

Why Form Follows Function for Cell Culture Science

Configurability builds cell culture equipment around processes, so you don't need to build your processes around your equipment.



Many pieces of microbiology equipment are so common scientists often consider these tools as everyday commodities. The expanding market for biosafety cabinets, CO₂ incubators, or ultralow temperature freezers is becoming saturated by large manufacturers with cookie-cutter solutions. While the low upfront cost may seem tempting, their designs simply target the lowest common denominator. Though equipped with the most common features, these pieces may not suit your specific needs—this compromise forces your team to adjust their work procedures to the equipment. Consider purchasing your cell culture equipment from a manufacturer that offers a wide range of configurability options to ensure the new system accommodates your current processes and enhances workflow.

CO₂ Incubator Configurability

When looking for an incubator manufacturer, you should understand how your workspace environment will impact your needs. HVAC and ambient heat sources contribute to the environment within the incubator chamber. Furthermore, vibration sources within the lab can also affect the integrity of your cell cultures.

Ask your manufacturer if a water-jacket or direct-heat CO₂ incubator model will work best for you. Water-jacket incubators utilize natural water cycling for greater temperature uniformity and stability inside the chamber. Water-jacket models provide greater vibration protection—however, they are heavy and must be drained before being moved to a new location. The water-jacket also requires more time to return to your temperature set points when compared to their direct-heat counterparts.

Direct-heat incubator models typically utilize electrical heating coils on all six chamber walls. They are also insulated with high-density foam to maintain temperature uniformity. These incubators weigh less than water-jacket models and quickly recover from temperature changes. These changes occur every time someone opens the chamber doors.



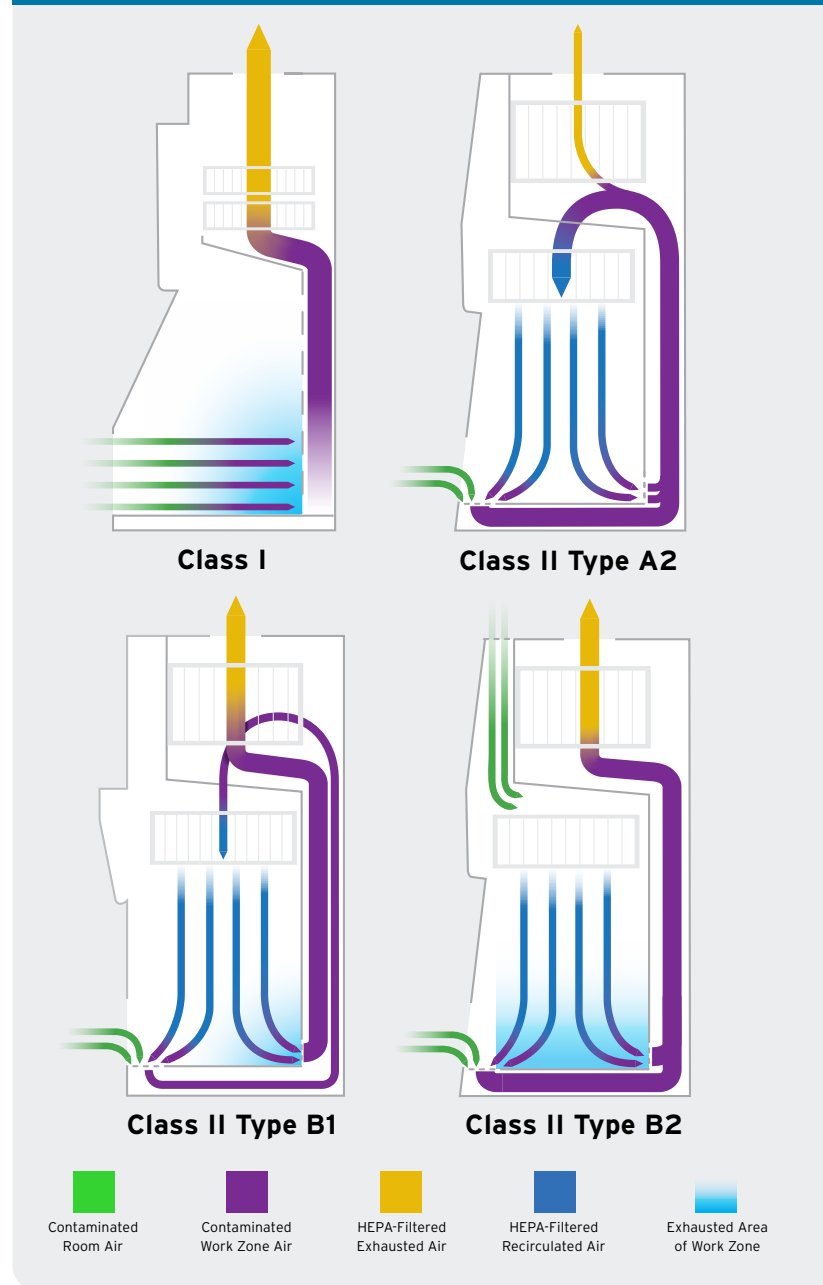
Configurability of your CO₂ incubator is essential for meeting your lab's specific needs. Before purchasing a new incubator, consider its internal temperature, CO₂/N₂/O₂, and relative humidity accuracy/uniformity controls. Take the chamber material into account, as well—copper alloys help reduce contamination. Features such as a single or double set of chamber doors, door hinge direction, shelf materials & quantity, water pan locations, and incubator stacking capabilities all reflect your individual needs. Finally, ask about the type of available decontamination cycles and how they affect your workflow.

Biological Safety Cabinet (BSC) Configurability

Before purchasing a BSC, you must perform a risk assessment for the type of work the cabinet will be used for. Risk assessments are not universal—they must be catered specifically to your applications^{1,2}. In general, there are three classes of BSCs, from I to III, with several differing types within class II. All biosafety cabinets offer varying degrees of personnel and environmental protection, but certain class and types of BSCs also provide product protection. The level of protection needed will be dictated by your lab's risk assessment.

Once your containment considerations have been satisfied, you should now consider the type of options that will help enhance your workflows. Cell culture scientists often work more than eight hours in the lab, making ergonomic comfort a necessity. Work zone height/adjustability, motor noise, interior lighting, cabinet vibrations, and even the hardness of cabinet's materials should be taken into account. Also consider your lab's spatial limitations and your work area's proximity to any doors, windows, or high traffic areas. Any nearby air turbulence can greatly impact your cabinet's level of containment. All these features can be precisely configured for your location and needs.

As a lab manager, you also need to consider the lifespan and maintenance costs of the unit. Accessibility and frequency of filter changes can make an enormous difference to the maintenance downtime of your lab. Ensure your manufacturer offers comprehensive warranties and technical support before you commit to purchasing.



Ultralow Temperature (ULT) Freezer Configurability

When you think of the freezer room in a research facility, you generally envision the seven-foot upright behemoths working away to store your critical samples—for many scientists those units are ideal. However, many cell culture labs have limited verticality, so an under-counter or chest ULT freezer may be more suitable. Energy efficiency and environmental impact often reign as the top priority when investing in cold storage equipment. Features such as segmented inner doors, gasket quantity, insulation materials, compressor quality, and types of refrigerants significantly impact your ULT freezer's power usage.

Blizzard® HC NU-99100J Under-Counter ULT Freezer



Understand Your Investments

For your cell culture or microbiology needs, cheaper off-the-shelf options may be tempting, but equipment designed specifically for your lab and its unique needs will ultimately pay greater dividends in the form of improved workflow efficiency and ergonomics.

References

- i. Laboratory biosafety manual, fourth edition. Geneva: World Health Organization; 2020 ([Laboratory biosafety manual, fourth edition and associated monographs](#)). License: CC BY-NC-SA 3.0 IGO.
- ii. Risk assessment. Geneva: World Health Organization; 2020 ([Laboratory biosafety manual, fourth edition and associated monographs](#)). License: CC BY-NC-SA 3.0 IGO.

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