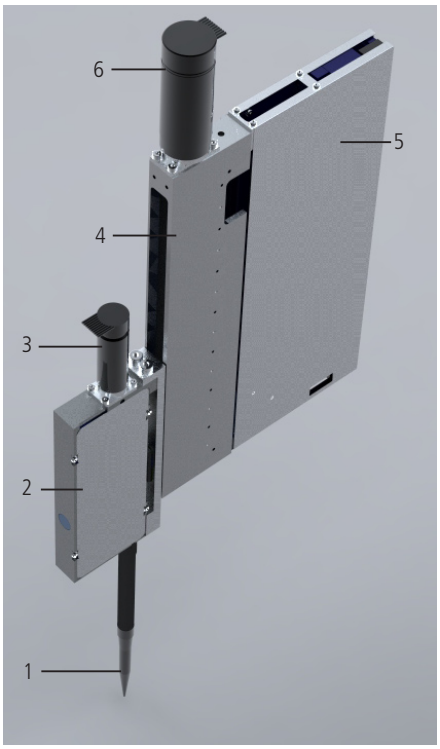
HAMILTON ZEUS Pipetting Module

Module for Automated Liquid Handling

HAMILTON

Z-Excursion Universal Sampler (ZEUS)

The HAMILTON Z-Excursion Universal Sampler (ZEUS) Pipetting Module is a fully automated, self-contained, ready-to-go liquid handling module for integration into instruments requiring on-board pipetting. The ZEUS Pipetting Module is based on HAMILTON's revolutionary air-displacement pipetting technology and uses disposable tips to avoid carry-over. The module is equipped with QPM - Qualitative Pipette Monitoring - to positively verify successful pipetting actions.

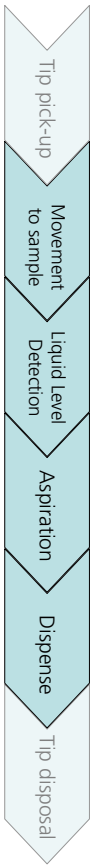


Z-Excursion Universal Sampler (ZEUS) Pipetting Module

1: Pipetting tip
2: Sensor board: Controls liquid aspiration, dispense and self-monitoring functions
3: Pipetting drive
4: Z-axis
5: Pipetting main board: Controls the movement of the pipetting module
6: Z-drive

Installation: ZEUS is mounted with M4 screws at its target position. For power supply and digital data transmission, a FFC connector is used. Communication is facilitated through the HAMILTON CAN protocol.

Monitored Pipetting Process



Automated pipetting with ZEUS follows these steps:

1. Tip pick-up:
ZEUS automatically picks up a pipetting tip and verifies its presence.

2. Movement to sample:
The tip is moved by the pipetting system over the sample. Then the integrated Z-motion of ZEUS is used to find the liquid level and to follow the liquid during aspiration and dispense.

3. Liquid Level Detection (LLD):
ZEUS allows two modes for Liquid Level Detection (LLD): by capacitance for conductive liquids and by pressure for non-conductive liquids.

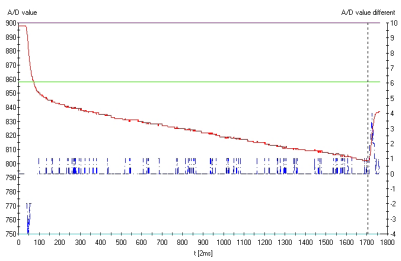
4. Aspiration:
ZEUS automatically aspirates the quantity of liquid defined by the user in the range of 1 µL - 1000 µL into the pipetting tip. Self-monitoring functions of QPM (Qualitative Pipetting Monitoring) ensure precision of the pipetting and prevent malfunction.

5. Dispense:
The liquid is dispensed in one ore more aliquots while monitoring the process with QPM.

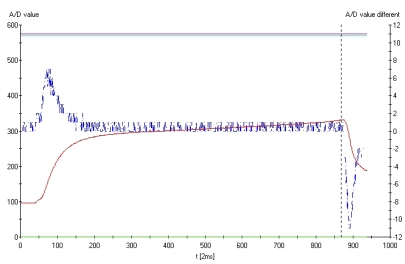
6. Tip disposal:
ZEUS disposes the used pipetting tip.

QPM - Qualitative Pipette Monitoring

The HAMILTON ZEUS Pipetting Module is equipped with a process monitoring system called QPM. The Qualitative Pipette Monitoring guarantees proper pipetting. During the entire aspiration and dispense cycle, the air pressure in the pipette tip is monitored and instantly compared to a successful pipetting cycle. When ZEUS aspirates or dispenses foam, blood clots, or air due to insufficient reagent, the system will immediately identify the error and follow a predefined error handling procedure.



Pressure (red) during aspiration / time



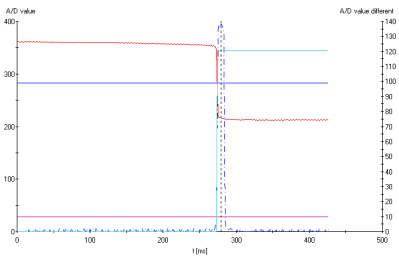
Pressure (red) during dispense / time

Module for Automated Liquid Handling

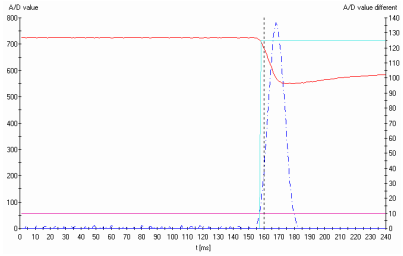
Liquid Level Detection (LLD)

Hamilton offers both the traditional capacitive liquid level detection as well as pressure liquid level detection. Normally capacitive LLD is used for conductive liquids. The sensitivity of the LLD can be adjusted to the vessel size and the conductivity (or polarity) of the liquid to be detected.

For non-conductive liquids pressure LLD is used. Pressure LLD only works with new and empty tips during the aspiration of liquids. When detecting under demanding circumstances, as e.g. detecting foaming liquids, the capacitive and pressure liquid level detection can be used at the same time.

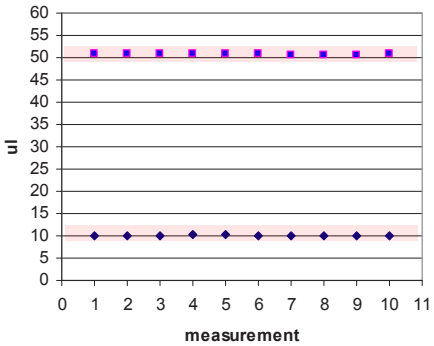


Capacitive signal / time



Pressure signal / time

Pipetting performance



Gravimetric testing at HAMILTON with Precinorm® solution for 50 µL and 10 µL target volumes in single steps

ZEUS allows single sample transfers as well as transfers with multiple dispenses (aliquoting) with highest precision and accuracy.
The use of disposable tips ensures the lowest possible cross-contamination.

Precinorm® is a registered trademark of Roche Diagnostics AG

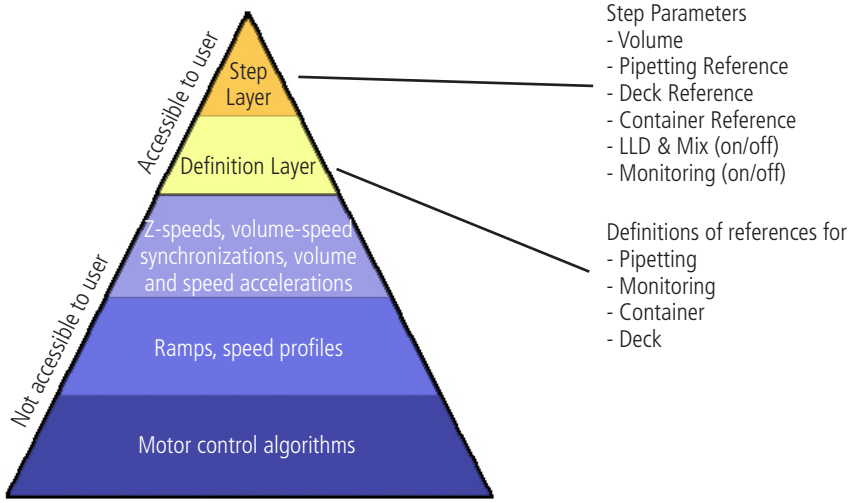
Graphical User Interface for R & D Use

The intuitive, user-friendly interface enables the user to program the pipetting parameters and allows the user to control ZEUS with a Windows PC.
The interface displays error messages, so the user can start the appropriate action if a problem arises, e.g. clogging of the pipette tip.

Screenshot of the GUI

Controlling ZEUS

The control functionality of ZEUS ensures that the end user only needs to access high-level parameters and does not have to worry about basic programming of movements.
The Step Layer contains parameters the user can set for each action, e.g. the pipetting volume or the liquid level detection (LLD) mode.
In the Definition Layer the user can define general settings for several actions in the application, e.g. the container dimensions.
Fundamental parameters of pipette movement control are handled internally to ensure smooth functioning of ZEUS.



http://www.hamiltoncompany.com

contact@hamilton.ch

OEM@hamiltoncompany.com

HAMILTON Bonaduz AG
Via Crusch 8
CH-7402 Bonaduz, Schweiz
Telephone: +41-81-660-60-60
Fax: +41-81-660-60-70
contact@hamilton.ch

HAMILTON Company
4970 Energy Way
Reno, Nevada 89502 USA
Telephone: +1-775-858-3000
Fax: +1-775-856-7259
OEM@hamiltoncompany.com

Your HAMILTON representative:

PN: 695091/01 11-2009