Achieve easy and fast pipetting of 96- and 384-well plates with PLATEMASTER®

White paper LT805008

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Introduction

Researchers need to collect data from large numbers of samples for many applications in basic science and clinical research in a precise and uniform way. Regardless of the assay method employed, laboratories requiring high throughput have often adapted the described protocol to a 96-well, and more recently, a 384-well format. The push for high-throughput data collection is a major reason that explains the researchers' transition from multichannel pipettes to robotic systems. Indeed, with ordinary pipettes, preparing or transferring more than 10 microplates a day is not only time consuming, but can also be tiring and a lot of time for programming or training before use is required with an automated pipetting system.

Gilson has now designed an alternative solution – PLATEMASTER- to prepare microplates manually and precisely in a few seconds only. This white paper demonstrates the benefits of using PLATEMASTER versus manual pipettes or automated solutions.

Why transition to manual 96 channel pipetting solutions when dispensing in microplates?

The healthcare field today is under significant pressure, in the lab, this can mean being asked to increase workload and deliver even faster results, while maintaining quality. The following materials can affect the need of productivity in laboratories:

Manual pipettes
Filling more than 10 microplates a day requires lot of times, but can also be tiring. Risk of human errors can lead to skipping or repeating wells. Many manipulations with different solutions above the microplate can increase the risk of contamination of samples inside pipettes and microplate, particularly crucial for DNA purification or qPCR. All enzymatic reactions or cell-based applications such as kinetic

reactions or cells based assays (CBA) cannot be started and stopped in a microplate at the same time. The analysis of results could thereby be more difficult.

Automated systems
An automated pipetting station requires a lot of time for installation, often a dedicated location for different laboratories, and a specific trainer. It requires a lot of time for training before use. Most of the users need time to program it before each use. There are many risks of human errors during the complex programming. Furthermore, these devices are generally quite expensive.

What is the PLATEMASTER and PIPETMAN DIAMOND Tips solution?

Tips are essential components of the pipetting system. Accuracy and precision of your pipetting system is intimately linked to the performance delivered of your system. PIPETMAN DIAMOND Tips guarantee that Gilson 96- channel pipetting system stay in the Gilson specified tolerances and deliver consistent results over time.

Superior Accuracy and Precision guaranteed
Tips contribute up to 50% to the performance of your pipetting system (ISO 8655-2*). Loosely fitted tips are a major cause of bad performance. Tip holders of PLATEMASTER are calculated to fit perfectly with the diameter of the tip-collar of the PIPETMAN DIAMOND Tips, thus ensuring a perfect seal. The four locations of PLATEMASTER have been specially designed for PIPETMAN DIAMOND Tips racks. The rack will perfectly fit into all the locations and will be stable due to the slots. Besides, with their fine point and improved flexibility, Gilson PIPETMAN DIAMOND Tips make the last drop easier to dispense.

Prevention of Contamination
Often overlooked as a source of sample contamination, the tip system comes into direct contact with the sample and may contaminate the solution. PIPETMAN DIAMOND Tips are designed to meet the most stringent demands in various fields and applications such as PCR, molecular biology or cell technology. Gilson pipette tips are injection-molded, a high temperature process that is inherently free of contaminants.

- Manufactured and packaged in a clean production environment.
- 100 % pure polypropylene ensures no contamination.
- High quality filter tips.

Meeting the normative environment
PIPETMAN DIAMOND Tips are designed so that Gilson systems meet the EN ISO 8655 requirements and ensure compliance with Good Laboratory Practices. PIPETMAN DIAMOND Tips are CE certified for the In Vitro Diagnostic (IVD) directive.

Full traceability

Clear batch number identification on all packaging ensures full traceability from the mold to your laboratory bench. Quality certificates with detailed protocols and detection levels for each batch are downloadable from the Gilson website. All tip packaging are labelled with a two dimensional bar-code (2D data matrix) containing the product reference, the lot number and the quantity for enhanced traceability.

Large volume range

PIPETMAN DIAMOND Tips are available for a volume range from 0.5 µL to 220 µL for PLATEMASTER, and for all tip models including filter tips, standard or sterilized.

Filter tips are equipped with a high density polyethylene filter; PIPETMAN DIAMOND Tips contain no sealing additive which can be released in your sample. Filter porosity has been scientifically determined to constitute an effective barrier against aerosols generated by pipetting tasks.

Sterilized version tips are certified free of biological contaminants: free of DNA, RNA, DNase, RNase and pyrogen.

Figure 1: PLATEMASTER and PIPETMAN DIAMOND Tips D300

Faster sample preparation

PLATEMASTER reduce the number of manipulations necessary for filling a microplate, in comparison to ordinary multichannel pipettes to optimize working times.

Filling a microplate (384 wells) with 1 Lambda DNA template. *(Number of manipulations)*	PLATEMASTER	8 channel pipette
Buffer	4	48
MgCL2	4	48
PCR nucleotide mix	4	48
Control primer 1	4	48
Control primer 2	4	48
Taq DNA polymerase	4	48
Lambda DNA template	4	48
Total	28	336

Figure 2: Comparison between the number of manipulations to fill a 384 well plate in qPCR with PLATEMASTER and a 8-channel pipette.

With the PLATEMASTER, executing qPCR protocol requires 28 steps whereas with an 8-channel pipette the same protocol would require 336 manipulations. With its 96 channels, PLATEMASTER allows rapider processing of multiple samples than single, 8-channel and 12-channel pipettes.

For genomics applications, such as qPCR or sequencing, the need of increased throughput preserving the same quality of results is significant. The PLATEMASTER P20, covering a volume range from 0.5 to 20 µL, can play a prior role in all qPCR steps. Real-time PCR is used for many applications, including gene expression analysis, microRNA analysis, SNP genotyping, CNV analysis, and even protein analysis.

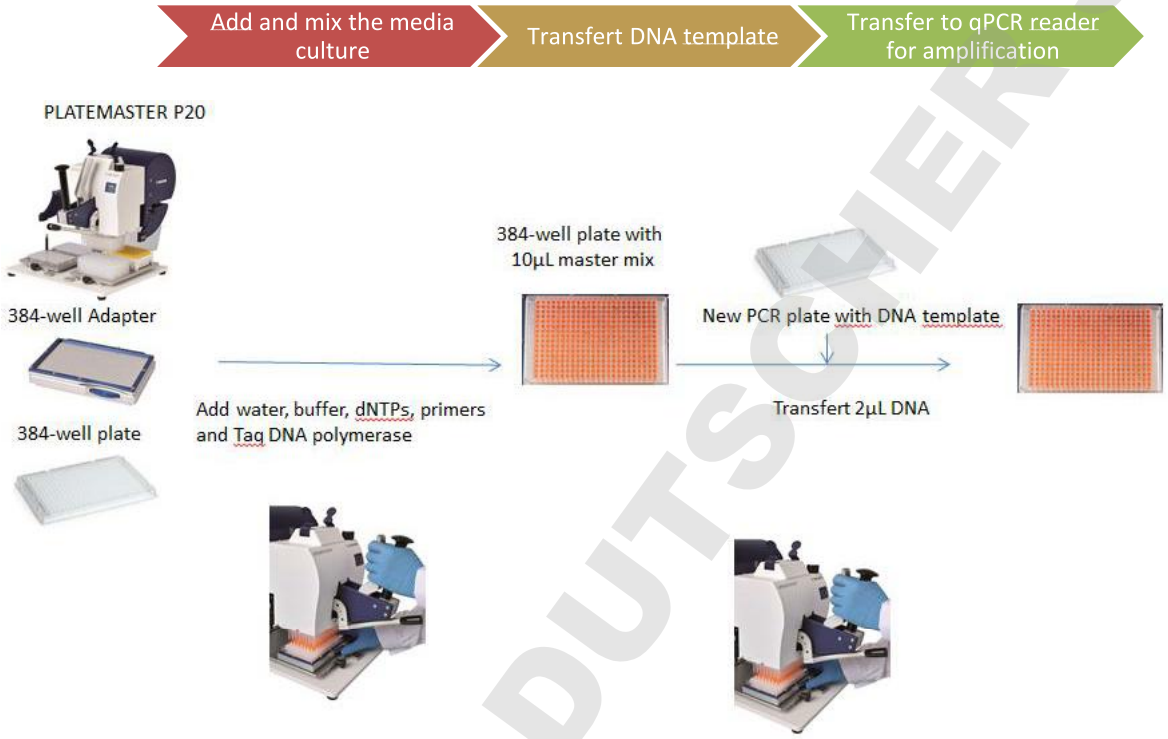

Figure 3: qPCR with PLATEMASTER and its 384 microplates adapter

PLATEMASTER and PIPETMAN DIAMOND Tips are first used to fill 384-well plates with addition separately of the qPCR media culture compounds: water, buffers (Mg CL2), PCR nucleotide mix (dNTPs), primers (control primer 1 and control primer 2), and Taq DNA polymerase. Finally, PLATEMASTER transfers lambda DNA template. Real-time PCR instruments can be launched with the filled microplate.

PLATEMASTER can fill a 96-well plate within 10 seconds or a 384-well plate in only 4 steps in less than 1 minute.

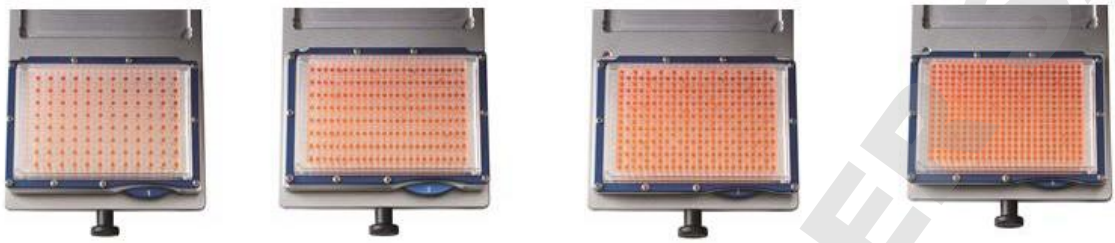

Figure 4: Filling a 384 well plate in four steps with a 384 well adapter positioned by a wheel

Optimization of results

All enzymatic reactions or cell-based applications can be started and stopped in the 96 wells at the same time. The ability to add buffer and protein samples to all the 96 wells simultaneously can ensure equal treatment of all samples.

The PLATEMASTER P220, covering a volume range from 2 to 220 µL, plays an important role in major steps of Cell-Based Assays. PLATEMASTER can perform all steps of experimental set-up including cell dispensing, serial titration and array of compound, and addition of the assay reagents to the plate for one type of cells, for example to determine a mechanistic toxicity profiling of a titrate compound on one type of cells.

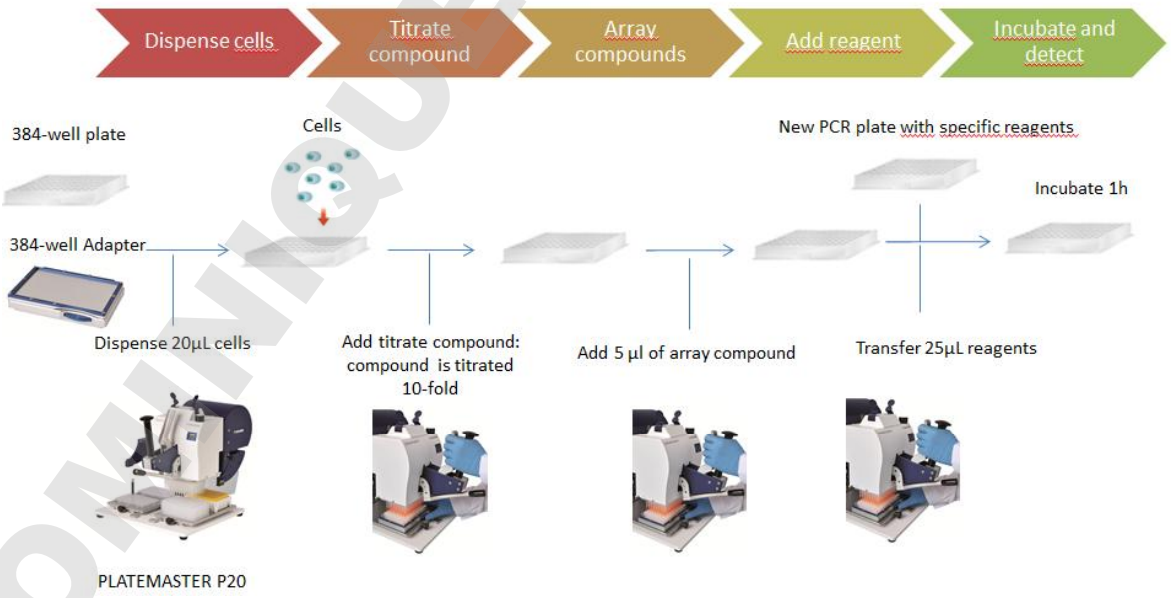

Figure 5: Cells-based assays with PLATEMASTER P20 and its 384 microplates adapter

Besides, PLATEMASTER deletes risks of human errors by eliminating the possibility of skipping or repeating wells which compromise the data from an otherwise sound experiment.

Trusted results guaranteed

PLATEMASTER covers a volume range from 0.5 µL to 220 µL and benefits from PIPETMAN DIAMOND Tips accuracy and precision. Measurements must include replicates to decrease the effects of laboratory errors (i.e., pipetting accuracy). With PLATEMASTER, the precision between each well is exactly the same, human errors of pipetting or human factors are deleted. PLATEMASTER and PIPETMAN DIAMOND Tips can increase the well-to well reproducibility to get better results from cell based assays, ELISA, cell culture, nucleic acid quantification, plate reformatting or other applications.

Cell culture refers to the removal of cells from an animal or plant and their subsequent growth in a favorable artificial environment. PLATEMASTER can dispense uniformly and simultaneously the same quantity in each wells. PLATEMASTER can use in all steps before incubation.

Cell culture is one of the major techniques used in cellular and molecular biology, providing excellent model systems for studying the normal physiology and biochemistry of cells (e.g., metabolic studies, aging), the effects of drugs and toxic compounds on the cells, mutagenesis, and carcinogenesis. It is also used in drug screening and development, and in a large scale manufacturing of biological compounds (e.g., vaccines, therapeutic proteins). The major advantage of using PLATEMASTER for cell culture for any of its applications is the consistency and reproducibility of results that can be obtained from using a batch of clonal cells.

Figure 6: Cell culture with PLATEMASTER P220

How easy it is to operate the PLATEMASTER?

Same working principle as a regular pipette

Its functions are to the same as the ones of a manual handheld pipette.

Figure 7: Use of PLATEMASTER

As easy and intuitive as a regular pipette

No required programming, long training or even power; it simply works like a manual pipette.

Save money because PLATEMASTER is compatible with same tips like the PIPETMAN range
It is used with Gilson's tips for pipettes, PIPETMAN DIAMOND Tips; PLATEMASTER simply offers the cheapest consumables. For customers using several racks per day with PLATEMASTER, there are thousands of euros to save per year. Compared with robotics, the PLATEMASTER offers lower upfront and maintenance costs. Laboratories save time and so money by increasing workflow and decreasing human errors. For example for a qPCR an average price for a kit is around 300€, so with PLATEMASTER, lab technicians can economize solutions avoiding waste.

As secure as a regular pipette
It is possible to remove supernatant in a defined way: Piston lever inside the pipetting head is strictly guided through the whole movement of the plate so you can stop the action on every position you want and the volume in the 96 channels will be the same. Volume adjustment dial has a defined "click" for every µL (0.1 µL for the small volume head). Another advantage of the PLATEMASTER over robotic systems is its flexibility to stop the reaction at any time.

Easy integration in the laboratory
Compact and portable to use on any lab bench, under a hood, or in a cold room, PLATEMASTER is a flexible instrument as it works without electricity.

Summary:

PLATEMASTER is the best option to fill rapidly and easily numerous microplates. The 20 µL and 200 µL PLATEMASTER models offer many benefits to biological and chemical researchers carrying out medium and low-volume applications. It is intuitive to use and can easily be moved around the laboratory from bench to bench, or under a hood. Both PLATEMASTER models offer high accuracy and precision.

For genomics applications, such as qPCR, cell culture, and other applications, PLATEMASTER guarantees accuracy and precision in combination with increased throughput. In terms of time sensitive experiments, the PLATEMASTER can be used for techniques like enzymatic assays, Cells based assay and ELISA and optimize results to launch and stop simultaneously reactions.

PLATEMASTER easily adapts to complex and varied workflows and can save time, samples and money.

References

1. Gilson PIPETMAN DIAMOND Tips brochure
2. Gilson PLATEMASTER brochure