

General Description

The Series 19 desiccator storage cabinet is designed to create a storage area that can be purged to create a controlled environment for long-term storage of parts or material that will degrade when left out in the normal atmosphere.

Standard Construction

The standard desiccator cabinet is constructed with a welded type 304 stainless steel shell and compartment dividers. The welds are ground and finished. The compartments stainless steel seams are sealed with a clear epoxy sealant to create tight sealed compartments.

The stainless steel shell will not crack, break, deform and lose its integrity like acrylic or other plastic cabinets. The stainless steel shell is conductive and will not hold a charge. This reduces dirt and other contamination build up that is common in all acrylic cabinets. The stainless steel shell also shields the interior from static charges, creating an enclosure similar to a Faraday cage or box in which the conducting stainless steel enclosure neutralizes free electrons (static charges) inside the cabinet.

With the conducting stainless steel construction, when grounded the cabinet can automatically neutralize a static charge on an operator as soon as they touch the door handle.

The front of the welded shell is attached stainless steel doors with a viewing window. The standard front viewing clear acrylic with optional ESD static dissipative PVC or acrylic, safety glass, yellow or clear UV filtering acrylic and solid stainless (no viewing window).

Each door has heavy duty 1/8 inch stainless steel hinges, a decorative heavy duty lever handle over center cam action door latch, to ensure the door pulls tight to ensure the door gasket seals against the cabinet. The door latches can be furnished with individual compartment locks or a high security bar assembly (see optional section for details).

The door seal to the cabinet with a 3/4 inch-thick PVC closed cell gasket that is attached to the door by an adhesive backing. The thick gasket is compressed by approximately 15% its thickness to reduce permanent "set" that can occur when a gasket is over compressed.

The rear of the desiccator can be covered in a variety of materials. The standard is clear acrylic, with optional ESD PVC or acrylic, safety glass, yellow/clear UV filter acrylic and solid stainless steel. All but the stainless steel back panel are gasketed and compression sealed to the welded shell. The back panel are replaceable should it become broken or damaged.

The stainless steel back panel is permanently welded to the rear of the cabinet. It is sealed with clear epoxy.

The standard cabinet is furnished with leg leveling glides. The standard height to the first compartment (bottom riser height) is 3 inches above the floor. Smaller units setting on a table can utilize a shorter plastic glide for a 2-inch height. Optional risers heights of 6 inches and 12 inches are also available. NOTE: The risers are integral to the cabinet and cannot be removed. Optional detachable stands are available upon request.

The flow meter controls are mounted onto the top of the desiccator assembly and are available in a variety of styles and configurations. (See the purge control option section.) Multiple compartment assembly the purge tubing and dispersion nozzles are located along one side of the cabinet and the optional bleeder valve is located on the opposite side. The standard desiccator comes with a CAP19FMC

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Flow Meter Control system (single flow meter to purge all compartments in that desiccator cabinet system).

The standard flow meters are the Dwyer VFA series. They are made of solid acrylic with an adjustable brass needle valve, 1/8 FNPT brass inlet and outlet fittings, Buna-N "O" ring seals, internal float and float rod are stainless steel. NOTE: The main nitrogen shut off valve and regulator are optional.

Fittings and Supply Tubing

The supply tube fittings compression style is white polypropylene, the nozzles PVC and the tubing is polyethylene. Optional tubing materials are PVC, white polypropylene and Teflon fittings.

Options

- ❖ Bleeder check valves
- ❖ Flow meter upgrade from brass to stainless steel
- ❖ Individual compartment flow meters, specify brass or stainless (see purge option section)
- ❖ Main nitrogen shut off valve (specify brass or stainless)
- ❖ Regulator (brass or stainless steel, high purity stainless steel)
- ❖ Door viewing windows
 - Clear acrylic (standard)
 - ESD, static dissipative PVC or acrylic
 - Safety glass
 - Yellow or UV filtering acrylic
 - Solid stainless steel (no viewing window)
- ❖ Rear back panel
 - Clear acrylic
 - ESD, static dissipative PVC or acrylic
 - Safety glass
 - Yellow or UV filtering acrylic
- Solid stainless steel (no viewing window) (Not removable. Welded to back of unit)
- ❖ Polypropylene construction; Shell and dividers made of white Poly Pro. Low metal construction
- ❖ Locks on the door latches
- ❖ Security bar to lock doors, for high security areas (Typically also needs stainless steel back panel)
- ❖ Low outgas gasketing
- ❖ Purge control options
 - Manual, single flow meter (standard)
 - Automatic purge with when door opens
 - Electronic humidity controlling
- ❖ Internal compartment shelves
 - Fixed stainless steel
 - Removable stainless steel
 - Flat and semi flat light duty stainless or acrylic with side wall standards
 - Sliding drawers or trays
- ❖ Standard compartment sizing
 - Clear height 8, 10, 12, 14, 16, 20, 24, 28, 32, 36, 48, 60, 72, 84
 - Clear width 12, 16, 20, 24, 28, 32, 36, 42, 48
 - Front to back depth 12, 16, 20, 24, 28, 32, 36, 42, 48
 - Custom sizes and configurations available upon request
 - Consult factory for current stock sizes.

NOTE: On multiple tier cabinets, if the interior width and depth get too small, the cabinet will become "tippy". (2) Cabinet tiers can be attached together to make the unit more stable, an extended base stand can be used, the unit can be bolted to the floor or bottom counterweights can be added. Consult factory for details.

The compartment sizing is the front

clear open area. Internal shelves will reduce the effective storage area.

Purge Control

Types of Desiccator Cabinet Purge Control Option

- CAP19BCV** Bleeder check valves
- CAP19FMC** Flow meter control
 - CAP19CHL Cabinet high/low flow control
 - CAP19ICP Individual compartment purge high/low control
- CAP19MDC** Multiple desiccator cabinet high/low purge
 - CAP19RHS Relative humidity sensing to control purge rate
 - CAP19FMM Flow meter manual control

CAP19BLD Bleeder check valves

The CAP19BCV bleeder check valve is designed as a port to allow the nitrogen to vent out the purged compartment. The bleeder ports are not required with very low flow purge rates, they are required with higher purge flow rates.

The valves are designed to improve the purging airflow maintain a more constant compartment pressure. As the airflow increases the valve allows more air to escape and as the flow is reduced the valve closes. In the event nitrogen pressure is lost, the valve will close completely to reduce air infiltration.

Detailed Description of Flow Control Options

CAP19FMC Flow Meter Control (standard unless specified)

Flow meter control has the lowest up front cost. It has a single flow

meter with a main purge tube. The nitrogen purge rate is constant and set by the flow meter. The recovery rate for an individual compartment is subject to the flow rate. The system does not alter the flow rate. An operator can adjust the flow at the beginning and end of a shift to increase compartment recovery time or leave the flow same all the time. If the flow is the same all the time, there is often a compromise between the compartment recovery rate and total nitrogen consumption. Uses brass fittings unless specified.

CAP19ICP Individual Compartment Purge Control

The CAP19ICP is designed so each desiccator compartment (door) has independent high/low purge control. When an individual compartment is opened, a magnetic sensor on the door activates an adjustable timer. The timer starts the high purge flow to that individual compartment while keeping the other inactive compartments at low flow purge rate. After the timer times out, the high flow purge rate switches back to low flow and remains at low flow until the compartments becomes active or the door is reopened. This provides a fast recovery rate while minimizing the total nitrogen consumption.

The system controller has one timer per compartment so multiple compartments can be accessed with each being individually timed. A single adjustable potentiometer controls all the timers to a range from 0 to 30 minutes.

Nitrogen consumption is low because only active compartments get a high purge flow. The other inactive compartments low flow rate is

just enough to maintain a slight positive pressure and maintain the dry inert environment. This purge option is most often used on larger multiple door systems when any of the doors or compartments within the desiccator system are opened two or more times per hour. NOTE: Multiple desiccator stacks can be connected to a single CAP19ICP purge control assembly. The CAP19ICP purge controllers are available for systems from 1 to 24 compartments (doors).

The purge module is a stainless steel enclosure that mounts on the top of the desiccator cabinet. It contains the control timers, solenoid valves, low voltage transformer, flow meters, air regulator, power cord and other controls required for the purge system. The front control panel has a total nitrogen flow meter, low flow meter indicating the total low flow purge rate, high purge flow off switch and nitrogen pressure gage with regulator control. The standard fittings are brass with polypropylene tubing for the purge lines.

Options:

- ❖ Adjustable low flow meter for each compartment
- ❖ Adjustable high flow meter for each compartment
- ❖ Nitrogen shut off valve
- ❖ Upgrade brass to stainless fittings
- ❖ Upgrade regulator from brass to high purity stainless
- ❖ Low nitrogen pressure alarm
- ❖ 220 V 50 Hz power input

Part #CAP19-ICP-* Where * = # of compartments (doors) being controlled. Sized for 1 to 24 compartments (doors)

CAP19CHL Cabinet High/Low Flow Purge Control

The CAP19CHL purge option switches all the compartments within the purge system from low to high flow whenever any of the compartments (doors) within the system are opened. When a door opens, a magnetic switch activates an adjustable timer, which starts the high flow purge to all the compartments in that purge system. After the timer times out, the purge flow rate goes back to low flow on all the compartments. The system uses slightly more nitrogen the individual compartment option, but much less than if continuous purge was used. The purge option is typically used on smaller desiccator systems or on systems with very low activity.

The purge module is a stainless steel enclosure that mounts on the top of the desiccator cabinet. It contains the control timer, a solenoid valve, low voltage transformer, flow meters, air regulator and other controls required for the purge



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system. The front control panel has a total nitrogen flow meter, low flow meter indicating the total low flow purge rate, high purge flow off switch and nitrogen pressure gage with regulator control. The standard fittings are brass with polypropylene tubing for the purge lines.

Options:

- ❖ Adjustable low flow meter for each compartment
- ❖ Adjustable high flow meter for each compartment
- ❖ Nitrogen shut off valve
- ❖ Upgrade brass to stainless fittings
- ❖ Upgrade regulator from brass to high purity stainless
- ❖ Low nitrogen pressure alarm
- ❖ 220 V 50 Hz power input

CAP19MDC Multiple Desiccator Cabinet System Purge

The CAP19MDC system is designed so a single control module can control multiple desiccator stacks. This system is a combination of the CAP19ICP, Individual Compartment Purge and the CAP19CHL, Cabinet High/Low Control. Like the other systems each desiccator compartment door will have a magnetic sensor. These sensors are connected in series for a vertical stack or group of compartments. When any of the doors in the "group" are opened all the compartments within that group are purged at the high purge flow rate.

Because the system can control multiple stacks of different sizes of desiccator cabinet, each purge feed line has its own high and low flow gage to allow for individual control of the high and low flow rates to the different stacks.

CAP19DEH Digital Electronic Humidity Control System

The CAP19DEH is designed to monitor and control the relative humidity within a desiccator system. Like other systems each compartment has a magnetic door switch to change the purge flow rate of each individual compartment like the CAP19ICP. In addition there is a compartment sampling tube connect from the compartment bleed port to the control box. The sampling tube connects to an electronic humidity sensor for measuring and controlling the relative humidity within the desiccator cabinet.

The system takes rotating sample of each compartment. If the sample is above the set point, the compartment is turned to high purge rate. Indicator light shows which compartment is being measured. The sampling times are adjustable from 1 to 10 minutes.

During the purge exhaust sampling the compartment pressure is measured. If the pressure falls below a present level the system will go into a high purge mode for that compartment. The high flow purge time for low pressure failure is independently adjusted from the purge time associated with opening the compartment door. No extra nitrogen is used as a result of the sampling because the sample gas is the purge gas being discharged from the compartments through the bleeder port.

When the electronic sensor detects high humidity the purge flow will go into the high flow and will maintain that flow rate for the same amount of time on the "active compartment purge" timers.

The purge module is a stainless steel enclosure that mounts on top of

the desiccator cabinet. It contains digital humidity controller, control timers, solenoid valves, low voltage transformer, flow meters, air regulator, power cord and other controls required for the purge system. The front control panel has a digital humidity display, total nitrogen flow meter, low purge flow meter (indicating the total low flow purge rate), high purge flow off switch, and nitrogen pressure gage with regulator control. The standard fittings are brass with polypropylene tubing for the purge lines.

Times When High Purge Rate is Activated:

- (1) When the door to the compartment is opened
- (2) A compartment has low pressure during the RH sampling
- (3) The compartment relative humidity goes above a preset level

Available sizes on desiccators with 1 to 24 compartments.

Options:

- ❖ High flow meter to each compartment
- ❖ Low flow meter to each compartment
- ❖ Individual compartment continuous pressure sensing

Examples of the Systems

- ❖ The CAP19ICP system (individual compartment purge control) controls up to 24 individual compartments i.e., a (2) 6 tier (12 total doors/compartments).
- ❖ Controlling 12 individual compartments. When an individual compartment door opens (1 of 12) only that one compartment (1

of 12) would be purged at the high flow rate.

- ❖ The CAP19CHL (Cabinet High/Low Purge System) i.e., using the same (2) 6 tier (12 total doors/ compartments)
- ❖ Controls a single or multiple tiers. When any one of the doors (1 of 12) in that system open all the compartments (12 of 12) get a high flow purge rate.
- ❖ The CAP19MDC (Multiple Desiccator Cabinet):
(12) 6 tier desiccators (72 total doors); When any one of the 6 doors in the tier or group (1 of 72 total doors) are opened that entire tier or group (6 of 72) compartments would be purged with the high flow rate.

Determining Which Purge System

- (1) How many compartments are being controlled?
- (2) How fast do the compartments need to recover after they have been accessed?
- (3) How frequently are the compartments accessed?
- (4) What is the maximum length of time the product within the compartments can be in an out of spec environment per day, week or month before damage will occur?
- (5) Are the multiple compartments being opened in the same?
- (6) Is monitoring of the compartments humidity a requirement?

Starting with an empty cabinet with 60% RH internal compartment of humidity level there will be a 25% reduction in relative humidity for each complete volume equivalent air

change. This rate will continue until the desiccator reaches approximately four air volume changes the RH would be about 18% or approximately a 70% reduction in the humidity. At the 18% level the rate reduction level decrease to about 15% per air change down to about 8% to 10% level where curve starts to flatten out. At this point a flow rate of 10% to 20% of compartment/ cabinet volume will maintain the reduced RH level.

The 60% RH inside the cabinet can be reduced to under 20% in less than an hour, after which the flow rate could be switched to a reduced rate saving on nitrogen consumption.

High volume of compartment with stored material can reduce nitrogen consumption required to bring the cabinet down to its "dry" state, but has little effect on the low flow purge rate required to "maintain" a particular state. If the material being stored has residual moisture, larger/longer high flows will be required in order to dry the materials. Drying will typically require longer slower high flow purge rates or use the Electronic Humidity sensing alarm.

Assume 8760 hours in a year, assume 2024 working hours in an 8-hour shift (2080 - 56 hours for 7 standard annual holidays), a low flow purge rate. In the above example a 25 cubic foot cabinet with a 4 air change per hour high flow rate (100 cubic ft./hour) and a 15 cubic foot per minute low flow purge rate, would save (24 hour - 8.5 shift - 1 hour of high flow after the shift ended is 14.5 hours per day * 5 days + 48 hours for the weekend) 120.5 hour per week of low flow operation. 100 CFH - 15

CFH low flow is an 85 CFH savings. 85 CFH * 120.5 hours per week = 10,242 CFM/week or 532,000 CFM per year. Multiple this by your cost per CM on nitrogen and you have a lot of money.

The figures shown are reference only. Clean Air Products is making no claims as to what the nitrogen consumption will be for you individual system.

Safety Note: The desiccator cabinets should be placed in a well-ventilated room. If the cabinets are placed in a small room such as a closet, the purge nitrogen can displace the oxygen within the space and cause suffocation.



Specifications subject to change. Please contact factory for details.