

ATMOSPHERE SPECIFICATIONS

ATMOSPHERE 210

Resolution	<1.5 Å or better - (TEM dependent)
Temperature Range	Room temperature (RT) to 1000 °C
Temperature Accuracy	< 5%
Heating/Cooling Rate	Any rate up to 10 °C per second
Thermal Drift	<1.0 nm/minute
E-chip Heating Membrane	Ceramic – chemically inert, highly thermal stable, metal-free
STEM Compatibility	Top chip heater available for STEM imaging
E-chip Window Thickness	Amorphous silicon nitride – 50 nm on window E-chip, 30 nm on heating E-chip
Nominal Gas Layer Thickness	5 µm (spacer thickness)
Holder Assembly	Self-aligning using 1 gasket to complete in under 15 minutes
Tip Volume	< 1.0 µL
Gas Mixing	Volumetric blending - pressure-based
Gas Mixing Range	0.01% - 99.99% mixtures of up to 3 gases
Holder Operating Pressure Range	1.0 – 760 Torr (1 atmosphere)
Holder Base Pressure	3.0×10^{-2} Torr
Holder Base Pressure (w/ RGA)	$< 9.0 \times 10^{-7}$ Torr
Lowest Controllable Flow Rate at 1 Atmosphere	0.005 mL/min
Compatible Vapors	Water, methanol, ethanol, hexane, naphtha, etc.*
Vapor Introduction	Software-controlled
Compatible Gases	H ₂ , O ₂ , CO, CO ₂ , CH ₄ , Ar, He, forming gas, custom exhausts, etc.*
System Cleaning	Automated pump and purge cycles with bake-out
TEM Analytical Compatibility	EDS and EELS
EDS Performance	>3,000 CPS (detector dependent)
Software Control	Independent control of gas composition, flow rate, pressure, and temperature
Data Synchronization	Pressure, temperature, time, and flow rate with Clarity Echo for Gatan® GMS 1,2, and 3
Gas Inputs	3 total, 1 can be used for vapor introduction
Manufacturer Tested & Approved	ThermoFisher Scientific and JEOL

Atmosphere 210 TEM

*Contact Protochips for the full list of compatible gases and vapors.

INTEGRATED RESIDUAL GAS ANALYZER (RGA)

Mass Range	1 – 200 amu
Response Time	< 3 seconds**
Vacuum System	Integrated with Atmosphere for TEM image stability– no roughing pump required
Signal-to-Noise Enhancement	Protochips' software-controlled heating jacket – up to 50°C during operation
RGA Protection	Protochips' software-controlled protection from gas flooding
Detector Type	Faraday cup (FC) and electron multiplier (EM)
Minimum Detectable Partial Pressure (MDPP)	5×10^{-11} Torr (FC) ; 5×10^{-14} Torr (EM)***

RGA

**When mounted on the boom and using 0.5m connection lines at 0.1mL/min flow rate

***MDPP is dependent upon cleanliness and background signal

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TILT RANGES

FEI	X-TWIN	± 29
	Ultra-TWIN	NA
	Twin / Super-Twin	± 39
JEOL	ARM 300F FHP	Up to 23°
	ARM 300F WGP	Up to 51°
	UHR	Up to 16°
	SAP	Up to 23°
	HRP	± 18
	HT	± 43

TILT RANGES