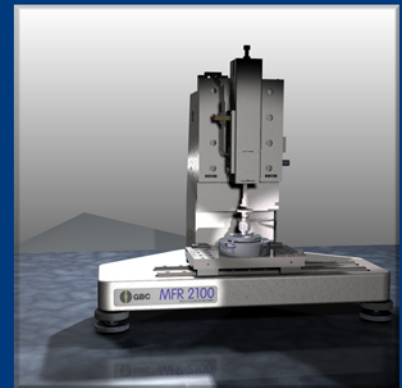


# MFR 2100

Micro Fourier Rheometer  
Micro Fourier Rheometer



www.GBCsci.com  
SCIENTIFIC EQUIPMENT

# Who is GBC Scientific Equipment?

GBC Scientific Equipment Pty Ltd commenced operations in 1978. GBC designs, manufactures and markets a range of scientific instruments comprising Atomic Absorption spectrometers (AAS), UV-Visible spectrometers (UV-Vis), Inductively Coupled Plasma Optical Emission spectrometers (ICP-OES), Inductively Coupled Plasma Time of Flight Mass spectrometers (ICP-TOF-MS), High Performance Liquid Chromatographs (HPLC) and Rheological Analysis Equipment.



Endorsed by the international quality standard, ISO 9001, the company prides itself on developing products, which meet and often exceed market

expectations. GBC has been the recipient of many international export awards, acknowledging the superior standard and world acceptance of both the organisation and the products.

The company's head office is based in Melbourne, Australia and its USA subsidiary office is situated at Arlington Heights, Illinois. Worldwide, GBC is represented by one of the largest distribution networks, in over 85 countries. Now more than 20 years after its inception, GBC is renowned in the elemental analysis field as a result of its successful AAS, ICP and UV-Vis portfolio. The company is now leading the world in instrument development, launching the most technically advanced ICP Time of Flight Mass Spectrometers (ICP-TOF-MS) and *the new Micro Fourier Rheometer (MFR 2100)*.

GBC customers benefit from our efficient and effective global organization. Access to information, applications support and technical service is never more than a phone call or email away.

## ISO 9001 QUALITY ACCREDITATION

GBC has always placed a strong emphasis on quality in all aspects of our operation, from design and manufacture to the provision of service and support to our customers, and we are fully committed to continuous evaluation and improvement in all areas.

The GBC Quality Management System has been accredited to the ISO 9001 quality standard by Lloyd's Register Quality Assurance Limited. This certification is your assurance that the procedures and processes used to produce the goods and services which GBC provides comply with the relevant International Standard, and demonstrates our commitment to meeting the needs and expectations of our customers.



## What is the GBC vision?

*GBC Scientific Equipment*

*will*

*advance people's knowledge*

*and*

*their capacity to enhance the quality of life*

*for all humankind.*

## GBC's product lines...



AAS



HPLC



ICP-OES



ICP-TOF-MS



Rheometer



UV-Vis

# Introducing the MFR 2100 - Micro Fourier Rheometer



The exciting new MFR 2100 Micro Fourier Rheometer has redefined the state-of-the-art in rheological analysis.

This groundbreaking product will revolutionize the traditional rheometer market due to the significant benefits offered by its ability to analyse very small volumes and perform analyses across a wide frequency range in seconds.

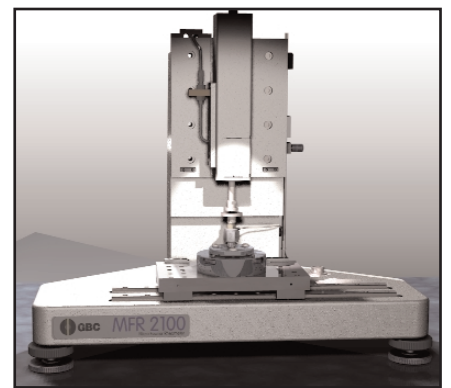
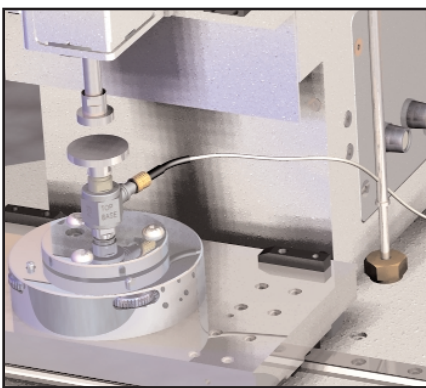
While traditional rheometers use a twisting motion at a single frequency,

the MFR 2100 applies a novel patented pseudo-random squeezing motion to a sample. The complex visco-elastic properties are extracted across a wide frequency range in seconds at high resolution using Fourier analysis.

This makes the MFR 2100 excellent for measuring the visco-elastic properties of materials that are changing rapidly with time. An example of this is in the paint industry or in the adhesives industry where the visco-elastic properties of

samples that are curing or changing with time are required.

Traditional rheometers also require large volumes of sample. The MFR 2100 can perform analyses on volumes as small as 100  $\mu\text{L}$  or lower hence analyses on precious samples can be performed. The automated sample introduction system enables sample introduction and subsequent cleaning in seconds.



Find out more...

...about GBC Scientific Equipment at our website...

<http://www.gbcsci.com>

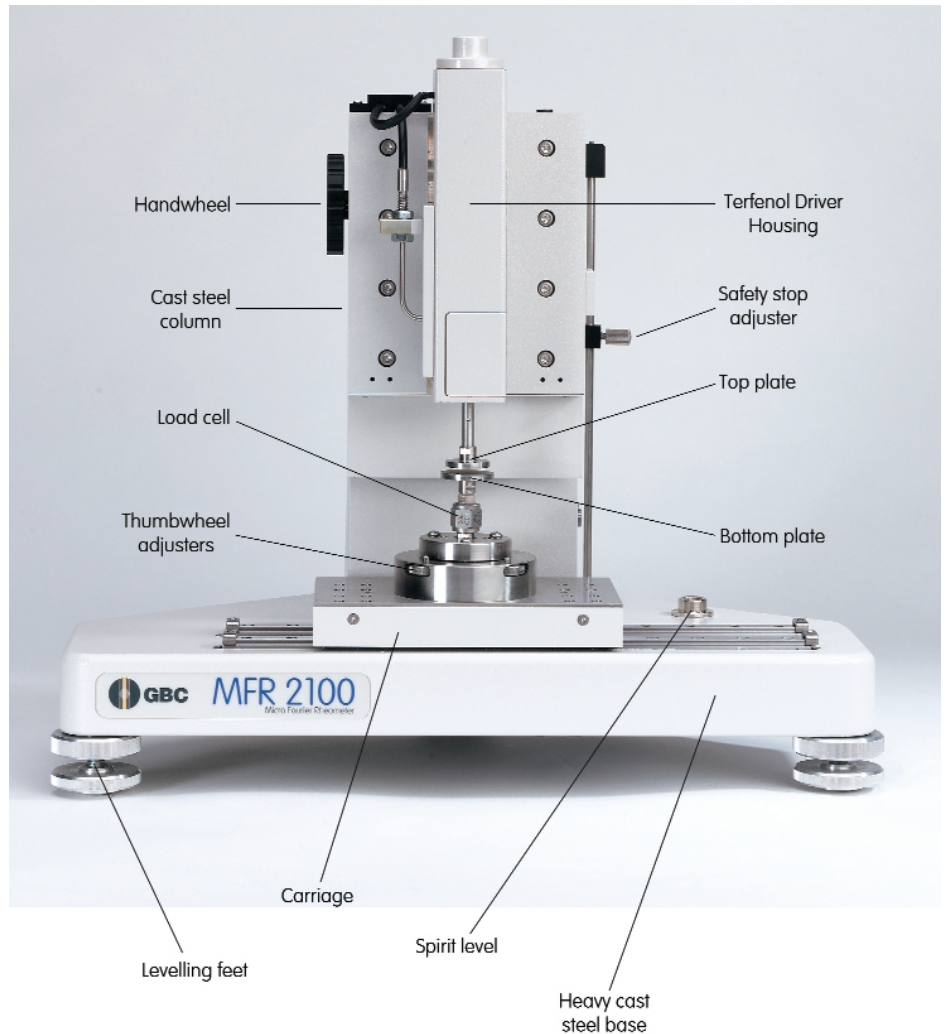
# MFR 2100

## Proven in novel applications

The MFR 2100 has already undergone significant trials with end user applications in the analysis of inks, biological fluids, cosmetics, polymers, adhesives, paints, food and petroleum products.

In one instance the MFR 2100 was also been used to characterize Human Tears!

Because of the uniqueness of the MFR 2100 many applications which have never previously even been imagined using a rheometer can now be performed using the MFR 2100.



# Micro Fourier Rheometer

# MFR 2100

## Software

The intuitive Windows software graphically represents key rheological parameters on the same screen.

For example, graphs of the transfer function of force and displacement can be shown on the same screen as complex viscosity and modulus as a function of frequency in seconds.

### Data Output

Text files of analyses are easily generated. These files can be imported into third party software packages such as Microsoft Excel for further manipulation and representation.

### The Cathode Ray Oscilloscope (CRO) View

You can get real-time measurements from the "CRO" view. This enables you to see live data from the instrument immediately and allows you to configure the strain (or displacement amplitude) and gap

settings to suit. The live data signals, being the Displacement of the top plate and the resulting Force upon the bottom plate permit an immediate qualitative view of a samples' rheological properties.

The two live data signals can be plotted against each other as well as a "Lissajous" figure. This figure displays an immediate qualitative measure of phase shift, which is important in determining the proportions of the elastic and viscous moduli.

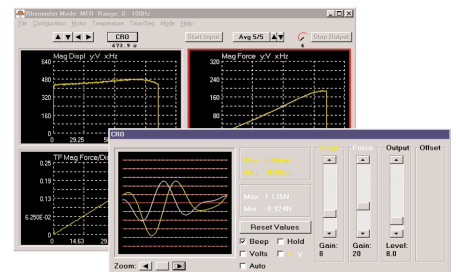
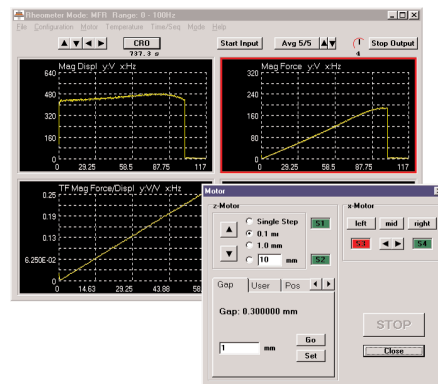
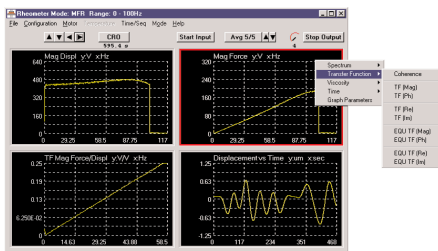
The Displacement may vary as a sinusoid, saw-tooth or square wave, over a variety of frequencies. Most important of all, the instrument supports pseudo-random noise - a summation of sinusoids over many frequencies.

### Analysis

The graphics are fully customisable and can perform a variety of

analyses. Upon applying the pseudo-random noise signal to the sample, a full analysis is available within seconds. You can immediately see the viscosity and how it varies with frequency, or a whole range of intermediate or alternate functions. Some of these are -

- Displacement vs Time
- Force vs Time
- Displacement vs Frequency
- Force vs Frequency
- Transfer Function  
(Force / Displacement)
- Magnitude vs Frequency
- Phase vs Frequency
- Transfer Function - Equalised  
(Normalised to a Reference)
- Magnitude vs Frequency
- Phase vs Frequency
- G' vs Frequency
- G'' vs Frequency
- Eta' vs Frequency
- Eta'' vs Frequency



# Fast Analysis

# MFR 2100

## Specifications

*The specifications of the MFR 2100 are impressive*



FAST - Up to 400 frequency steps analysed in seconds

Very small sample size (<100  $\mu\text{L}$ )

High phase resolution (<2°)

Wide measurement range

Sophisticated Windows software

Automated gap setting

Simple calibration

Easy sample preparation and cleaning

$G'$  measured to  $10^{-4}$  Pa

$\eta$  down to 1 mPa.s

Frequency range: 0 - 100 Hz

Force range: 0.002 - 44.5 N

Gap setting resolution: 0.625  $\mu\text{m}$

Displacement amplitude: 0.02 - 20  $\mu\text{m}$

Measurement time: 4 to 10 seconds

Samples down to 100  $\mu\text{L}$  or lower

# MFR 2100

Easy to use

*State of the art rheometry*



*As well as being very fast the MFR 2100 is incredibly easy to use.*

*Gap setting is computer controlled from 0.6 $\mu$ m to ~30mm with an incredible resolution of 0.625  $\mu$ m. This is critical when measuring the rheological properties of samples approaching the viscosity of water.*

*The sample introduction plate is computer controlled into the load position. The sample is placed on the plate and then set into the sample analysis mode.*

*Within seconds the analysis is complete. The plate is then moved into the load position, cleaned and a new sample loaded. As no cups are used sample cleaning takes seconds.*

*GBC Scientific Equipment*

*takes*

*rheological analysis*

*into*

*the 21st Century!*

Multiple frequencies simultaneously

## Ordering Information

99-2100-00

MFR2100

The MFR 2100 is manufactured exclusively by GBC Scientific Pty Ltd under license from CSIRO Australia.

GBC Scientific Equipment Pty Ltd  
A.C.N. 005 472 686  
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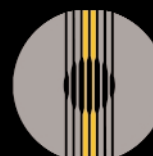
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## GBC SCIENTIFIC EQUIPMENT

Manufacturer of world-class scientific instruments and accessories—  
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UV-Vis

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