AMI-400

Fully Automated Chemisorption Analyzer

INTRODUCTION

"Complete Chemisorption & Reactor Solutions—Precision Without the Premium"

The **AMI-400 Series** is the latest generation of fully automated chemisorption analyzers developed by Advanced Measurement Instruments (AMI). After nearly three years of focused development—driven by evolving research demands and supported by a robust global supply chain—the **AMI-400 Series** has officially launched.

Engineered for precision, safety, and user-friendly operation, the **AMI-400** characterizes catalysts under both temperature-programmed and isothermal conditions. It provides detailed insights into surface chemistry, adsorption behavior, and reaction mechanisms—making it an essential instrument for catalysis, materials science, environmental research, and energy innovation.

MAIN FUNCTIONS:

Standard:

- Temperature-programmed desorption (TPD)
- Temperature-programmed reduction/ oxidation (TPR/O)
- Temperature-programmed surface reaction (TPSR)
- Pulsed chemisorption
- Dynamic BET surface area

Options:

- Sub-ambient temperatures
- Mass spectrometer
- Gas chromatograph
- FTIR
- Vapor dosing

*Figure 1. **AMI-400** chemisorption analyzer*

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

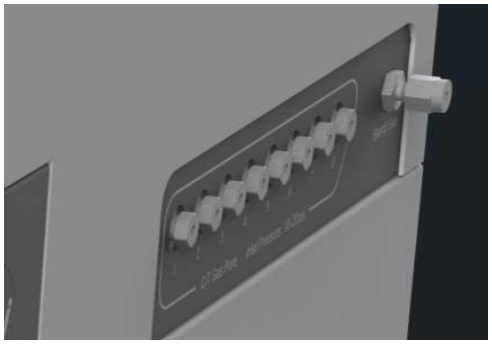
KEY FEATURES

Precise Thermal Conductivity Detector
The instrument is equipped with a high-precision, four-wire rhenium-tungsten TCD detector, featuring a constant temperature range from room temperature to 200°C. Additionally, filament types can be customized to match specific research needs, or the system can be integrated with auxiliary gas detectors such as mass spectrometers, FTIR, or FID, providing enhanced analytical versatility for a wide range of experimental applications.

All-in-One Constant Temperature
Precise Vapor Control – Ensures a stable and uniform temperature for consistent and reliable performance.

Simplified Vapor Operation – Designed for easy and efficient vapor handling, optimizing experimental conditions and reproducibility.

Intelligent Gas Inlet Interface
A user-friendly port design eliminates the need for users to manually determine the type of gas used (carrier gas, process gas, or pulse gas); the software automatically selects the appropriate gas. The eight inlet ports meet daily testing needs, allowing multiple experiments without frequent gas interface changes, thus reducing user operations.



Integrated Constant Temperature Valve Box
The instrument's process tubing is heated using a convection oven, maintaining a uniform temperature distribution with a maximum temperature of 130ºC. This design eliminates cold spots in the stainless-steel tubing, valves, and TCD detector, ensuring optimal performance and accurate measurements.

Precise Temperature Control
The system offers a temperature range from - 130°C (with optional configuration) to 1100°C, with linear heating ramps from 1 to 50°C/min.

Automatic Air-Cooling Module

Software-controlled automation enables precise, efficient cooling without the need for manual intervention. Rapid Furnace Cooling - Utilizes air cooling technology to quickly lower furnace temperature, enhancing turnaround time and overall operational efficiency.

Accurate Flow Control System
High-precision MFCs regulate gas flow from 0-100sccm (+/-1% FS accuracy), ensuring stable, accurate measurements. A built-in mixing volume enables real-time gas blending for flexible experimental setups.

Cold Trap
A dedicated cold trap is installed downstream of the sample to effectively remove condensable substances before they reach the TCD detector, ensuring accurate measurements and extending the TCD's operational lifetime.

BUILT-IN SAFETY FEATURES

Integrated Exhaust Fan – Prevents the accumulation of toxic and harmful gases, ensuring a safe and controlled operating environment.

Comprehensive Temperature Monitoring – Continuously tracks internal instrumentation temperature, TCD temperature, and process component temperatures to ensure precise thermal control and operational safety.

Intelligent Fault Diagnosis & Alarm System – Features automated fault detection and real- time alerts, enhancing system reliability, protection, and user safety.

Self-Locking Door
The instrument features an interlocked safety door, designed to prevent accidental contact during experiments. Equipped with an electronic safety lock, it ensures the door remains securely closed throughout the process, providing enhanced safety and operational reliability.

Triple Thermocouple Design
The system incorporates a Triple Thermocouple Design for precise temperature control and enhanced safety:

- Bed Temperature Control Thermocouple – Ensures accurate temperature regulation of the sample.
- Furnace Thermocouple – Monitors and stabilizes the overall furnace environment.
- Overtemperature Protection Thermocouple – Provides an additional safety layer to prevent overheating.

Hard Wired Over-Temperature

A hard-wired over-temperature power protection system is integrated to automatically shut down the instrument if excessive heat is detected, protecting both the equipment and the operator and ensuring continuous safe and reliable operation.

SOFTWARE

User-Friendly Software Interface

A clear graphical interface with logical flow simplifies navigation, minimizes errors, and ensures smooth experimentation with real-time monitoring and traceable data logging.

SOFTWARE (cont.)

The system offers comprehensive data processing capabilities, including peak fitting, peak separation, integration, differentiation, and overlay analysis of signal peaks. This enables precise characterization of surface features of catalysts, distribution of acidic and basic-sites, activation energy, reaction kinetics, and more.

- Clear Control System: Real-time monitoring with a visual software system
- Simultaneously displays gas flow, temperature, and other information.
- Real-time display of temperature programming
- Real-time display of valve status

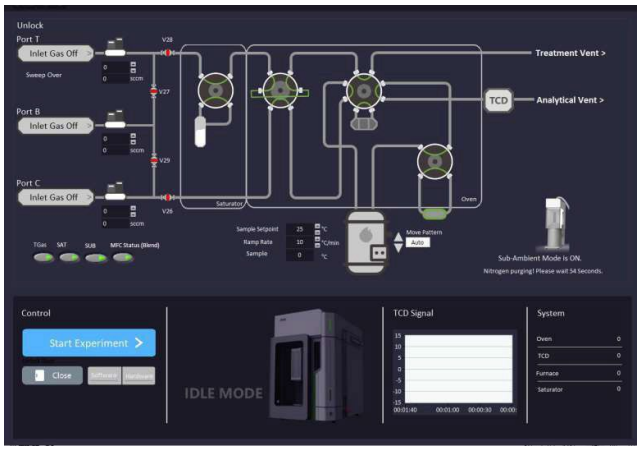


*Figure 2. **AMI-400** operation interface*

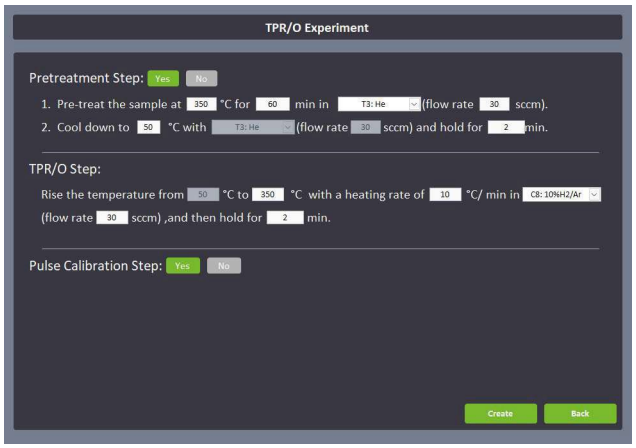


*Figure 3. **AMI-400** experiment setting interface*

*Figure 4. **AMI-400** experiment model setting*

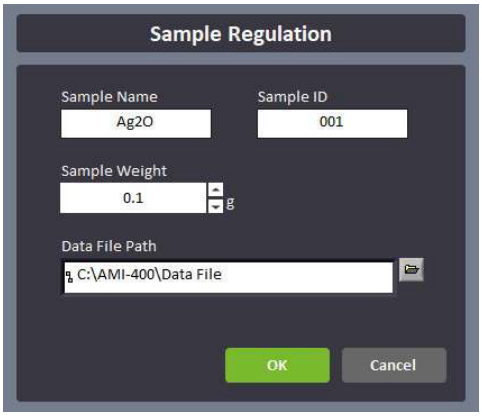


*Figure 5. **AMI-400** sample regulation*

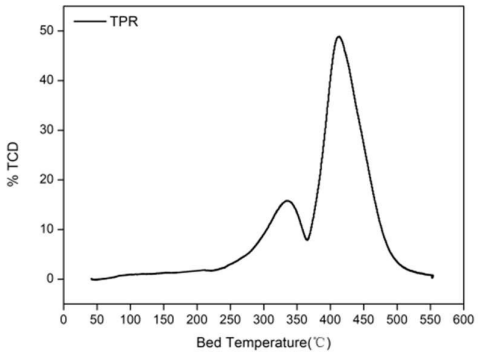


Figure 6: TPR on Cobalt Oxide

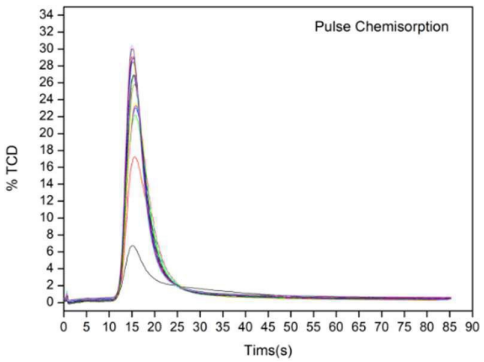


Figure 7: Pulse Chemisorption on 0.5% Pt/Al_2O_3

SPECIFICATIONS

Sample loading	0.1-5g
Number of workstations	1 analysis station
Temperature control range	Room Temperature - 1200°C; -130°C (Optional) to 1100°C
Heating rate	0.1-50°C/min
Gas input	1 Standard MFC C (Carrier MFC) with 8 gas inlets. Optional 2nd MFC T (Treatment MFC) with 8 gas inlets Optional 3rd MFC A (Auxiliary MFC) with 6 gas inlets Optional 4th MFC B (Blend MFC) with 6 gas inlets (BTC MFC)
Standard operating pressure	Ambient Pressure
Mass Flow Controllers	1 Standard; Optional -2, 3, and 4
Gas flow rate	0-100sccm (+/-1% FS accuracy)
Sample tube type	Quartz U-shaped tube (6mm, 8mm, 10mm optional), bubble tube
TCD	Tungsten-rhenium filament, room temperature up to 200°C
Materials of Construction	Kalrez, 316 stainless steel
Dimensions	19.4 in (493 mm) × 26 in (661 mm) × 28.4 in (721mm), 162.8 lbs (74 kg)
High Temperature Oven	130°C
Vapor Generator	100°C (Optional)
Mass Spectrometer	Optional
FID	Optional