



KINETICS GC 300

Gas Distribution Cabinet - Fully Automated Operation

- **Safe** — places system in safe mode, upon failure
- **Reliable** — proven components, smart automation
- **Intelligent** — fully automatic, allows cylinder changes with minimal risk to people or processes

SYSTEM OVERVIEW

The Kinetics GC 300 Gas Cabinet is a fully-automated gas dispensing system designed to provide an exhausted enclosure for the safe dispensing of toxic and hazardous gases used in semiconductor and photovoltaic manufacturing. The system is intended for highly corrosive, toxic and pyrophoric gases, where the release of these gases would create a severe hazard to humans and equipment. The system features automated vacuum-assisted purging and pressure leak testing of the cylinder connection. Redundant safety features provide automatic system shut-down in the event of gas leaks or other emergency conditions. The PLC-based controller with graphic interface ensures proper sequencing of cylinder operations and also allows for fast and easy trouble-shooting.

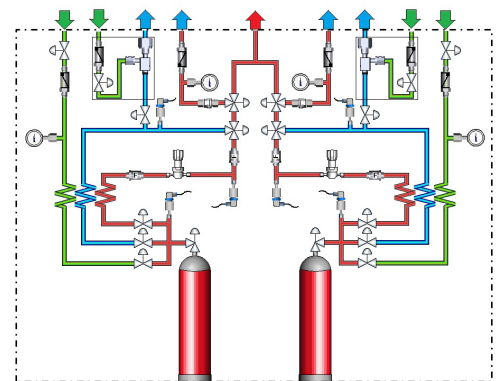
KEY FEATURES:

- Automatic gas shut-off valve, for emergencies
- Accommodates one, two, or three gas cylinders
- Automated, vacuum-assisted purging during cylinder changes
- Safety shut-down upon over-pressurization
- Water sprinkler for fire protection

OPTIONS:

- Hastelloy material within regulator for corrosive gases
- Nitrogen purge panel, where regulated N₂ is not available
- Co-Axial tube connection, for corrosive and pyrophoric gases
- Particle Filter, located after regulator, removes particles $\geq 0.003 \mu\text{m}$
- Gas Purifier (with integrated filter), located after regulator. Removes contaminants, such as H₂O, CO₂, O₂, and CO to $< 1 \text{ ppb}$
- Excess gas flow sensors and automated cylinder valves, for added safety
- Cylinder Scale, for determining an empty cylinder for liquid gases
- Heater and Chiller assemblies, for specific liquid process gases

PROCESS FLOW DIAGRAM



Configuration with dual-cylinder operation and automatic cylinder shut-off valves

RELIABILITY¹

- Availability > 99.999%
- MTBF > 8000 Hours
- MTBA > 6000 Hours
- MTTR < 2 Hours

¹Reliability figures represent typical performance.

TECHNICAL DATA

CONTROLS

- Automatic shut-down of gas flow under emergency conditions, including internal hardware conditions or an external EMO signal
- Siemens S7 300 PLC
- 10-inch HMI Touch Panel, showing
 - System P&ID
 - Alarm and warning screens
 - Sensor, actuator and valve status

SAFETY FEATURES

All Kinetics gas cabinets comply with applicable guidelines by:

- OSHA, TGO, CE
- Uniform Fire Code (UFC80) and National Fire Protection Agency (NFPA 318)
- Semi S2-0200
- NRTL Listing

SPECIFICATIONS

PARAMETER	CAPABILITY
Application	Distribution of corrosive, toxic and pyrophoric gases, where safety contamination, and factory automation are critical. Examples include: HCL, Cl ₂ , BCl ₃ , NF ₃ , PH ₃ , AsH ₃ , SiH ₄ , and various mixtures
Typical Gas Purity Levels	Total Purity ≥ 99.999999%
Purge Mode	Automated Sequences (N ₂ and vacuum-assist)
Process Gas Dispense Rate	≤ 3 M ³ /hr, with ¼" flow path
Process Gas Pressure, max	<ul style="list-style-type: none"> • Inlet: 3000 psi (205 bar) • Delivery: 100 psi (7 bar)¹
Cabinet Footprint (WxDxH)	<ul style="list-style-type: none"> • Single cylinder: 16" x 24" x 91" (400mm x 600mm x 2305mm) • Dual cylinder: 32" x 24" x 91" (800mm x 600mm x 2305mm) • Three cylinders: 48" x 24" x 91" (1200mm x 600mm x 2305mm)
Cabinet Materials	• 11-gauge cold-rolled carbon steel
Component Materials	<ul style="list-style-type: none"> • SS Diaphragm Valves & Regulator • Electropolished 316L SS tubing and fittings
Type of Valves and Pressure Regulator	316L SS Diaphragm, Hastelloy optional

¹Other outlet gas pressures are available, as options.

FACILITY REQUIREMENTS

UTILITY	REQUIREMENT	CONNECTION TYPE
Process Gas Outlet, with Co-Axial tube connection	n/a	316L SS, coaxial weld connection – ¼", 0.035 wall x ½", 0.049 wall
Vacuum Generator, N ₂	<ul style="list-style-type: none"> • Pure, Filtered N₂ (≥99.995%) • Regulated and adjustable up to 85 psig (5.8 bar) 	¼" (6.35 mm) Swagelok-Compression Fitting
Process Purge Gas Inlet, N ₂	<ul style="list-style-type: none"> • High-purity inert purge gas (≥99.999%) • 80 psig (5.5 bar), adjustable • 30 slm flow, max 	¼" VCR
Pneumatic Supply, CDA	<ul style="list-style-type: none"> • 90 psig (6.2 bar) • 1 slm max flow 	¼" (6.35 mm) Swagelok-Compression Fitting
"Z" Purge Inlet ¹ (optional, for Class I, Div II environments)	<ul style="list-style-type: none"> • 35 psig ± 1 psi (2.4 ± 0.06 bar) • 45 slm max flow 	¼" (6.35 mm) Swagelok-Compression Fitting
Process Vent Outlet	n/a	⅜" OD, 0.035 wall (9.5 mm) tubing-316L SS
Cabinet Exhaust	<ul style="list-style-type: none"> • Single cylinder: 200 SCFM @ 2" H₂O (340 Nm³/hr) • Dual cylinders: 300 SCFM @ 2" H₂O (510 Nm³/hr) • Three cylinders: 450 SCFM @ 2" H₂O (760 Nm³/hr) 	6" OD Stub
Sprinkler Water	68°C, max flow 114slm, 2 bar	½" M-NPT
Electrical supply	110-230 VAC, 50-60 HZ, Single Phase, 0.60 - 0.35 Amp	Compression, Bulkhead or Conduit

¹The purge gas and source must comply with NFPA 496, "Standard for Purged and Pressurized Enclosures for installation in a Class 1 Division 2 Location".