microLAB®
600 Series

Intelligent Pipette
Automation made Simple

Introducing the MICROLAB 600

The MICROLAB 600 is a highly precise syringe pump with a graphical user interface designed to quickly and easily dilute and dispense liquids. This positive displacement system provides better than 99% accuracy, independent of a liquid's viscosity, vapor pressure, and temperature. The inert fluid path minimizes sample carry over and is compatible with harsh chemicals.

Where is the MICROLAB 600 used?

Every laboratory has tasks that are too small to automate and too large to reliably accomplish by hand. The MICROLAB 600 is a Semi-Automated Liquid Handler designed specifically for these in-between applications. The ML600 increases throughput and consistency while reducing cost and wasted buffer. Common industries utilizing the ML600 are:

- **Forensics**
- **Environmental Analysis**
- **Mining**
- **Manufacturing**
- **And many more…**

Why choose the MICROLAB 600?

No more adjusting pipettes and recalculating dilutions. Quickly recall stored dispenses and dilutions with the Favorites Screen. Trigger the hand probe or tap the foot switch to actuate the precision syringe drives according to the predefined program.

- Reduce time preparing samples or dispensing reagents
- Minimize experimental variation from one user to the next
- Simplify compliance to EPA, FDA (GLP, GMP) and ISO
- N.I.S.T. traceable calibration

See pages 5–6 for details about ML600 Diluter

MICROLAB 600 Diluter

Dual Syringe Diluter

- Designed for large ratio dilutions in a single step.

MICROLAB 600 Dispensers

See pages 7–8 for details about ML600 Dispensers

Single Syringe Dispenser

- Precisely dispense one liquid at a time.

Dual Syringe Dispenser

- Dispense two liquids at the same time.

Continuous Dispenser

- Minimize the time between dispenses.
- One syringe fills while the second syringe dispenses.

Syringe Pump Features

The MICROLAB 600 is available as a single or dual syringe system. The high torque, precision stepper motors provide unsurpassed positional accuracy across the full range of Hamilton syringes from 10 µL to 50 mL. The instrument communicates with the controller or a corporate network via an ethernet port.

1. High Torque Valve Motors
2. Precision Syringe Drives with 48,000 step resolution over 60 mm
3. Lighted Power and Prime Buttons
4. Independent Left and Right Trigger Ports

1. Fanless Heat Vent
2. 24 Volt Power Input
3. CAN Daisy Chain Input/Output
4. RS-232 Console Port
5. Power over Ethernet (PoE)
6. TTL Input/Output

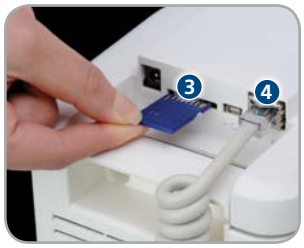
Syringe Pump Specifications

Specifications	Single and Dual Syringe Pump
Accuracy	+/- 1%
Precision	+/- 0.2%
Flow Rate	0.003 - 6000 µL/second (depending on the syringe that is selected)
Syringe Resolution	0.002% of the nominal syringe volume
Compatible Syringes	10, 25, 50, 100, 250, 500 µL, 1, 2.5, 5, 10, 25, and 50 mL
Fluid Path	Borosilicate, PTFE, CTFE
Communication Type	Ethernet, 10/100 BASE-T
Communication Protocol	.NET 2.0 Application Programming Interface (API)
Pump Memory	One method stored in non volatile memory
Calibration	Factory tested and traceable to N.I.S.T. standards
Certifications	CE, CSA
Power Rating	24 VDC, 2.5A
Dimensions	7 x 5.5 x 10.5 inch (177.8 x 139.7 x 266.7 mm)
Weight	13 lbs (5.9 kg)

Controller Features

See pages 11–12 for details about the Advanced versus Basic functionality

The MICROLAB 600 Controller integrates a streamlined user interface with a large touch screen display. Dilutions, dispenses, titrations and more are visually displayed in real-time with just the touch of a button.



1. Touch Screen
2. Screen tilts for viewing comfort
3. Expansion Slot
4. Ethernet

A Hardware Key unlocks Advanced functionality including Wizards and Custom methods *(See pages 11–14)*. The Hardware Key also provides an upgrade path for the Syringe Pump and Controller to the most current firmware.

Controller Specifications

Specifications	MICROLAB 600 Controller
Screen Size	5.7 inch (15 cm diagonal)
Screen Resolution	640(H) x 480(V) pixels
Tilt Positions	5 positions from 90° to flat
Mounting Options	On top of the Syringe Pump, Bench Top, or Wall Mount
Program Memory	2 GB (with Advanced Upgrade)
Communication Type	Ethernet, 10/100 BASE-T
Power rating	24 VDC, 2.5A
Dimensions	2.25 x 6.5 x 7 inch (57.2 x 165.1 x 177.8 mm) in down position
Weight	1.9 lbs (0.86 kg)

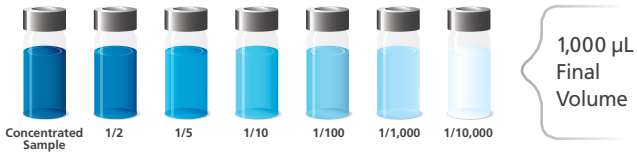
Dual Syringe Diluter

The MICROLAB 600's Dual Syringe Diluter configuration uses two syringes to create up to a 1:50,000 dilution in a single step, drastically reducing preparation time and wasted buffer. The diluent washes the tubing between each sample, minimizing carryover for even the most sensitive techniques, including:

- Atomic Absorption (AA)
- Inductively Coupled Plasma Spectroscopy (ICP)
- Liquid Scintillation
- High Performance Liquid Chromatography (HPLC)
- Gas Chromatography (GC)

Applications

- **Forensics Blood Alcohol Analysis and Urinalysis**
- **Mining Assay Labs Metals Detection**
- **Environmental Analysis Water and Soils Testing**
- **Oil Analysis Preventative Maintenance**
- **Alcohol Testing Beer and Wine Manufacturing**



Dilution	Diluent	Sample	Final Volume
1/2	500 µL	500 µL*	1000 µL
1/5	800 µL	200 µL*	1000 µL
1/10	900 µL	100 µL*	1000 µL
1/100	990 µL	10 µL	1000 µL
1/1000	999 µL	1 µL	1000 µL
1/10000	999.9 µL	0.1 µL	1000 µL

*This dilution series was performed using a 1000 µL diluent syringe on the left and a 10 µL sample syringe on the right. *These sample volumes were aspirated by the diluent syringe because the volume exceeded the capacity of the 10 µL sample syringe.*

Diluter Ordering Information

Part Number	Description
ML615-DIL	Dual Syringe Diluter with Basic Controller
ML625-DIL	Dual Syringe Diluter with Advanced Controller

The "–DIL" model ships complete with the Concorde Hand Probe, Universal Valves, Fill/Dispense Tubing, Accessory Holder, country specific Power Cord, and the choice of two syringes. If no syringes are selected at the time of the order a 2.5 mL and 250 µL syringe will be included.

See page 9 to learn how the Diluter works

Dual Syringe Diluter

Single, Dual and Continuous Syringe Dispensers

The MICROLAB 600 is able to dispense volumes from 100 nL to 50 mL. The ML600 uses positive displacement syringes to accurately dispense volatile, viscous, and dense liquids independent of atmospheric influences. The inert fluid path is compatible with harsh chemicals, making the MICROLAB 600 the most reliable and robust dispensing system available.

Applications

- Sample Spiking
- Titration
- Animal Dosing (oral gavage)
- Reagent Addition to Chemical Reactors
- Flow Chemistry
- Manufacturing
  - Mercury Dispensing for Light Bulbs
  - Ink Cartridge Filling
  - Glue and Epoxy Dispensing
  - Nasal Therapeutics (viscous)
  - Contact Lenses

Single Syringe Dispenser

See page 9 –10 to learn how the Single, Dual and Continuous Syringe Dispensers work

Dispenser Ordering Information

Part Number	Description
ML610-DIS	Single Syringe Dispenser with Basic Controller
ML620-DIS	Single Syringe Dispenser with Advanced Controller
ML615-DIS	Dual Syringe Dispenser with Basic Controller
ML625-DIS	Dual Syringe Dispenser with Advanced Controller
ML615-CNT	Dual Syringe Continuous Dispenser with Basic Controller
ML625-CNT	Dual Syringe Continuous Dispenser with Advanced Controller

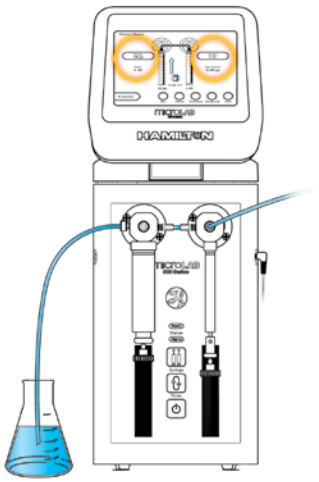
All dispensers ship complete with a Concorde Hand Probe (the Dual Dispenser uses the Dual Push Button Hand Probe), Universal Valve(s), Fill/Dispense Tubing, Accessory Holder, country specific Power Cord, and the choice of syringes. If no syringe(s) are selected at the time of the order the –DIS will ship with 1 mL syringe(s) and the –CNT will ship with 10 mL syringes.

How Does it Work?

The diagrams below illustrate the basic workflows of the four MICROLAB 600 models.

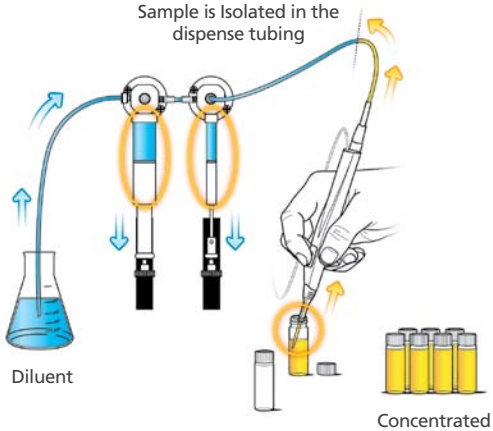
Dual Syringe Diluter Method

Step 1. Program the desired Diluent and Sample volumes.



Diluent

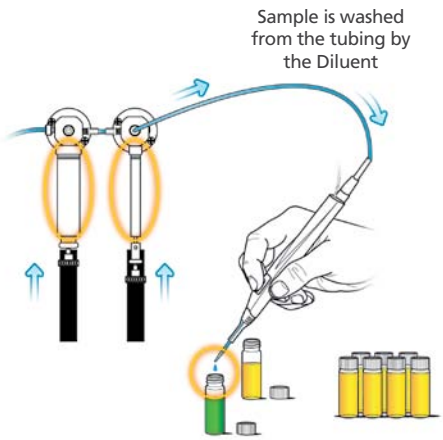
Step 2. Trigger the hand probe to fill the left syringe with Diluent and aspirate Sample into the hand probe with the right syringe.



Diluent

Concentrated Sample

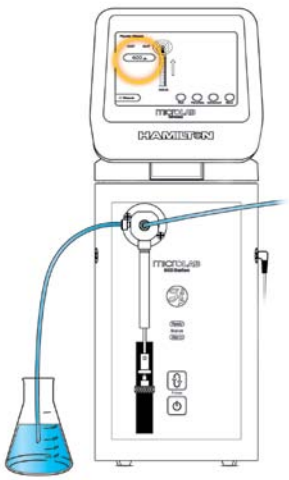
Step 3. Trigger the hand probe to dispense the Sample and then Diluent into a vial.



Diluted Sample

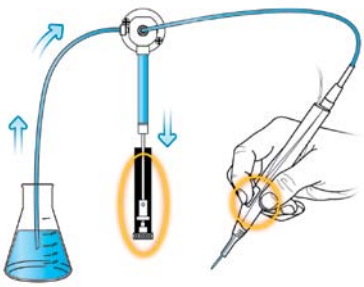
Single Syringe Dispenser Method

Step 1. Program the desired dispense volume.



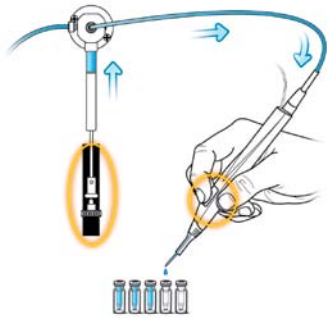
Solvent

Step 2. Trigger the hand probe to fill the left syringe with Solvent.



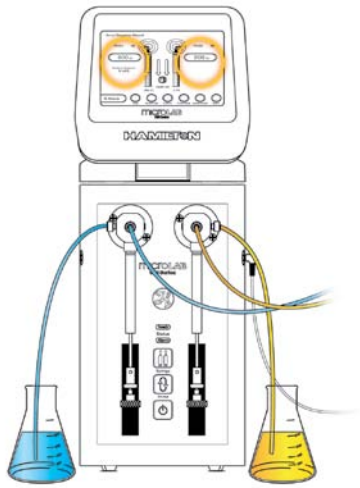
Solvent

Step 3. Trigger the hand probe to dispense the Solvent into a vial.



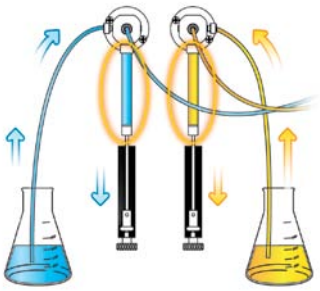
Dual Syringe Dispenser Method

Step 1. Program the desired dispense volume for Solvent 1 and Solvent 2.



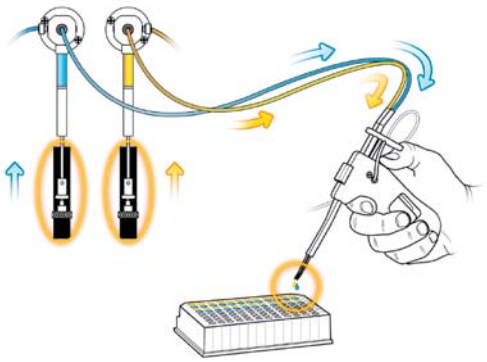
Solvent 1 Solvent 2

Step 2. Trigger the hand probe to fill the left and right syringes with Solvents 1 and 2.



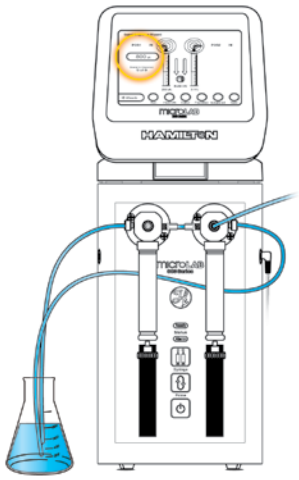
Solvent 1 Solvent 2

Step 3. Trigger the hand probe to dispense the left and right syringe into the same or separate vials.



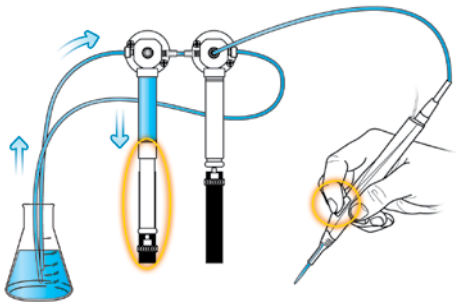
Continuous Dispenser Method

Step 1. Program the desired dispense volume.



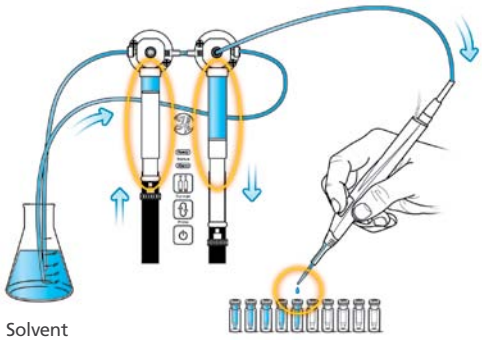
Solvent

Step 2. Trigger the hand probe to fill a syringe with Solvent.



Solvent

Step 3. Trigger the hand probe to dispense Solvent from the full syringe and fill Solvent into the empty syringe. One syringe is always filling while the other is dispensing.



Solvent

User Interface

Hamilton conducted Human Factor Studies in the pursuit of the ultimate user interface for the MICROLAB 600. The Quick Start Wizard gets you up and running for simple dilutions and dispenses. As application complexity increases, the Basic Controller can easily be upgraded to an Advanced Controller that utilizes Wizards to simplify the creation of complex methods.

Basic Controller

Quickly program simple diluting or dispensing applications. Use the Basic Run Screen to adjust the dispense volume and start dispensing.

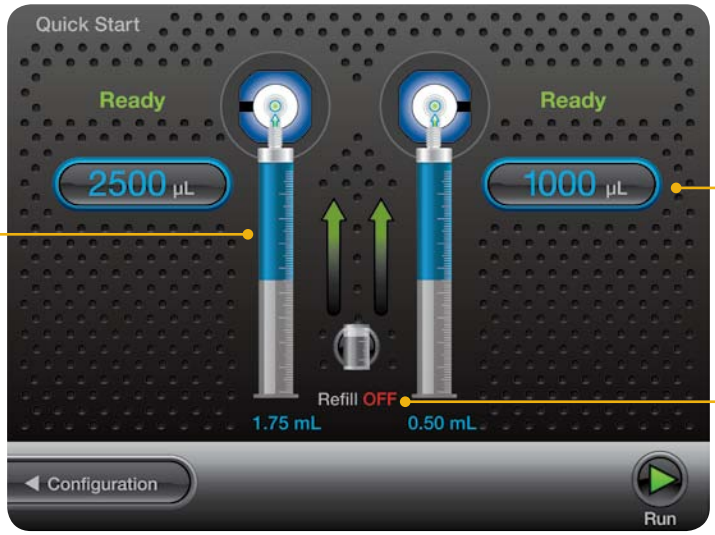
Advanced Controller

Upgrade the controller to create methods that use air gaps, washing, repetitive dispensing, and more. Store frequently used methods in the controller to save time and improve consistency.

Basic & Advanced Functionality Comparison

Features	Basic	Advanced
Quick Start Run Screen - Prime the instrument, program the desired dispense volume, and start dispensing.	✓	✓
Graphical Pump Status - Animations of the fluid path display the current and future state of the syringe pump.	✓	✓
Adaptive Dispense Control - Adjust dispense volumes on the fly and the instrument will calculate the remaining dispenses and the proper time to refill.	✓	✓
Wizards Menu - Dedicated wizards for Aliquot Dispensing, Serial Dispensing, Dilution, Pipetting, and Titration.		✓
Favorites Menu - Used to quickly recall frequently used Wizard setups.		✓
Custom Method Programming - For custom applications that are not covered by the standard Wizards.		✓
2 GB Capacity for Method Storage - Store, archive, and share methods written to the memory card.		✓
Software Upgrades - Downloadable software updates available online.		✓

Basic Quick Start



Graphical status of the current valve and syringe position

Press this button to adjust the dispense volume at any time

Toggle the Auto Refill Button ON and OFF

Advanced Software - Main Menu

Simulate Basic Controller functionality from the Advanced Controller

Edit and Run Custom Methods

Dedicated Wizards simplify common tasks

Reconfigure the pump hardware

Download a method to the pump, custom prime and check instrument diagnostics

Design Your Own Software for the MICROLAB 600

The standalone ML600 syringe pumps come with a CD containing the MICROLAB 600's Application Programming Interface (API). The API is compatible with Windows computers running .NET 2.0 framework. Quickly connect and start coding with example programs written in LabView, VB, and C#.

Stand Alone Pump Ordering Information

Part Number	Description
ML630	Single Syringe Pump no Controller or Accessories
ML635	Dual Syringe Pump no Controller or Accessories

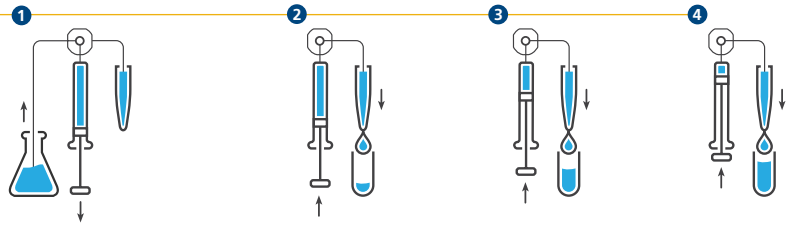
Wizards

To simplify programming of the MICROLAB 600, Wizards handle common dispensing and diluting applications. Frequently used settings can be saved as Favorites which can be quickly recalled from within any Wizard. Below is a brief description of the Wizards and diagrams of the common applications.

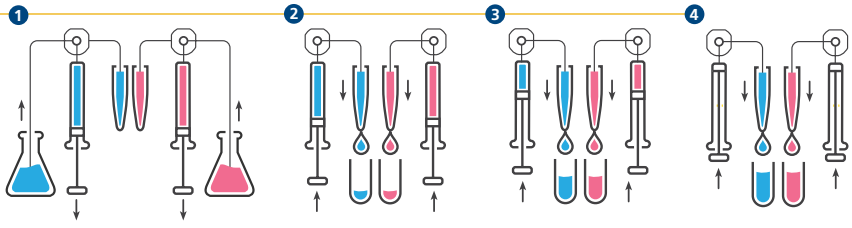
Aliquot Dispense Wizard

Repetitively dispense aliquots of the same volume at the press of a button.

Single Syringe Aliquot or Serial Dispense



Dual Syringe Aliquot or Serial Dispense



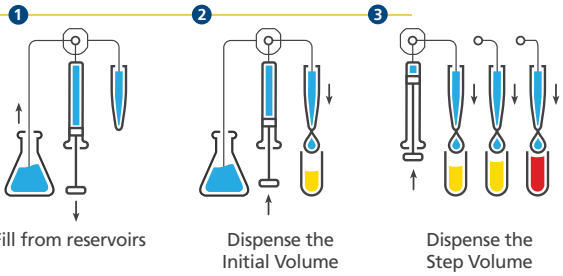
Serial Dispense Wizard

Repetitively dispense aliquots of differing volumes at the press of a button.

Titration Wizard

Slowly add liquid to another liquid until an endpoint is reached. An example of this application is adding acid or base to pH a buffer.

Titration

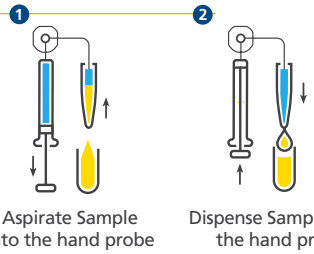


A large Initial Volume is dispensed to get close to the endpoint. Then a smaller Step Volume is dispensed until the endpoint is reached.

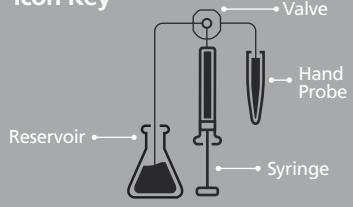
Pipette Wizard

Simulate a manual pipette used to transfer liquid from one vessel to the next.

Pipette



Icon Key



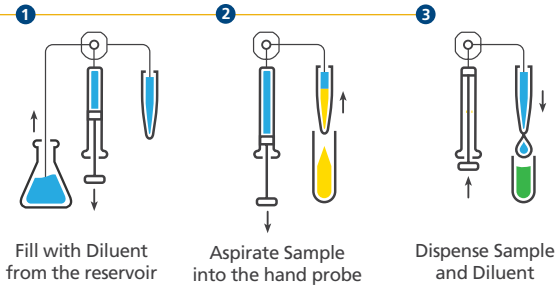
Color Guide

- Reagent 1 / System Fluid
- Reagent 2
- Sample
- Diluted Sample
- Standard
- Titration Endpoint
- Diluted Sample + Standard

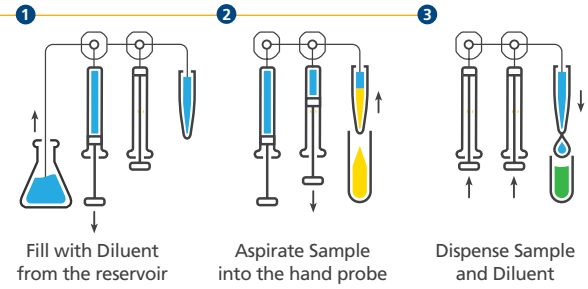
Dilution Wizard

Accurately dilute concentrated samples with diluent over a wide range of dilution ratios.

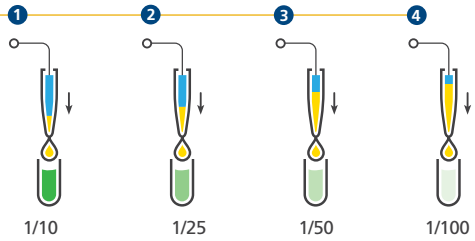
Single Syringe Dilution



Dual Syringe Dilution

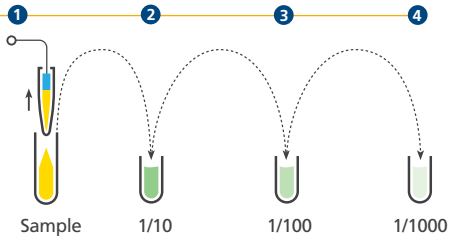


Serial Dilution (programmed)



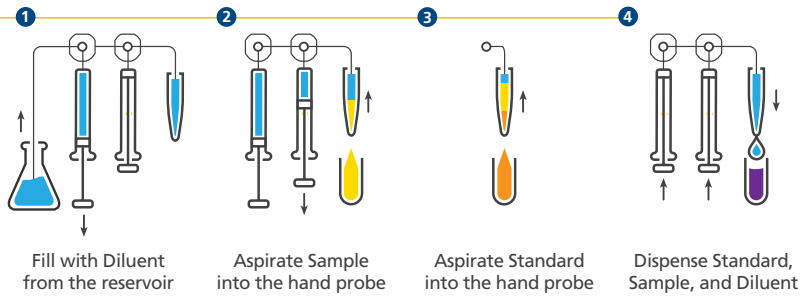
Repeat the steps for Single or Dual Dilution with varying dilution ratios and the same final volume.

Serial Dilution (tube to tube)



Repeat the steps for Single or Dual Dilution and use the resulting dilution as the sample for the next dilution.

Multi Sample Dilution (or Internal Standard Addition)

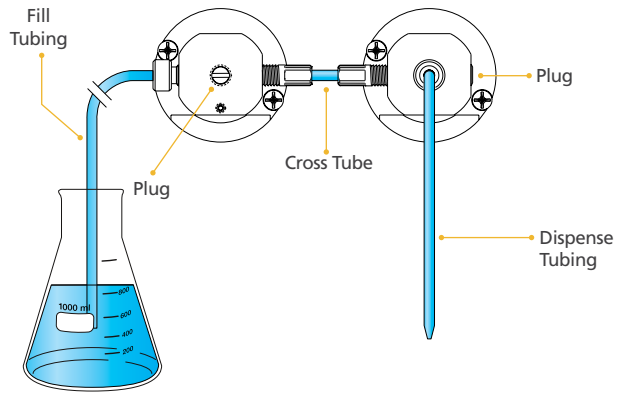


Ultimate Flexibility with the Universal Valves

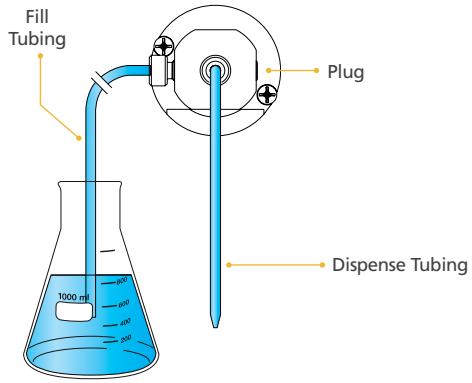
Innovative fluid logic enables the same Universal Valve to be used in all MICROLAB 600 dispensing and diluting applications. Interchange the valve plugs and tubing to achieve the following configurations in a matter of minutes.

Valve Plumbing based on instrument configuration

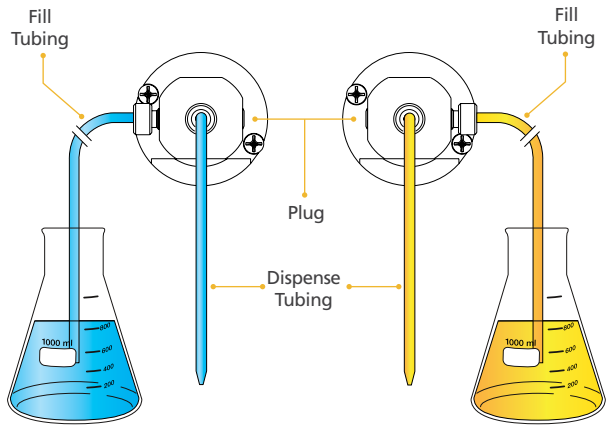
Dual Syringe Diluter



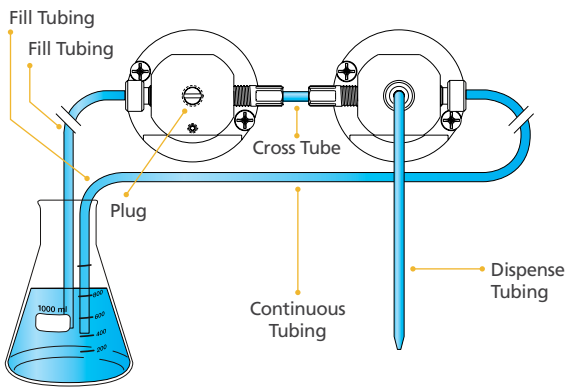
Single Syringe Dispenser



Dual Syringe Dispenser



Continuous Dispenser



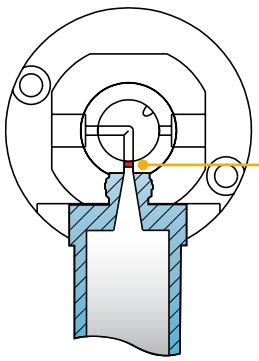
Bubble Free Prime (BFP) Syringes

For any syringe pump, the key to achieving the most accurate dispenses is eliminating all air from the fluid path. Traditional syringes trap approximately 50 µL of air between the tip of the syringe and the valve. For small syringes, this trapped air is the last to leave the syringe and the first to be drawn back in, making them difficult if not impossible to prime.

The Bubble Free Prime (BFP) syringe has a conical plunger tip that extends through the threaded termination and into the valve. This unique design expels the air from the syringe and valve decreasing the number of priming cycles required.

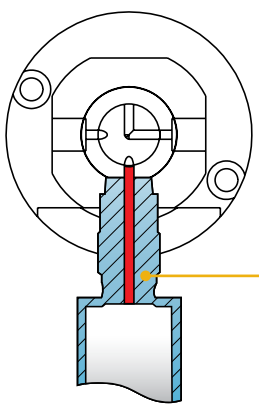
BFP vs. Standard Syringes

Bubble Free Prime Syringe



BFP Syringes eliminates the air from the fluid path.

Standard Syringe



Traditional TLL syringes trap approximately 50 µL of air, making small syringes nearly impossible to prime.

- Trapped Air
- Syringe
- Plunger

Accessories

Hand Probes, Foot Switch, and Disposable Tips

Concorde CT Hand Probe

(Standard with the Single Syringe Dispenser, Dual Syringe Diluter, and Continous Dispenser)

Luer Lock Conversion Kit (P/N 58381-01)

Disposable Tips

Disposable Tip Hand Probe

1–35 µL or 1–125 µL

Foot Switch

Large Volume Disposable Tip Hand Probe

Syringes

Dual Push Button Hand Probe

(Standard with the Dual Syringe Dispenser)

Selecting a Syringe:

Select the smallest syringe with a maximum volume that is greater than the largest volume to be dispensed. Ideally the smallest volume to be dispensed should fall within the optimal ranges listed above. The MICROLAB 600 can dispense volumes below the optimal range but there will be some impact on accuracy and precision. Contact a Hamilton sales representative for additional assistance.

Hand Probes, Foot Switch, and Disposable Tips

Part Number	Description
61401-01	Concorde CT Hand Probe
62541-01	Dual Push Button Hand Probe
62539-01	Disposable Tip Hand Probe 1–35 µL
62540-01	Disposable Tip Hand Probe 1–125 µL
11008-21	200 µL Disposable Tips Bulk
9766-01	300 µL Disposable Tips Racked (5 racks of 96)
62575-01	Large Volume Disposable Tip Hand Probe (5 mL)
75702	5 mL Disposable Tips (250/pk)
62576-01	Foot Switch

Syringes

Part Number	Syringe Size	Optimal Range
59000-05	10 µL	1–10 µL
59000-10	25 µL	2.5–25 µL
59000-15	50 µL	5–50 µL
59000-20	100 µL	10–100 µL
59000-25	250 µL	25–250 µL
59000-30	500 µL	50–500 µL
59000-35	1.0 mL	100–1.0 mL
59000-40	2.5 mL	250–2.5 mL
59000-45	5.0 mL	500–5.0 mL
59000-50	10.0 mL	1–10.0 mL
59000-55	25.0 mL	2.5–25.0 mL
59000-60	50.0 mL	5–50.0 mL

Valves, Power Supplies, Upgrade Kits, Tubing and Miscellaneous Accessories

Left Valve

Valve Plugs

Right Valve

Cross Tube

Power Cord

Power Supply

Software CD & SD Card

Fill & Dispense Tubing
(Dispense tubing has tapered end)

Universal Valve & Accessories

Part Number	Valve Assembly Description
60676-01	Left Valve Assembly
60675-01	Right Valve Assembly
61498-01	Valve Cross Tube Assembly
61729-01	Valve Plugs

Misc. Accessories

Part Number	Description
88990	Tubing Clips (5/pk)
61710-01	Accessory Holder & Tubing Wire Stand

Accessory Holder & Wire Stand

Tubing Clips

Power Supply & Power Cords

Part Number	Power Supply Voltage
61092-01	Universal (110–220 VAC)

Part Number	Power Cord Country	Diagram of Plug
355008	Switzerland	
3892-01	Continental Europe, Russia, Schuko	
3892-02	Australia, New Zealand, Argentina, China	
3892-03	UK, Ireland, Malaysia, Middle East	
3892-04	Japan	
3892-05	USA, Canada, Mexico, Central America, Brazil	

Upgrade Kit

Part Number	Upgrade Kit	Includes
61500-02	Basic to Advanced Controller Upgrade Kit	Advanced Manual, 2 GB SD Card, SD to USB Converter, Programmer Software CD
61500-03	Custom Programmer Kit (compatible with .Net 2.0)	Programmer Software CD with Programmer Manual, Application Programming Interface, and Example LabView, C#, and VB Programs

PTFE Tubing Assemblies

Part Number	Gauge	Type	Length	Internal Volume
61615-01	18	Fill Tubing	48" (1219 mm)	1.15 mL
240134	18	Dispense Tubing	54" (1372 mm)	1.29 mL
1174-02	18	Fill Tubing	Custom Length	0.94 µL/mm
1173-02	18	Dispense Tubing	Custom Length	0.94 µL/mm
61614-01	12	Fill Tubing	48" (1219 mm)	4.57 mL
240133	12	Dispense Tubing	54" (1372 mm)	5.15 mL
1172-02	12	Fill Tubing	Custom Length	3.75 µL/mm
1171-02	12	Dispense Tubing	Custom Length	3.75 µL/mm
61491-02	18	Continuous Fill Tubing		0.94 µL/mm
61491-01	12	Continuous Fill Tubing		3.75 µL/mm

Ordering Information:

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