

MQC



A new range of benchtop systems
from the NMR specialists



Fat, moisture and fluorine content
measurement made **Easy**

The Business of Science™



Easy NMR

Since the early 1970s Oxford Instruments has been in the forefront of developments in benchtop NMR. Thousands of first-generation Continuous Wave (CW) instruments were installed around the world, many of them still in use for measurements of fat in chocolate, oil in seeds and hydrogen in aviation fuel.

In more recent years, pulsed NMR instruments have taken over from CW, and once again Oxford Instruments has led the way with the QP20, QP20+ and MQA series instruments. Oxford Instruments is again first to bring forward innovative technology, in the shape of the **MQC** benchtop NMR analyser.



The Oxford Instruments MQC

With over 30 years experience in the benchtop NMR business, Oxford Instruments knows that the most important requirements of laboratory instrument users are size, reliability, serviceability, and ease of use. The Oxford Instruments' **MQC** has been designed specifically to meet all these requirements.

Size

Benchtop space in most laboratories is at a premium, so Oxford Instruments has designed the **MQC** to use the minimum possible footprint.

The **MQC** incorporates a new, compact magnet that is smaller than that in any comparable instrument. The **MQC** requires no external PC - all the control and data processing hardware is located inside the instrument, together with a hard disk drive for data storage.

The magnet and electronics are housed in separate units so that the electronics unit can be placed on the floor, under the bench, or even on a shelf to save bench space. The flat panel LCD display can be free-standing or mounted on the back of the magnet unit for the absolute minimum footprint and flexibility.

MQC fits around you...

Placed on a shelf

Placed on the bench

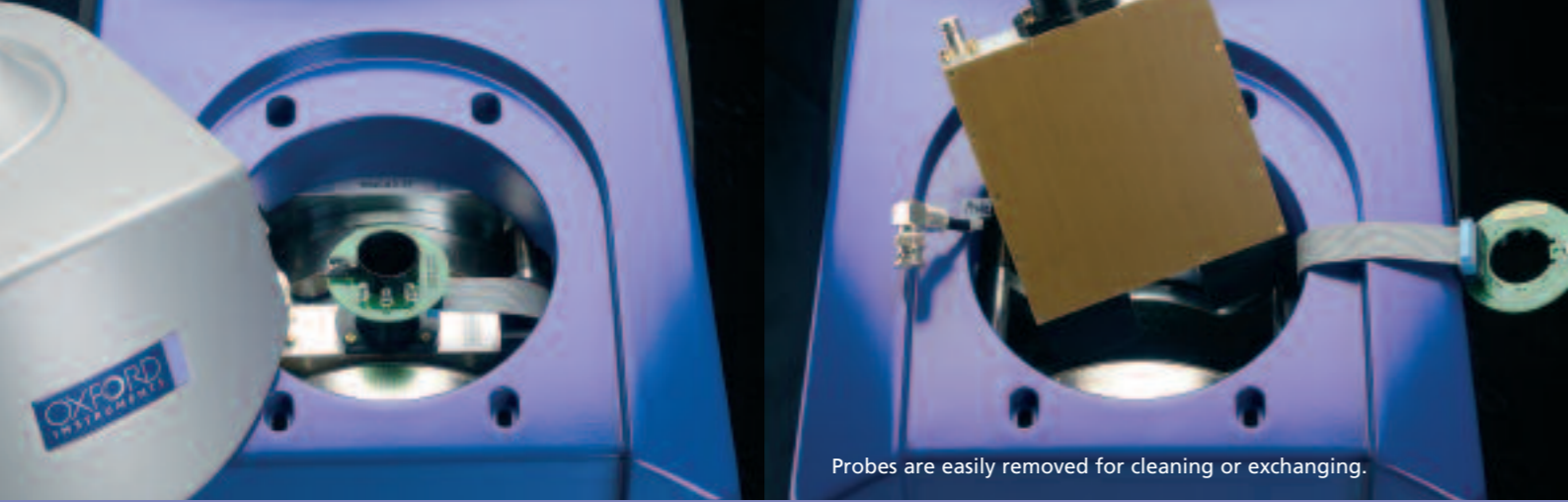


Reliability & Serviceability

The **MQC** has been designed with the minimal number of component parts so that it is easy to set up and maintain. Inside the electronics unit, the main modules are arranged in pods, which are conveniently accessible and removable through a back panel for easy servicing. The advanced new electronics of the **MQC** allows the instrument's internal firmware to be upgraded through a USB port, using a file that can be e-mailed to the user. This ensures that users can easily be kept up to date with improvements and advances in the **MQC's** capabilities.

The **MQC** incorporates advanced self-diagnostics routines so that any faults can be quickly localised. Diagnostic data can either be accessed over the internet or, alternatively, saved to a file that can be emailed to the service engineer.





Probes are easily removed for cleaning or exchanging.

Easy to use



Ease of use - hardware

The **MQC** employs advanced digital electronics, controlled by a Linux operating system supervised by a standard Windows™ PC motherboard. This unique combination ensures **MQC** users enjoy high performance with minimum size while also retaining expansion and future development capability.

Despite the small overall size of the **MQC** magnet, the magnet has the largest sample space in its class, to allow larger samples to be measured. It also has the highest field strength, to offer the highest sensitivity. Further sensitivity enhancements are gained from the high speed digital sampling and wide dynamic range of **MQC** electronics.

The **MQC** has the facility for interchangeable probes, so that different sample sizes can be used to optimise different applications. Probes can be changed easily by the user in a matter of minutes – and all 23MHz probes have open-ended bottoms to allow easy cleaning in the event of sample spills.

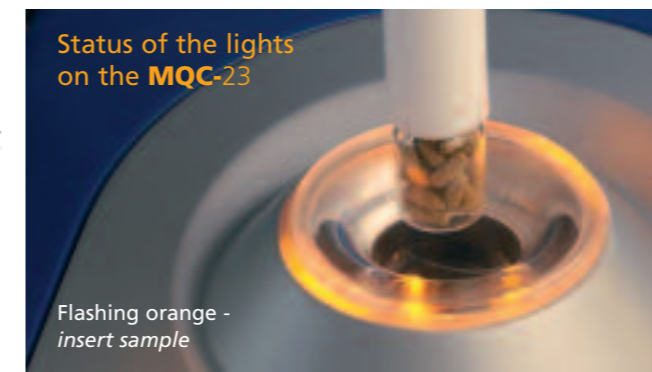


Left: Cleaning the inside tube of the probe is simple on the **MQC-23**

Ease of use - software

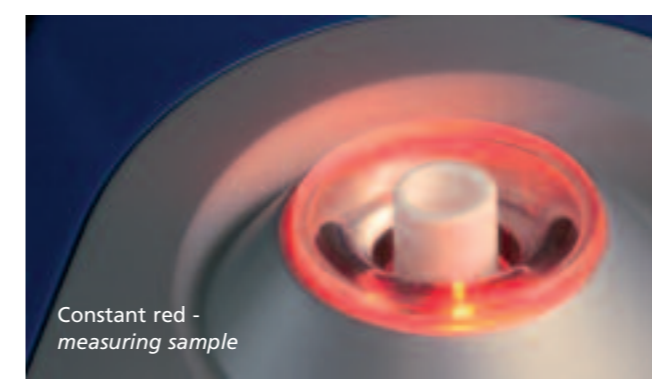
Instrument operators these days are familiar with PC-driven instruments. The space saving internal PC uses Windows-based software, together with a flat screen monitor and standard PC keyboard. USB ports are provided to aid software upgrades and to allow data to be saved externally. If required the **MQC** can be connected into a house network to allow data files or results to be transmitted to a remote location.

Most **MQC** installations come complete with **MultiQuant**, **EasyCal** and **RI Analysis**, Oxford Instruments' acclaimed software packages for Quality Control users. These packages offer the facility for easy calibration of up to four constituents in the samples (depending on the application), together with a measurement mode that guides the operator step by step through the process with clear on-screen prompts. Operator prompts can be customised, and even displayed in any required language.

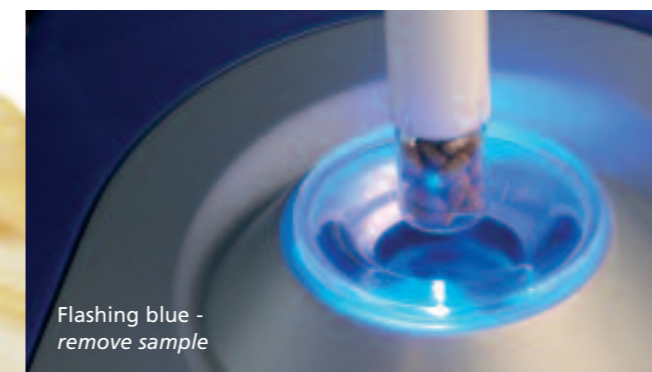


Status of the lights on the **MQC-23**

Flashing orange - insert sample



Constant red - measuring sample



Flashing blue - remove sample

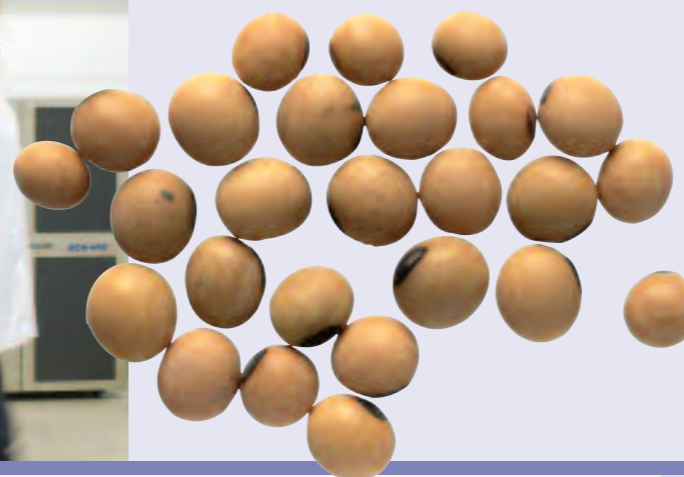
Ease of use – packaged applications

Users of laboratory instruments today demand convenience of operation. To this end, every **MQC** system is supplied complete with all software, hardware and sampling accessories required for the application it will be used for. Software is pre-configured with

the necessary parameters, with operating instructions specific to the intended application, and appropriate sampling accessories and setting up standards are supplied as part of the complete **MQC** package.



Easy to get fast and accurate results



Model range and Applications

The **MQC** is available in a number of different variants, to cover as wide a range of user needs as possible, as shown in the table.

Instrument range and sample sizes

Instrument	Operating frequency (MHz)	Sample sizes recommended - diameter (volume)	Application
MQC-23	23	5mm (0.2ml) 10mm* (1ml) 18mm* (8ml) 26mm (14ml)	All-round, including solids. Combination of high field and large sample space.
MQC-5	5	40mm (40ml) 51mm (80ml) 60mm (150ml)	Largest sample capacity for inhomogeneous samples, e.g. in agri-food industry.
MQC-F	22	18mm (8ml) 26mm (14ml)	Fluorine sensitive version for toothpaste and minerals.

* Liquid Variable Temperature option available



Advantages of NMR

The **MQC** benchtop NMR analyser offers several important advantages over other laboratory analytical techniques:

- Minimal sample preparation** Samples are loaded into tubes, weighed (if necessary) then measured directly after a short period of temperature equilibration. Grinding or other forms of sample preparation are rarely needed.
- No solvents** The **MQC** takes measurements on the constituent of interest in its natural state in the sample. No solvents or other chemicals are required, thus removing the need for fume cabinets, specially trained staff or expensive disposal procedures.
- Bulk measurements** NMR signals are generated from all parts of the sample, not just the surface, thereby guaranteeing accurate measurements.

Easy, robust calibration

MQC measurements are generally insensitive to colour, particle size and other physical properties of the samples. As a consequence, calibrations tend to be easy to carry out, requiring only a handful of samples. Once established, calibrations are robust and need to be repeated infrequently.

- Fast measurements** Most **MQC** measurements take typically from a few seconds to a few minutes, allowing a high throughput of samples and efficient laboratory operation.

- Non-destructive** NMR measurements do not damage the sample in any way, so samples can be kept if necessary for repeat measurements.



What is NMR?

When hydrogen protons are placed in a magnetic field they acquire the ability to resonate when irradiated with radio waves of the correct frequency.

When the magnetic field and the radio frequency are correctly matched, the protons absorb and re-emit the radio energy. By detecting the emitted energy and measuring its intensity we can get a measurement of the number of resonating protons in the sample.

Because most constituents of interest in Quality Control applications contain protons (e.g. water, oil, fat), we can calibrate the resonance signal against samples of known content in order to perform quantitative measurements.



Solids, semi-solids and liquids

An important facet of pulsed NMR is that the duration of the re-emitted resonance signal depends to a large extent on the physical phase of the proton-containing material.

Signals from protons in solids tend to have very short durations, whereas signals from protons in liquids tend to last much longer.

The **MQC** uses this fact to distinguish between different phases in samples, to eliminate a solid background signal, or to measure, for example, solid to liquid ratios.

Easy to see the advantages of NMR

Taking the lead in benchtop NMR

Oxford Instruments support & service

MQC users will often be in demanding, high pressure industries where every minute counts. To make sure our users get effective support when they need it, Oxford Instruments has established a worldwide network of subsidiary companies and trained distributors who are there to help you.

As well as this network of local support, Oxford Instruments also maintains a central e-mail support function which can often provide immediate answers to common questions. Using the advanced diagnostic and control features of the **MQC**, Oxford Instruments engineers can log in directly to your **MQC** and even operate it remotely to assist with set-up questions or to diagnose faults.



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