

# 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*

## 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.

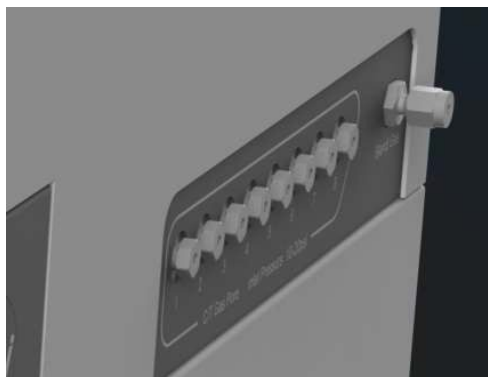
### All-in-One Constant Temperature

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 150°C. 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 1200°C, with linear heating ramps from 1 to 50°C/min.

### Automatic Air-Cooling Module

Software - Controlled Automation – Enables precise and efficient cooling with no manual intervention required. 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 2–100 SCCM, 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

power protection system, ensuring 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

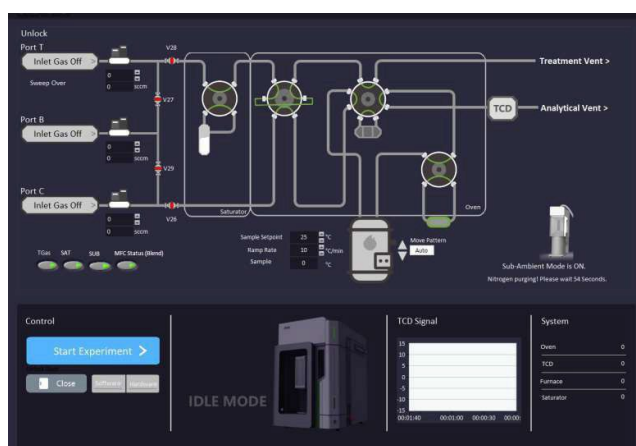


Figure 2. **AMI-400** operation interface

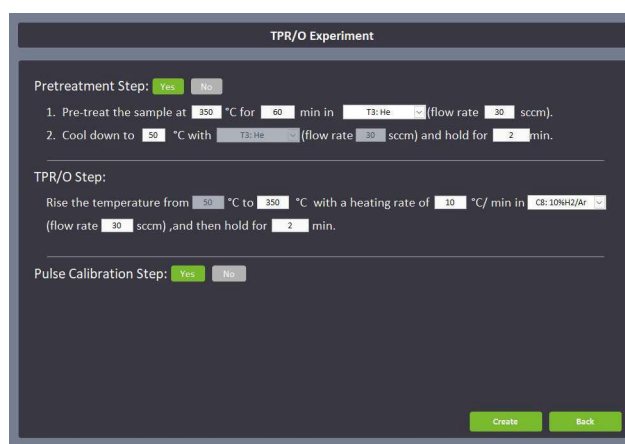


Figure 3. **AMI-400** experiment setting interface



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

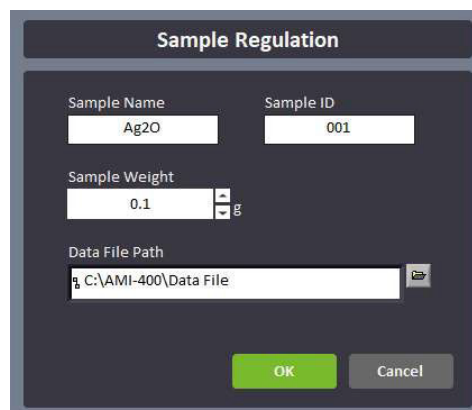


Figure 5. **AMI-400** sample regulation

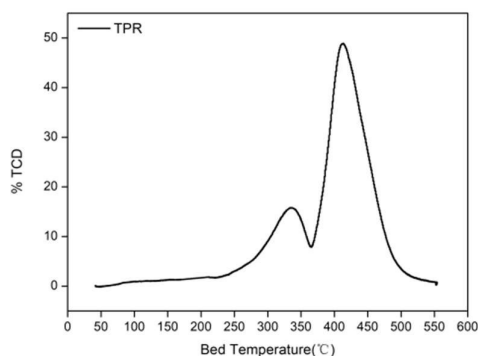


Figure 6: TPR on Cobalt Oxide

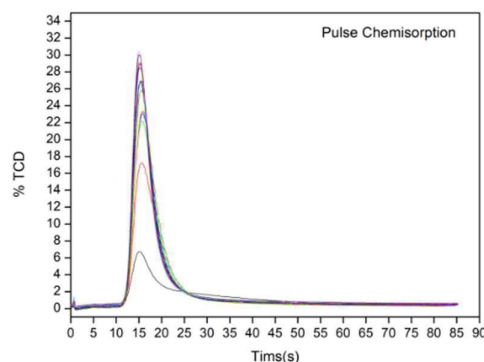


Figure 7: Pulse Chemisorption on 0.5% Pt/Al<sub>2</sub>O<sub>3</sub>

## SPECIFICATIONS

<b>Sample loading</b>	0.1-5g
<b>Number of workstations</b>	1 analysis station
<b>Temperature control range</b>	Room temperature - 1200°C (option: sub-ambient starts at -130°C)
<b>Heating rate</b>	0.1°C/min-50°C/min
<b>Gas input</b>	8 inlets standard (14 optional with gas-blending MFC).
<b>Standard operating pressure</b>	ambient pressure (high pressure available with the AMI-300HP)
<b>Gas flow rate</b>	2-100 ml/min (up to 3 MFCs with options)
<b>Sample tube type</b>	Quartz U-shaped tube, bubble tube
<b>TCD</b>	Standard Tungsten Rhenium filaments (can change with options), temperature up to 200°C.
<b>Pipe material</b>	316 stainless steel
<b>Additional detectors</b>	MS, IR Detector, GC, etc. (optional)
<b>Dimensions</b>	17" (43cm) x 25" (62cm) x 25" (64cm)