

SINCE 1889



# Your Guide to **PCR Workstations**

How to expand your lab's capacity or upgrade  
your existing infrastructure with features that  
provide value in your application.





## Introduction

PCR workstations are small in size but a necessity in laboratories that deal with PCR, general tissue cultures, and the amplification of DNA and RNA. They're clean enclosures that provide a contaminant-free environment with sustained air quality to store and protect samples, maintaining consistent conditions until they are ready for use.

In a way, PCR workstations are the key to ensuring that the samples used in the foundations of your various other laboratory procedures remain successful and uncompromised.

A new PCR workstation is a capital expense and will live in your lab for the foreseeable future. It has to be the right mix of features and value for your lab to invest. That's why we put together this guide, to help you figure out which features are worth spending your money on to best suit the needs of your laboratory and the variety of applications that keep you busy.

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There are generally two types of PCR workstations on the market:

- **UV PCR workstations**
- **UV + HEPA filter PCR workstations**



## **UV PCR WORKSTATIONS VS. UV + HEPA PCR WORKSTATIONS**

Both chambers use UV germicidal lamps, sometimes referred to as “UVC lamps,” to radiate the chambers so the environment your samples reside in are free of contamination that may have come from previous generations of samples, or human contamination.

The main difference between the two types of chambers on the market is the factory-installed HEPA filter system, which filters the air before it enters the chamber.

For the most sensitive samples, we recommend a PCR workstation with a HEPA filter. It gives your samples the best opportunity to avoid the external influence of bacteria and similar contamination.

The factory-installed HEPA filter system allows chambers to create a positive pressure environment with exceptional ability to keep your samples safe.

# Positive Pressure

In hospitals, clinics, and other medical settings, positive pressure is used in certain rooms to create a protective environment, shielding staff and patients from infections, diseases, and any harmful bacteria carried in the air.

Thinking about a hospital or medical room helps us understand what a PCR workstation needs to get the job done right.

To protect staff and patients from contaminants, a room would require things like:

- Recirculation of air through HEPA filters.
- Well-sealed areas in which contaminants could enter or exit, such as doors, windows, and walls.
- A built-in system that allows an operator to track or adjust decontamination processes.



A good positive pressure PCR workstation relies on similar technology to get the job done right in your laboratory. It requires filtration, well-sealed seams, and some method of making sure the positive pressure is maintained.

So in the context of a PCR workstation, what does positive pressure mean? The air pressure inside the chamber is greater than that of the atmosphere. The pressure inside the chamber is created by a fan (also known as a “blower”) that runs any time the chamber is in use.

**The technical specs on the blower probably aren’t your main selling point, but there is one point you should pay attention to.** The blower runs whenever your chamber is in use, and has the potential to create a lot of noise pollution in your lab.

**Look for a blower with a sound rating of 40 dBA or lower.**

“dBA” stands for A-weighted decibels, which is the scale used to measure sound levels for healthy levels of listening among humans. Think of your kids walking into the kitchen with a set of headphones on, and you can hear the sound squeezing out of the speakers’ noise-canceling insulation around their ears. You aren’t wrong to worry about their ears. That’s too many decibels.

To put things into perspective, an average alarm clock rings at about 80 dBA. An electric toothbrush is approximately 60 dBA. **40 dBA is equivalent to the small background noises in a library**, and that’s about as loud as a blower in a good PCR workstation should be.



Now, back to the science of positive pressure:

A HEPA filter cleans the external air before it enters the chamber. Any contaminant that originates within the chamber is blown out. Bacteria, dust, and any other contaminants are forced out of the chamber due to the pressure differential between the environment inside the chamber and out. It’s like the bouncer at the front door of the exclusive nightclub: contaminants are not on the guest list.

The blower blows clean air into the chamber, similar to the way an oxygen ventilator provides air to a hospital patient. Combined with UV sterilization, which we’ll get to shortly, it’s the cleaning crew in the nightclub the morning after.

Positive pressure chambers also promise excellent temperature uniformity throughout the chamber as the blower forces the air to circulate the chamber evenly. This means that your samples can be situated anywhere inside the chamber without noteworthy changes in environmental conditions.

[Yamato’s PCR204 H and PC R214H](#) are positive pressure PCR workstations that include a factory installed HEPA filter system rated at 99.9997% efficiency and retention of particles at 0.3 (μ) microns. Its fan (blower) noise level is rated at less than 40 dBA.



## Still Air

Some PCR workstations work with “still air,” which refers to the stationary state of the air inside the chamber. There is no vertical or horizontal movement of air, minimizing disturbance to the samples contained within the chamber, which is often a vital component of procedures in many tissue culture applications.

Still air is also helpful in preventing contamination and keeping products sterile due to the lack of circulation within the chamber. Nothing is blown into the chamber, nothing is blown out.

However, **due to the lack of a ventilation system and a blower, still air chambers do not promise the temperature uniformity that pressurized chambers do**, meaning different areas of the chamber will experience slight but potentially significant variations in temperature. Still air results in air layers within the chamber, and you may have to monitor your samples more closely than in a positive-pressure chamber.



[Yamato's PCR204 and PCR214](#) are still air enclosures that contain both the “Bright Light” illumination system and a U.V. germicidal lamp.



## Key Features

At their most basic, PCR workstations protect your tissue culture (and similar application) samples from contamination. They give you a controlled, measurable, verifiable environment where you can be sure the growth of your samples isn't altered by an unknown contaminant.

For the most thorough protection for your cultures, look for:



**An illumination system** made up of both UV and fluorescent lights. The UV lights decontaminate the surfaces inside the chamber, where microscopic contaminants could live and spoil your next batch of samples. The fluorescent lights make it easy for you to review your samples without exposing them to outside conditions.



**Protection against beta rays and 32P labeled compounds.**



**Strategic shelving and walls** made of optically transparent acrylic or a similar material, as well as adjustable shelves. One shelf should be dedicated to storing pipettors to prevent spills.



**Proximity sensors** that turn off the UV system when the door is opened.



The **main housing and top should be removable** for the installation of large pieces of equipment.

There are some other key features to look for as well that contribute to the user-friendliness of a PCR workstation.

Though it's a seemingly small aspect of the design, **is there a digital or analog display** on the unit?

Either type of display will help you to determine and set useful measurements such as a UV timer. Other display benefits include the ability to toggle the fluorescent light or the UV light, based on the current lifecycle of your sample.





## Benefits

PCR workstations are easy to set up in your lab and don't require external ventilation. Since they don't have to be hooked up to vents or other large pieces of equipment, they are generally portable and lightweight. They're easy to relocate and reuse for:

- Different applications
- In different departments
- Under different conditions

They don't vary much in size, and most PCR workstations easily fit on top of a laboratory bench.

# Limitations

Where there are benefits, there are also some limitations.

Though PCR workstations are extraordinary for preserving PCR and culture samples, they're not designed to protect users or samples from hazardous vapors or gases. They're also not designed to protect users from gamma rays.

Users should take precautions to ensure that PCR workstations are used according to instructions and sterilized and decontaminated regularly.



[Yamato's PCR Series Workstation](#) is designed with electronic sensors that turn off power to the UV system when a door is removed or accidentally opened. This is a safety feature to prevent accidental U.V. burns.

# Contamination Risk Mitigation

Mitigating contamination risks during PCR procedures is the most critical component of the process. Contamination can jeopardize samples, make the lab unsafe, and result in inaccurate results.



If risk mitigation is your primary concern, look for these features in this order:

- A **UV germicidal system** rated at 254 nm to decontaminate all exposed surfaces in the interior.
- An **automatic timer** to activate UV sterilization procedures, which should run before and after chamber use.
- A built-in tray that consists of a “**spill guard**” for easy cleaning.
- **Removable side access doors** with “slip-apart” hinges. This type of hinge allows airtight connection, as good as a permanent seam, so the chamber can maintain its airtightness when the doors are in place.
- A **HEPA filter** (for filtered models) that can be changed without any tools, so scientists in your lab don’t have to learn any new procedures.

And of course, it is always recommended to wear gloves and change them consistently while maintaining a sterile and organized workspace. Best practices is to put glove-changing guidelines into practice so contamination risk mitigation becomes second nature.





## Conclusion

PCR workstations are long-term investments and diverse in terms of their applications.

Now that you're equipped with a greater knowledge about the important features of a PCR workstation, you're also equipped to evaluate the features that give your workplace the greatest value.

As you shop, think about features that might allow you to share the cost of a new chamber with other departments. Think about your most common tissue culture applications, and whether your lab can get more done with multiple PCR workstations simultaneously.

Think about how precise the conditions in your PCR workstation need to be. Your staff don't want to lose generations of samples because the conditions inside the chamber were too variable for their sensitive work.

Whether you are ready to make a purchase or still need to do more research, [Yamato Scientific America](https://www.yamato-usa.com) is here to help. Contact us at 1-800-292-6286 or email us at [customerservice@yamato-usa.com](mailto:customerservice@yamato-usa.com).