the liquid. By using polarised light it is additionally possible to detect fibres.

#### Features

During the measurement, the recorded images and the measurement data can be observed on a monitor. The results can be represented in coloured graphs or tabular form and after each completed measurement a test certificate can be printed out. For further evaluation, it is possible to create diagrams on time behaviour and histograms. It is also possible to define alarm limits. When these are exceeded, a floating contact is switched (optional). The existing

process interface can optionally be configured according to customer requirements. The system offers the possibility to make many individual adjustments which ensures an exact adaptation to special requirements. These can be stored on hard disk. Thus, an unlimited number of adjustments for many different kinds of material can be defined and stored so that changing from one mode of examination to another is considerably easy. •



#### Technical data

Inspection Area	10mm x 7.5 mm approx.
Pump - flow rate	30µl/min - 2.7 l/min
Resolution	20µm

- new product brochure

## Film & liquid optical testing systems

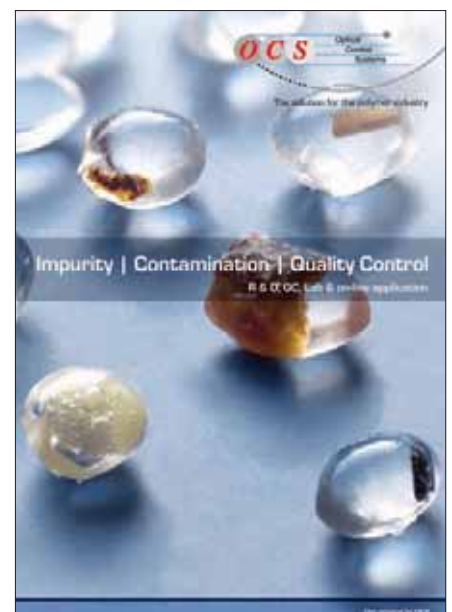
### polymer industries

A range of film and liquid optical testing systems are available from Optical Control Systems that provide information on contamination and impurities in product samples.

The brochure provides full product information and specifications on the following products:

- Film Testing Systems - surface inspection system for use in laboratories and production
- Sample Testing Systems - a bench unit for laboratories for inspection of transparent and non transparent surfaces
- Multiple Plaque Analyser - table unit to detect impurities on the surface of several plaques
- Liquid Analyser - for counting and classifying contaminations in transparent liquid substances

*A copy of the product brochure is available on request. •*



- new product brochure

## Extrusion - cast & blown film lines

### polymer industries

Optical Control Systems offer an extensive range of products specifically for R&D, QC, Lab & On-line applications for the polymer industry.

The brochure includes full product information and specifications on the following products:

- Measuring Extruder
- Chill Rolls & Winder Unit
- Cast Film Lines
- Blown Film Lines
- Pelletiser
- Calender/Tape Test equipment
- Filter Test System

This range of products is tailored to the needs of R&D and QC for laboratory and on-line applications and will provide you with:

- Improvement of quality through elimination of non-standard products
- Accurate and consistent automatic grading
- Reduction of customer returns & complaints
- Increased line speed and throughput where manual inspection is a limiting factor - perfect for on-line and laboratory applications
- Efficient, objective and reproducible laboratory evaluation
- Optimised quality
- Increased competitiveness by automated QC
- Precise and consistent quality evaluation
- Faster inspection
- Reproducible operation settings
- Fully automated control of haul-off and winding tension
- Maintenance free
- Designed for 24/7 continuous operation.

*A copy of the product brochure is available on request. •*



- new product brochure

## Pellet & powder optical testing systems

### polymer industries

A range of pellet and powder optical testing systems are available from Optical Control Systems that provide information on contamination and discolouration in product samples or on line throughout production.

The brochure provides full product information and specifications on the following products:

- High Speed Pellet Scanning Systems - systems with a throughput up to 200 kg/hr or material throughput up to 400 kg/hr
- Contamination Detection - for pellets with colour scanning systems
- Contamination Detection - for powder with colour scanning systems
- Pellet Size and Shape Distribution System
- Pellet Analyser - for contamination analysis plus shape, size and distribution system

- Colour Measurement System - for automatic colour measurement of plastic granules

This range of products are tailored to meet the optical control needs of pellets and powders used within polymer industries for QC & R&D within the laboratory and on-line applications and will provide you with:

- 24 hour on-line production surveillance
- Trend analysis parallel to production
- Logging of the production process
- Accurate and consistent automatic grading
- Reduction of customer returns for complaints
- Quality increase
- Scrap - sub standard product minimising
- Transition time reduction as all values are permanently available
- Cost savings
- Optimising product sequences

*A copy of the product brochure is available on request. •*



- technical papers

## Options for semiconductor process tool temperature control

### chemical & allied industries

Traditionally, chillers (refrigerated temperature control equipment) are viewed as the preferred choice for removing heat from process equipment or for controlling their temperature.

Depending upon the application and the degree of control required, heat exchangers can represent a very viable alternative to chillers. The two critical variables enabling the use of heat exchangers are: facilities water supply temperature; and process fluid temperature stability. When these two are sufficiently low, heat exchangers can provide an optimal solutions.

If raw heat removal, at moderate process fluid temperature stability is permissible, and if the

process fluid supply temperature is higher than the facilities water temperature, then heat exchangers become attractive alternatives to chillers.

This application report discusses a case within the semiconductor manufacturing industry and compares a heat exchanger and two configurations of chillers.

*A full copy of this technical paper is available on request by quoting AN-MK-06-1 ●*

- technical papers

## The curing behaviour of reaction resin compounds

### polymer industries

This test examined the effect of various initiators on the curing behaviour of a glass fibre-filled polyester resin using a laboratory mixer.

Initiators are chemical substances which form so-called radicals under the influence of energy (eg: heat) and which are thus able to initiate curing reactions.

The processability of thermosetting resins can be influenced by selecting the right initiators and this way to control the reaction time.

*A full copy of this technical paper is available on request by quoting LR-12 ●*



*Thermo Scientific HAAKE PolyLab OS with Rheomix 540*

- technical papers

## Automatic detection of the thermal degradation of a polymer

### polymer industries

Similar to any other material, the properties of polymeric materials are closely linked to their chemical nature.

What makes polymers so different from low-molecular-weight substances is the huge influence of their molecular weight (MW) and their molecular weight distribution (MWD) on their macroscopic behaviour. Without changing its chemical nature, we can e.g. "select" the rigidity or elasticity of a polymeric material just by varying the parameters of the polymerisation process.

Thus, to make a polymer with the desired properties we have to be able to quickly determine the right moment to stop the polymerisation process in order to always get the same MW and MWD. Also, these two parameters can be used to decide whether materials delivered meet the specifications or not.

One widely accepted method makes use of the fact that the crossover frequency determined with a frequency sweep depends on the MW of a polymer, whereas the crossover modulus is related to its MWD. From the crossover modulus the polydispersity-index (PI) can easily be calculated:

$$PI = 100.000/\text{Crossover Modulus [Pa]}$$

The HAAKE MARS is a high-end rheometer, which has a number of important advantages for polymer analysis. Amongst them is the sensitive normal force sensor, which allows the measurement of forces down to 0.01 N. In combination with the precise lift control this is a great tool to ensure the reproducible loading and axial relaxation of samples. Another unique feature of the HAAKE MARS is the Controlled-Environment-Chamber (CTC). Its powerful combination of convection and radiation heating guarantees the quick adjustment of temperature and low temperature gradients in the sample.

*A full copy of this technical paper is available on request by quoting V-237 ●*

- technical papers

## Investigation of cremes and gel products

pharmaceutical, cosmetic & allied industries

In quality control and production monitoring often a lot of samples have to be investigated every day.

Usually the time needed for a measurement may not exceed a couple of minutes; therefore, routine measuring procedures are followed with fixed parameters. At computer operated instruments with application software these measuring and evaluation procedures can be stored. The so-called job streams allow the start of those procedures by a push of a button after having

filled the sample in the measuring system. The used measuring geometries should be easy to fill and to clean after completion of the rheological tests. In case of very expensive products the sample volume is often restricted.

*A full copy of this technical paper is available on request by quoting V-151 •*

- technical papers

## The influence of two different types of carbon black on flow behaviour of a SAN masterbatch

polymer industries

### Abstract

Variations of the filler structure can have a drastic effect on the flow behaviour and so the processability of Polymer Compounds.

### Introduction

In the described case a Masterbatch producer had changed the supplier of the Carbon Black. The new Carbon Black caused major problems in production.

The report describes a fast and reliable test method to characterise the influence of fillers properties on the flow behaviour of a Polymer Masterbatch.

### Materials and Methods

Basic Polymer: SAN  
Filler: 30% Carbon Black (Type 1 & Type 2)

The report shows in the test results that the mixer test is an easy and fast method to describe the effect of fillers on the flow behaviour of polymer compounds and the mixer test can help to prevent problems in production.

*A full copy of this technical paper is available on request by quoting LR-05 •*

- technical papers

## Correlation between mixer tests and the extrusion behaviour of PVC dry blends

polymer industries

This report describes the correlation between measurements done on a laboratory mixer with PVC dry blends and their processing behaviour on a counter-rotating twin-screw extruder.

On July 1st, 2006, the EU Directive 2002/95/EG ("RoHS-Directive, Restriction of Hazardous Substances") was put into force. It restricts

producing and trading of products containing lead, mercury and cadmium.

Because a lot of PVC compounds still contain lead as stabilising media, there is urgency for the PVC industry to replace these stabilisers by less dangerous materials like CaZn stabilisers.

Changing the formulation of a PVC compound by using a new stabiliser, always takes the risk that also the production behaviour will change. The reason behind this is the fact that stabilisers also work as a lubricant. So the change of stabilisers will influence the fusion behaviour of the PVC compound. To make sure that the PVC compound

keeps its processing properties it is necessary to adapt the whole compound formulation.

The most common tool to check the fusion behaviour of PVC compounds is the laboratory mixer test. It is an easy and reliable method to characterise the fusion and degradation behaviour of PVC compounds.

The samples used for this investigation were three PVC dry blends with new lead free formulations.

*A full copy of this technical paper is available on request by quoting LR-60 •*

- technical papers

# Viscosity measurement of LDPE samples with the same MFR value

polymer industries

## Abstract

In the plastics industry, measuring the melt flow rate (MFR) is one of the simplest and most frequently used test methods for finding out about the flow behaviour of polymers. The following case, taken from actual practice, will show that this method of determining the melt characteristics of a substance is not always sufficient. The two LDPE (low-density polyethylene) samples in this investigation both had the same MFR value, but displayed different modes of behaviour in practice when they were being processed.

## Introduction

The described two LDPE samples were produced by different suppliers. The samples showed both a MFR value of 4.0 g/10 min. But one of the LDPE caused major problems in production.

## Materials and methods

Polymer: LDPE

## Test arrangements

- Torque rheometer: Thermo Scientific HAAKE RheoDrive 4
- Analysis software: Thermo Scientific HAAKE PolySoft OS
- Laboratory single screw extruder: Thermo Scientific HAAKE Rheomex 19/25 OS
- Extruder screw: L = 25 x D. Compression ratio 2:1
- Melt pump with bypass
- Slit capillary die: 0.8 x 2.0 mm
- Melt-pressure sensors.

## Test conditions

- Extruder feeding zone: liquid cooled
- Temperature profile extruder: 180°C / 240°C / 280°C
- Temperature of melt pump: 280°C
- Temperature at die: 280°C
- Speed of extruder: 100 rpm
- Speed of melt pump: 5 to 60 rpm (programmed).

## Test procedure

The polymer pellets are molten and homogenised in the extruder. Via a bypass valve the melt is directed into the melt pump. (Fig. 1)

The melt pump transports a defined volume, dependent on the speed of the pump, through the slit-capillary die.



Thermo Scientific  
HAAKE PolyLab OS  
Torque Rheometer  
with RheoMex

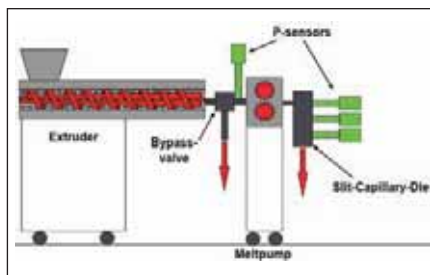


Fig. 1

From the capillary geometry and the volume flow the apparent shear rate can be calculated.

$$\dot{\gamma} = \frac{6 \cdot Q}{W \cdot H^2}$$

With pressure transducers the pressure drop in the capillary is measured. From the capillary geometry and the pressure drop the shear stress is calculated.

The apparent viscosity is then calculated from the apparent shear rate and the shear stress.

$$\tau = \frac{H}{2} \cdot p^2$$

The analysis software, after the application of a correction process, calculates the true viscosity value.

$$\eta = \frac{\tau}{\dot{\gamma}}$$

By stepwise raising the speed of the melt pump the melt viscosity at various different shear is measured.

## Results and discussion

The diagram (Fig. 2) shows the results of the viscosity measurement with the two LDPE samples in one graph. It can be clearly seen that the samples display the same viscosity behaviour at low shear rates. However, widely different shear rates emerged during processing, and it can be seen from the graph that at higher shear rates there are clear differences between the samples.

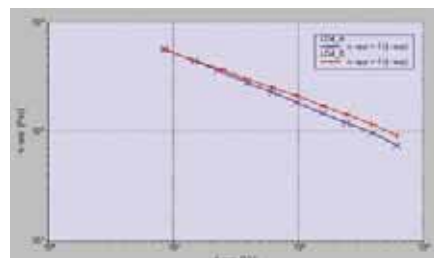


Fig. 2

The MFR method was not able to show these differences, because it only measures one point of the viscosity behaviour and this is at low shear rates.

## Summary

This test shows that it is possible to differentiate between the two samples with the extruder capillary rheometer. The MFR method was not able to give any different readings, because it only measures one point of the viscosity behaviour and this at such low shear rates.

A copy of this technical paper is available on request by quoting LR-33 •

- industry applications

## On-line optical QC measurements for food manufacturing industries

### food industries

#### Introduction

Production quality and uniformity in food manufacturing and processing is closely related to good quality control (QC) during the manufacturing process and for raw materials before they enter the process proper. On-line optical systems are capable of delivering solutions for QC monitoring.

In particular this technical note deals with optical quality control, for raw materials or final products used in pellet or free flowing powder form, or for sheets and films of various opaque, semi-transparent and transparent materials. These on-line systems are based on optical closed circuit cameras, and are used to observe the powder/pellets or film/sheet. Comprehensive software can analyse the images, recognising and cataloguing user-defined abnormalities, complete with images, sizes and user defined classifications, including tears, scratches, holes,

discolourations, as well as dimensional irregularities for pellets and so on. The system can be trained to recognise (or ignore) and catalogue any defect seen by the camera, and the camera can be used in either transmission mode (for transparent films) or reflection mode (for opaque films, or a combination of both).

#### On-line optical QC

The optical properties of many food-based materials are a crucial indication of their quality. Optical properties of raw materials like granules or powders can be important in dictating the quality of the materials they are used to manufacture. Any discolouration, dimensional irregularities or contamination can adversely impact on the quality of the manufactured product. On-line analysis of some, or all, of the pellet or powder stream for these defects can prevent poor quality product entering the manufacturing process, and reduce the wastage therein. On-line CCD camera systems with high performance computers and software are becoming increasingly important in the recognition, recording and removal of these

impurities before they can harm the product or the reputation of the manufacturer.

When a sheet or a film of product (for example pasta, liquorice, or similar). has been formed, it is important that it is of high quality with low levels of impurities (eg. insects), discolourations (white/black spots, smudging etc), pinholes, tears, surface defects etc. Poor quality control in these areas can lead to customer returns, dissatisfaction and reduced shelf-life of the product. Using CCD technology, along with sophisticated image processing and analysis software, the quality of a film or sheet can be continuously monitored and impurities detected. The size, colour and shape of the impurities which are important can be defined by the user.

Optical Control Systems GmbH (OCS) manufacture cutting edge optical QC equipment for pellets, powders, films and sheets for the food industry.

*A reprint of this technical paper is available on request by quoting Rheo052TP •*



(A) Powder Tester OCS PT-2C (B) Pellet Analyser OCS PA-66 - provides information on size & shape plus colour (C) Film inspection system OCS FSA-100



# Calibrations & repairs of rheology instruments

all industries

## Why re-calibrate?

The accuracy of the electronic components used in all instruments drifts over time. The effects of time in service as well as environmental conditions add to this drift. As time progresses changes in component values cause greater uncertainty in your measurements. At some point in time, the drift causes the instruments uncertainty to become undefined, meaning the manufacturer can no longer predict the uncertainty and guarantee measurement results. To resolve this issue instruments must be calibrated at regular intervals as defined by the manufacturer.

Calibration is the comparison of an instruments performance to a standard of known accuracy. The result of a calibration may be documentation showing the deviation of a measurement from the known standard or it may also include adjusting the instruments measurement capability to improve accuracy.

The goal of calibration is to quantify and improve the measurement accuracy of your instrument. The benefits of maintaining properly calibrated equipment include:

- Reduced measurement errors
- Consistency between measurements
- Increases in production yields
- Assurance you are making accurate measurements

Rheology Solutions recommends that you periodically calibrate your hardware to ensure measurement accuracy and to keep your instrument operation in peak precision.

## Calibrations

To minimise the cost to our customers, we conduct scheduled annual calibrations interstate, however if you wish your rheometer or viscometer calibrated outside of the set program, please phone or email our Administration Manager, Jackie at [jackiew@rheologysolutions.com](mailto:jackiew@rheologysolutions.com) and she will either organise your HAAKE equipment to be sent to our office or put you on the list for a site visit to coincide with the schedule. All equipment received for calibration will have a 48 hours turnaround from the time it arrives in our office and we will contact you to confirm receipt of equipment and date for return despatch.

Calibration letters have been sent out to those customers that have previously had their HAAKE equipment calibrated by us. We will be in contact



Richard Donaldson - Service Engineer.



in the coming weeks to arrange and finalise your booking.

If you have not received a calibration letter from us and require your instrument calibrated, please contact our office to arrange your booking.

## Interstate calibration schedule

- **Western Australia**  
Week Commencing 23rd November 2009
- **Queensland**  
Week commencing 11th January 2010
- **New South Wales**  
Week commencing 8th February 2010
- **South Australia**  
Week commencing 1st March 2010
- **Tasmania**  
Please contact our office to arrange a time

The pricing for calibrations that are conducted in our office or link in with the scheduled interstate schedule in 2009/2010 are based on Melbourne Metropolitan rates as follows:

HAAKE MARS	\$1,650.00
HAAKE RheoScope 1	\$1,650.00
HAAKE RheoStress 50	\$1,250.00
HAAKE RheoStress 600	\$1,250.00
HAAKE RheoStress 6000	\$1,250.00
HAAKE RotoVisco 1	\$1,650.00
HAAKE ViscoTester 550	\$825.00

## Notes:

- Melbourne metropolitan customers can have their HAAKE instrument calibrated at any time on site.

- Victorian customers (non metropolitan) can arrange for calibration of their instrument at any time or when the next scheduled calibration is due by contacting our office direct.
- Prices exclude GST, and any parts required for instrument repairs.
- Multiple unit calibrations are priced on a sliding scale if they are serviced at the same time. Prices are available on request.

All calibrations are completed by our Service Engineer who is factory trained at the manufacturers. A calibration certificate is provided as verification.

As part of the calibration our Service Engineer will

- check and adjust the high sensitive measuring head to plate geometry
- calibrate all physical measurement parameters according to standards
- maintain all moveable parts
- and ensure your rheometer is in its optimal condition

If any parts are required in order to repair any instrument found to be faulty, these will be ordered directly from our suppliers, which can take four - six weeks to arrive. When the parts are on hand the repair can be finalised. We will notify you of timing and request that you please be patient if this is the case.

*Quotes for all repairs, spare parts can be obtained from us at any time. •*

- industry applications

## Rheological measurement with optical analysis

food industries

polymer industries

surface coatings industries

chemical & allied industries

pharmaceutical, cosmetic & allied industries

The Thermo Scientific RheoScope module for the HAAKE MARS rheometer platform simultaneously measures rheological properties and changes in the microscopic structure of the tested sample.

The results allow researchers to speed formulation development, process optimisation and product processability.

### Applications/examples

- Food: fat, starch
- Polymer: solution, melt
- Pharma / Cosmetic: creme, lotion
- Paint / Inks: printing paste, thickening agents
- Petrochemical: crude oil, drilling fluid
- Others: medical

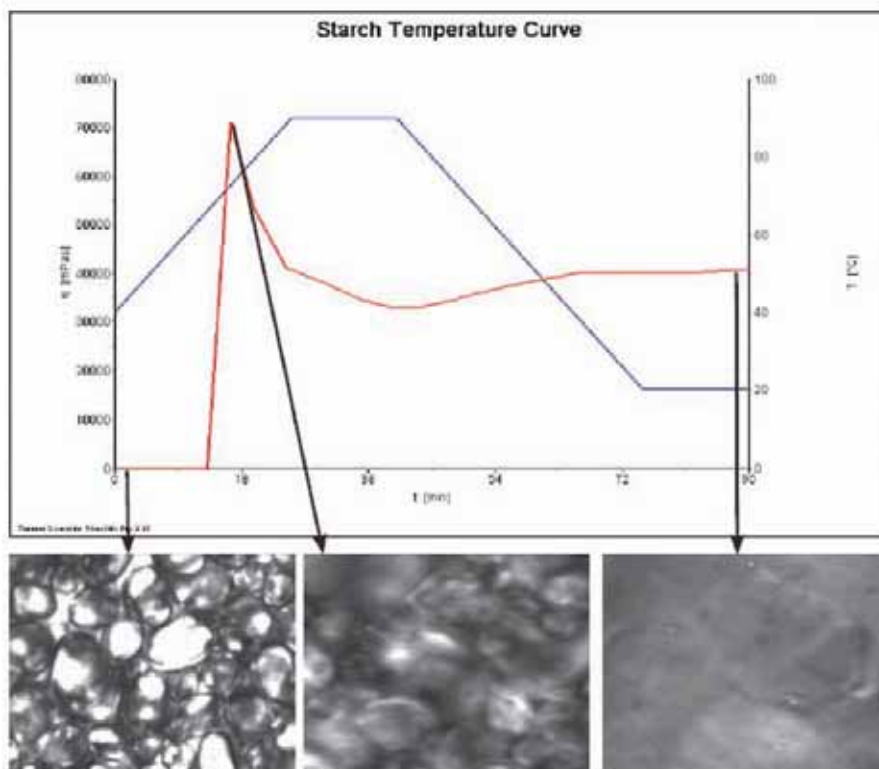
### Formulations

- Gels
- Solutions
- Foam
- Suspensions
- Emulsions / Dispersions
- Melts

### Rheology and microscopy

The Thermo Scientific RheoScope module simultaneously records rheological properties and changes in the microscopic structure of the tested sample at a macroscopic level. Understanding micro structures enables researchers to characterise a product's mechanical properties. The module is comprised of an optical microscope, digital video camera and temperature control unit that is used in conjunction with the Thermo Scientific HAAKE MARS rheometer platform.

The Thermo Scientific HAAKE RheoWin software used to control the rheometer also positions and focuses the scope and polarisation filter. Rheological data and images (video sequences) can be viewed on line next to each other. In addition, the data and images can be stored in various formats for further evaluation and export. The RheoScope's architecture allows the module to be adapted quickly for customised user



Temperature ramp measured on potato wild type starch in water

configurations. The RheoScope module is available in two versions. The temperature range of the standard version is  $-5^{\circ}\text{C}$  to  $+120^{\circ}\text{C}$ . In the high-temperature version the temperature is extended to  $+300^{\circ}\text{C}$ .

Rheological phenomena and structural changes that can be observed:

- Shear thinning
- Thixotropy
- Emulsification
- Disaggregation
- Homogeneity
- Melting behaviour
- Dilatancy
- Aging
- Gelification
- Flocculation
- Orientation
- Mixing

### Benefits

- Compact and full integration in the HAAKE MARS rheometer platform
- All measuring modes including normal force measurement available with simultaneous recording of microscopic properties
- Camera and microscope control via software
- Simultaneous rheological and optical measurements
- Visualisation of data and images in one software package
- Analysis of structural changes under shear
- Image analysis software for determination of particle sizes, particle size distribution and structure analysis •



Thermo Scientific RheoScope Module for HAAKE MARS III Rheometer

● Product News

# Pharmaceutical twin-screw extruders for hot melt extrusion

pharmaceutical, cosmetic & allied industries

The Thermo Scientific PHARMA HME is ideal for small-scale continuous processing in research, development or production in the pharmaceutical industry.

The stainless steel extruders are built to GMP standards with a focus on a clean, streamlined design.

**Benefits:**

- Reduced clean room area
- Consistent, controllable processing
- Suitable for PAT
- Reduced product changeover time
- On-demand production
- Minimised scale-up risk
- Reliable cleaning

**Features:**

- Small footprint
- Continuous operation
- High free volume
- Small process inventory
- Segmented screws and barrel
- Removable screws and liners

**Materials:**

- Medical polymers
- Drug delivery systems
- Soft gels

**Applications:**

- Melt granulation
- Biomedical compounds
- Water sensitive products
- Medical adhesives

**Comprehensive range of capabilities**

Available in 16mm and 24mm sizes, the Thermo Scientific PHARMA HME series is complemented by a full range of ancillary equipment for product mixing, and post extrusion processing.

**Designed for pharmaceutical needs**

The horizontally split barrels (up to 40:1 L/D) have a crevice-free, GMP design. Quick release clamps give easy access to screws and process contact surfaces for cleaning or configuration changes. Both barrel liners and the screws themselves can be easily removed for cleaning or product changeover. The barrel is modular, with

interchangeable segments for feeding solids and liquids, or for venting. The variable speed AC motors are brushless and therefore low maintenance.

The touch-screen display is easy to use and easy to clean. The PLC incorporates data acquisition with an option to download to a remote computer for archiving and analysis. The controls include recipe storage of preset extruder parameters for repeatable process conditions.

**Ancillary equipment**

A range of ancillary equipment is available to integrate with the twin-screw extruders, including pre-mixers, feeders, chill rolls, air-cooled conveyors, pelletisers, and cast sheet or blown film lines. GMP standard pharmaceutical versions of the ancillaries are available with stainless steel construction and dust-tight touch-screen operator interface where applicable.

**Preblending**

Preblending small batches is easy with Thermo Scientific bench top change bowl mixers available in 3 and 5 litre sizes.

**Face-cut pelletising**

For water sensitive products or highly filled compounds, an air-cooled face-cut pelletiser, the Thermo Scientific Pharma FCP, is available complete with blower and collecting cyclone.

**Strand pelletising**

Extruded products can be cut using a traditional strand pelletiser with water or air-cooling. The Thermo Scientific Pharma VARICUT pelletiser allows pellet length to be controlled between 1 and 3mm. Alternative pellet length are available on request.

**Strand cooling**

Using a GMP air cooled conveyor belt, extruded products are supported and cooled before pelletising.

**Metering feeders**

Volumetric and gravimetric feeders can be fitted and integrated into the control system.

**Chill roll flaker units**

A free standing chill roll is available with easily removed belt and flaker. Extruded melt is rapidly cooled and flaked. ●

Specifications		PHARMALAB 16		PHARMALAB 24	
Barrel Length	L/D	25:1	40:1	30:1	40:1
Barrel Bore Diameter	mm	16	16	24	24
Screw Diameter (D)	mm	15.6	15.6	23.6	23.6
Channel Depth	mm	3.3	3.3	5.15	5.15
Root Diameter (d)	mm	9.0	9.0	13.3	13.3
Diameter Ratio (D/d)		1.73	1.73	1.77	1.77
Centre-line Spacing	mm	12.5	12.5	18.75	18.75
Centre-line to Radius Ratio		1.56	1.56	1.56	1.56
Maximum Motor Power	kW	2.5	2.5	11.0	11.0
Maximum Screw Speed	rpm	1000	1000	1000	1000
Extruder Dimensions	L x W x H m	1.5 x 0.7 x 1.5	1.5 x 0.7 x 1.5	2.0 x 0.7 x 1.5	2.0 x 0.7 x 1.5
Scale-up Data					
Internal Free Volume	cm <sup>3</sup>	68	109	274	365
Peripheral Surface Area	cm <sup>2</sup>	316	505	854	1138
Services					
Electrical Power	Volt/ph/Amp	400V/3ph+N/20A	400V/3ph+N/20A	400V/3ph+N/40A	400V/3ph+N/40A
Cooling Water 20°C	Litres/min	5	5	20	20
Performance					
Throughput (formulation dependent)	kg/h	1 - 5	1 - 5	5 - 20	5 - 20

• News & Views

# Process viscometer software update & new software packages

all industries

Marimex Industries Corp. has updated both the firmware for their ViscoScope transmitters and the VisConfig software. The updated software is available free to all Marimex customers.

Further Marimex has introduced two new software packages: VisConfig-Express and ViscoView. All new systems will be delivered with the new firmware and all existing systems can be updated by Marimex Industries Corp, if the need exists. The updated firmware 2.002 provides for better interaction with the software packages and is compatible with both the ViscoScope VS-4450 and VS-D250 series of transmitters.

The software packages are able to run on Windows operating systems Windows 2000 and newer. All three software packages have a common opening page to establish communication with a transmitter. It is clearly indicated, when communication with the transmitter has been established - a configure / run toggle switch allows the configuration to be

changed, as an example when multiple transmitters are on the same communication loop. Some functions may not be available in either the run or configuration mode, depending their function.

VisConfig has been updated to take full advantage of the firmware 2.002. VisConfig however will configure itself to the actual firmware residing in the transmitter. It does this by interrogating the transmitter, when communication with the transmitter is being established. VisConfig simplifies the configuration of a transmitter by showing the available parameters on one page and translating codes into words. Some configuration functions like linearisation cannot be changed but only viewed by the customer. All configurations can be saved to separate files for safekeeping and writing back to the transmitter.

VisConfig-Express has only one functionality, to download and upload the entire configuration of a transmitter at once. This makes it easy to trouble shoot transmitters by emailing the downloaded configuration to Marimex Industries Corp. for examination. Marimex can then return the entire configuration for a single upload with any

corrections included. This makes it very easy for anyone to request help directly from Marimex Industries Corp. ViscoView-Express is firmware independent.

ViscoView is a data collection program for ViscoScope transmitters. Available data streams are collected at regular time intervals. The time intervals are adjustable between five and 120 seconds. The data is being displayed in graphical form and the current values are displayed in digital form. Further, the 15 most recent viscosity values are also displayed in a table. Concurrently the data is saved in a tab delimited txt file, which makes it easy to import the file into a spread sheet for further evaluation. •



Marimex ViscoView



Marimex VisConfig



Marimex VisConfig



Marimex Industries Corp. ViscoScope



Further information is available by contacting **Rheology Solutions:**

**Telephone:** 03 5367 7477

**Facsimile:** 03 5367 6477

**Email:** [info@rheologysolutions.com](mailto:info@rheologysolutions.com)

**Web:** [www.rheologysolutions.com](http://www.rheologysolutions.com)

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**From the November 2009 - February 2010 issue of RheoTalk, I am interested in the following:**

## ● Application Notes

### Tim's Top Tips – How to Measure... Series

- |   |                                     |                                       |   |
|---|-------------------------------------|---------------------------------------|---|
| Mineral Industries <i>(please select)</i>                           | <input type="checkbox"/> Thixotropy | <input type="checkbox"/> Yield Stress | <input type="checkbox"/> Flow & Viscosity |
| Food Industries <i>(please select)</i>                              | <input type="checkbox"/> Thixotropy | <input type="checkbox"/> Yield Stress | <input type="checkbox"/> Flow & Viscosity |
| Polymer Industries <i>(please select)</i>                           | <input type="checkbox"/> Thixotropy | <input type="checkbox"/> Yield Stress | <input type="checkbox"/> Flow & Viscosity |
| Surface Coating Industries <i>(please select)</i>                   | <input type="checkbox"/> Thixotropy | <input type="checkbox"/> Yield Stress | <input type="checkbox"/> Flow & Viscosity |
| Pharmaceutical, Cosmetic & Allied Industries <i>(please select)</i> | <input type="checkbox"/> Thixotropy | <input type="checkbox"/> Yield Stress | <input type="checkbox"/> Flow & Viscosity |
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| Mineral Industries <i>(please select)</i>                           | <input type="checkbox"/> Thixotropy | <input type="checkbox"/> Yield Stress | <input type="checkbox"/> Flow & Viscosity |

### Tim's Top Tips – Explanation & Evaluation... Series

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| Tim's Top Tips for Food Industries <i>(please select)</i>    | <input type="checkbox"/> Mouthfeel   | <input type="checkbox"/> Shelf Life       | <input type="checkbox"/> Processability | <input type="checkbox"/> Cohesiveness      |
| Tim's Top Tips for Surface Coatings <i>(please select)</i>   | <input type="checkbox"/> Shelf Life  | <input type="checkbox"/> Flow & Levelling | <input type="checkbox"/> Misting        | <input type="checkbox"/> Mixing & Blending |
| Tim's Top Tips for Polymer Industries <i>(please select)</i> | <input type="checkbox"/> Compounding | <input type="checkbox"/> Shark Skin       | <input type="checkbox"/> Processability | <input type="checkbox"/> Die Swell         |

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| <input type="checkbox"/> Chemical & General Manufacturing              | <input type="checkbox"/> Construction & Building |   |   |
| <input type="checkbox"/> Pharmaceutical, Cosmetics & Allied Industries |  |   |   |

## ● Technical Papers

- Options for Semi Conductor Process Tool Temperature Control - AN-MK-06-1
- Automatic Detection of the Thermal Degradation of a Polymer - V237
- Investigation of Cremes & Gel Products - V151
- The Curing behaviour of Reaction Resin Compounds - LR12
- Correlation Between Mixer Tests & the Extrusion Behaviour of PVC Dry Blends - LR60
- Viscosity Measurements of LDPE Samples with the Same MFR Value - LR33
- The Influence of Two Different Types of Carbon Black in the Flow Behaviour of a SAN Masterbatch - LR05
- On-line Optical Control Measurements for Food Manufacturing Industries - Rheo052TP
- Improvement of the pharmaceutical coating process by rheological characterisation - V234

## ● Comments:

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**From the November 2009 - February 2010 issue of RheoTalk, I am interested in the following:**

● **Products**

- Torque Rheometer with Twin-Screw-Extruder - Thermo Scientific HAAKE Rheomex PTW24-MC OS 24 mm Twin Screw Extruder Line
  - Pharmaceutical Twin-Screw Extruder for Hot Melt Extrusion (HME) - Thermo Scientific PHARMA HME
  - Laboratory Single Screw Extruder - Thermo Scientific Rheomex 19/25 OS
  - Controlled Stress Rheometer with Visualisation - HAAKE RheoScope 1
  - Modular Advanced Rheometer - Thermo Scientific HAAKE MARS III
  - Circulator Thermostats - Thermo Scientific Thermostats - Standard Series
  - Circulator Thermostats - Thermo Scientific Thermostats - Advanced Series
  - Ultra Low Refrigerated Circulators - Thermo Scientific GLACIER Range
  - Torque Rheometer - Thermo Scientific HAAKE PolyLab OS
  - Torque Rheometer - Dies, Screws, Sensors, Rotors
  - Process Viscometer - Marimex ViscoScope
  - Transmitter VS-D250 - Marimex ViscoScope
  - Transmitter VS-4450 - Marimex ViscoScope
  - Pharma HME Ancillaries
  - Controlled Stress Rheometer - HAAKE RheoStress 1
  - Extensional Rheometer - Thermo Scientific HAAKE CaBER
  - Modular Advanced Rheometer Accessories
  - Heating Circulators - Thermo Scientific SAHARA Range
  - Refrigerated Circulators - Thermo Scientific ARCTIC Range
  - Heat Exchangers - NESLAB Water to Water
  - Liquid Analyzer - OCS LA20
  - Pellet Analyser - OCS PA-66
  - Powder Tester - OCS PT-2C
  - Film Inspection System - OCS FSA-100
- Process Viscometer Software**    Marimex VisConfig    Marimex ViscoView    Marimex VisConfig-Express
- Application Solutions**    Polymers    Petrochemicals    Pharmaceuticals & Cosmetics    Paints, Inks & Coatings

● **Brochures**

- Extrusion & Material Characterisation for Drug Development & Production
- Extrusion / Cast & Blown Film Lines / Quality Control - R&D, QC, Lab & On-line Application
- Impurity / Contamination / Quality Control - R&D, QC, Lab & On-line Application
- Pellet / Powder / Quality Control - R&D, QC, Lab & On-line Application
- ARCTIC Refrigerated Circulators
- NESLAB Water to Water Heat Exchangers
- Refrigerated Circulators
- Comprehensive Materials Characterisation for Polymer
- SAHARA Heating Circulators
- GLACIER Ultra Low Refrigerated Circulators
- Heating Circulators
- Liquid Analyser for Transparent Liquid Substances

● **Services**

Calibration & Service. Please provide details on model of product and serial number: .....

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