

Hamilton's MagPip Technology allows automation of pipetting low volume reactions at high speed and quality

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Introduction

The MagPip channels represent a unique, revolutionary technology to transfer liquids. In short, the plunger of the pipette is no longer driven by any mechanical coupling like a spindle or a belt. It is driven by a coil set, while the plunger itself acts as a permanent magnet. With this setup enormous acceleration and speed of the plunger is possible. This allows to dispense small volumes contact-free with a novel dispense mode called WhiPip dispense. With this WhiPip dispense, pipetting is highly precise down to volumes of 0.3 μL .

Smaller volumes mean you'll use less of your precious samples and reagents. Furthermore, WhiPip dispense mode makes it possible to rearrange, optimize and simplify the workflow and reduce your tip consumption. With this application note the advantages of the MagPip are shown by performing a TaqMan™ qPCR setup. MagPip channels low volume pipetting made it possible to reduce the total PCR volume by 50% compared to conventional pipetting platforms. Despite pipetting volumes down to 0.3 μL , the results of the qPCR analysis revealed very high precision and reliability.

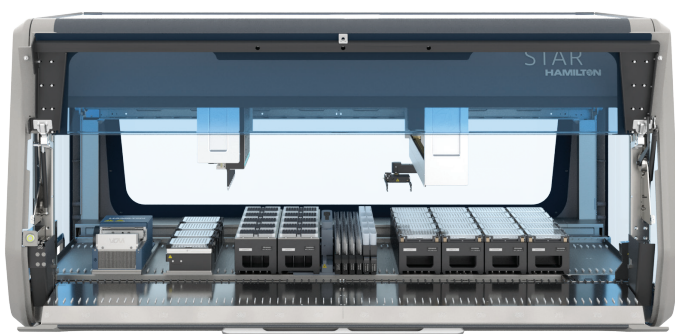


Figure 1: MagPip on STAR V

- Less volume: save your valuable samples and reagents due to lower volumes
- Less pipetting steps: simplify your pipetting workflow
- Less tips: WhiPip technology allows low volume aliquoting without touching your reagents
- Full quality: very precise pipetting allows high quality results

Visual Workflow

To confirm the precision of our MagPip technology, we performed a TaqMan™ qPCR with 15 biological samples and one water control using a STAR V equipped with 8x MagPip Channels. The pipetting precision using WhiPip dispense technology has been revealed by analyzing three differentially expressed genes. With the WhiPip

dispense mode we were able to pipette the TaqMan™ qPCR reactions for these three different genes without preparing master mixes (Fig. 2). Comparing the pipetting procedure of the MagPip with the standard channels, an improvement in the workflow is clearly visible.

qPCR Setup with MagPip Channels



qPCR Setup with Standard Channels

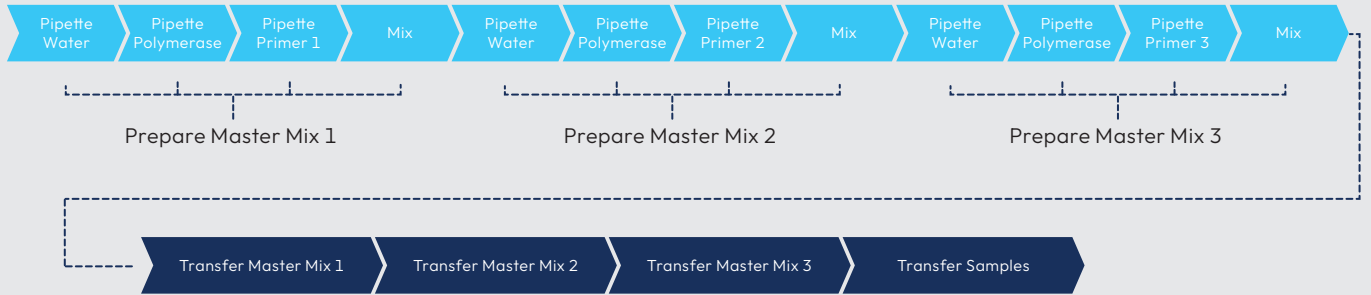


Figure 2: Pipetting Scheme for TaqMan™ qPCR Reactions Using MagPip vs. Standard Channels

MagPip reduces pipetting steps, pipetting time, and dead volume by not having to use master mixes. An overview is represented in Table 1.

Table 1: Comparison of MagPip vs. Standard Channels

	MagPip Channels	Standard Channels
Pipetting Technique for Small Volumes	WhiPip = Contact Free Multi Dispense	Single Transfer to Surface
Minimal Volume	0.3 µL	1 µL
Pipetting Steps w/o Sample Pipetting	5	12
Number Used Tips for Reagent Transfer	5	12
Number Used Tips for Sample Transfer	16	240
Additional Dead Volume for Master Mixes	0%	10%

Table 2: Pipetted Volumina of TaqMan(TM) qPCR Reaction

Reagent	Volume
ddH ₂ O	2.1 µL
2x Applied Biosystems™ TaqMan™ Gene Expression Master Mix	3 µL
TaqMan™ Probe	0.3 µL
cDNA [conc. 10 ng/µL]	0.6 µL

In a first step of the pipetting protocol, 2.1 µL ddH₂O was distributed with a single 300 µL tip with WhiPip multi dispense jet mode to 240 target wells of a 384-well plate. Thereby, up to 135 single aliquots were pipetted with only one aspiration. The same pipetting procedure was performed to distribute 3 µL 2x Applied Biosystems™ TaqMan™ Gene Expression Master Mix to the 240 target wells using only one 300 µL tip. Hereafter, 0.3 µL TaqMan™ Probes for analysis of the three different genes were pipetted into 80 target wells each, using 10 µL tips for better pipetting precision. For each probe, only 1 tip was needed. Pipetting was performed with WhiPip multi dispense jet mode, too. Lastly, 0.6 µL of cDNA [conc. 10 ng/µL] from 15 biological samples – cDNA was generated from C57BL/6 mouse brain isolated RNA – and one water control were pipetted into 15 wells each using WhiPip multi dispense mode. This allows to use one single tip per sample for all 15 replicates. The pipetting layout is depicted in Fig. 3.

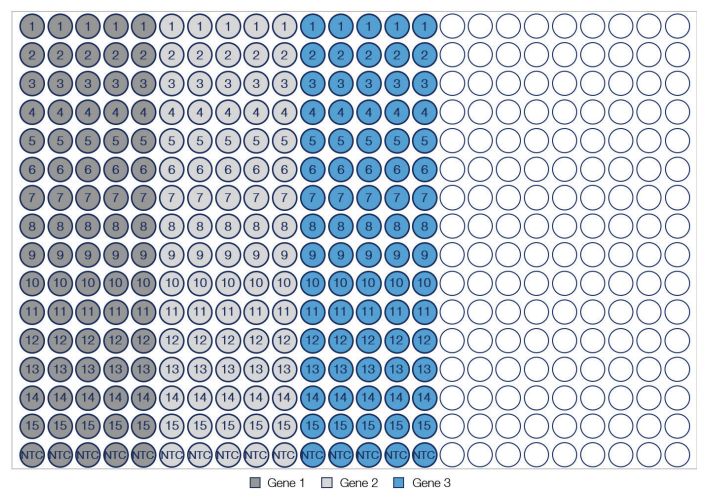


Figure 3: Pipetting Layout; NTC = No Template Control

Results

To confirm the precision of our MagPip technology, gene expression of three differentially expressed genes was evaluated for quintuplicates of 15 biological samples (Fig. 4.) Therefore, the above described TaqMan™ qPCR reaction mixes were analyzed at Novartis Pharma AG with the ThermoFisher QuantStudio 7 Pro Real-Time PCR System. Analysis of the results was performed using the QuantStudio Design & Analysis 2.6 software.

With our MagPip technology, we were able to very precisely pipette the different sample sets, also with a low volume reagent approach. Standard deviation ranged from $SD \pm 0.11$ to $SD \pm 0.43$. Pipetting and analysis of these sample sets at the Institutes for BioMedical Research revealed SD values within the same range. Furthermore, the coefficient of variation (CV) of the different quintuplicates was between 0.44% and 2.24% with a mean value of $CV = 0.98\%$.

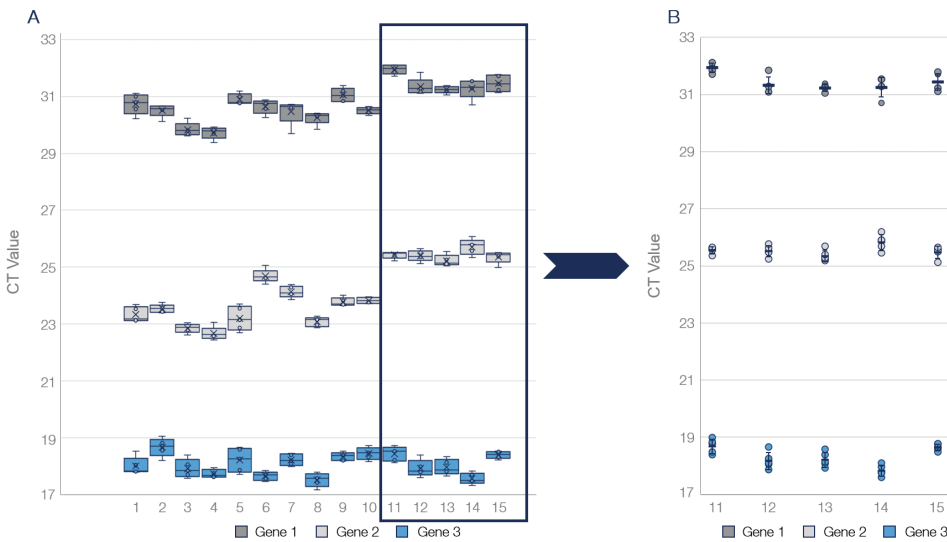


Figure 4: Expression of three differentially expressed genes from 15 biological samples; A) CT values of quintuplicates of each sample are depicted in a box plot with whiskers marking values outside the box; B) CT values of each quintuplicate of samples 11 to 15 are depicted in a scatter plot. Dark blue dashes represent mean values and standard deviation

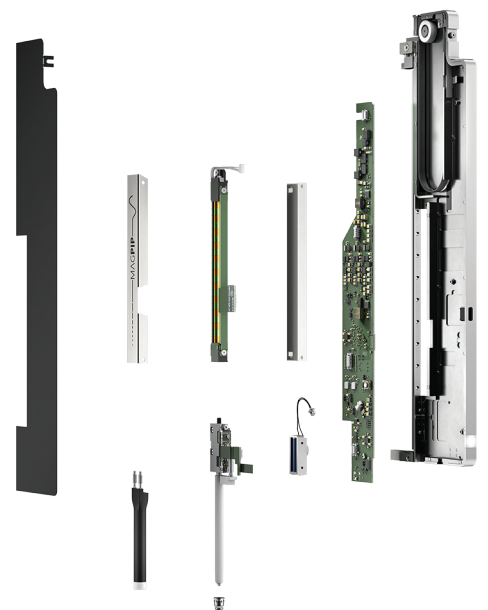
MagPip

Revolutionizing your Lab

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