



Mobile CWA Detection and Identification

- Mobile Mass Spectrometer – **MM2**

Choose Innovation – Choose Bruker

Bruker is recognised as the leading authority on the use of detection and identification technologies to mitigate the threat from the accidental or deliberate release of toxic gases, explosives and radioactive materials that could kill or injure civilians and military personnel.

We offer the world's most comprehensive range of threat detection and identification solutions and can help you to assess how these can be best employed to protect people, property and military assets.

We develop, manufacture and supply technology worldwide for a range of customers and end users that need to protect people and property. These

include, but are not limited to, national armies who need to protect their troops, as well as governments, commercial enterprises and multi-national corporations who need to protect their employees and clients from the ever-increasing threat from terrorism.

Bruker is strongly committed to meeting its customers' needs by continuing to revolutionise the design, manufacture and distribution of detection tools based on our core technologies; by providing solutions that are regarded as the 'Gold Standard' by threat mitigation experts.



Pioneers in Mobile Mass Spectrometry

BUILDING ON OUR EXPERTISE

More than thirty years ago, Bruker introduced the world's first Mobile Mass Spectrometer (GC/MS) for military use and named it the Bruker MM1. This pioneering product led to sales of more than six hundred systems, most of which were installed to military vehicles all over the world. Driven by a market requirement to identify the localisation of highly toxic substances, the MM1 was an unrivalled success. Even today, many of these pioneering systems are still deployed and they are still serviced and supported by Bruker.

LATEST GENERATION OF GC/MS

The MM2 is the latest iteration of mobile mass spectrometers from Bruker: the pioneers of mobile detection systems. MM2 builds on the unique functional characteristics of its predecessor, but in a significantly smaller package that is lighter in weight. MM2 utilises a novel vacuum system that allows significant reductions in size and power consumption, while a novel pneumatic system negates the need for carrier gas cylinders. Unlike other systems, MM2 is optimised for the detection and identification of chemical agents and toxic industrial chemicals in homeland security and defence applications.



Current specifications of the Bruker MM2 can be found in the Product Specification Sheet (PSS), a copy of which is available on request.





MM2 - Helping you to face the next threat

In a world of rapidly changing, asymmetric threats, military personnel and civil defence teams need the best detection and identification technology available. This helps them determine the composition of unknown substances so they can decide if they are harmful. A mobile gas chromatograph/mass spectrometer (GC/MS) is the clear choice for the detection and identification of chemical agents and toxic industrial chemicals in a wide range of defence and homeland security applications.

Capable of identifying thousands of substances, MM2 is a military-hardened, mobile GC/MS system, whose design consolidates over 35 years of Bruker experience in applications of mobile mass spectrometry.

MM2 is optimized for long-term chemical reconnaissance in various mobile platforms, including mobile chemical agent inspection and detection missions that require fast positive identification. Because of its specificity, mobile mass spectrometry is also the technology of choice for the identification of unknown chemical compounds, especially when deployed in combination with a selection of GC system modules.

MM2 uses a quadrupole mass spectrometer with a membrane inlet. Equipped with various sampling technologies, such as the air/surface probe, or a GC system with thermodesorption, all chemical detection tasks can be tackled easily and quickly.

MM2 has a novel high-vacuum system that is sustained for months without user interaction, and which ensures that time to operational readiness is minimised. Low power consumption reduces the demand on the vehicle's power packs, whilst novel Bruker MM2 operations needs no bottled carrier gas support.

In the example opposite, the MM2 is mounted to the rear of an ad-hoc reconnaissance vehicle, and operators dressed in suitable protective gear, analyse soil samples using the heated air/surface probe. When the heated tip of the probe contacts the soil, organic vapours are released and drawn into the MM2. The MM2 is configured to detect and identify specific toxins based on the requirements of the Mission Commander.





Picture: Krauss-Maffei Wegmann GmbH & Co. KG



MM2 Colpro Vehicle Installation

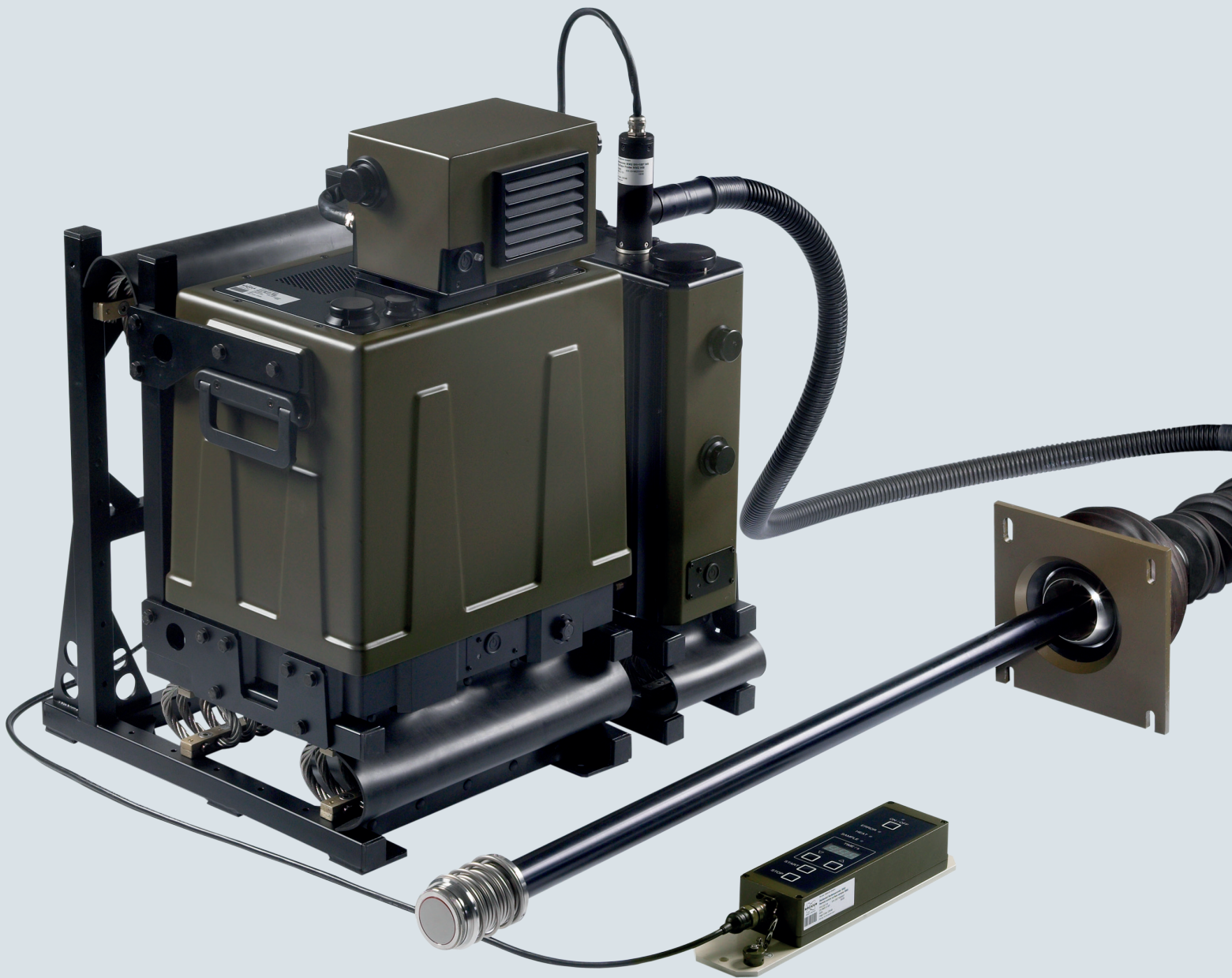
MM2 systems are deployed successfully in many countries around the world, where they can be found in various types of mobile platforms, as well as in detection networks comprising chemical, biological and radiological/nuclear detectors.

In the example vehicle installation shown opposite, a closed environment protects the crew. Their breathing air is supplied via CBRN filters giving an internal atmosphere protected from external toxic threats. In this ColPro (Collective Protection) system, operators do not leave the vehicle to take samples; except in extreme circumstances. To support the ColPro concept of operation, Bruker has pioneered an external heated air/ surface probe assembly that passes through the wall of the vehicle, and allows samples of the atmosphere to be drawn into the MM2 continuously. The system software is configured to detect the presence of specific agents, as determined by the Mission Commander.

This same external heated air/ surface probe assembly can be used in conjunction with a double wheel assembly. One of the wheels runs along the surface of the terrain behind the vehicle, and its replaceable silicon tyre accumulates samples of organic materials that are present. Periodically the wheel is raised and brought into contact with the tip of the heated probe. Then the accumulated substances vaporise from the tyre, are drawn into MM2 and analysed. The wheel operation is synchronised; as one wheel is raised to the heated probe, the second wheel lowers to contact the ground. This coordinated movement facilitates continuous uninterrupted terrain monitoring.

Applicable to a wide range of CWA/TIC, the wheel assembly is especially useful to detect and identify persistent chemicals such as VX. VX is deployed as a persistent, terrain denial Chemical Warfare Agent and one of its key characteristics is a very low vapour pressure. Because of this, VX is retained on surfaces for extended periods, yet preserves its highly toxic nature. VX and similar persistent chemicals are readily detected and identified by MM2.





The flexibility to meet your requirements.



The MM2 is able to identify any organic chemical from any medium (soil, water, air) within fifteen minutes via complementary sampling techniques. The detection limit for volatile organic compounds is in the low ppm range depending on the analytical procedure. Specifications and performance are not limited to a selected portion of chemicals; new libraries can be created and used by the operator.



Because many MM2 systems are deployed in remote areas, special attention has been paid to support requirements and consumables have been reduced to a minimum. Furthermore, all consumables replacements can be completed quickly and easily within a Level 1 (Operator Level) maintenance schedule.



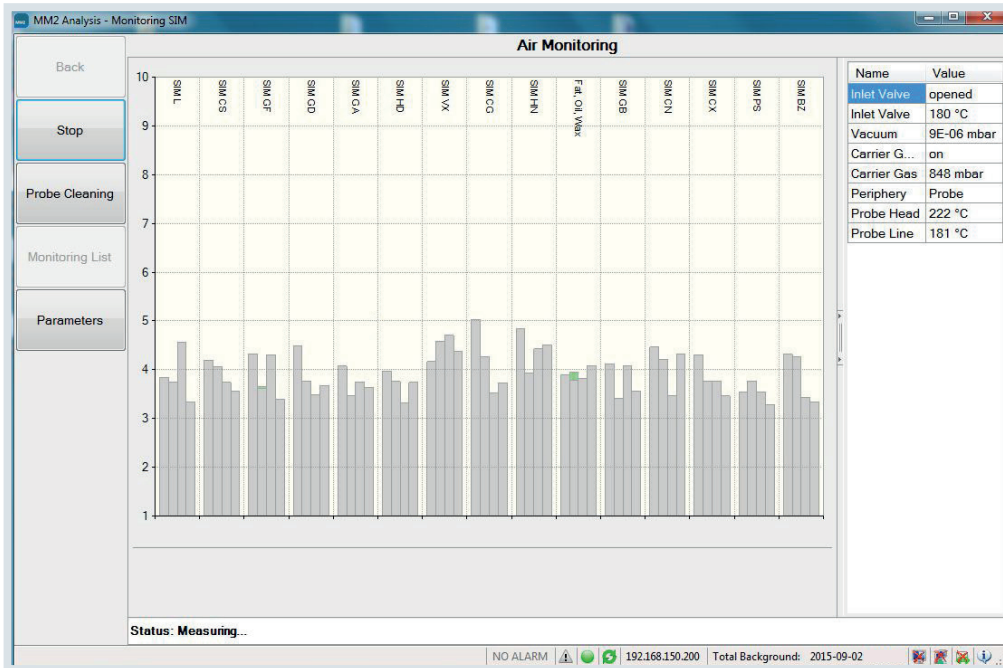
MM2 places no reliance on carrier gas cylinders to run its GC system; instead, it draws its resources from the ambient air. Power consumption has been reduced and optimised so that the MM2 energy requirements have been reduced to a minimum. By implementing a method-based system to operate the instrument, both the operator training and subsequent operational steps have been reduced and simplified. Overall system reliability has been enhanced, thanks to the integrated semi-automated mass calibration function.



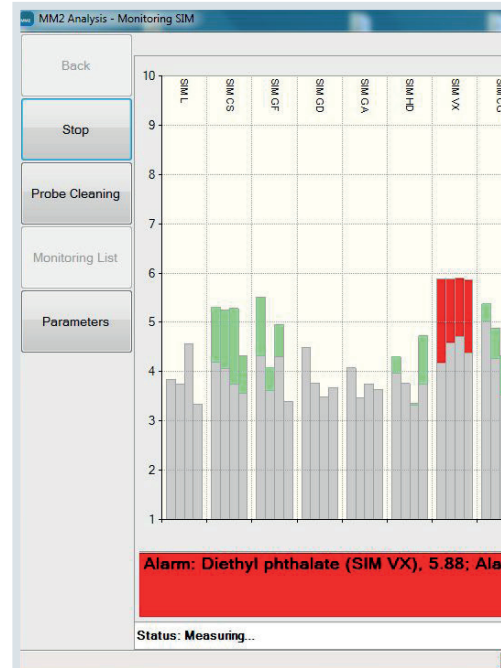
Key Attributes

- Robust system built to exacting Military Standards
- Low consumables requirements
- No reliance on bottled carrier gases
- Low power consumption eases the burden on the power source
- Identifies thousands of substances, including CWA, from its on-board libraries
- A selection of optimised GC modules is available, allowing sample introduction by syringe, Tenax® tubes and SPME kits

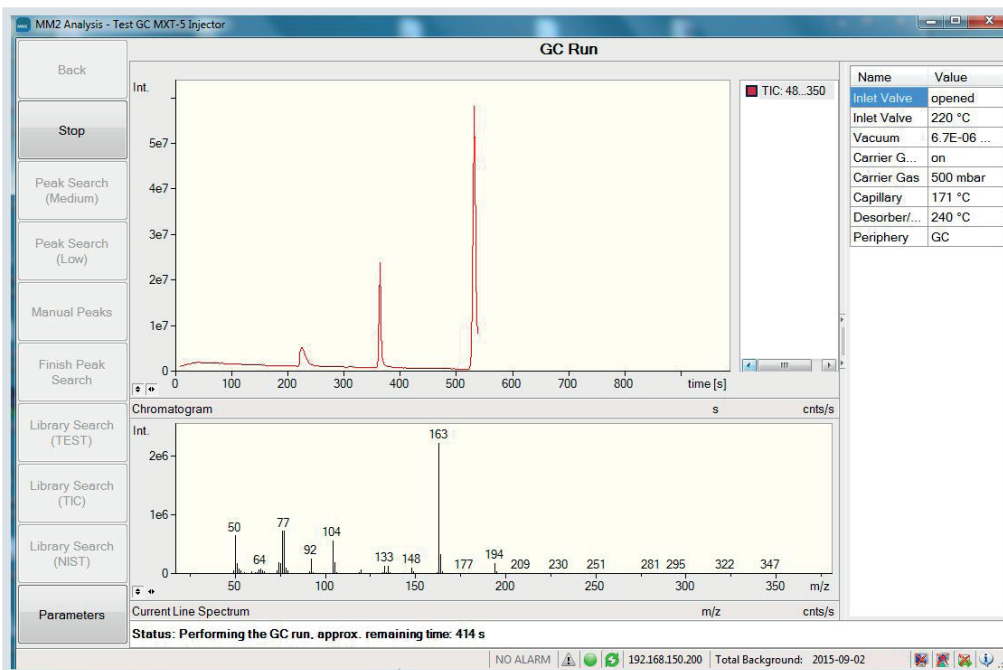




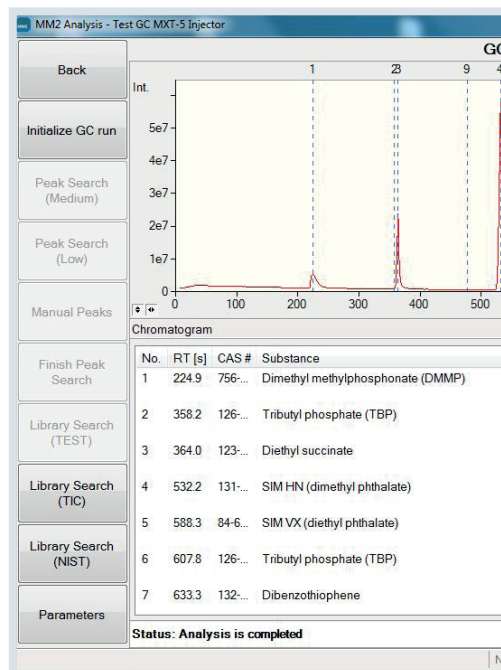
This air monitoring measurement uses a 'selective ion' approach. No compounds have been detected yet.



This air monitoring measurement has detected compounds simultaneously.



A GC run is underway, with mass spectra taken from the last emerged peak.



Here, the GC run has finished. The relevant mass spectra are shown from all the individually resolved GC peaks.

MM2 Software

CONTROL AND DATA ACQUISITION

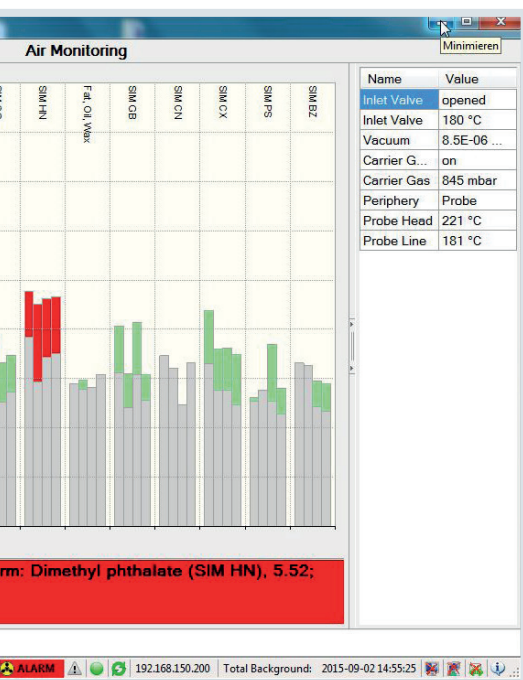
The MM2 Analysis software package is designed for use by operators, and supports standard operation of the system by implementing a series of default methods. It permits the detection, identification and analysis of detected chemicals, and is used in conjunction with libraries that have been pre-selected specifically for this purpose.

The MM2 Control software package is designed for advanced users such as trained specialists, chemists and physicists and can record chromatogram and spectra series data. Because it is used to set all the parameters of the instrument, it provides the capability to create new applications or to modify/update existing methods. These new or changed methods can then be made available to the operators where they can select them through the MM2 Analysis software Package.

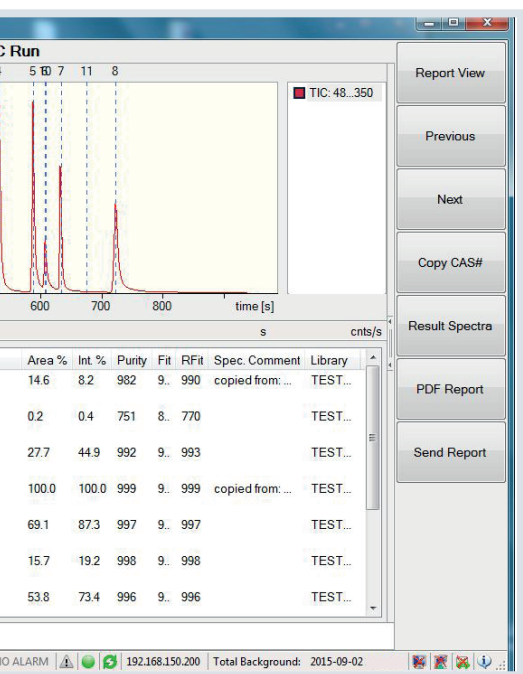
Both the MM2 Analysis package and the MM2 Control package incorporate software tools for fully automated data evaluation based on the NIST spectra library (National Institute of Standards and Technology). Additionally the Bruker CWALib (optional) and TICLib (Toxic Industrial Compounds) or a customer-specified library can be incorporated as required.

Key to the success of the MM2 is the extensive library capability provided in the software. Not only can the system be interfaced to the NIST library, permitting the identification of hundreds of thousands of substances, the flexibility of the library configuration allows users to add as many different libraries as are required by the mission. In this way the MM2 is differentiated from other more basic mass spectrometers by meeting the precise requirements of the deployment.

The example displays shown opposite illustrate the true power of GC/MS - separation, detection and identification of multiple substances simultaneously. Moreover, because the MM2 is a fully mobile system, these results are readily achieved during field operations.



ected and identified two separate substances



mass spectrum identification has been generated

Global Resources – Local Focus



Bruker has support centres of technical expertise in every major area of the world providing sales, applications and engineering support for our complete product range. With more than 6,000 employees at 90 locations worldwide you can be confident that the support team fronts a uniquely integrated global resource. Research and development specialists, applications professionals and highly trained engineers in every field are dedicated to your investment in our equipment.

Superior Detector Performance

For highly sensitive detection, identification and quantification of chemical, biological, explosive and radiation threats. Superior performance and high reliability comes as standard.

Applications Support

Systems are configured to meet your needs and result from our detailed evaluation of your requirements.

Standards & Compliance

All our systems are manufactured in ISO9001 compliant factories; so you can be assured of superior quality and performance.

Software & Data Systems

Designed to industry standards on the Microsoft® platform, our software can be integrated with your security management software.

Training

User Training and User-Level Maintenance is part of our standard Scope of Supply. Our goal is simple; to minimise your cost of ownership.

Low Maintenance

All our systems are designed for extended maintenance periods and reduce the through-life-costs of your investment.

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