Master 400

Quadrupole Mass Spectrometer

INTRODUCTION

"Accurate, Accessible, Advanced Gas Analysis"

Figure 1. ***Master 400*** *quadrupole mass spectrometer*

The **Master 400** is a compact desktop gas analysis system developed by Advanced Measurement Instruments (AMI) and launched in 2022. Designed for both qualitative and quantitative analysis of gas components, it supports on-line and off-line measurements with exceptional speed and precision. With its intuitive interface, fast response, and high accuracy, the **Master 400** meets the demands of modern laboratories across a wide range of applications. It seamlessly integrates with various systems, including chemisorption analyzers, reactor systems, breakthrough curve analyzers, and thermogravimetric analyzers, making it a versatile tool for advanced gas characterization.

FEATURES

Figure 2: ***Master 400***

- **Temperature-Controlled Inlet Pipeline**
  Prevents condensation of the injection gas during injection, ensuring more reliable results.
- **Bakeable Mass Spectrometry Chamber**
  Minimizes background gas interference for cleaner and more accurate measurements.
- **Multi-Signal Input/Output**
  Enables automatic control and seamless integration with external instruments.

133 East Main Street, Twin Lakes, WI 53181 • 262-877-3600 (Voice) • 262-877-3699 (Fax)
Email: sales@ami-instruments.com
Visit our Website: www.ami-instruments.com

KEY FEATURES

- **Millisecond-Level Response and Scanning**
  Enables fast, real-time online gas analysis.

- **Dual Detectors: Faraday Cup and Electron Multiplier**
  Provides high sensitivity and a broad detection range, from 100% down to ppb.

- **Advanced Analysis Software**
  Supports multicomponent sampling for both qualitative and quantitative gas analysis.

- **Customizable Sampling System**
  Allows for gas pretreatment and multichannel detection tailored to specific needs.

- **Built-in Filament Pressure Protection**
  Extends filament lifespan through intelligent pressure management.

- **Sampling System**
  Stainless steel or quartz glass capillary with corresponding filter membrane; features two-stage pressure reduction and a heating jacket (room temp to 200 °C) for stable gas delivery.

- **Vacuum System**
  Combines a turbomolecular pump with an oil-free diaphragm dry pump. A full-range vacuum gauge monitors pressure to ensure stable mass spectrometer operation. The stainless steel chamber features a heating jacket (up to 200 °C) for regular baking and degassing, with independent temperature control for both the chamber and sample tube.

- **Quadrupole System**
  Includes an electron bombardment ion source, a quadrupole mass separator, and a high-sensitivity detector for accurate mass analysis.

- **Data Processing System**
  Multi-channel gas detection software supports qualitative and quantitative analysis; compatible with Windows 7/10.

APPLICATIONS

Coupled with a Chemisorption Analyzer

The integration of mass spectrometry with chemisorption analyzers combines precise control of gas adsorption and desorption (e.g., TPD and TPR) with real-time, high-sensitivity gas composition analysis. This powerful combination allows dynamic monitoring of gas species, concentration changes, and temperature-dependent behavior during reactions. The result is deeper insight into the distribution of active sites, reaction kinetics, and structure–property relationships on material.

Figure 3. ***AMI-300***

Coupled with a Reactor System

The reactor system is a compact, high-efficiency setup that simulates real industrial reaction conditions with precise control. Coupled with the **Master 400**, it enables real-time detection of reaction products from microreactors. This provides insights into composition, reaction mechanisms, and kinetic behavior. It also supports catalyst evaluation and the development of new catalysts and reaction processes.

Figure 4. ***µBenchCAT***

Coupled with a Breakthrough Curve Analyzer

Breakthrough curve analyzers evaluate gas mass transfer on adsorbents or catalysts by measuring outlet concentration changes. When paired with the **Master 400,** it enables in-situ monitoring of surface reactions and outgassing. This helps uncover reaction mechanisms and guides the development of improved catalysts and processes.

Figure 5. ***BTSorb-100***

Coupled with a TGA or STA

The **Master 400** enables rapid qualitative and quantitative analysis of gas products released during TGA or STA experiments. It supports synchronous triggering and temperature signal import for seamless integration with thermal analyzers. TGA-MS and STA-MS combined technologies are widely used in the study of polymers, inorganic materials, and organic-inorganic composites.

Figure 6. ***TGA 1000***

SPECIFICATIONS

Mass Range	1-100 Optional : 200 or 300 amu
Detection Limit	< 500 ppb
Scanning Rate	1 ms-16 s/amu
Sampling Pressure	0.5 bar- 1.5 bar
Maximum heating temperature of sample tube	200°C
Maximum temperature of Chamber	200°C
Filament Material	Iridium Filament
Detector	Faraday cup/SEM Electron multiplier

RIFERIMENTO PER L'ITALIA

Qi technologies

Qi srl
t +39 06 9105461
www.qitech.it | SalesQi@qitech.it