



Thermo Scientific
HAAKE MARS
Accessories

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Accessories

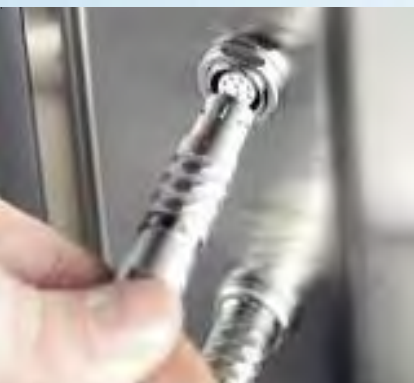
Temperature modules



Electrical temperature module (TM-EL-P) for plate/cone measuring geometries with active hood (TM-EL-H)



Peltier temperature module for cylinders (TM-PE-C) with adapter for use with plate and cone measuring geometries as well as selection of plate and cylinder geometries



Standardized connections including quick connectors for cooling media and electronics for all temperature modules

Temperature modules for fast, precise temperature control within a broad temperature range

There is a large selection of temperature modules available for the HAAKE MARS, covering a temperature range from -150 °C to 600 °C. Depending on the application, electrical and liquid controlled temperature modules or Peltier are available. In addition a controlled temperature test chamber is offered.

Peltier Plate

for fast temperature changes up to 60 K / min; temperature range: -60 °C* up to 200 °C

- Easy exchange of lower plates due to new quick bayonet mounting ring
- Fast heat transfer and very good temperature homogeneity due to low thermal masses

Electrical Plate

for measurements in a wide temperature range: -40 °C* up to 400 °C

- Easy exchange of lower plates due to new quick bayonet mounting ring
- In combination with the TM-EL-H active cone heater system a closed chamber with a 360° viewing window is created

Liquid Plate

for very precise, constant temperature control; temperature range: -40 °C* up to 200 °C*

- Easy exchange of lower plates due to new quick bayonet mounting ring
- Most reasonably priced unit when using an existing circulator

Peltier Cylinder

for fast temperature changes up to 60 K / min; temperature range: -40 °C* up to 200 °C

- Easy exchange of cups due to new quick bayonet mounting ring
- Smaller cups and rotors optimized for fast temperature changes
- Easy switch between cylinder / plate / cone geometry

Electrical Cylinder

for very fast temperature changes; temperature range: -20 °C* up to 200 °C (300 °C using suitable geometries, e.g. for pressure cell)

- For cylinder geometries or application-focused measuring cells such as pressure cells
- Powerful, with heating circuit

Liquid Cylinder

for very precise, constant temperature control; temperature range: -20 °C* up to 180 °C*

- Larger cups and rotors for low viscosity measurements
- Most reasonably priced unit when using an existing circulator

* Depending on the cooling medium and circulator

Benefits of the temperature modules at a glance:

- Plug-and-play modules with new compact design
- Automatic temperature module recognition
- Easy installation in seconds without tools or adjustment
- Standardized connections including quick connects for cooling media and electronics for all modules
- All connections visible from operator position
- No other accessories required, electronics and control valves integrated in HAAKE MARS frame
- Very low thermal mass for fast control response time
- Integrated base so that the dismounted unit can be parked on the lab bench, for example

Order numbers

Order no.	Description
222-1861	Peltier temperature module TM-PE-P for cones and plates for HAAKE MARS, power supply 222-1897 required
222-1860	Electrical temperature module TM-EL-P for cones and plates for HAAKE MARS
222-1909	Liquid temperature controlled module TM-LI-P for cones and plates for HAAKE MARS
222-1858	Electrical temperature module TM-EL-H for upper geometries for HAAKE MARS, holder 222-1902 required
222-1902	Holder for guide bar, necessary accessory for TM-EL-H and TM-IN-H
222-1955	Peltier temperature module TM-PE-C for cylinders for HAAKE MARS
222-1857	Electrical temperature module TM-EL-C for cylinders for HAAKE MARS
222-1862	Liquid temperature module TM-LI-C for cylinders for HAAKE MARS
222-1897	Power supply for temperature modules (TM-PE-P (1 pc.), TM-PE-C (1 pc.), TM-EL-P (1 pc.), TM-EL-H (1 pc.), TM-EL-C (2 pcs.), RheoScope module (1 pc.))

Accessories

Measuring geometries



Plates, cones, cylinders with helical grooving to prevent sedimentation and vane rotors

Comprehensive selection of measuring geometries for a wide variety of applications

We offer concentric cylinders, plate/plate and plate/cone measuring geometries as well as disposable and custom designs:

- in multiple sizes (8 mm - 60 mm)
- of various materials
- with different surfaces (e.g. serrated, sand blasted, polished)

The standard measuring geometries are made of titanium and designed for use with a solvent trap, for preventing the sample from drying out.

For plate and cone rotors lower plates are available with the same

- size
- material
- surface

This ensures ideal measuring conditions, such as optimal sample filling.



High-precision production of the lower measuring plate with guide and bayonet ring for simple, plan parallel installation

Sample hoods

Sample hoods for preventing heat loss and solvent evaporation as well as minimizing the temperature gradient are available in three different versions:

- Two part POM (Polyoxymethylene) version for temperatures up to 120 °C
- Insolated sample hood TM-IN-H with Ampcoloy® inlet and Teflon® insulation for very fast heat transfer in a temperature range from -40 °C up to 200 °C
- Unique transparent glass cover for observing the sample during the measurement, for temperatures up to 400 °C



Titanium rotor with diameter to fit lower plate for optimized gap filling and sample cover (glass or plastic) with integrated solvent trap and inert gas connection

Common features for all hoods

- Integrated inner and outer solvent trap for all geometries!
- Small enclosed volume
- Automatically centered and closed by lower plate
- Inlet for nitrogene gas to create inert atmosphere

Order numbers

Order no. Description

Lower measuring plates (TMP) for plate/plate and cone/plate measuring geometries

222-1891	Lower plate TMP60 for temperature modules (D = 60.0 mm)
222-1892	Lower plate TMP35 for temperature modules (D = 35.0 mm)
222-1928	Lower plate TMP25 for temperature modules (D = 25.0 mm)
222-1893	Lower plate TMP20 for temperature modules (D = 20.0 mm)
222-1895	Lower serrated plate TMP35 S for temperature modules (D = 35.0 mm)
222-1896	Lower serrated plate TMP20 S for temperature modules (D = 20.0 mm)
222-1898	Lower plate for double cone TMP60 DC for temperature modules
222-1910	Lower plates TMP60 Alu (100 pcs.) for temperature modules (D = 60.0 mm)
222-1926	Lower plates TMP35 Alu (100 pcs.) for temperature modules (D = 35.0 mm)
222-1925	Lower plates TMP25 Alu (100 pcs.) for temperature modules (D = 25.0 mm)
222-1924	Lower plates TMP20 Alu (100 pcs.) for temperature modules (D = 20.0 mm)
222-1923	Lower plates TMP15 Alu (100 pcs.) for temperature modules (D = 15.0 mm)
222-1922	Lower plates TMP10 Alu (100 pcs.) for temperature modules (D = 10.0 mm)
222-1921	Lower plates TMP8 Alu (100 pcs.) for temperature modules (D = 8.0 mm)

Plates and cones made of titanium with shaft length of 77 mm incl. solvent trap

222-1866	Plate P60 Ti L for HAAKE RotoVisco/HAAKE RheoStress/HAAKE MARS
222-1867	Cone C60/2° Ti L for HAAKE RotoVisco/HAAKE RheoStress/HAAKE MARS
222-1868	Cone C60/1° Ti L for HAAKE RotoVisco/HAAKE RheoStress/HAAKE MARS
222-1869	Plate P35 Ti L for HAAKE RotoVisco/HAAKE RheoStress/HAAKE MARS
222-1870	Cone C35/4° Ti L for HAAKE RotoVisco/HAAKE RheoStress/HAAKE MARS
222-1871	Cone C35/2° Ti L for HAAKE RotoVisco/HAAKE RheoStress/HAAKE MARS
222-1872	Cone C35/1° Ti L for HAAKE RotoVisco/HAAKE RheoStress/HAAKE MARS
222-1873	Cone C35/0.5° Ti L for HAAKE RotoVisco/HAAKE RheoStress/HAAKE MARS
222-1874	Plate P20 Ti L for HAAKE RotoVisco/HAAKE RheoStress/HAAKE MARS
222-1875	Cone C20/4° Ti L for HAAKE RotoVisco/HAAKE RheoStress/HAAKE MARS
222-1876	Cone C20/2° Ti L for HAAKE RotoVisco/HAAKE RheoStress/HAAKE MARS
222-1877	Cone C20/1° Ti L for HAAKE RotoVisco/HAAKE RheoStress/HAAKE MARS
222-1878	Cone C20/0.5° Ti L for HAAKE RotoVisco/HAAKE RheoStress/HAAKE MARS
222-1879	Plate P35 Ti L S (serrated) for HAAKE RotoVisco/HAAKE RheoStress/HAAKE MARS
222-1880	Plate P20 Ti L S (serrated) for HAAKE RotoVisco/HAAKE RheoStress/HAAKE MARS
222-1932	Double cone DC60/2° Ti L for HAAKE RotoVisco/HAAKE RheoStress/HAAKE MARS
222-1933	

Plates and cones with ceramic shaft 77 mm incl. solvent trap

222-1883	Plate P60 CS L for HAAKE RotoVisco/HAAKE RheoStress/HAAKE MARS
222-1882	Cone C60/1° CS L for HAAKE RotoVisco/HAAKE RheoStress/HAAKE MARS
222-1886	Plate P35 CS L for HAAKE RotoVisco/HAAKE RheoStress/HAAKE MARS
222-1884	Cone C35/2° CS L for HAAKE RotoVisco/HAAKE RheoStress/HAAKE MARS
222-1885	Cone C35/1° CS L for HAAKE RotoVisco/HAAKE RheoStress/HAAKE MARS
222-1887	Plate P25 CS L for HAAKE RotoVisco/HAAKE RheoStress/HAAKE MARS
222-1889	Plate P20 CS L for HAAKE RotoVisco/HAAKE RheoStress/HAAKE MARS

Order numbers

Order no. Description

222-1888	Cone C20/1° CS L for HAAKE RotoVisco/HAAKE RheoStress/HAAKE MARS
222-1356	Plate P8 CS L for HAAKE RotoVisco/HAAKE RheoStress/HAAKE MARS
222-1881	Plate P20 CS L S (serrated) for HAAKE RotoVisco/HAAKE RheoStress/HAAKE MARS
222-1375	Holder for disposable plate PXX Al D (P20 Al D, P35 Al D, P60 Al D), with ceramic shaft
222-1295	Disposable plate (upper geometry) P20 Al D (100 pcs.) made of aluminium for HAAKE MARS
603-0021	Disposable plate (upper geometry) P35 Al D (100 pcs.) made of aluminium for HAAKE MARS
222-1238	Disposable plate (upper geometry) P60 Al D (100 pcs.) made of aluminium for HAAKE MARS
222-1789	

Coaxial cylinder geometries for liquid temperature module TM-LI-C and electrical temperature module TM-EL-C (temperature control units with inner diameter of 48 mm)

222-1468	Cup Z40 (∅ = 40 mm) for HAAKE MARS
222-1457	Rotor Z40 DIN 53019/ISO 3219, low inertia for RV/RS/MARS
222-1290	Gasket for cup Z34/40/43, Viton (10 pcs.)
222-1951	Solvent trap for Z40 DIN for sample covers TM-IN-H, glass and POM
222-1465	Cup Z20 for HAAKE MARS
222-1458	Rotor Z20 DIN 53019/ISO 3219, low inertia for HAAKE MARS
222-1291	Gasket for cup Z20, HS28 Viton (10 pcs.)
222-1953	Solvent trap for DG41 (double gap), Z20 DIN for sample covers TM-IN-H, glass and POM
222-0620	Cup Z10 for HAAKE MARS
222-0621	Rotor Z10 DIN 53019/ISO 3219, low inertia for HAAKE RotoVisco/HAAKE RheoStress/HAAKE MARS
222-1292	Gasket for cup Z10, CCB10 Viton (10 pcs.)
222-1952	Solvent trap for Z41, Z38, Z10 DIN for sample covers TM-IN-H, glass and POM
222-1466	Cup DG41 (DG = double gap) for HAAKE MARS
222-1463	Rotor DG41 DIN 53544, low inertia for HAAKE MARS
222-1560	Rotor DG41, low inertia, with helical groovings on its inner and outer side against sedimentation for RheoStress
222-1293	Gasket for cup DG41/DG43, Viton (10 pcs.)
222-1953	Solvent trap for DG41, Z20 DIN for sample covers TM-IN-H, glass and POM
222-0629	Disposable cups Z43E/diameter 48 mm (100 pcs.) made of aluminium for HAAKE RheoStress and HAAKE MARS
222-1280	Rotor Z41 DIN 53019/ISO 3219, low inertia for disposable measuring geometry for HAAKE RheoStress and HAAKE
222-1467	MARS
222-1459	Cup Z43 for rotor Z31, Z38, Z41 for HAAKE RheoStress and HAAKE MARS
222-1460	Rotor Z41, low inertia for HAAKE RotoVisco/HAAKE RheoStress/HAAKE MARS
222-1461	Rotor Z38, low inertia for HAAKE RotoVisco/HAAKE RheoStress/HAAKE MARS
222-1290	Rotor Z31, low inertia for HAAKE RotoVisco/HAAKE RheoStress/HAAKE MARS
222-1464	Gasket for cup Z34/40/43, Viton (10 pcs.)
222-1462	Cup Z43S, serrated for HAAKE RheoStress and HAAKE MARS
222-1467	Cup Z43 for rotor Z31, Z38, Z41 for HAAKE RheoStress and HAAKE MARS
222-1290	Gasket for cup Z34/40/43, Viton (10 pcs.)
222-1276	Adapter coupling with bore 6 mm for HAAKE RotoVisco/HAAKE RheoStress/HAAKE MARS
222-1324	Vane rotor FL40 (D=40 mm) for HAAKE RotoVisco/HAAKE RheoStress/HAAKE MARS (adapter 222-1276 is req.)
222-1325	Vane rotor FL22 (D=22 mm) for HAAKE RotoVisco/HAAKE RheoStress/HAAKE MARS: as long as stock lasts, replaced by 222-1985
222-1326	Vane rotor FL16 (D=16 mm) for HAAKE RotoVisco/HAAKE RheoStress/HAAKE MARS: as long as stock lasts, replaced by 222-1984

Order numbers

Order no. Description

222-1626	Rotor with variable number of laterally mounted pins (adapter 222-1276 is req.)
222-1599	Propeller shaped rotor with 2 blades for HAAKE RotoVisco/HAAKE RheoStress, adapter is not necessary
Coaxial cylinder geometries for Peltier temperature module TM-PE-C (temperature control units with inner diameter of 32 mm)	
222-1956	Cup CCB25 DIN for TM-PE-C
222-1966	Rotor CC25 DIN Ti for cup CCB25 DIN (222-1956)
222-1993	Gaskets (10 pcs.) for TM-PE-C cups (CCB25)
222-1972	Cup CCB16 DIN for TM-PE-C
222-1967	Rotor CC16 DIN Ti for cup CCB16 DIN (222-1972)
222-1994	Gaskets (10 pcs.) for TM-PE-C cups (CCB16)
222-1971	Cup CCB10 DIN for TM-PE-C
222-1968	Rotor CC10 DIN Ti for cup CCB10 DIN (222-1971)
222-1292	Gasket for cup Z10, CCB10 Viton (10pcs.)
222-1976	Cup CCB26 for TM-PE-C for rotors CC26 Ti, CC24 Ti and CC20 Ti
222-1973	Rotor CC26 Ti for cup CCB26 (222-1976)
222-1974	Rotor CC24 Ti for cup CCB26 (222-1976)
222-1975	Rotor CC20 Ti for cup CCB26 (222-1976)
222-1992	Gaskets (10 pcs.) for TM-PE-C cups (CCB26, CCB27, DG, CCB25 ME)
222-1980	Cup CCB27 DG (double gap) for TM-PE-C
222-1979	Rotor CC27 ME Ti (Mooney Ewart) for cup CCB25 ME (222-1982)
222-1992	Gaskets (10 pcs.) for TM-PE-C cups (CCB26, CCB27, DG, CCB25 ME)
222-1982	Cup CCB25 ME for TM-PE-C (Mooney Ewart)
222-1981	Rotor CC25 ME Ti (Mooney Ewart) for cup CCB25 ME (222-1982)
222-1992	Gaskets (10 pcs.) for TM-PE-C cups (CCB26, CCB27, DG, CCB25 ME)
222-1969	Insert for disposable cups (222-0631) for TM-PE-C
222-0631	Disposable cups Z25E/diameter 28 mm (100 pcs.) made of aluminium for HAAKE RheoStress and HAAKE MARS
222-1970	Adapter for vane and propeller shaped rotor FL16, FL22, FL26-2b
222-1985	Rotor FL22 (vane), adapter (222-1970) is req.,incl. adapter for use with adapter coupling 222-1276
222-1984	Rotor FL16 (vane), adapter (222-1970) is req.,incl. adapter for use with adapter coupling 222-1276)
222-1986	Rotor FL26-2b propeller shaped with two blades, adapter (222-1970) is req.
222-2010	Adapter for TMP Lower plate insert for TM-PE-C for plate / cone geometries

Sample hoods

222-1904	Insulated sample hood TM-IN-H for HAAKE MARS with guide bar and integrated solvent trap, holder 222-1902 required
222-1996	Sample hood (glass) for HAAKE MARS with integrated solvent trap, incl. guide bar, holder (222-1902) required
222-1902	Holder for guide bar, necessary accessory for TM-EL-H and TM-IN-H
222-1900	Sample hood (glass) with integrated solvent trap
222-1903	Sample hood (POM) with integrated solvent trap

Application-oriented measuring cells



HAAKE MARS with CTC and clamps for measuring solids, SER tool for extensional rheological measurements and RheoScope unit

Controlled Test Chamber (CTC)

Unique combination of convection and radiation heat transfer for very fast temperature changes and homogeneous temperature distribution from 30 °C to 600 °C, can be extended to -150 °C with the premium low temperature option.

The CTC consists of two independently movable half-shells with the following advantages:

- Good access to sample for easy sample loading, trimming, cleaning.
- Chamber can be closed behind the sample while T is still controlled.
- With the CTC in *Park Position*, other Temperature Control Modules can be used.



Solid clamps

Solid clamps / DMTA option for Controlled Test Chamber (CTC)

Clamps for solid samples for measurements according to DIN/ISO 6721-1. These clamps are self-centering and self-adjusting to automatically compensate for physical changes of the sample (e.g. expansion or contraction due to temperature changes).

The sample can be 5.0 – 12.7 mm wide, 0.15 – 4.0 mm thick and have a maximum length of 68 mm.

The jaws are easily removable for cleaning. Also jaws with various profiles for different sample types (soft, medium, hard) are available.

Base unit comes with medium samples. Others on request.



Measuring cell for UV assisted thermal curing at elevated temperatures

UV curing cell for Controlled Test Chamber (CTC)

UV measuring cells as an integrated solution for the controlled test chamber (CTC) to enable the measurement of UV-induced thermal curing.

Plate/plate measuring geometries with diameters up to 20 mm and made from various materials (e.g. titanium, stainless steel or aluminium as disposable version) are available.

SER Tool

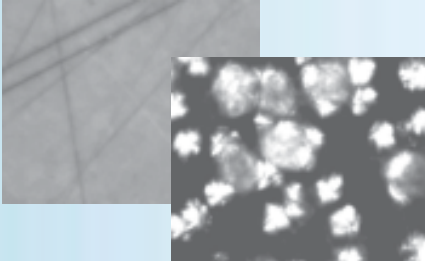
The SER (Sentmanat Extension Rheometer) system for the Thermo Scientific rheometers extends a conventional steady rotational rheometer into a robust extensional rheometer for melts and semi-solids.

Order numbers

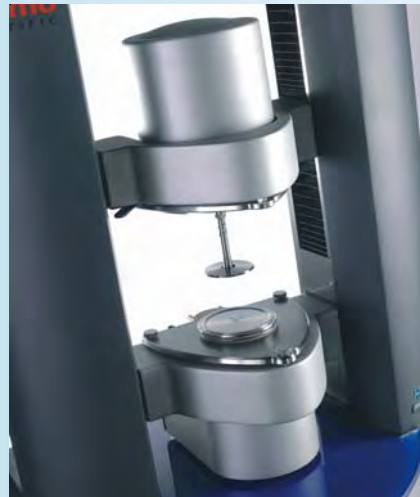
Order no.	Description
222-1913	Controlled Test Chamber (CTC) for HAAKE MARS I/III, 30 up to 600 °C
222-1768	Transformer for CTC
222-1914	Mounting rods for HAAKE MARS I/III
222-1730	Option "low temperature", premium version with low energy consumption, down to -150 °C for CTC
222-1733	Dewar vessel (50l)
222-1734	DMTA option (solid clamps incl. temperature sensor)
222-1781	Clamp jaws for soft samples
222-1782	Clamp jaws for medium samples (spare part for solids clamps)
222-1783	Clamp jaws for hard samples
222-1735	Lower holder for exchangeable measuring geometries incl. temperature sensor for HAAKE MARS
222-1769	Temperature sensor for lower shaft (CTC)
222-1747	Upper holder for exchangeable measuring geometries for HAAKE MARS
222-1736	Plate P35 St Ex (exchangeable geometry), as lower or upper geometry, for HAAKE MARS, holder required
222-1737	Lower Plate P35 St Ex (exchangeable geometry) for HAAKE MARS/HAAKE RotoVisco/HAAKE RheoStress, holder required
222-1738	Cone C35/4° St Ex (exchangeable geometry) for HAAKE MARS/HAAKE RotoVisco/HAAKE RheoStress, holder required
222-1739	Cone C35/1° St Ex (exchangeable geometry) for HAAKE MARS/HAAKE RotoVisco/HAAKE RheoStress, holder required
222-1740	Lower Plate P20 St Ex (exchangeable geometry) for HAAKE MARS, holder required
222-1741	Upper Plate P20 St Ex (exchangeable geometry) for HAAKE MARS/HAAKE RotoVisco/HAAKE RheoStress, holder required
222-1742	Cone C20/1° St Ex (exchangeable geometry) for HAAKE MARS/HAAKE RotoVisco/HAAKE RheoStress, holder required
222-1743	Lower Plate P25 St Ex (exchangeable geometry) for HAAKE MARS, holder required
222-1744	Upper Plate P25 St Ex (exchangeable geometry) for HAAKE MARS/HAAKE RotoVisco/HAAKE RheoStress, holder required
222-1745	Lower Plate P8 St Ex (exchangeable geometry) for HAAKE MARS, holder required
222-1746	Upper Plate P8 St Ex (exchangeable geometry) for HAAKE MARS/HAAKE RotoVisco/HAAKE RheoStress, holder required
222-1751	Plate P35 Al Ex (exchangeable geometry out of aluminum), as lower and upper geometry, for HAAKE MARS (40 pcs. = 20 sets), holder required, collection device (222-1779) recom.
222-1750	Plate P25 Al Ex (exchangeable geometry out of aluminum), as lower and upper geometry, for HAAKE MARS (40 pcs. = 20 sets), holder required, collection device (222-1779) recom.
222-1779	Collection device for PP25 exchangeable geometry
222-1749	Plate P20 Al Ex (exchangeable geometry out of aluminum), as lower and upper geometry, for HAAKE MARS (40 pcs.= 20 sets), holder required, collection device (222-1778) recom.
222-1778	Collection device for PP20 exchangeable geometry
222-1748	Plate P8 Al Ex (exchangeable geometry out of aluminum), as lower and upper geometry, for HAAKE MARS (40 pcs.= 20 sets), holder required
222-1808	Disposable plate/plate-measuring geometry consisting of a lower and an uppershaft, incl. press tool for mounting the disposable plates on the shafts and removal tool to remove the disposable plates from the shaft
222-1295	Disposable plate (upper geometry) P20 Al D (100 pcs.) made of aluminium for HAAKE MARS/HAAKE RotoVisco/HAAKE RheoStress
603-0021	Disposable plate (upper geometry) P35 Al D (100 pcs.) made of aluminium for HAAKE MARS/HAAKE RotoVisco/HAAKE RheoStress
222-1776	Sample loading tool for all plate / cone measuring geometries with mold for diameter adaptation incl. disposable steel strips (50 pcs.)
222-1777	Sample trimming tool for plate / cone measuring geometries
603-0315	UV measuring cell for CTC (HAAKE MARS)
222-1803	SER (Sentmanat Extension Rheometer) tool G2 incl. adapter for HAAKE MARS I/III

Accessories

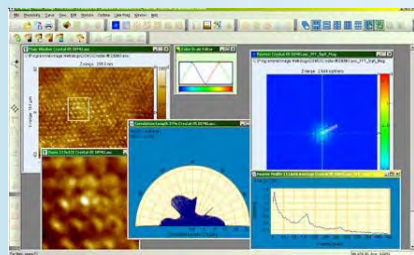
Combined Methods



Microscopic pictures of the homogeneous molten fat (left) and the same are after crystallization has begun (right)



RheoScope Module



Screenshot SPIP software

Rheology is a “macroscopic” method that provides information on the behavior of a sample under specified conditions. The mechanical properties of a material depend on its structure at the microscopic level. In order to be able to determine the reasons for the rheological properties, rheological measurements must be combined with tests on the microscopic level, using FTIR or microscopy, for example.

Benefits of combined methods:

- Same sample preparation
- Same measuring conditions
- Shorter test times
- Perfect correlation of results

RheoScope Module - Microscope Coupling

- Simultaneous rheological measurements and image acquisition
- Fully integrated compact modular unit for the HAAKE MARS
- Visualization of data and images in the same software package
- Analysis of structural changes under shear
- Image analysis software to determine particle sizes, particle size distributions and structural analysis.

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

Order numbers

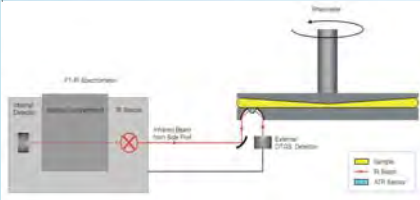
Order no. Description

RheoScope Module

222-1912	RheoScope module for HAAKE MARS I/III: temperature range -5 °C to 120 °C (300 °C with high temperature option) consisting of: liquid temperature control unit (-5 up to 120 °C) incl. heating elements for high temperature extension, cold light source, polarizer and HAAKE RheoWin module Necessary accessories: camera, lens, measuring plate (MP) for RheoScope module and measuring geometry (computer with firewire interface necessary) Necessary accessories for high temperature extension: TM-EL-H (222-1858)
222-1858	Electrical temperature module TM-EL-H for upper geometries for HAAKE MARS, holder 222-1902 required
222-1902	Holder for guide bar, necessary accessory for TM-EL-H and TM-IN-H
222-1897	Power supply for temperature modules (TM-PE-P (1 pc.), TM-PE-C (1 pc.), TM-EL-P (1 pc.), TM-EL-H (1 pc.), TM-EL-C (2 pcs.), RheoScope module (1 pc.))
222-1852	Camera for RheoScope module: Foculus FO232 TB monochrome
222-2033	Camera for RheoScope module: Foculus FO323 TC color
222-1815	Lens with 5 fold magnification for RheoScope module, 2 mm glass plates req.
222-1816	Lens with 10 fold magnification for RheoScope module, 2 mm glass plates req.
222-1817	Lens with 20 fold magnification for RheoScope module, 2 mm glass plates req.
222-1818	Lens with 50 fold magnification for RheoScope module, 1 mm glass plate req.
222-1811	Measuring plate MP60 glass 2 mm (sand blasted), D=60 mm for RheoScope module
222-1812	Measuring plate MP60 glass 2 mm (transparent), D=60 mm for RheoScope module
222-1813	Exchange kit glass plates 2 mm (sand blasted) for RheoScope module (5 pcs.)
222-1814	Exchange kit glass plates 2 mm (transparent) for RheoScope module (5 pcs.)
222-1830	Measuring plate MP60 glass 1 mm (sand blasted), D=60 mm for RheoScope module
222-1831	Measuring plate MP60 glass 1 mm (transparent), D=60 mm for RheoScope module
222-1832	Exchange kit glass plates 1 mm (sand blasted) for RheoScope module (5 pcs.)
222-1833	Exchange kit glass plates 1 mm (transparent) for RheoScope module (5 pcs.)
222-1915	Polishing of a cone or plate measuring geometry (price per unit), measuring geometry not included
603-0673	Plate P60 Ti L polished
603-0672	Cone C60/1° Ti L polished
603-0671	Plate P35 Ti L polished
603-0741	Cone C35/2° Ti L polished
603-0677	Cone C35/1° Ti L polished
603-0740	Cone C60/1° CS L polished
603-0782	Plate P35 CS L polished
222-1603	Cone C60/1° Ti, D=60 mm, low inertia, polished: as long as stock lasts
222-1604	Plate P35 Ti, D=35 mm, low inertia, polished: as long as stock lasts
222-1576	Cone C35/1° Ti, D=35 mm, low inertia, polished: as long as stock lasts
222-1597	Box with cleaning tissues (280 pcs.)
222-1821	Fire wire interface (necessary accessory for RheoScope module)
098-5052	Image Analysis Software SPIP consting of base module with roughness and grain analysis
222-1598	Length calibration scale for checking the optical quality of the RheoScope module

Accessories

Combined Methods



Scheme of the Rheonaut Module

Rheonaut Module - FTIR Coupling

The Rheonaut technology enables a new level of understanding of rheological properties and processes, which depend on changes on the molecular structure. On the one hand, deformations and orientations of molecules as function of shear can be monitored.

On the other hand the insitu-spectroscopy enables the investigation of chemical reactions in the measuring gap such as chemical or thermal curing of polyurethane (PU)- or epoxy-adhesives.

- Simultaneous rheological and FTIR spectra measurements
- Patented technique in a compact module for the HAAKE MARS
- ATR (attenuated total reflection) principle
- Analysis of structural changes on the molecular level under shear/deformation
- Extensive investigation of thermal/UV curing reactions with special measuring cell



Rheonaut Module manufactured by RESULTEC



Measuring cell for thermal assisted UV curing

Order numbers

Order no. Description

Rheonaut Module

603-0600	Rheonaut Module for HAAKE MARS; consisting of: an optical unit with integrated detector, controller for a temperature control unit, HAAKE MARS frame extension to hook up a commercially FTIR spectrometer Necessary accessory: - FT-IR spectroscopy module for HAAKE RheoWin software - chassis depending on the available spectrometer model (included in order no. 603-0600) - temperature control unit : Peltier or electrical - detector: MCT or DTGS
603-0751	Part of Rheonaut module (603-0600): chassis for Nicolet iS10 spectrometer
603-0752	Part of Rheonaut module (603-0600): chassis for Nicolet 6700 spectrometer
603-0753	Part of Rheonaut module (603-0600): chassis for Bruker Vector spectrometer
603-0754	Part of Rheonaut module (603-0600): chassis for for Nicolet iS50 spectrometer
603-0755	Part of Rheonaut module (603-0600): chassis for Bruker Vertex spectrometer
603-0756	Part of Rheonaut module (603-0600): chassis for Bruker Tensor spectrometer
603-0601	Lower ATR plate (exchangeable) incl. electrical temperature unit
603-0604	Lower ATR plate (exchangeable) incl. Peltier temperature unit
603-0607	DTGS detector for Rheonaut module
603-0606	MCT detector for Rheonaut module
603-0886	Trigger box for MCT detector
603-0974	Selectable part for the trigger box (603-0886): remote start cable for Nicolet iS10 and 6700 spectrometer
603-0975	Selectable part for the trigger box (603-0886): remote start cable for Nicolet iS50 spectrometer
098-5061	FT-IR spectroscopy module for HAAKE RheoWin 4
222-2036	UV module for a HAAKE MARS rheometer; consisting of: - a shaft with integrated mirror - screw holder ring (for mounting an exchangeable quartz glass plate) - incl. adapter and collimator for an UV light guide (UV light guide und UV light source not included)
222-2038	Tool for spreading quartz glass clamps
222-2039	Clamp rings (3 pcs.) for circular quartz glass plates with a diameter of 8 mm (603-0763)
222-2040	Circular quartz glass plates with a diameter of 8 mm (10 pcs.)
222-2041	Clamp rings (3 pcs.) for circular quartz glass plates with a diameter of 20 mm (603-0765)
222-2042	Circular quartz glass plates with a diameter of 20 mm (10 pcs.)
222-2043	One piece quartz glass plates with a diameter of 8 mm (3 pcs.)
222-2044	One piece quartz glass plates with a diameter of 20 mm (3 pcs.)
222-2047	Hood for UV curing cell (222-2036) in combination with Rheonaut

Application-oriented measuring cells



Pressure cell with vane rotor

Pressure cells

For testing samples at elevated pressures, different pressure cells are available. They are designed as closed systems, which can be filled with the sample and pressurized. Depending on the measuring conditions, which have to be simulated with the pressure cell, different types are available, e.g. made out of titanium for pressures up to 600 bar and temperatures up to 300 °C or made out of Hastelloy® for measurements on chemical aggressive samples.

The pressure can be increased by either increasing the temperature or using an external pressurization, e.g. a pump to compress the sample volume during the filling process.

Depending on the sample different measuring geometries are available: coaxial cylinder geometries, double gap or vane rotors.

Construction material cell



Construction material cell

A unique special measuring cell with a flexible profile for measurements on building materials is offered. Thanks to the interchangeable profile lamellas the measuring cell can be easily and quickly adapted to new materials. The design avoids slippage layer formation.

Order numbers

Order no. Description

Pressure cells

222-1405	Pressure cell D100/200 (up to 100 bar and 200 °C) made of titanium for HAAKE MARS incl. rupture disk (222-1401), block valve (222-1402) and manometer
333-0514	Temperature sensor for pressure cell system up to 100bar
222-1306	Rotor P36, D=36 mm, L=93 mm made of steel for pressure sensor system for HAAKE MARS
222-1307	Rotor P38, D=38 mm, L=93 mm made of steel for pressure sensor system for HAAKE MARS
222-1308	Rotor P39, D=39 mm, L=93 mm made of steel for pressure sensor system for HAAKE MARS
222-1628	Vane rotor 25/8.8 for pressure cell D100/200
222-1629	Vane rotor 30/8.8 for pressure cell D100/200
222-1630	Vane rotor 36/8.8 for pressure cell D100/200
222-1631	Vane rotor 25/93 for pressure cell D100/200
222-2076	Pressure cell made of Hastelloy (up to 75 bar and 300 °C) for HAAKE MARS incl.ball valve, press. gauge, rupture disk (spare part), gaskets
222-2179	Pressure cell made of Hastelloy (up to 170 bar and 300°C) for HAAKE MARS incl.ball valve, press. gauge, rupture disk (spare part), gaskets
222-1946	Temperature sensor (complete) for pressure cell D75/300 (Hastelloy) and D170/300 (Hastelloy) incl. extension cable
222-1585	Rotor D=36mm, L=93mm (D35/D50/D100), Hastelloy
222-1586	Rotor D=38mm, L=93mm (D35/D50/D100), Hastelloy
222-1587	Rotor D=39mm, L=93mm (D35/D50/D100), Hastelloy
222-2075	Pressure cell D600/250 (up to 600 bar and 250 °C), made of titanium for HAAKE MARS only incl. rupture disk, high-pressure valve, pressure sensor with digital manometer, Enerpac hand pump with high-pressure hose Including holder for pressure cell and PEEK safety hood, delivery in a transport case, user training (777-0829) is included
222-2084	Temperature sensor for pressure cell D600/250 incl. connecting cable and gasket
222-2081	Rotor PZ34 made of titanium incl. geometry specific inner diameter for pressure cell D600/250
222-2080	Rotor PZ33 made of titanium incl. geometry specific inner diameter for pressure cell D600/250
222-2080	Rotor PZ32 made of titanium incl. geometry specific inner diameter for pressure cell D600/250

Construction material cell

222-1792	Measuring cell for building materials for Thermo Scientific rheometers incl. 2 mm profile lamellas
222-1796	Vane Rotor FL 26 CMC (R = 26 mm)
222-1797	Vane Rotor FL 29.5 CMC (R = 29.5 mm)
222-1798	Measuring cell cover for measuring cell for building materials 222-1792
222-1793	Set of lamellas with profile depth 1 mm (8 pcs.)
222-1794	Set of lamellas with profile depth 0 mm (8 pcs.)
222-1795	Set of lamellas with profile depth 2 mm (8 pcs.)
222-1799	Liquid temperature control unit for measuring cell for construction material for HAAKE MARS
222-1800	Temperature sensor with swing mechanism for HAAKE MARS
222-1801	HAAKE MARS adapter plate for cell for construction materials, necessary accessory for the adaptation of the temperature control unit (222-1799)

Application-oriented measuring cells



Universal container holder

Universal holder for individual containers

A universal holder for sample containers has been developed. Thanks to the three individually adjustable clamps, sample containers like glass jars, cans, beakers, cups, etc., can be mounted solidly onto the rheometer. This allows the insertion of a (vane) measuring geometry into the sample without comprising its structure.

Vane rotors with different diameters are available. The universal adapter shaft can be used to adapt any individually designed measuring geometry.



UV-curing cell

UV-curing cell

For tests on UV-curing materials. UV cells are available as a standard version and as an individual measuring cell with freely configurable distances for optical components such as light guides, condensers and glass plates.



3 point bending tool

3 point bending tool

The Thermo Scientific HAAKE MARS is equipped with a highly sensitive normal force sensor and a very precise lift motor which allows applying controlled axial forces to the sample, pushing or pulling the material.

A sample fixture is available to investigate the bending and breaking behaviour of a wide range of materials.

This tool consists of a support plate with two parallel bars with an adjustable distance between 1 cm and 7 cm. An individually designed piston can be lowered onto the sample. The piston is mounted to the Thermo Scientific rheometer using a 6 mm universal adapter. Thanks to this universal adapter any kind of piston design can be attached to the Thermo Scientific rheometer.

Order numbers

Order no. Description

Universal container holder

222-2049	Universal holder for original containers incl. triangular plate for HAAKE MASRS
222-1276	Adapter shaft with a 6 mm bore for vane, pin or individual rotors
222-1324	Vane rotor FL40 (D=40 mm)

UV curing cells

603-0645	UV module for a HAAKE MARS rheometer consisting of: <ul style="list-style-type: none">- a shaft with integrated mirror- screw holder ring (for mounting an exchangeable quartz glass plate)- incl. adapter and collimator for an UV light guide (UV light guide und UV light source not included)
603-0761	Tool for spreading quartz glass clamps
603-0762	Clamp rings (3 pcs.) for circular quartz glass plates with a diameter of 8 mm (603-0763)
603-0763	Circular quartz glass plates with a diameter of 8 mm (10 pcs.)
603-0764	Clamp rings (3 pcs.) for circular quartz glass plates with a diameter of 20 mm (603-0765)
603-0765	Circular quartz glass plates with a diameter of 20 mm (10 pcs.)
603-0766	One piece quartz glass plates eith a diameter of 8 mm (3 pcs.)
603-0767	One piece quartz glass plates eith a diameter of 20 mm (3 pcs.)
603-0768	One piece quartz glass plates eith a diameter of 20 mm (3 pcs.)
222-1931	UV curing cell for cone/plate measuring geometry for temperature modules TM-XX-P, without UV light source
222-1375	Holder for disposable plate PXX Al D (P20 Al D, P35 Al D, P60 Al D), with ceramic shaft fo HAAKE RotoVisco/HAAKE RheoStress
222-1295	Disposable plate (upper geometry) P20 Al D (100pcs.) made of aluminium for HAAKE MARS

3 point bending tool

603-0241	Measuring geometry for bending and breaking tests for use with HAAKE MARS consisting of a sample fixture with adjustable bars and a cylindrical piston with a diameter of 6 mm
222-1849	Adapter plate for HAAKE MARS for standard temperature control units
222-1276	Adapter coupling with bore 6 mm

Accessories

Application oriented-measuring cells



Submersion flow cell

Submersion flow cell

Submersion flow cell with fluid for testing interactions between creams and salves with human skin or bandage adhesion when subjected to skin secretions



Tribology cell

Tribology cell

Measuring cell for friction tests to determine the tribological behavior of material combinations with or without lubricants



The BiCone measuring cup (from left to right): cup for BiCone with glass ring insert and securing ring, two piece lid, tool for mounting the securing ring; Insulation sleeve (not included and has to be ordered separately)

Interfacial rheology

The Du Noüy ring, commonly used for interfacial tension measurements, has been successfully applied to interfacial testing using a Thermo Scientific rheometer.

A new measuring configuration based on a BiCone geometry enables the user to perform temperature controlled interfacial experiments using a HAAKE MARS. This setup can be used for testing the rheological properties of an interfacial film formed between either two liquid phases or a liquid and a gas phase.

Order numbers

Order no.	Description
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Submersion flow cell

222-2012	Submersion flow cell; adapter plate requested (design depending on the used temperature unit)
222-2015	Adapter plate for submersion flow cell (222-2012)
222-2018	Sample hood made out of POM for submersion flow cell (222-2012)

Tribology cell

603-0347	Tribology cell, adapter plate requested (design depending on the used temperature unit)
603-0787	Adapter plate for tribology cell (603-0347)
603-0433	Contacts made of hardened steel for tribology cell (603-0347) 15 pcs.
603-0547	Bearing balls for tribology cell (603-0347) 10 pcs.

Interfacial rheology

603-0408	DuNoüy ring incl. adapter to use with HAAKE MARS
222-2049	Universal holder for original containers incl. triangular plate for HAAKE MARS
222-2067	BiCone BC68/5° Ti
222-2066	Cup for BiCone
222-2068	Insulating sleeve for cup for BiCone
098-5057	Interfacial rheometry, tool for HAAKE RheoWin 4

Software Thermo Scientific HAAKE RheoWin



Selection of predefined measurement and analysis elements in HAAKE RheoWin



Data evaluation using Lissajous plots



Customizable HAAKE RheoWin measuring and evaluation software

Components

- RheoWin JobManager for fully automated process control ("jobs") of measuring and analysis routines and report printout or export
- RheoWin DataManager for interactive evaluation of measured data as well as sophisticated tools for creating reports and generating templates for graphs, tables and screen views
- RheoWin UserManager for comprehensive user management regarding user access control and assignment of specific access rights

Functionality

- Monitor mode for preliminary testing, for displaying selected parameters and for saving manually acquired data
- Convenient creation and customization of measuring routines using predefined measuring and evaluation elements via "drag and drop" techniques
- Fully automated measurement, analysis and documentation within one measuring routine
- Real multitasking – simultaneous measurements using several rheometers and data evaluation
- Freely configurable data export (ASCII, MS-Excel®, XML)
- Save graphs in a wide variety of formats (pdf, jpg, etc.)
- Numerous algorithms for data analysis (e.g. interpolation, regression and automated quality control)
- Availability of saving the raw data and numerical values for data evaluation
- Loop programming with break-up criteria
- Integrated image capture with USB and Firewire camera

Customization

- User-defined configuration of paths and subdirectories for data filing
- Push-button selection of one out of 12 languages
- Modular generation of a file name and automated saving in a predefined subdirectory
- Data transfer to ERP and laboratory systems (e.g. SAP®, LIMS, etc.)
- Online display of all corrections to improve data quality (Micro Stress Control)
- Snapshot for quick characterization of an unknown sample
- RheoWizard expert help to set up a measuring routine
- Customizable report templates to permit the use of custom logos and text

Order numbers

Order no. Description

Thermo Scientific HAAKE RheoWin software*

098-5058	HAAKE RheoWin 4 software for HAAKE MARS III
098-1790	HAAKE RheoWin Data Manager
098-5042	HAAKE RheoWin 4 CD with documentation
098-5045	Time-Temperature Superposition (TTS) tool for HAAKE RheoWin 4
098-5046	Spectra tool for HAAKE RheoWin 4
098-5047	Molecular Weight Distribution (MWD) tool for HAAKE RheoWin 4
098-5044	CFR Part 11 tool for HAAKE RheoWin 4 for Thermo Scientific rheometers
098-5057	Interfacial rheometry, tool for HAAKE RheoWin 4
098-5061	FT-IR spectroscopy module for HAAKE RheoWin 4

* PLEASE NOTE: Each HAAKE RheoWin key is a license for one computer. This key can be used for a free-of-charge download of the newest version of the HAAKE RheoWin software 4.xx from www.rheowin.com

HAAKE MARS related accessories for customized setups



Customized HAAKE MARS set-up

Rheological investigations are very diverse regarding both the measured samples and the measuring methods. As a consequence the ability to configure a special and individually configured test set-up is very important. This is valid for the rheometer control software as well as the rheometer hardware. The exchange of temperature control units and the mounting of application-oriented measuring cells to rheometer must be easy, quick and user-friendly.

The HAAKE MARS is one of the most modular rheometers in its class thanks to its one-piece, spacious, aluminium cast two-columned frame. A circular aperture with a diameter of 125 mm in the base plate of the frame and the possibility to remove the electronics out of the frame allows for access to the sample from all directions. This is useful for integrating special sensing equipment for additional measuring techniques into the rheometer. Optional mounting rods on the rear of the frame can be used for the adaptation and positioning of the Controlled Test Chamber (CTC) or individual accessories.

Due to the fact that all application related components including the measuring head and the control electronics are exchangeable, customized solutions can be realized to meet even the most complex demands. For example, the lower holder - designed to mount a temperature control unit or a special measuring cell - is removable. This space can be used for individual components such as a (huge) individual container (e.g. a 10-liter bucket). It is also possible to mount the measuring head on the lower holder in order to position the sample in a (x-ray) beam. By mounting two measuring heads into the frame a rheometer with co- or counter-rotating measuring geometries can be realized.

Order numbers

Order no. Description

HAAKE MARS related accessories

222-1849	Adapter plate for HAAKE MARS for standard temperature control units RheoStress
222-1725	Adapter for using RheoStress-temperature control units for HAAKE MARS Holder for existing RheoStress600/300 temperature control units, not necessary for UTCP/P (new)
222-1856	Adapter plate for HAAKE MARS for CTC measuring geometries
222-1914	Mounting rods for HAAKE MARS
222-1929	Set of cables to swap-out the lift electronic
222-1722	USB-RS232 Adapter

Filter unit and compressors

222-1211	Standard filter unit for RS
222-1214	Exchange filter insert (fine)
222-1213	Exchange filter insert (activated carbon)
222-1434	Air compressor Carat (230V/50Hz) with dryer, filter unit and precision pressure controller 222-1666. Not for continuous use! Not for use with more than one rheometer or one rheometer with a CTC oven.
222-1435	Air compressor Carat (115V/60Hz) with dryer, filter unit and precision pressure controller 222-1666. Not for continuous use! Not for use with more than one rheometer or one rheometer with a CTC oven.
222-1567	Preliminary filter for compressor Carat
222-1666	Precision pressure controller for compressor Carat
222-1827	Air compressor Carat (230V/50Hz) with dryer, filter unit and precision pressure controller 222-1666. Not for continuous use!
222-1828	Air compressor Carat (115V/60Hz) with dryer, filter unit and precision pressure controller 222-1666. Not for continuous use!

Heat Exchanger and Circulator packages

222-1529	Heat exchanger HX1 P for Peltier temperature control unit (230V/50Hz) passive heat exchanger for heat removal of the Peltier element with fluid pump and water reservoir consisting of: Heat exchanger HX1P for Peltier temperature control unit (230V/50Hz)
222-1511	Heat exchanger HX1 A for Peltier temperature control unit (230V/50-60Hz) active heat exchanger for heat removal of the Peltier element with fluid pump, water reservoir and cooling fan consisting of: Heat exchanger HX1 A for Peltier system (230V/50-60Hz)
222-1937	Circulator-package SC100-A10 for temperatures from 0 up to 100 °C (230V/50Hz) consisting of: 152-5101 SC100-A10, 082-0663 (3 m silicon hoses)
222-1938	Circulator-package SC150-A10 for temperatures from 0 up to 100 °C (230V/50Hz) consisting of: 153-5101 SC150-A10, 082-0663 (3 m silicon hoses), 160-0033 USB cable
222-1512	Heat exchanger HX1 A for Peltier temperature control unit (115V/60Hz) active heat exchanger for heat removal of the Peltier element with fluid pump, water reservoir and cooling fan consisting of: Heat exchanger HX1A for Peltier temperature control unit (115V/60Hz)
222-1939	Circulator-package SC100-A10 for temperatures from 0 up to 100 °C (115V/60Hz) consisting of: 152-5108 SC100-A10, 082-0663 (3 m silicon hoses), 160-0033 USB cable
222-1940	Circulator-package SC150-A10 for temperatures from 0 up to 100 °C (115V/60Hz) consisting of: 153-5108 SC150-A10, 082-0663 (3 m silicon hoses), 160-0033 USB cable

Accessories

Services and Trainings



Services to meet individual requirements

We offer a wide range of professional services to a variety of industries to help our customers improve their productivity and decrease costs. Individual solutions to support our customers and maintain their instruments are a standard service. Additional service packages, warranty extensions or premium service packages, which can be bundled, allow our customers to plan and budget for maintenance and service support. All services are provided by skilled and certified service engineers.



Seminars and training courses

Customers are offered a comprehensive training program and selected courses in our international training center in Karlsruhe, Germany. Basic and advanced rheology seminars and training on special applications are held worldwide. In-house seminars are available on request. For more information visit www.thermo.com/mc_seminar.

Order numbers

Order no. Description

Services

777-5241	Warranty extension 12 months (one time) HAAKE MARS
777-5270	Warranty extension 12 months (one time) HAAKE MARS module (CTC, RheoScope, Pressure Measuring Cell)
777-0823	Installation HAAKE MARS
777-0827	Option Installation HAAKE MARS module (CTC, RheoScope, Pressure Measuring Cell)
777-0824	Installation HAAKE MARS with IQ/OQ support
777-0827	Option Installation HAAKE MARS module (CTC, RheoScope, Pressure Measuring Cell)
777-5288	Documentation material IQ/OQ for HAAKE MARS III
777-5292	Documentation material IQ/OQ for HAAKE MARS I
777-5379	Installation 21 CFR part 11 module and verification of 21 CFR part 11 requirements already part of IQ/OQ Documentation. Required only when 21 CFR part 11 system is qualified in a second step!.
777-5383	Documentation OQ RheoWin 21 CFR part 11 modules already part of IQ/OQ Documentation. Required only when 21 CFR part 11 system is qualified in a second step!.
777-5384	Relocation Rheometer incl. installation and packaging at one site
777-0857	Maintenance & calibration (service - plan) HAAKE MARS: basic coverage incl. on-site maintenance
777-0858	Maintenance & calibration (service - plan) HAAKE MARS: basic coverage incl. on-site maintenance with requalification
777-0859	Option Maintenance & calibration HAAKE MARS module (CTC, RheoScope, Pressure Measuring Cell)
777-5246	Repair coverage HAAKE MARS: covers labor, travel and parts for repairs This option is valid in combination with a service-plan. Parts in contact with the sample are excluded from the repair coverage
777-5382	Repair coverage HAAKE MARS module (CTC, RheoScope, Pressure Measuring Cell) This option is valid in combination with a service-plan. Parts in contact with the sample are excluded from the repair coverage
777-5159	Response Service : 24 hours on site response / 2 bussiness days repair time in depot This service is only available in connection with a service-plan.
777-5227	Option additional temperature calibration
777-0606	Option test fluid measurement with additional rotor
777-5236	One time maintenance HAAKE MARS
777-0608	Certified standard factory calibration HAAKE MARS

For training at customer site please contact us

Advanced training: instrument training at customer site

Advanced training: software training at customer site

Software training CFR part 11 at customer site

Rheology seminar (seminar program: basics in rheology or advanced seminar)

Application solution: Polymers



Our equipment covers the entire life cycle of a polymer – from its development to the pilot. Small batches can be compounded using the scale-up method or small quantities of specialized polymers or composites can be processed up to (online) quality control in production.

Compounding and test specimen production

We provide comprehensive workflow coverage with the Thermo Scientific HAAKE MiniLab micro-compounder together with the Thermo Scientific HAAKE MiniJet mini-injection molding machine. The HAAKE MiniLab combines compounding and viscosity tests for small sample volumes up to 5 g or 7 cm³. This unit is based on the proven conical twin-screw technology, with co- or counter rotating screws, and can operate as a separate unit with data export or as a fully software-controlled system. Together with the HAAKE MiniJet, different specimens can easily be produced from the compounded material.



HAAKE MARS with controlled test chamber and clamps for measuring solids, SER tool for extensional rheological measurements and RheoScope unit

Rheological measurement

With the Thermo Scientific HAAKE MARS rheometer, 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.

Selection of polymer specific accessories

- Micro compounder
- Injection molding machine for the production of test specimens
- Disposable pellet filling aid for optimal gap filling
- CTC controlled temperature test chamber for measurements in the range (-150 °C) 30 °C to 600 °C
- Solid clamp for DMA tests on rodshaped specimens
- SER tool from Xpansion Instruments for extensional rheological measurements
- Interchangeable plate and cone measuring geometries in various sizes and materials
- Measuring cell for UV-curing processes or for thermal assisted UV-curing
- RheoScope module for the measurement of the melting behavior of polymers
- HAAKE RheoWin Software-Module TTS (Time-Temperature Superposition), Spectra and MWD (Molecular Weight Distribution)



Mini-injection molding machine with various molds for the production of specimens for rheological tests: disk-shaped, in various diameters, for plate/plate measuring geometries or rectangular for the solid clamp

Application solution: Petrochemicals



Over 30 billion barrels of crude oil are conveyed and processed annually. Measurements of the viscosity of crude oils of varying compositions at different temperatures and pressures are used to optimize the flow behavior of the crude oil at various depths, while simulating and optimizing extraction and transport. The calculated use of drilling and boring fluids can increase oil field outputs.

Here too we have the entire process covered, from extraction to processing.

Extraction

For temperature- and pressure-dependent measurements, there is a comprehensive range of measuring cells in various materials (titanium, Hastelloy®, etc.) available, suitable for up to 400 bar and 300 °C. Cylindrical geometries or vane rotors are available as measuring geometries to simulate the starting behavior of pipelines. Isobaric measurements can be done using an automated pressure controller while performing temperature ramps.



HAAKE MARS with high pressure measuring cell

Transport

Simultaneous measurements of rheological properties with the help of microscopic observation of structure formation to study the crystal growth in crude oils ("waxing"), which must be avoided in order to optimize pipeline transport.

Processing

We offer several application-based measuring cells for petroleum processing and refining, such as for the rheological testing of bitumen or for tribological and rheological testing of oils and lubricants.

Selection of specific accessories for the petrochemical industry

- Pressure cells: up to 300 °C, up to 600 bar, titanium and Hastelloy® for aggressive liquids, with cylindrical, double gap or vane rotors
- Pump for pressurization
- RheoScope module for studying the waxing behavior of crude oil
- SHRP measuring cells for the rheological characterization of bitumen
- Tribology measuring cell for abrasion tests with greases and lubricants



Measuring cells for determining the tribological behavior of material combinations with or without lubricants

Application solution: Pharmaceuticals and cosmetics



Nasal sprays, creams, foams, tablet coatings, shelf life, sprays or active ingredient dosing – no matter what the product or application – rheological tests are essential for the development, optimization or production of suspensions and emulsions in order to reduce product development times and optimize production processes.

While simple viscosity measurements are often sufficient for evaluating raw materials, extensive rheological testing is necessary in order to predict and effectively adjust shelf life, sensitivity or processability. The HAAKE MARS has an extensive range of accessories for pharmaceutical and cosmetic applications.



HAAKE MARS with Du Noüy ring for rheological measurements of interfaces, microtiter plate with liquid temperature control for serial measurements or measurements with small sample volumes

Selection of accessories for pharmaceutical products and cosmetics

- High-performance Peltier temperature control unit for temperature cycle tests for stability testing
- RheoScope (Microscopy) module for stability testing of multi-phase systems and foams, plus SPIP software determining particle sizes and distribution
- Rheonaut module for analysis of structural changes on the molecular level under shear / deformation e.g. on proteins
- Du Noüy ring and BiCone geometry for interfacial rheology
- Variable holder for measurements in original containers
- Holder for microtiter plates for serial measurements of samples that are only available in small volumes
- Submersion flow cell surrounded by fluid
- Custom solutions for processing pharmaceutical products (hot melt extrusion, continuous granulation)
- Documentation for IQ/OQ and installation with IQ/OQ support
- “21 CFR Part 11” module for the HAAKE RheoWin software to meet FDA requirements



Selection of falling ball and rotational viscometers for fast, reliable viscosity measurement for raw material evaluation or batch testing

Application solution: Paint, inks and coatings



The requirements and demands placed on paints, inks and coatings are constantly increasing. And in the process, eco-friendly technologies and products are growing in importance: water as a diluting agent, solvent-free powder coatings and UV irradiation as a fast, energy-saving cross-linking method.

The flow behavior of these products is highly complex, but can be controlled when the relevant parameters are known. Suitable rheology additives can be selected depending on the desired formulation, whether they contain solvents or are water-based. For instance, existing coating systems can be reformulated to be in compliance with the law without significant changes to the flow characteristics, or customized photo-initiators that are mixed into the coating as an additive are developed to enable UV cross-linking. The result is a shorter drying times and therefore lower process costs. Our equipment supports you in every phase of your multi-layered process.



HAAKE MARS with controlled test chamber and measuring cell for UV curing

Selection of application-specific accessories for paints, inks and coatings

- Sample covers, including solvent traps to prevent drying out
- Double cone to measure low-viscosity paints without any edge effect
- Ring rotor for measuring powder coatings
- Disposable plate/plate measuring geometry to eliminate time-consuming cleaning
- Measurements with very high shear rates using special cylinders with small measuring gaps (up to 25 μm) or cones with small cone angles
- UV measuring cells for standard and custom applications such as UV-assisted thermal curing
- Rheometer for measuring extensional properties, such as during spraying or coating
- Rheonaut module for simultaneous rheological and FTIR spectra measurements for extensive investigation of thermal / UV curing reactions



Thermo Scientific HAAKE CaBER 1, the only commercially available rheometer to measure the extensional properties of fluids, e.g. to optimize a curtain coating or for filling processes

Accessories

Application solution: Food



Mouthfeel is a crucial property of any food or beverage. To know the visco-elastic properties linked to the mouthfeel is essential for development, production and quality control. In addition, the rheological properties determine how to run important steps of the production process like pumping, mixing, spraying and filling with best efficiency.

Selection of application-specific accessories for food

- Adaptable holder for various food containers to accelerate testing
- Special vane rotors for samples containing bigger pieces like fruits or kernels of rice
- Tribology cell e.g. for the taste of chocolate
- 3-point-bending/breaking accessory e.g. for chocolate or cookies
- Pressure cell up to 250 °C and 600 bar to simulate cooking processes
- Viscometer packages with focus on food applications, e.g. HAAKE Viscotester iQ DIN package for measurements on liquids such as chocolate and beverages or package with vane rotor and HAAKE RheoWin software for yield point determination and thixotropy tests



Thermo Scientific HAAKE MARS III



Thermo Scientific HAAKE Viscotester iQ application package for yield point determination on dairy products (e.g. yogurt) and for measurements on samples which are difficult to measure (e.g. due to sedimentation)

More information ...

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Selected product information:

- P48** Universal holder for measurements in original containers
- P46** Temperature controlled interfacial rheology
- P45** The TMP-Helper, a tool for optimized handling of lower measuring plates at higher temperatures
- P44** Dirt and dust protection for Thermo Scientific HAAKE rheometers
- P43** Exchangeable lower plate TMP80 optimized for easy cleaning
- P41** Viscoelastic standard for checking the rheometer functionality
- P38** The Thermo Scientific HAAKE MARS III rheometer frame:
Improved handling and customization
- P37** New UV module for UV curing measurements
- P36** Double gap geometry for pressure cell D400/300
- P35** New series of sample hoods with integrated solvent trap for plates/cones and cylinders
- P33** Spectroscopical insight into rheology with the Rheonaut module for the Thermo Scientific HAAKE MARS rheometer
- P32** Temperature control unit Peltier cylinder - A new dimension in performance, ease of use and flexibility
- P31** Flexible holder for individual components for Thermo Scientific HAAKE MARS
- P29** Exchangeable lower plates for temperature module
- P27** Rheological investigations on small sample volumes: Liquid temperature control holder for microtiter plate
- P26** Du Noüy ring for interfacial rheology
- P24** Submersion flow cell
- P23** Tribology cell for HAAKE rheometers
- P22** UV curing cell for an individual arrangement of optical components
- P21** Vane rotors for pressure cells for HAAKE MARS and HAAKE RheoStress 6000
- P19** SER - Extensional Rheology System for Thermo Scientific HAAKE MARS
- P18** Universal container holder for HAAKE MARS and HAAKE RheoStress 6000
- P17** New measuring cell for UV assisted thermal curing at elevated temperatures
- P14** Sample fixture for bending and breaking tests for Thermo Scientific rheometer
- P12** Support fixture for the analysis of textile samples
- P10** Disposable plate/plate-measuring geometry for the controlled temperature chamber (CTC)
- P6** New measuring cell for rheology of building materials
- P5** Cone/plate-exchangeable measuring geometries for maximum flexibility
- P4** New solids clamps for measurements on (semi)-solids
- P1** Investigation of the curing behavior with a newly designed ring rotor

More information ...

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Selected application notes:

- V265 Image acquisition with the HAAKE RheoScope module
- V263 Tracking Fast UV Curing Reactions in a Rheometer Using the Fast Oscillation Mode
- V261 Characterizing long-chain Branching in Polyethylene with Extensional Rheology
- V258 UV-induced curing reactions investigated by simultaneous rheometry and FT-IR measurements
- V257 Monitoring Emulsions Morphology Under Shear via Simultaneous Rheometry and In-situ FT-IR Spectroscopy
- V254 Curing of an Acrylate Glue – Rheology with Simultaneous FTIR-Spectroscopy
- V248 Well prepared - Good results
- V247 Detailed analysis of curing reactions of polyurethane resins using the Rheonaut technology for simultaneous rheometry and FT-IR
- V246 Measuring fast UV curing materials using oscillatory rheometry
- V242 Determining the flow behaviour of ceramic slurries
- V241 Dynamic Mechanical Thermal Analysis (DMTA) on polymer composites with the HAAKE MARS rheometer
- V240 Waxing of crude oil – An easy approach with rheoptical methods
- V238 Applied food rheology using fast speed control and axial measurements
- V228 What happens when rheological properties change?
Looking into rheological properties with simultaneous collection of microscopic images

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Material Characterization

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