



PCR Thermal Cycler Purchasing Guide: GMI Certified Knowledge

Polymerase Chain Reaction (PCR) is a cost-effective technique used in molecular biology laboratories to exponentially amplify segments of DNA, creating millions of copies of a specific DNA sequence. Fundamental to this technique is the thermal cycler, also known as a thermocycler, DNA amplifier, or a PCR machine. This go-to and indispensable lab tool features heating blocks and provides a thermally controlled environment for use in temperature-sensitive samples and reactions. By changing temperature at specific times for particular durations, a thermal cycler generate multiple copies of DNA and other genetic material fragments for use in downstream applications such as cloning, sequencing, expression analysis, and genotyping. Other important applications include diagnosis and monitoring of diseases, gene expression, mutagenesis, genetic research, and forensic research.

Whether for use in diagnostic, cell biology, pharmaceutical, environmental, or food safety laboratories, finding the right thermal cycler to effectively cater all your application needs is necessary. You would not want to have a unit that cannot offer reliable operation, affecting not only your lab outputs but also your lab efficiency. With plenty of thermal cycler models and types to choose from, deciding on the perfect unit for your research can be a daunting and intimidating task. To make it easier, GMI has prepared this simple guide to walk you through factors to consider when purchasing the best PCR thermal cycler for your workroom.

Determine Application Demands for Your PCR Thermal Cycler Purchase

Crucial in finding the most suitable PCR machine for your laboratory are the goals of your application. Reviewing what it demands of you and envisioning the changes your lab may undergo in the future can narrow down your choices. Start by answering these questions:

- **What type of thermocycler are you looking for?**

Depending on your end-goal, you can either get a standard endpoint PCR, a qPCR, or a digital PCR machine. For basic tasks like generating nucleic acid sequences for sequencing, cloning or checking reactions on a gel, you can opt for a standard thermocycler. If your focus is not on producing an end product but more on real-time quantification of a DNA target sequence or measuring presence of biomolecules such as mRNA or polymorphism, you can browse qPCR models instead like the [BioRad DNA Engine Opticon 2 Real-Time Cycler](#) and the [Techne Quantica](#). Similarly, a digital PCR thermocycler offers DNA quantification like a qPCR however not in real-time. The reactions happen in a large number of small partitions with each partition likely to have 0 or 1 DNA molecule only, achieving a more sensitive quantitative DNA measurement than what a qPCR unit can give and not requiring a standard curve.

- **What is your expected sample throughput?**

Even though digital PCR thermal cyclers provide better sensitivity and discrimination compared to qPCR thermal cyclers, keep in mind how these can only offer limited throughput. If you will be working with a few samples every now and then, you can look for smaller, personal cycling systems that can run up to 48 samples at a time.

For higher throughput work on a regular basis, think of getting qPCR cyclers, dual 48/48 well thermal cyclers that allow independent protocols to run simultaneously for instances when there are many users working with the equipment, multi-bay cyclers, and quad cyclers like the [Alpha Cyclers 4 with 3 96 well & 1 384 well blocks \(AC4396\)](#). You can also invest on PCR systems that can go over 96 samples at a time like the [Perkin Elmer PE 9700 Thermal Cycler](#) or 384-well units like the [Eppendorf Mastercycler EP Thermal Cycler Range](#). Think of not just your current throughput needs but also your future application requirements, acquiring thermocyclers that can be networked to other units for better throughput like the [Bio-Rad Thermal Cycler S1000-96 Well Block](#).

- **How much flexibility does your application require?**

Heating blocks, also called as thermal blocks, are designed to store DNA samples in small and large capacities. For instantaneous temperature changes during amplification of DNA samples, go for thermocyclers that has a peltier element for temperature control like the [Eppendorf Mastercycler Nexus Flat Thermal Cycler](#).

Whether for incubating 0.5 ml or 0.2 ml PCR sample tubes, PCR plates, or PCR strip tubes, a thermal block comes in multiple configurations and handles different sample types and formats. If you are looking for greater flexibility and sensitivity, go for models that have these blocks in different sizes and capacities. Instead of PCR machines with a fixed sample-block format, you can check out units with a multi-format block like that of the [Benchmark T5000-A-IS TC 9639](#) or those that feature interchangeable blocks, allowing you to swap various formats including 96-well, dual 48/48-well, and 384-well good for conducting many experiments all at once. For a wide range of thermal cyclers with interchangeable blocks, check out GMI's [MJ Research PTC Thermal Cycler](#), the [MJ Research Dyad Dual 96-Well Thermal Cycler](#), and the [MJ Research PTC-200 Thermal Cycler](#) featuring heat pump assemblies for easy changing of formats while maintaining NIST traceable accuracy. For ultimate flexibility, look for units with universal blocks like the [Eppendorf Mastercycler Nexus PCR Thermal Cycler Range](#) suited for routine PCR operation on a daily basis.



In case you shift focus in the future, you can buy thermal cyclers that can be upgraded for real-time PCR use such as the [Bio-Rad C1000 Thermal Cycler](#) and the [Eppendorf Mastercycler Pro Thermal Cycler](#). You can also think of getting cyclers that can be upgraded to gradient cycling like the [Techne 3PrimeX](#).

Review Lab Space where the PCR Thermal Cycler will be Situated

How much available space you have in your lab will dictate the convenience of location and accessibility of your equipment. For those with a large and open space, you can go for modular systems like the [Bio-Rad iCycler PCR Thermal Cycler](#), [Bio-Rad iCycler iQ PCR Thermal Cycler](#), and the [Bio-Rad C1000 Thermal Cycler](#). If you have a modest workroom or if your benchtop is already too crowded, you can go for small footprint units like the [Techne 3PrimeG](#), [Techne 3PRIMEX / 05](#), and the [MJ Research PTC-150 MiniCycler](#). Featuring a space-saving design, these portable equipment let researchers easily transport, setup, and test materials even when in field or anywhere outside the lab.

Decide on Budget Allocations for your PCR Thermal Cycler Purchase

When getting thermal cyclers, bear in mind other expenses that may come with your purchase like the consumables, lifetime costs, and possible parts replacements in the future. Different units may vary in prices depending on the features and configurations they offer. If you have ample resources at hand, you can always get [new PCR thermal cyclers](#) for animal diagnostics, personal product testing, and the detection of pathogens such as viruses, molds, and bacteria. An alternative option for labs short on budget is purchasing used and [fully recertified to factory specifications PCR thermal cyclers](#) for life science research, pharmaceutical engineering, and food testing applications. With a lot of Original Equipment Manufacturers (OEMs) offering long lead times in supplying lab instruments, a used equipment distributor like GMI can provide you economically priced and easily available thermal cyclers for any urgent unit replacement needs or to meet your market demands. Going for quality, certified pre-owned lab equipment from an industry-leading distributor such as GMI can help you save up to 70% of your budget.

Gradient Functionality of your PCR Thermal Cycler

If you do not prefer a multi-block thermal cycler but is still interested in simultaneously running various reactions at different temperatures, you can opt for a unit featuring a thermal block not heated uniformly but in a precisely defined gradient. Thermal cyclers with gradient capabilities let you quickly test and pick optimal conditions and the best working temperature for your assays. For maximum reagent and protocol optimization, you can check out the [Alpha Cycler 4 with 3 96 well & 1 384 well blocks \(AC4396\)](#), [Bio-Rad C1000 Thermal Cycler](#), [Eppendorf Mastercycler Nexus Gradient Thermal Cycler](#), and the [Eppendorf Mastercycler EP Thermal Cyclers](#).



Ramp Rate of your PCR Thermal Cycler

The ramp rate of a PCR thermal cycler shows how quickly the heating block can change to the selected temperature and complete a specified number of cycles. For high throughput applications, get a cycler that offers a fast ramp rate as this would mean faster cycles and run time. You can look for cyclers with a ramp rate of 3°C - 6°C per second like the [Techne 3PRIMEBASE/ 02](#) and the [Techne TC-5000 Plus](#) or those with heating blocks made of thermo conductive materials like silver such as the [Applied Biosystems 9800 Fast PCR System](#), [Eppendorf Mastercycler Nexus PCR Thermal Cycler Range](#), [Eppendorf Mastercycler Nexus Gradient GSX1 Thermal Cycler](#), and the [Eppendorf Mastercycler Pro Thermal Cycler](#).

Specialized Lids of your PCR Thermal Cycler

With most PCRs experiencing issues like evaporation and condensation of reaction fluids leading to insufficient data and negatively affecting results, it is best to procure thermal cyclers featuring heated lids. Units with specialized lids provide good sealing, minimize evaporation, and maintain the necessary sample volume and reagent ratio. Available at GMI are the [Bio-Rad Thermal Cycler S1000-96](#) Well Block and the [Techne TC-3000](#) both featuring a heated lid for optimal sealing.

User Experience Provided by your PCR Thermal Cycler

Other factors to consider before buying a thermal cycler include:

- **Ease of Use**
For users who are new to PCR, browse touch screen, ATM-style, or menu-driven thermocyclers for easy and smooth operation, minimizing risks of user-errors.
- **Remote Access**
If you need a system that lets you adjust protocols and view preliminary results wirelessly through a smartphone or a tablet, look for a thermal cycler that has networking capabilities like the [Techne TC-4000](#). Need units that allow you to store up to approximately 300-400 programs, organize data up to 12 individual folders and comes with pre-programmed protocols? Checkout the [MJ Research PTC-200 Thermal Cycler](#) and the [MJ Research PTC-100 thermocycler](#).
- **Speed, Accuracy, and Software Features**
Ensure fast and accurate PCR by taking into account the combination of enzyme, plasticware, and instrument you are working with. For rapid ramp rates, shop plates and tubes with ultrathin walls for better and quicker heat transfer between the block and the sample. Thermo cyclers with software features like the [Eppendorf Mastercycler EP Thermal Cyclers](#) and the [Bio-Rad iCycler PCR Thermal Cycler](#) make way for accurate data analysis.



Taking all these key factors into account before buying a PCR thermal cycler can help you find the right unit that best serves your laboratory needs. Having trouble choosing the appropriate instrument for your specific application? You can always rely on effective solutions and advice from industry-experts like GMI. With our large portfolio of new and used PCR thermal cyclers and factory trained technicians, trust us to meet your specific requirements.

For over 20 years, GMI has been supplying leading-edge products and exceptional services to the scientific market and cost conscious laboratories. With an ISO 9001:2008 under our wings, we assure any instrument purchased from us has undergone thorough refurbishing, recalibration, recertification and testing processes. Aside from these, we also offer a number of service agreement, warrant, and rental options for our PCR thermal cyclers.

For any assistance needed on potential new or used PCR thermal cycler purchase, feel free to reach us at **1-888-702-1775** or email us at sales@gmi-inc.com.