

# TEMPEST®

## flexible precision dispensing

TEMPEST® is a non-contact, bulk reagent dispenser that utilizes 96 individually-controlled nozzles to dispense any volume of up to 12 different reagents into any well.

## Broad Range of Applications



High-Throughput Screening (HTS)



Cell-based Assays



Assay Development and Optimization



Enzyme-Linked Immunosorbent Assays (ELISA)

## Key Features

- **Modular** - the modular dispense head can accept up to 12 easily replaceable chips, each with 8 dispense nozzles
- **Efficient** - non-recoverable dead volume of 40 µL, and a dead volume of only 100 µL using pipette tip dispensing
- **Fast** - dispense 200nL to 96-well plate in just 3 seconds and 1µL to 384-well plate in just 5 seconds
- **Flexible** - TEMPEST supports most SBS plate types, can easily be integrated with other robotic automation, and has an optional plate stacker and barcode reader
- **Reliable** - non-contact microdiaphragm pump technology maintains precision and accuracy over millions of cycles





*TEMPEST chip and micro-diaphragm technology*

## State-of-the-art Dispensing Technology

At the core of each TEMPEST channel is a microdiaphragm pump that meters and dispenses discrete volumes of liquid. This valve cluster has two microdiaphragms (select either 200 nL and 1  $\mu$ L, or 1  $\mu$ L and 5  $\mu$ L) that can fill and dispense as fast as 8 times per second. This technology is incredibly precise and can handle a wide range of viscosities.

## 12 Ingredients at Your Fingertips

TEMPEST can dispense up to 12 different reagents simultaneously using 12 microfluidic chips, each featuring eight independently-controlled nozzles.

Adding ingredients is effortless as no pressurized bottles or special containers are needed. Ingredients can be placed in nearly any container, and different tube lengths are available to meet your needs.



*12 ingredient inputs with tubing that can be used with any virtually any container*



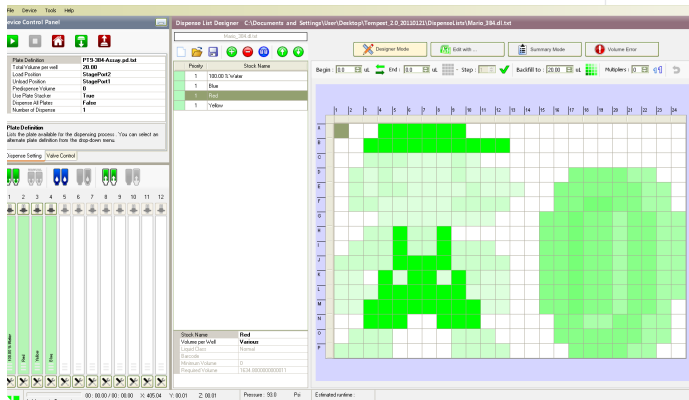
*direct pipette tip dispenses reduce dead volumes of only 100  $\mu$ L*

## Conserve Reagents

TEMPEST is capable of returning any excess sample from the microfluidic chip back into the ingredient reservoir, rendering an impressively low dead volume of less than 40  $\mu$ L. A pipette tip can be used as an ingredient reservoir yielding a dead volume of only 100  $\mu$ L.

## Deep Well Block Dispensing

The TEMPEST version 3 has upgraded plate clearance to accommodate dispensing into deep well blocks.



*user-friendly software makes designing complex design protocols easy*

## Easy-to-Use Software

The TEMPEST® software provides a straightforward, userfriendly way to design and execute even the most complex dispensing protocols. The control software offers an intuitive visual layout of both the plate design and the hardware setup, and provides tools to create gradient designs and backfills. Microsoft Excel integration allows you to manually edit well volumes for additional control.

## Flexible Viscosity Dispensing

Software-controlled pressure and vacuum settings are easily customized to optimize your dispenses based on your reagent's viscosity.

## High Speed for High Throughput

**Most tasks are completed in fewer than 40 seconds:**

200nL to 96-well plate: 3 secs	1uL to 384-well plate: 5 secs
200nL to 384-well plate: 6 secs	10uL to 384-well plate: 9 secs
200nL to 1536-well plate: 11 secs	20uL to 384-well plate: 13 secs
5uL to 96-well plate: 4 secs	



*Each 8-nozzled microfluidic chip dispenses reagents rapidly with minimal waste.*

## Hands-free Maintenance

The TEMPEST features an automated dual-solution wash cycle that cleans the entire fluid pathway and requires no user intervention. The reverse fluid flow wash aspirates solution through the nozzle and forces any particles backward through increasingly larger channels for thorough, clog-free cleaning.

## Designed for Integration

The small instrument size and powerful automation interface enables the Tempest to be easily integrated with robotic plate handling arms, grippers and scheduling software.



*optional barcode scanner automatically loads and executes dispenses*

### Barcode Scanner

An optional barcode scanner can run dispenses based on a plate's barcode. After the barcode is scanned the corresponding dispense file is loaded and executed.



*optional plate stacker holds up to 24 SBS footprint plates*

## Customizable to Meet Your Needs

As the TEMPEST can accept up to 12 microfluidic chips at once, each machine can be configured with any combination of high volume (1  $\mu$ L and 5  $\mu$ L) and low volume chips (200 nL and 1  $\mu$ L) to fit your application and budget.

### Stackers for Plate Storage

TEMPEST supports nearly all SBS-footprint plates, including 24-, 96-, 384-, and 1536-well plates. Optional plate stackers can hold 24 SBS plates (based on 14.35 mm plate height). The stackers are 350 mm tall and the system is bidirectional, enabling plates to be cycled in from either stacker.



## Specifications and Requirements

### Computer Specifications

- Microsoft Windows Vista, 7, 8, or 10; 32- or 64- bit
- Dual Core x86 or x64 1.5 GHz processor
- 1 built-in USB port (USB 2.0 recommended, USB 3.0 supported)
- 4 GB RAM
- 1 GB Hard Drive space
- 768 pixels vertical minimum screen resolution (900+ pixels recommended)

### Electrical Specifications

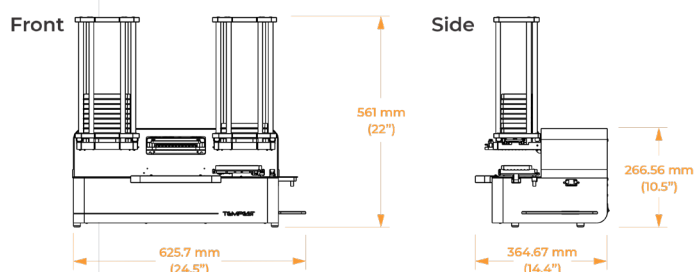
- 110-240 V, 50-60 Hz, 130 W typical, 200 W max. Standard or European outlet

### Direct-to-lab air and vacuum option

- Pressure: 30-35 psi @ 0.15 cfm = 2.0 bar @ 4.3 lpm
- Vacuum: 22 inHg @ 0.2 cfm = -750 mbar @ 5.7 lpm

### Physical Dimensions

- Width: 555 mm (22") (625.7 mm (24.5") with optional waste holder)
- Depth: 309.67 mm (12.2") (364.67 mm (14.4") with optional tube holder)
- Height: 266.56 mm (10.5") (561 mm (22") with plate stackers)
- Weight: ~11.5 kg (~25 lb) (~13.5 kg (~30 lb with plate stackers))



### Microfluidic Chip Options

A variety of dispensing chips are available including chips that are compatible with harsh solvents.

Chip Type	Part #	Diaphragm Vol.	Min Vol.	Max Vol.	Pulses per Second	Dead Vol. With Tube*	Dead Vol. Pipette	CV's
Low Volume	TSCL	0.2 $\mu$ L + 1 $\mu$ L	0.2 $\mu$ L	$\infty$	8	40 $\mu$ L	100 $\mu$ L	<8% at 0.2 $\mu$ L, <5% at 1 $\mu$ L
High Volume	TSCH	1 $\mu$ L + 5 $\mu$ L	1 $\mu$ L	$\infty$	4	40 $\mu$ L	100 $\mu$ L	<5% at 1 $\mu$ L, at 5 $\mu$ L

\*add 350  $\mu$ L if not recovered

For more information about the TEMPEST, visit us at [www.formulatrix.com](http://www.formulatrix.com) or email [info@formulatrix.com](mailto:info@formulatrix.com)