

Technical Information

Technical Specifications

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The Controller

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.

A Hardware Key unlocks the Advanced functionality including Wizards and Custom Methods. 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 (15cm 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	24VDC, 2.5A
Dimensions	2.25 x 6.5 x 7 inch (57.2 x 165.1 x 177.8mm) in down position
Weight	1.9 lbs (0.86 kg)



- 1 Touch Screen
- 2 Screen tilts for viewing comfort
- 3 Hardware Key
- 4 Ethernet
- 5 Device Expansion
- 6 Host USB
- 7 Slave USB
- 8 Power Cord jack

The Syringe Pump

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.



- 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
- 5 Fanless Heat Vent
- 6 24 Volt Power Input
- 7 CAN Daisy Chain Input/Output
- 8 RS-232 Console Port
- 9 Power over Ethernet (PoE)
- 10 TTL Input/Output

Syringe Pump Specifications

Specifications	Microlab 600 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)

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Accuracy and Precision

General Microlab 600 Accuracy & Precision

Syringe Size (µL)	Percent Stroke	Accuracy (± %)	Precision (%)
10	5% ≤ Stroke < 30%	3.0	2.0
	30% ≤ Stroke	2.0	0.2
25	5% ≤ Stroke < 30%	3.0	2.0
	Stroke = 30%	1.5	0.2
	Stroke = 100%	1.0	0.2
50	5% ≤ Stroke < 30%	2.0	1.0
	Stroke = 30%	1.0	0.2
	Stroke = 100%	1.0	0.2
100	5% ≤ Stroke < 30%	3.0	1.5
	Stroke = 30%	1.2	0.5
	Stroke = 100%	1.0	0.2
250	5% ≤ Stroke < 30%	3.0	1.5
	Stroke = 30%	1.2	0.5
	Stroke = 100%	1.0	0.2
500	1% ≤ Stroke < 5%	3.0	1.5
	5% ≤ Stroke < 30%	1.2	0.5
	Stroke = 30%	1.0	0.2
	Stroke = 100%	1.0	0.2
1,000 & larger	1% ≤ Stroke < 5%	3.0	1.5
	5% ≤ Stroke < 30%	1.2	0.5
	Stroke = 30%	1.0	0.2
	Stroke = 100%	1.0	0.2

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Syringe Flow Rates

Syringe Flow Rates

Syringe Volume (µL)	Part Number	Optimal Range (µL)	Flow Rate (µL/sec)		
			Recommended	Minimum	Maximum
10	59000-05	1.0–10	5	0.003	6.5
25	59000-10	2.5–25	12.5	0.007	16.5
50	59000-15	5–50	25	0.014	33
100	59000-20	10–100	50	0.03	66.5
250	59000-25	25–250	125	0.07	166.5
500	59000-30	50–500	250	0.14	333
1,000	59000-35	100–1,000	500	0.3	665
2,500	59000-40	250–2,500	625	0.7	1,250
5,000	59000-45	500–5,000	1250	1.4	2,500
10,000	59000-50	1,000–10,000	2500	3	5,000
25,000	59000-55	2,500–25,000	3125	7	6,000 ¹
50,000	59000-60	5,000–50,000	3125	14	6,000 ¹

1 - For these syringes it may be required to cut the tip of the dispense tube off to avoid stalling the instrument

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Chemical Compatibility

Chemical Compatibility

The Microlab 600's fluid path consists of PTFE-based materials (PTFE and CTFE) and borosilicate glass. These materials are resistant to a wide variety of acids and bases at room-to-moderate temperatures. Most chemicals do not affect PTFE at normal operating temperatures.

Important: Do not use the Microlab 600 for prolonged periods at high temperatures with aromatic or highly halogenated compounds. These compounds may cause the Microlab 's fittings to swell, adversely affecting performance and reducing the life of system components. Below is a chemical compatibility chart.

If you have any questions about chemical resistance to specific compounds, please contact Hamilton Company; check out any unusual or reactive compounds before using them with your Microlab 600 system.

The following table contains information about chemical reactivity with the Microlab 600 system at room temperature.

Legend

0 = No data available

A = No effect, excellent

B = Minor effect, good

C = Moderate effect, fair

D = Severe effect, not recommended

Chemical	PTFE	Borosilicate Glass	CTFE (Kel-F)
Acetaldehyde	A	A	A
Acetates	A	B	A
Acetic Acid	A	A	A
Acetic Anhydride	A	0	A
Acetone	A	A	A
Acetyl Bromide	A	0	0
Ammonia	A	A	A
Ammonium Hydroxide	A	0	A
Ammonium Phosphate	A	0	A
Ammonium Sulfate	A	0	A
Amyl Acetate	A	A	A
Aniline	A	A	A
Benzene	A	A	B-C
Benzyl Alcohol	A	A	A
Boric Acid	A	0	A
Bromine	A	A-B	A
Butyl Acetate	A	A	A
Butyl Alcohol	A	A	B
Carbon Sulfide	A	A	A
Carbon Tetrachloride	A	A	B-C
Chloroacetic Acid	A	A	A
Chlorine, liquid	A	A	B
Chlorobenzene	A	0	B
Chloroform	A	A	B
Chromic Acid	A	A	A
Cresol	A	A	A
Cyclohexane	A	A	B
Ethers	A	A	B
Ethyl Acetate	A	A	B-C

Ethyl Alcohol	A	A	0
Ethyl Chromide	A	0	B
Ethyl Ether	A	0	A-B
Formaldehyde	A	A	A
Formic Acid	A	A	A
Freon, 11, 12, 22	A	A	B-C
Gasoline	A	A	A
Glycerine	A	A	A
Hydrochloric Acid	A	A	A
Hydrochloric Acid (conc)	A	A	A
Hydrofluoric Acid	A	D	B
Hydrogen Peroxide	A	A	B
Hydrogen Peroxide (conc)	A	A	B
Hydrogen Sulfide	A	0	A-B
Kerosene	A	A	A
Methyl Alcohol	A	A	A
Methyl Ethyl Ketone (MEK)	A	A	A-B
Methylene Chloride	A	A	B
Naphtha	B	0	A
Nitric Acid	A	A	A
Nitric Acid (conc)	A	A-B	A-B
Nitrobenzene	A	A	A-B
Phenol	A	A	B
Pyridine	A	0	A
Silver Nitrate	A	A	B
Soap Solutions	A	A	A
Stearic Acid	A	A	0
Sulfuric Acid	A	A	A
Sulfuric Acid (conc)	A	A	A
Sulfurous Acid	A	0	A-B
Tannic Acid	A	0	A-B
Tanning Extracts	0	0	0
Tartaric Acid	A	0	B
Toluene	A	A	B
Trichlorethane	A	A	B
Trichloroethylene	A	A	B-C
Turpentine	A	A	A
Water	A	A	A
Xylene	A	A	B-C

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Cleaning and Maintenance

Cleaning & Maintenance

Caring for the **Microlab 600**

This page contains instructions on routine maintenance procedures for the **Microlab 600**, including the following topics:

- Deciding when to clean the Microlab 600.
- Cleaning the fluid path of the Microlab 600.
- Cleaning syringes and tubing.
- Cleaning the exterior of the Microlab 600.
- Storing the Microlab 600.

Note: Call Hamilton Company's Technical/Customer Service Department if you have questions about maintaining your Microlab 600 system.

Deciding When to Clean the Microlab 600.

How often you clean the **Microlab 600** depends upon how you use the instrument and what you use in it.

We recommend that, if you use the instrument daily, the tubing and syringes should be purged and primed at the end of each experiment and each work shift. Clean the system by flushing it with Hamilton Syringe Cleaner, ethanol or a with a 10% chlorine bleach and deionized water solution.

Avoid using caustic or acidic cleaning solutions.

***Important:** Leave the syringes and tubing filled with deionized water overnight. This is important if you are using buffers or other salt solutions which could accumulate or crystallize in the system. If buffers or other salt solutions are left in the fluid path overnight, crystals may form and damage the syringe plunger tip.

*See "Cleaning the Fluid Path of **Microlab 600**" for complete details on cleaning the fluid path. **If you still have questions, contact Hamilton Company Technical Support Department.**

Cleaning the Fluid Path of the Microlab 600.

Clean the **Microlab 600**'s fluid path before using it for the first time. Use Hamilton Syringe Cleaning Solution to clean the fluid path. Click here (</products/syringes-and-needles/syringe-accessories/syringe-care/cleaning-concentrate>) for information on ordering Hamilton Syringe Cleaner.

To clean the fluid path, follow these steps:

1. Prepare a reservoir of cleaning fluid and place the fill tubing in the cleaning fluid reservoir. Use a tubing clip to secure the tubing to the side of the reservoir.
2. Place the hand probe into the cleaning fluid reservoir.
3. Press the Prime button to begin the prime cycle.
4. Continue the priming cycle until the fluid path is clean. The number of cycles needed to clean the fluid path will depend on the sizes of the syringe(s) and the level of contamination in the system. A good estimate is 5-10 cycles of the syringe or 5-10 times the internal volume of the fill and dispense tubing.
5. When the fluid path is clean, press the Prime button to stop the priming cycle.
6. Move the fill tubing from the cleaning fluid reservoir and replace it into a reservoir of deionized water.
7. Press the Prime button to continue the priming cycle.
8. Continue the priming cycle until the fluid path is free of all cleaning fluid. Dispense the rinse fluid into a waste reservoir.
9. The system is now clean and ready for use.

Note: If you have questions on cleaning the fluid path contact Hamilton Company Technical Support.

Cleaning Syringes and Tubing.

Warning! Follow your laboratory's safety procedures if you use the **Microlab 600** system to handle hazardous materials.

When tubing and syringes come in contact with contaminated or hazardous samples, follow safe laboratory practices in selecting and using a cleaning fluid to flush out the tubing and syringes. Purge, clean and decontaminate the **Microlab 600** by thoroughly flushing out all portions of the tubing and syringes.

Use a cleaner that is compatible with the fluids previously run through the system. Depending on the sample that is being run, you may want to use de-ionized water, urea, ethanol or a 10% chlorine bleach and deionized water solution as a cleaning fluid.

If you still have questions, contact Hamilton Company's Technical/Customer Service Department.

Cleaning the Exterior of the Microlab 600.

Warning! Follow your laboratory's safety procedures if you use the **Microlab 600** system to handle hazardous materials.

The **Microlab 600** housing is moderately inert to chemical exposure. However, some chemicals may discolor the surface of the unit. If a spill occurs on the instrument's exterior, wipe the surface immediately. Wash the surface using a damp cloth with water and soap. Then dry the area. Take care that liquids do not enter the interior of the **Microlab 600**.

To disinfect the exterior surface, wipe it down with a 10% chlorine bleach and deionized water solution. Then dry the area.

Note: The cleaning instructions presented here are meant as a guide only. If your particular applications require different cleaning solutions, contact Hamilton Company for more information.

Storing the Microlab 600.

For long-term storage, prime and purge the system with methanol to facilitate drying. Remove the tubes and syringes. Cover the instrument to protect it from damage. Store syringes in their original containers.

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Microlab 600 Wizards

Built-in Wizards



(/products/laboratory-products/laboratory-instruments/microlab-600-diluter-dispenser/about-the-microlab-600/software/microlab-600-wizards/dilution-wizard)

Dilution Wizard

Achieve analytical dilutions by inputting only 2 parameters like sample volume and diluent volume or dilution factor and final volume. Additional parameters like air gaps and wash volumes are easily input.



(/products/laboratory-products/laboratory-instruments/microlab-600-diluter-dispenser/about-the-microlab-600/software/microlab-600-wizards/aliquot-dispense-wizard)

Aliquot Dispense Wizard

Enter the desired dispense volume and go. The instrument determines when the syringe needs to refill. Dispense volume can be changed on the fly.



(/products/laboratory-products/laboratory-instruments/microlab-600-diluter-dispenser/about-the-microlab-600/software/microlab-600-wizards/serial-dispense-wizard)

Serial Dispense Wizard

Program a series of dispense volumes and the Microlab 600 will execute the dispenses and determine when to refill. Press the hold button to dispense the same volume multiple times before proceeding to the next volume on the list.



(/products/laboratory-products/laboratory-instruments/microlab-600-diluter-dispenser/about-the-microlab-600/software/microlab-600-wizards/titration-wizard)

Titration Wizard

Dispense an initial volume to get you close and then a step volume to slowly titrate to the end point. The instrument keeps track of the total volume used during the titration.



(/products/laboratory-products/laboratory-instruments/microlab-600-diluter-dispenser/about-the-microlab-600/software/microlab-600-wizards/pipette-wizard)

Pipette Wizard

Use for simple sample transfers from one container to another.

Additional Wizard Plug-ins



(/products/laboratory-products/laboratory-instruments/microlab-600-diluter-dispenser/about-the-microlab-600/software/microlab-600-wizards/disposable-tip-hand-probe-dilution-wizard)

Dilution Wizard for the DTHP

Viscous liquids like blood may need compensation or reverse pipetting to achieve



(/products/laboratory-products/laboratory-instruments/microlab-600-diluter-dispenser/about-the-microlab-600/software/microlab-600-wizards/multi-sample-dilution-wizard-concorde-ct-probe)

Multi-Sample Dilution Wizard

This wizard was developed for applications that require the mixing of



(/products/laboratory-products/laboratory-instruments/microlab-600-diluter-dispenser/about-the-microlab-600/software/microlab-600-wizards/multi-sample-dilution-wizard-dthp)

Multi-Sample Dilution Wizard For the DTHP

This wizard was developed for

accurate dispenses with the Disposable Tip Hand Probe (DTHP). This plug-in enables options to tweak the pipetting to achieve exception accuracy with these difficult liquids.

3 or more solutions in the same reaction. Solutions are aspirated into the Concorde Hand Probe.

applications that require the mixing of 3 or more solutions in the same reaction. Solutions are aspirated into the Disposable Tip Hand Probe (DTHP).

The additional plug-ins are only compatible with the new controller when running software revision 5003 or later.

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Troubleshooting

Microlab 600 Diluter & Dispenser Troubleshooting

Please read this page as some problems may be easily resolved by using the information found in the message code and troubleshooting guides.

Quick answers to help you troubleshoot your Microlab 600.

Instrument does not power ON
Instrument functions normally, but display screen fails to illuminate
Instrument does not fill or dispense
Instrument gives inaccurate or imprecise results
Small air gap appears at tip of probe tubing after final aspiration
Persistent air or leaks in the fluid path
Unit is overheated

Instrument does not power ON

Probable Cause 1:	Corrective Action:
Disconnected power cord or faulty power outlet.	Connect power cord and check power source.

Probable Cause 2:	Corrective Action:
Main fuses are blown.	Check main fuses on instrument's rear panel; replace fuses if necessary.
Faulty power supply.	Check the power supply to see if the light is on when plugged in.

Instrument functions normally, but display screen fails to illuminate

Probable Cause 1:	Corrective Action:
Controller unit not plugged in drive unit.	Check to see that the controller unit is plugged into the drive unit.

Probable Cause 2:	Corrective Action:
Faulty LCD.	Call the Hamilton Service Department. The PoE may be turned Off.

Instrument does not fill or dispense

Probable Cause 1:	Corrective Action:
Faulty or blocked tubing; blocked or leaky fluid path.	Check tubing, valve, and syringes for blockages, crimps or loose fittings; replace tubing; either replace or reseal valve and syringes; tighten valve and syringes.

Probable Cause 2:	Corrective Action:
Incorrect tubing or syringe connections.	Check that appropriate tubing, fittings and syringes are used and that they are finger-tight.

Probable Cause 3:	Corrective Action:
Faulty controller.	Call the Hamilton Service Department.

Probable Cause 4:	Corrective Action:
Non-functional syringe drive(s).	Call the Hamilton Service Department.

Probable Cause 5:	Corrective Action:
Valves do not rotate (valve drives are not engaged or valve is faulty).	Remove and reinstall the valve or replace the valve.

Instrument gives inaccurate or imprecise results

Probable Cause 1:	Corrective Action:
Air exists in the fluid path.	<p>Check to see that tubing ends are totally submerged in reagent bottle(s).</p> <p>Check to see that tubing connections are tight; replace if necessary.</p> <p>Check to see that the syringe is installed correctly and that is not leaking.</p> <p>Replace worn or leaking valve or tubing.</p> <p>Reduce the syringe drive speed to eliminate cavitation problems.</p>

Probable Cause 2:	Corrective Action:
Incorrect size of dispense tubing used with syringe.	<p>Check for correct tubing and fittings.</p> <p>Use small tapered tubing (18-gauge) for small dispense volumes.</p>

Small air gap appears at tip of probe tubing after final aspiration

Probable Cause 1:	Corrective Action:
Dirty tubing.	Change or clean the tubing.

Probable Cause 2:	Corrective Action:
Improper aspiration.	Lower the aspiration speed.

Persistent air or leaks in the fluid path

Probable Cause 1:	Corrective Action:
Cavitation is occurring; syringe drive speed is too high for the current liquid.	Reduce syringe drive speed, use lower drive speeds for viscous liquids.

Probable Cause 2:	Corrective Action:
Loose, worn, or incorrect tubing fittings.	Hand-tighten the fittings or replace old tubing with new or correct-size tubing.

Probable Cause 3:	Corrective Action:
Damaged syringe plunger tip.	Replace plunger or syringe.

Probable Cause 4:	Corrective Action:
Damaged valve.	Replace valve.

Unit is overheated

Probable Cause 1:	Corrective Action:
Inadequate ventilation, room temperature too high, or duty cycle too high.	<p>The unit is overheated, power it OFF and allow it to cool down.</p> <p>Resume use at a lower duty cycle.</p> <p>See Appendix A, Technical Specifications in the Basic manual, for information about</p>

appropriate environmental condition.

Technical Information

Diluter/Dispenser FAQs

Microlab 600 Diluter & Dispenser FAQs

Common Questions

How can I determine the accuracy for my Hamilton Microlab 600?

What can I do if I am getting corrosion and crystallization in my syringe(s) and valve(s) from my saline/salt based solutions?

How tight should fittings on the valve be?

When will the valve need to be replaced?

My Microlab 600 is making strange noises, what should I do?

How often should I calibrate my Microlab 600?

How do I clean and maintain my Microlab 600?

What is the recommended preventative maintenance schedule for the Microlab 600 instruments?

How can I determine the accuracy for my Hamilton Microlab 600?

Hamilton has developed a gravimetric method for determining the accuracy of our Microlab 600. Click here for the procedure (</~/media/Files/Microlab 600/Microlab 600 IQ OQ PQ.ashx>).

What can I do if I am getting corrosion and crystallization in my syringe(s) and valve(s) from my saline/salt based solutions?

Salts, including saline are as rough or rougher on the Microlab 600's than concentrated acids. Make sure to flush the system thoroughly when you are finished using the instrument. Remove the syringes, valve, and tubing so the components can air dry.

How tight should fittings on the valve be?

The fittings should only be finger tight or 13 ounce inches. Over tightening the fitting will cause the valve to rotate, rub the fitting and ultimately cause the valve to fail. This is a leading cause of premature valve failures.

When will the valve need to be replaced?

The Microlab valves may last for several years depending on use. Eventually they need to be replaced from normal wear and tear. Below are common signs the valve needs to be replaced:

1. The instrument is drawing fluid from the incorrect side of the valve.
2. The instrument becomes less accurate and or precise (changes in the coefficient of variation).
3. The tip of the probe is dripping.
4. An air gap forms at the tip of the probe.

My Microlab 600 is making strange noises, what should I do?

When a Microlab 600 starts to make noise, it needs to be serviced. A squealing sound indicates a lack of lubrication on the lead screw. A grinding sound indicates a bearing has failed. Please call the Hamilton Service Department to discuss your service options

How often should I calibrate my Microlab 600?

Every user has different applications and requirements for calibration, but a general rule, calibrate the instrument on the same interval used for analytical balances. (Generally once or twice per year)

How do I clean and maintain my Microlab 600?

Hamilton has outlined the cleaning and maintenance for the Microlab 600 in the Basic manual, Chapter 4. Click here for the details (/technical-information/microlab-600_cleaning-and-maintenance).

What is the recommended preventative maintenance schedule for the Microlab 600 instruments?

The maintenance schedule is determined by the frequency of use and the types of solvents being used.

1. For instruments in production environments where they are used constantly all day every day, the instruments should be serviced at least once every year.
2. For less frequently used instruments, service is recommended every 1-2 years.

Regular service includes cleaning of the internal components, adjustment of the motors, etc and is necessary for the proper, accurate, and continuous operation of the

instrument.

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