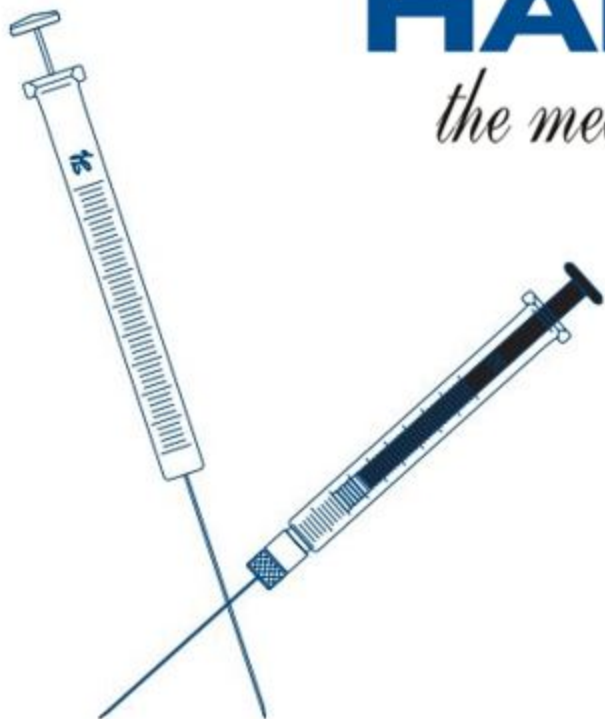


# HAMILTON

*the measure of excellence*



This combined document includes a brochure for all of the following areas for Hamilton:

- HAMILTON Syringe Selection Guide
- HAMILTON Life Science Syringes
- HAMILTON Instrument Syringes
- HAMILTON 7000 Series Syringes

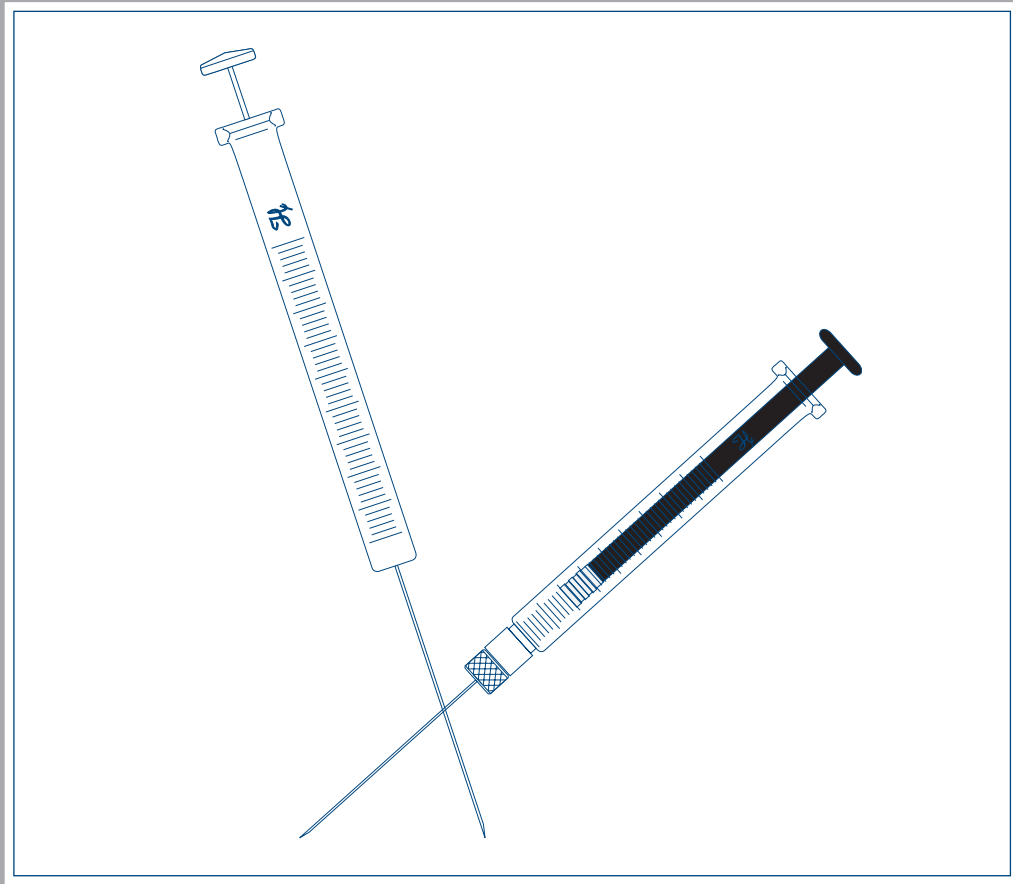
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# SYRINGE SELECTION



**Complete Guide to Selecting the Right  
Hamilton GASTIGHT®, MICROLITER™, and  
Specialty Syringe for Your Application**



**HAMILTON**   
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# Introduction

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Hamilton syringes are the finest quality precision fluid measuring devices available. We offer the most complete selection of syringes on the market for use in applications that range from simple liquid transfers to animal injections to complex GC and HPLC chromatographic injections.

In this guide, all the information needed to select the right syringe for manual applications is presented. In addition, Hamilton offers a complete line of syringes for use with instrumentation such as autosamplers and syringe pumps, including replacement syringes for pumps produced by other manufacturers. Top quality materials and skilled workmanship ensure that Hamilton syringes consistently deliver the highest possible performance for reliable analyses.

Our syringes are accurate to within  $\pm 1\%$  of nominal volume with a precision of 1% at 80% of the total volume. The fluid path of a Hamilton syringe is designed to be chemically inert with stainless steel, borosilicate type I glass, and PTFE used for most syringes. N.I.S.T. traceable certification is available, as an additional service, for the majority of the syringes in our product line.

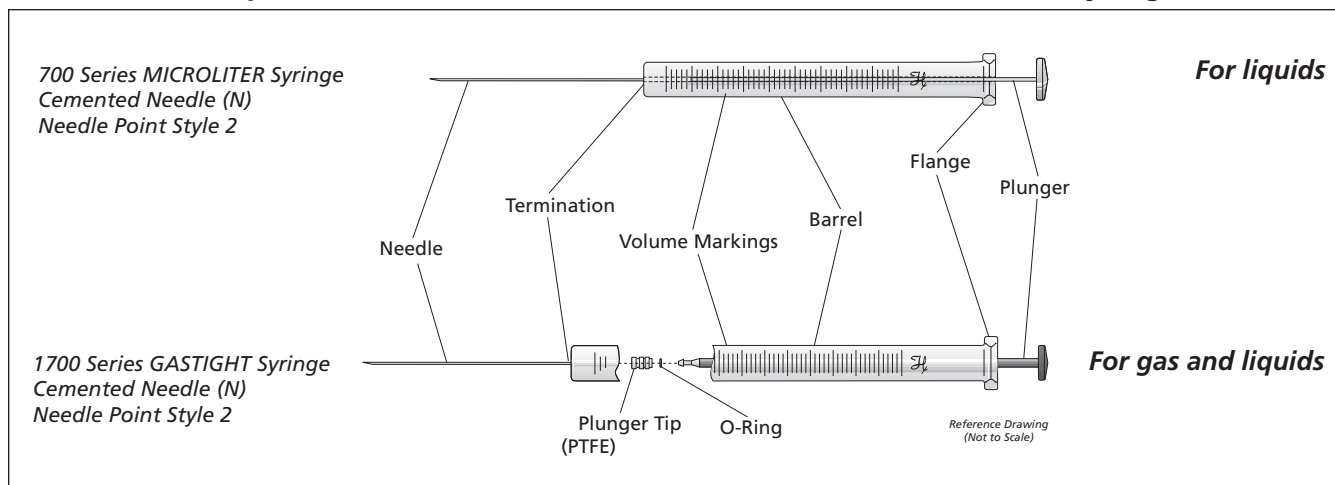
All Hamilton products are unconditionally guaranteed to be free of defects in materials and workmanship for one year (12 months) from date of purchase. The Hamilton Company Quality System is ISO 9001-2000 Certified. Syringes and needles manufactured by Hamilton Company are intended for scientific research and laboratory use only and are not intended for human in vivo use. Consult our published specifications to determine the material compatibility of Hamilton products with your application.

Hamilton continuously researches new materials and methods to improve form, fit, and function of our syringes, so you can be confident that when you buy from Hamilton you are on the cutting edge. For the latest information on new products, detailed product and part descriptions, published specifications, and our *Guide to Maintaining and Using Hamilton Syringes*, please visit [www.hamiltoncompany.com](http://www.hamiltoncompany.com)



# Syringe Schematics

## Examples of Hamilton MICROLITER and GASTIGHT Precision Syringes



MICROLITER syringes have a stainless steel plunger which is individually hand-fitted to its matching glass barrel. The hand-fitting process is finely controlled to create a liquid-tight seal between the barrel and the plunger. Plungers for MICROLITER syringes cannot be interchanged or replaced if damaged.

GASTIGHT syringes have a precision machined PTFE plunger tip which provides a tight seal for both liquids and gases. Replacement plunger assemblies are available for most GASTIGHT syringes.

## Selecting the Right Syringe for Your Application Step-by-Step Guide

Hamilton offers seven core series with a wide range of delivery volumes, termination types, needle gauges, and needle point styles plus numerous speciality syringes. Hamilton's syringe series are grouped by sample type, application, and volume range. Our syringes are further supported by an array of accessories to improve durability and reproducibility.

Use our five-step guide and worksheet to choose the ideal syringe for your application. The next page is a blank Hamilton Syringe Selection Worksheet. The blank

worksheet is followed by a sample of a completed worksheet. Instructions for using the worksheet are included on the form. Once the worksheet is completed, you can fully describe the syringe needed for your application.

Note: you may want to make copies of the blank worksheet for future use or you can download a copy by visiting [www.hamiltoncompany.com](http://www.hamiltoncompany.com)

# Hamilton Syringe Selection Worksheet

To use this worksheet, first define the sample type and required dispensing volume. Next, read each step, and for additional details go to the appropriate reference section in this guide. Choose the feature needed and, enter your selection on the worksheet. On completion, this

worksheet will fully describe the Hamilton syringe needed for your application. Visit [www.hamiltoncompany.com](http://www.hamiltoncompany.com) to identify the part number or call 1-888-525-2123 for Hamilton Customer Service assistance. Call your local dealer for assistance outside the U.S.

## Steps to Choosing a Syringe

1. See *Syringe Types, pg. 7*, to decide whether a GASTIGHT or a MICROLITER syringe is best for the application.

Note: GASTIGHT syringes are recommended for viscous samples. With MICROLITER syringes, it is possible for air to slip past a plunger as a vacuum is created.

2. Use the *Syringe to Series Chart, pg. 8*, to determine the available syringe series in the volume range needed.
3. See the *Series Descriptions, pg. 9*, to determine the most appropriate series, and the available volumes and terminations for that series.
4. See *Terminations, pg. 13*, to determine the most suitable termination.
5. See *Needle Selection, pg. 15*, to determine the most appropriate needle if a termination or application requires the selection of a specific needle.
  - a. Standard Needles. Most Hamilton syringes are available with 2 in. needles of an appropriate gauge with either Point Style 2 (sharp point) or Point Style 3 (blunt point).
  - b. Custom Needles. If the application requires a non-standard length, gauge or point style, then Hamilton offers several custom options. See *Custom Needles, pg. 15*, to determine the appropriate needle for any application.

## Your Selection

1. GASTIGHT \_\_\_\_\_  
MICROLITER \_\_\_\_\_  
Your dispensing volume in  $\mu\text{L}$  \_\_\_\_\_
2. Series available \_\_\_\_\_  
\_\_\_\_\_
3. Series selected \_\_\_\_\_  
Volume selected \_\_\_\_\_  
Terminations available \_\_\_\_\_  
\_\_\_\_\_
4. Terminations selected \_\_\_\_\_
5. Standard Needle  
Point Style 2 \_\_\_\_\_  
Point Style 3 \_\_\_\_\_  
Custom Needle  
Gauge \_\_\_\_\_  
Length in inches \_\_\_\_\_  
Point Style \_\_\_\_\_  
Needle Hub \_\_\_\_\_

## The Right Hamilton Syringe for My Application is:

\_\_\_\_\_ Type          \_\_\_\_\_ Series          \_\_\_\_\_ Volume          \_\_\_\_\_ Termination          \_\_\_\_\_ Needle

# Example of Completed Worksheet

*In this example, Jane needs a syringe that is capable of doing nine rapid 10 µL injections of a blood serum solution for a nitric oxide study using GC analysis.*

## Steps to Choosing a Syringe

1. See *Syringe Types, pg. 7*, to decide whether a GASTIGHT or a MICROLITER syringe is best for the application.

*Jane's sample is a liquid, but it is viscous and contains numerous dissolved components that over time could cause a fitted plunger to freeze, so she elects to use a GASTIGHT syringe.*

2. Use the *Syringe to Series Chart, pg. 8*, to determine the available syringe series in the volume range needed.

*Using the chart, she determines that syringes in the 1700 and 1800 series are available in her volume range.*

3. See the *Series Descriptions, pg. 9*, to determine the most appropriate series, and the available volumes and terminations for that series.

*From the descriptions, she determines that although the 1700 series would work, the 1800 series has a supported plunger which eliminates the chance of bending the fragile plunger during the nine rapid injections. She selects the appropriate volume and lists the terminations available for the 1800 series syringes.*

4. See *Terminations, pg. 13*, to determine the most suitable termination.

*She sees that the 1800 series syringes are available with either Cemented Needle or Removable Needle terminations. She determines that a Removable Needle is the most appropriate termination because if her serum sample clogs the needle she can replace the needle and not the whole syringe.*

5. See *Needle Selection, pg. 15*, to determine the most appropriate needle if a termination or application requires the selection of a specific needle.

*Since a standard needle is suitable for her application, Jane does not need to supply information for a custom needle.*

## Your Selection

1. GASTIGHT     **X**    

MICROLITER                     

Your dispensing volume in µL     **10 µL**    

2. Series available     **1700 and 1800**    

3. Series selected                     **1800**                    

Volume selected                     **10 µL**                    

Terminations available     **N and RN**    

4. Terminations selected                     **RN**                    

5. Standard Needle  
Point Style 2                     **X**                    

Point Style 3                     

## The Right Hamilton Syringe for My Application is:

    **GASTIGHT**      
Type

                    **1800**                      
Series

                    **10 µL**                      
Volume

                    **RN**                      
Termination

                    **Std. Point Style 2**                      
Needle

*Jane calls Hamilton Customer Service and orders a GASTIGHT 1800 series 10 µL syringe with a RN hub and a standard sharp needle (Point Style 2).*

# 1. Syringe Types

---

Key to selecting the right syringe for your application is to identify your sample type and determine the smallest volume to be dispensed or injected. Hamilton offers two types of syringes, GASTIGHT and MICROLITER, which differ in the design of the plunger.

## **GASTIGHT Syringes for Gases and Liquids**

GASTIGHT syringes have a precision-machined PTFE plunger tip which creates a leak-free seal. With the tight fit, the tip essentially wipes the interior of the syringe barrel free of sample. This feature is particularly useful with heterogeneous samples as it reduces the chance that a deposit will occur and cause the plunger to freeze.

The GASTIGHT series still requires careful and regular cleaning to minimize deposits on the glass which might score the soft PTFE plunger tip and resulting in a leak. Replacement plunger assemblies are available for GASTIGHT syringes. However, a replacement plunger should not be put into a barrel which still contains deposits because the new plunger tip is likely to be scored by the deposit after only a few strokes. It is important to remember that over time, the increased friction created by the tight seal may cause the PTFE tip to wear out and the plunger will have to be replaced.

## **MICROLITER Syringes for Liquids**

MICROLITER syringes incorporate a hand-fitted stainless steel plunger with a finely bored syringe barrel. These syringes are ideal for homogenous samples that are not prone to precipitation or bonding with glass.

Under the proper conditions, plunger wear is minimal and the life of a MICROLITER syringe is almost unlimited. However, when using heterogeneous solutions with a MICROLITER syringe, the user must be especially diligent about cleaning the syringe after each use. For more information, see our *Guide to Maintaining and Using Hamilton Syringes*.

In some cases, even diligent cleaning is not sufficient and the barrel will become soiled. The deposits on the glass will compromise the tight tolerances between the glass and the plunger resulting in a frozen plunger. Plungers for MICROLITER syringes cannot be interchanged or replaced if damaged. For heterogeneous solutions, a GASTIGHT syringe is the best option.

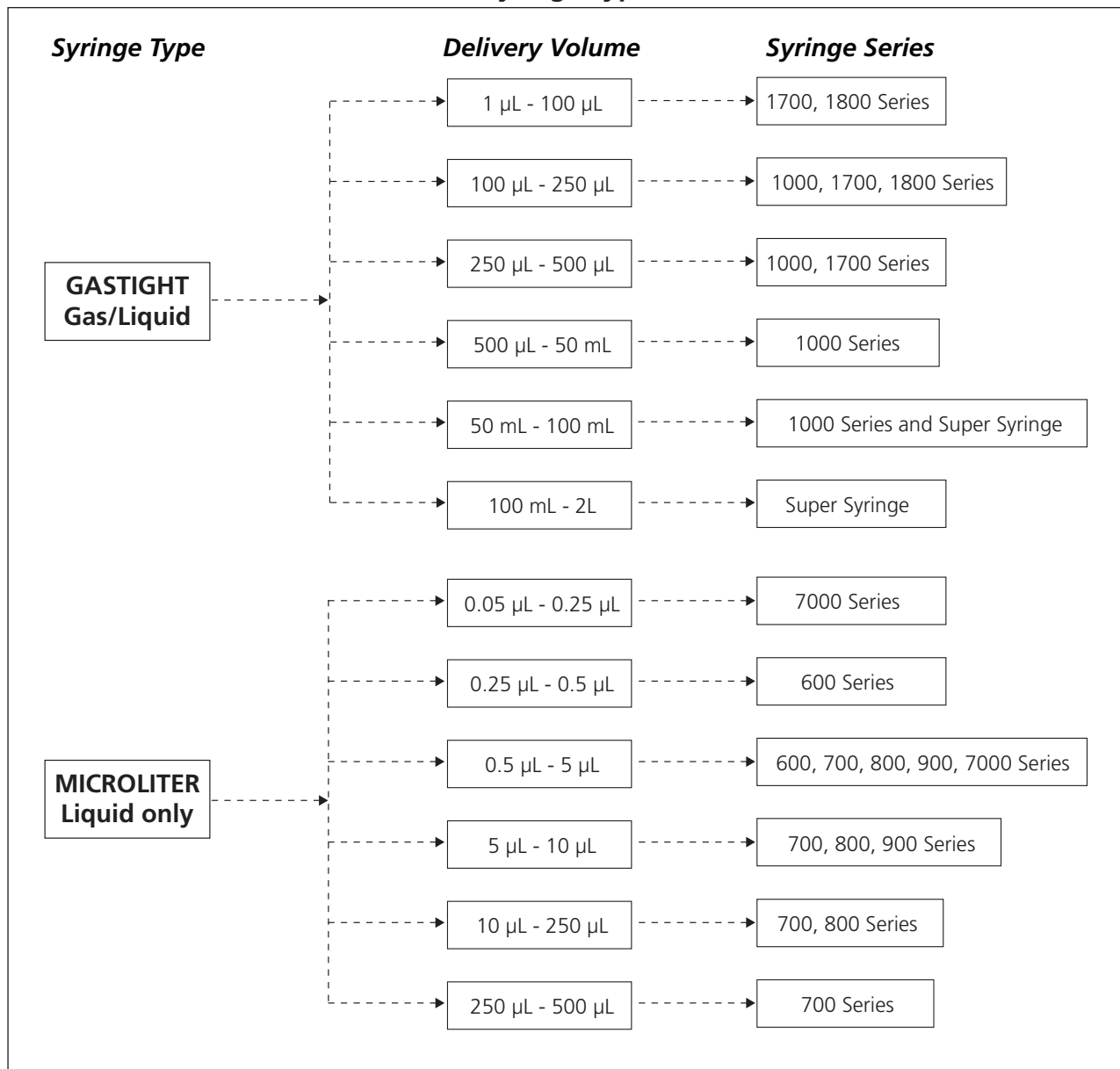


## 2. Syringe Series

For gas samples and heterogeneous liquids, there are four GASTIGHT syringe series from which to choose. For homogeneous liquid samples, there are five MICROLITER syringe series. Given the variety of syringe series available with MICROLITER and GASTIGHT plungers, an easy way to narrow down the list of series is to use delivery (or dispensing) volume as a discriminating factor. For the most accurate dispenses always choose a syringe that has a nominal volume as close to the dispense volume as possible.

For accuracy and precision, the smallest dispensing volume for a given syringe should be greater than or equal to 10% of its total capacity. For example, the smallest dispensing volume recommended for a 10  $\mu\text{L}$  syringe is 1  $\mu\text{L}$ . The following Syringe Type to Series Chart shows the volumes that each series is capable of dispensing within 10-100% of the syringes' nominal volume.

The Hamilton Syringe Type to Series Chart



### 3. Series Descriptions

Complete descriptions for Hamilton syringe series used for manual applications are given below. The descriptions include product features and typical applications along with the volumes, terminations, and accessories available for each series. For some volumes, several series may include syringes with equivalent volume ranges and similar terminations.

#### MICROLITER Syringes (0.05 $\mu\text{L}$ - 500 $\mu\text{L}$ Delivery Volume)

This type of syringe is for use with liquids and incorporates a stainless steel plunger that is individually fitted to its matching syringe barrel. These micro-volume syringes have a very close tolerance between the plunger and the barrel which creates a liquid-tight seal without parts such as O-rings that eventually wear out.

#### 600 Series (0.25 $\mu\text{L}$ - 5 $\mu\text{L}$ Delivery Volume)

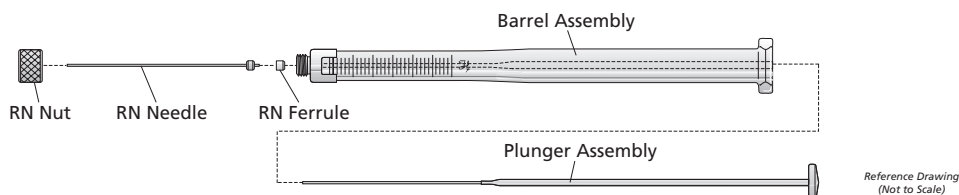
The 600 series are robust syringes consisting of two distinct parts. The bottom half of the barrel accurately measures the liquid sample and the top half supports the plunger. In addition, the top section of the plunger is thicker to further reduce the risk of bending the plunger. These syringes require half of the standard stroke length making them ideal for one-handed operation. The plungers and barrels are not interchangeable or replaceable.

**Recommended Use:** The 600 series is great for animal injections because one hand is free for manipulating the animal.

**Volumes:** 2.5  $\mu\text{L}$  and 5  $\mu\text{L}$

**Terminations:** Removable Needle (RN)

**Accessories:** Syringe Guide and Reproducibility Adapter



#### 700 Series (0.5 $\mu\text{L}$ - 500 $\mu\text{L}$ Delivery Volume)

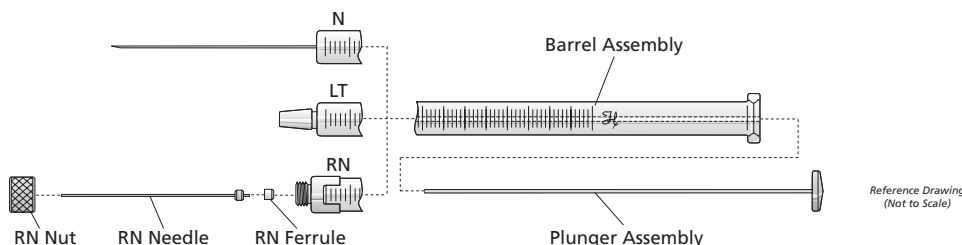
The 700 series is the original Hamilton syringe. It was designed to solve the general liquid handling requirements of manufacturing and research laboratories and remains the industry standard. The plungers and barrels are not interchangeable or replaceable.

**Recommended Use:** The 700 series is used for manual and automated GC and HPLC injections. Also, it is used for everyday applications that require accurate measuring and dispensing of liquid.

**Volumes:** 5  $\mu\text{L}$ , 10  $\mu\text{L}$ , 25  $\mu\text{L}$ , 50  $\mu\text{L}$ , 100  $\mu\text{L}$ , 250  $\mu\text{L}$ , and 500  $\mu\text{L}$

**Terminations:** Cemented Needle (N), Special Cemented Needle (SN), Removable Needle (RN) and Luer Tip (LT)

**Accessories:** PB600 Repeating Dispenser, Reproducibility Adapter, Syringe Guide, and Digital Syringe



### 800 Series (0.5 µL - 250 µL Delivery Volume)

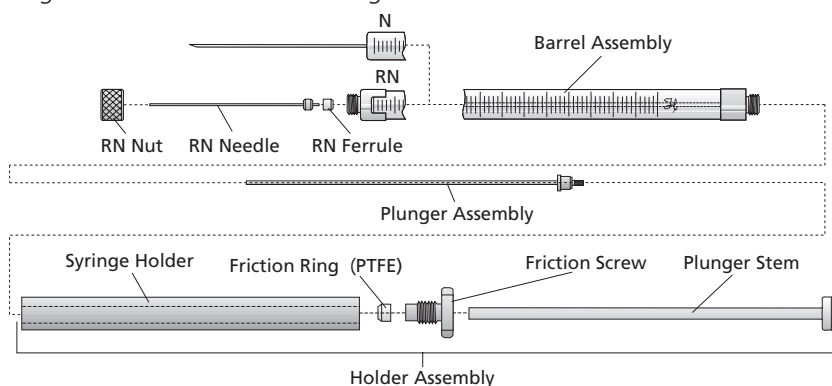
The 800 series has the same liquid handling capabilities as the 700 series, but with the addition of an aluminum syringe holder designed to eliminate the possibility of plunger damage. The syringe holder screws onto the glass barrel. A two-piece extended plunger further eliminates the risk of breakage. A friction screw at the top of the barrel can be adjusted to give the user some control over dispensing speed and prevent the accidental removal of the plunger. In addition, the syringe holder can be fitted with different barrel/plunger assemblies to cover a range of volumes.

**Recommended Use:** This syringe is intended for applications where the plunger on a 700 series syringe might be bent. Excellent for novice users.

**Volumes:** 5 µL, 10 µL, 25 µL, 50 µL, 100 µL, and 250 µL

**Terminations:** Cemented Needle (N), Special Cemented Needle (SN), and Removable Needle (RN)

**Accessories:** Reproducibility Adapter



Reference Drawing  
(Not to Scale)

### 900 Series (0.5 µL - 10 µL Delivery Volume)

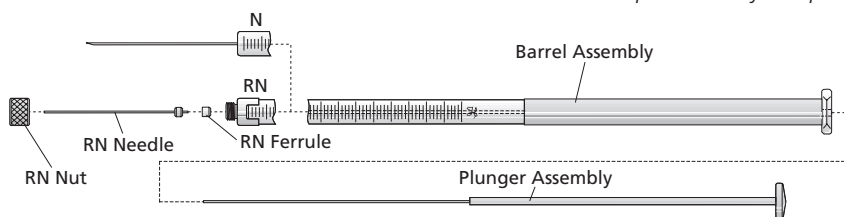
The 900 series has the same liquid handling capabilities as the 800 series but is a more economical version. The 900 series does not have any replaceable parts making the initial cost less than the 800 series.

**Recommended Use:** This syringe is perfect when a robust syringe is desired and budget is a consideration.

**Volumes:** 5 µL and 10 µL

**Terminations:** Cemented Needle (N), Special Cemented Needle (SN), and Removable Needle (RN)

**Accessories:** Reproducibility Adapter



Reference Drawing  
(Not to Scale)

### 7000 Series (0.05 µL - 5 µL Delivery Volume)

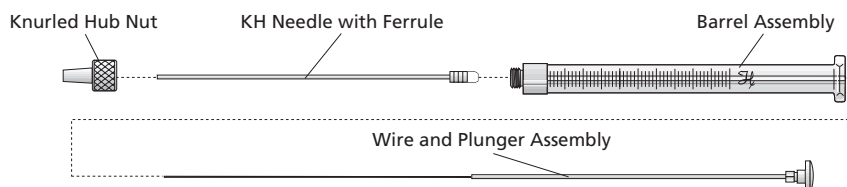
The 7000 series employs a plunger wire inside the needle to accurately dispense ultra-low volumes. The needle is bored to extremely accurate tolerances to accommodate the plunger wire. With the plunger inside the needle, the standard dead volume inside the needle is eliminated.

**Recommended Use:** The 7000 series is used for manual and automated GC and HPLC injections. Also, it is used for everyday applications that require ultra-small measurements of liquid.

**Volumes:** 0.5 µL, 1 µL, 2 µL, and 5 µL

**Terminations:** Knurled Hub (KH)

**Accessories:** Reproducibility Adapter, Syringe Guide, Digital Syringe, and Syringe Cleaner



Reference Drawing  
(Not to Scale)

## GASTIGHT Syringes (1 $\mu$ L - 100 mL Delivery Volume)

These syringes can be used with both gases and liquids. The precision-machined PTFE plunger tip creates a leak-free seal. The plungers are replaceable.

### 1000 Series (100 $\mu$ L - 100 mL Delivery Volume)

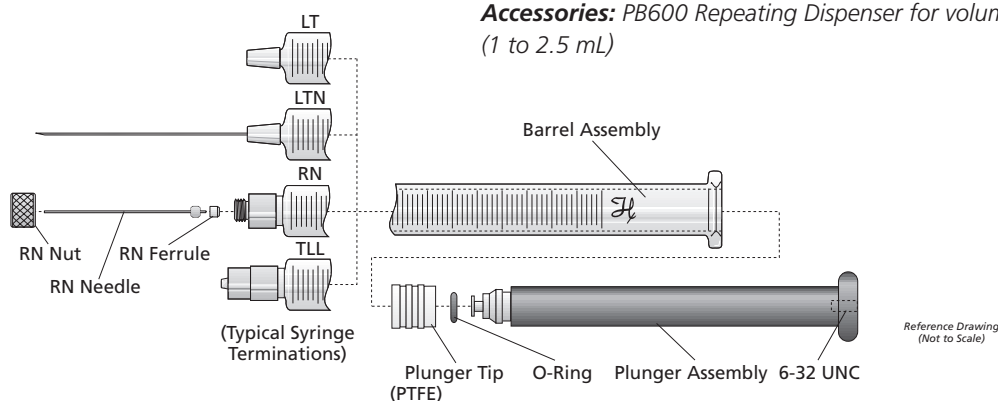
The 1000 series is a mid-volume solution for all liquid and gas handling needs.

**Recommended Use:** The 1000 series is ideal for manual and automated HPLC injections. This syringe is commonly used in syringe pumps and other liquid handling instrumentation.

**Volumes:** 1 mL, 1.25 mL, 2.5 mL, 5 mL, 10 mL, 25 mL, 50 mL, and 100 mL

**Terminations:** Luer Tip Cemented Needle (LTN), Luer Tip Special Cemented Needle (LTSN), Luer Tip (LT), Removable Needle (RN), SampleLock (SL), and PTFE Luer Lock (TLL)

**Accessories:** PB600 Repeating Dispenser for volumes (1 to 2.5 mL)



### 1700 Series (1 $\mu$ L - 500 $\mu$ L Delivery Volume)

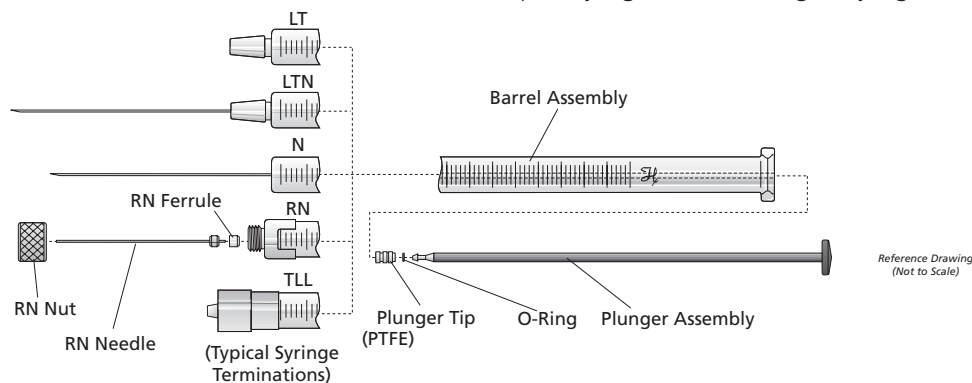
This is the GASTIGHT version of the original Hamilton 700 series syringe. It was designed to meet the low volume gas or liquid handling needs of research and manufacturing laboratories.

**Recommended Use:** The 1700 series is excellent for manual and automated GC and HPLC injections. This syringe is commonly used in syringe pumps and other liquid handling instrumentation.

**Volumes:** 10  $\mu$ L, 25  $\mu$ L, 50  $\mu$ L, 100  $\mu$ L, 250  $\mu$ L, and 500  $\mu$ L

**Terminations:** Cemented Needle (N), Special Cemented Needle (SN), Luer Tip Cemented Needle (LTN), Luer Tip Special Cemented Needle (LTSN), Luer Tip (LT), Removable Needle (RN), SampleLock (SL), and PTFE Luer Lock (TLL)

**Accessories:** PB600 Repeating Dispenser, Reproducibility Adapter, Syringe Guide, and Digital Syringe



### 1800 Series (1 $\mu$ L - 250 $\mu$ L Delivery Volume)

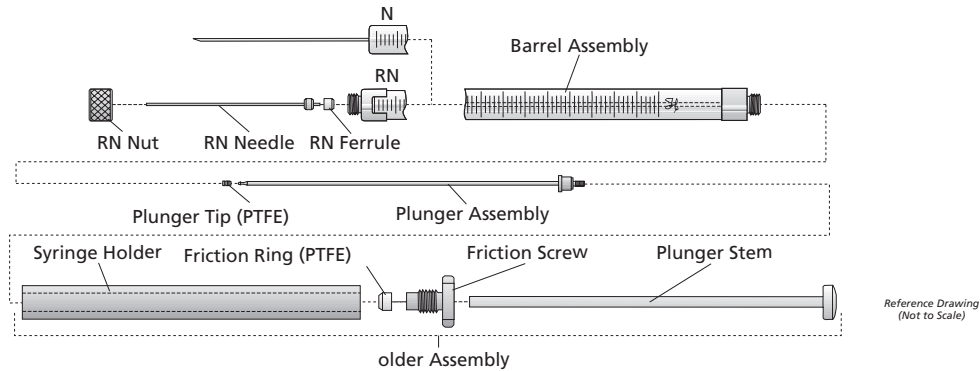
The 1800 series was designed to eliminate the possibility of plunger damage. It has the same liquid handling capabilities as the 1700 series but the extended plunger eliminates breakage and allows the user some control over the dispense speed.

**Recommended Use:** This syringe is intended for applications where the plunger on a 1700 series syringe might be bent.

**Volumes:** 10  $\mu$ L, 25  $\mu$ L, 50  $\mu$ L, 100  $\mu$ L, and 250  $\mu$ L

**Terminations:** Cemented Needle (N) and Removable Needle (RN)

**Accessories:** Reproducibility Adapter



### Super Syringes - Specialty Syringes for Gases

#### Super Syringe (50 mL - 2L Delivery Volume)

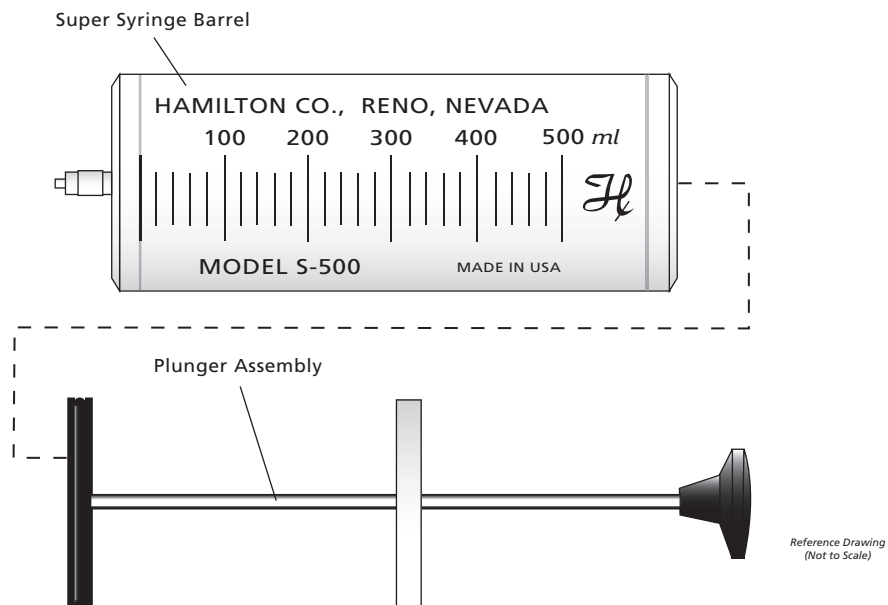
Super Syringes were designed primarily for air sampling, preparing gas standards, calibrating reservoirs, and pneumographs. The Super Syringe is the only Hamilton syringe with an acrylic barrel, which makes this syringe slightly less chemically resistant.

**Recommended Use:** This syringe is intended for sampling or transfer of gases.

**Volumes:** 0.5L, 1L, 1.5L, and 2L

**Terminations:** PTFE Luer Lock (TLL) and Tracheal Adapter (accepts 5/8 inch I.D. flexible tubing)

**Accessories:** None



## 4. Terminations

Terminations are located at the end of the syringe barrel and function as the interface between the syringe and its mating connection such as the needle. Terminations are offered in a number of different needle and connection

configurations to accommodate a broad range of applications. Below is a listing of the most popular syringe terminations. For a complete overview, please visit [www.hamiltoncompany.com](http://www.hamiltoncompany.com)

### **N, Cemented Needle**

#### ***For low volume syringes***

The needles are cemented into the glass syringe barrel at a point corresponding to the zero graduation mark. With this termination, dead volume is limited to the internal volume of the needle. Not autoclavable. Needle gauge is determined by the syringe volume and are not user-selectable. For available needle gauges, see [www.hamiltoncompany.com](http://www.hamiltoncompany.com)



### **SN, Special Cemented Needle**

#### ***For low volume syringes***

The special needle terminations are the same as the Cemented Needle terminations except they allow for a variety of user-defined gauges, lengths, and point styles to be attached.



### **LTN, Luer Tip Cemented Needle**

#### ***For mid volume syringes***

The needles are cemented into the glass syringe barrel at a point corresponding to the zero graduation mark. With this termination, dead volume is limited to the internal volume of the needle. Not autoclavable. Needle gauge is determined by the syringe volume and are not user-selectable. For available needle gauges, see [www.hamiltoncompany.com](http://www.hamiltoncompany.com)



### **LTSN, Luer Tip Special Cemented Needle**

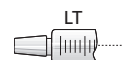
#### ***For mid volume syringes***

The special needle terminations are the same as the Luer Tip Cemented Needle terminations except they allow for a variety of user-defined gauges, lengths, and point styles to be attached.



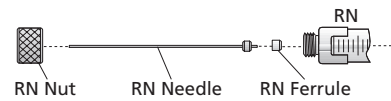
### **LT, Luer Tip**

The needles are removable and fit over a ground glass hub which is tapered in the shape of a male luer. The LT termination will accept most hypodermic needles but was designed specifically for use with Hamilton Kel-F needles. This termination increases the dead volume in the syringe, which may not be appropriate for some applications. Autoclavable when disassembled.



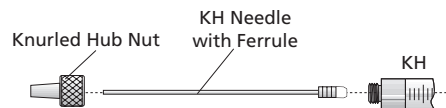
### RN, Removable Needle

The needles are removable and are a Hamilton-specific design. The design allows the needles to seat precisely at the zero graduation mark of the syringe. Users can select the needle gauge, length, and point style to optimize the syringe for custom applications. Additionally, this termination allows for a removable needle without increasing the dead volume of the syringe and is ideal when there is a risk of the needle clogging. Autoclavable when disassembled. Repeated autoclaving will shorten syringe life. For more information, see our *Guide to Maintaining and Using Hamilton Syringes*.



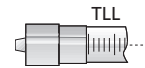
### KH, Knurled Hub

The knurled hub is used exclusively on 7000 Series syringes. The hub handles up to 6000 psig maximum injection pressure. The needle is removable but with a limited number of gauges available because the plunger is fitted inside the needle. Autoclavable when disassembled. Repeated autoclaving will shorten syringe life. For more information, see our *Guide to Maintaining and Using Hamilton Syringes*.



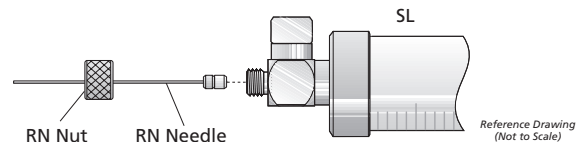
### TLL, PTFE Luer Lock

This termination has a PTFE, male Luer taper with nickel-plated brass locking hub for use with Kel-F needles, metal hub needles, and universal connectors. Also, the TLL is used with Hamilton diluters/dispensers, OEM applications, and manual operations. Autoclavable when disassembled, except on 25 mL and greater syringes. Repeated autoclaving will shorten syringe life. For more information, see our *Guide to Maintaining and Using Hamilton Syringes*.



### SL, SampleLock™

The sample lock incorporates an On/Off syringe valve with RN needle. This termination is used for headspace, environmental sample collection and storage, pre-pressurization of gaseous samples for GC analysis, and sample spiking. Not autoclavable.



## 5. Needle Selection

Needle point styles range from blunt points for HPLC injections to conical points for penetrating vinyl and plastics. With most syringes, Hamilton provides a standard 2-inch needle of an appropriate gauge and point style. However, if your project requires a non-standard needle gauge or point style, Hamilton offers a wide variety of custom options.

### Standard Needles

For most syringes, Hamilton has already selected the most common gauge (22 or 26), point style (2 or 3) and length (2 inches) for the average application. Throughout our web site and catalogs, the needles are designated by (Gauge/Length (inches)/Point Style), e.g., (22s/2/2). Review the Needle Point Style Chart to determine if a standard point style is suitable or if a custom needle is necessary for your application.

### Custom Needles

For our custom needles, the user-definable parameters are indicated by asterisk like (22s/\*/\*). Review the following sections to fully define the custom needle that is required. There are limits to the gauge, length, and point style combinations that are available so contact Hamilton Customer Service at 1-888-525-2123 for assistance. Contact your local dealer for assistance outside the U.S.

#### Custom Needle Hubs

Choose a needle hub based on the syringe volume and the compatible termination for the specific syringe you have selected for your application.

**SN, Special Cemented Needle:** These are cemented needle syringes that allow for a user-defined needles to be attached from the factory.

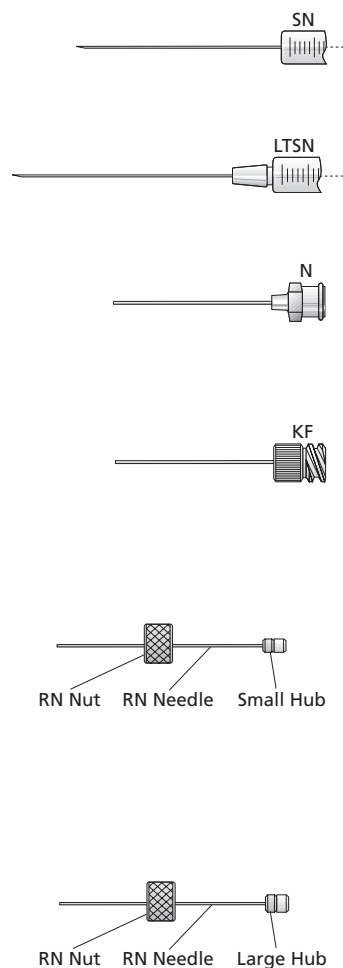
**LTSN, Luer Tip Special Needle:** These are Luer Tip Cemented Needles that allow for user-defined needles to be attached from the factory.

**N, Metal Hub Luer Lock Needle:** These needles are designed for use with the TLL syringe termination and are available in a variety of gauges between 33 and 10.

**KF, Kel-F Hub Luer Lock Needle:** These needles are designed for use with the LT and TLL syringe terminations and are available in a variety of gauges between 31 and 10.

**Small Hub Removable Needle:** These needles are designed for use with the RN syringe termination on syringes with a nominal volume less than or equal to 100  $\mu\text{L}$ . The needles are available in a variety of gauges between 33 and 22. Note: Remove the original needle and PTFE ferrule from the RN termination before inserting the replacement needle assembly.

**Large Hub Removable Needle:** These needles are designed for use with the RN syringe termination on syringes with a nominal volume greater than or equal to 250  $\mu\text{L}$ . The needles are available in a variety of gauges between 26s and 22. Note: Remove the original needle and PTFE ferrule from the RN termination before inserting the replacement needle assembly.





## Point Styles and Applications

The correct point style varies depending on the intended application. Below are a few examples of common applications.








**Animal Injections:** Point Style 4 with a 45° angle allows for the most accurate targeting of a specific biological structure.

**Manual HPLC Injections:** Most manual injection valves are designed to be used with a 22 gauge Point Style 3 needle.

**Manual GC Injections:** Historically a Point Style 2 was required to achieve efficient septum penetration with minimized coring. With Hamilton's new line of GC septa there is evidence that indicates the Point Style AS will consistently extend septa life by as much as 10-fold.

**Drawing Sample:** Any point style will efficiently draw a sample, but when it is important to get the last drop out of a vial use Point Style 3 or AS to reach all the way to the bottom.

**Needle Point Style Chart**

<b>Point Style 2</b>		Sharp, beveled, curved, non-coring needle point recommended for septum penetration. Available gauges: 33-10.
<b>Point Style 3</b>		Blunt needle point for use with HPLC injection valves and for sample pipetting. Available gauges: 33-10.
<b>Point Style 4</b>	  30°  45°	Standard 12° beveled needle point is recommended for life science applications. Available gauges: 33-10. Special point styles such as 30°, 45°, or any other angle are available upon request.
<b>Point Style 5</b>		Conical needle with side port for penetration of septa, thin-gauged vinyls and plastics without coring. Available gauges: 26-10.
<b>Point Style AS</b>		Special conical style needle point used on autosampler syringes the non-coring needle point is recommended for septum penetration. Available gauges: 26-22.

## Custom Needle Gauge and Length

When selecting a needle gauge it is important to keep in mind the volume of the syringe and the dead volume of the needle. For example, it will be very difficult to prime a 10 µL syringe if the dead volume in the needle is greater than 10 µL. Refer to the gauge index to choose a needle gauge with an appropriate µL/inch before selecting a needle. Select the minimum length that allows you to carry out your application comfortably.

**Note:** The 's' on a 22s needle represents a smaller I.D. (inner diameter) for the needle and a thicker needle wall for better durability. For example, a 26 gauge needle has an O.D. (outer diameter) of 0.46 mm and an I.D. of 0.26 mm while the 26s gauge needle has an O.D. of 0.47 mm and an I.D. of 0.13 mm. The 26s has half the I.D. of the 26 gauge needle. Also, the difference in the wall thickness nearly doubles with 26s gauge having a thickness of 0.18 mm while the 26 gauge is only 0.10 mm.

### Gauge Index Table

Gauge	Nominal O.D.		Nominal I.D.		Wall Thickness		Volume
	inch	mm*	inch	mm*	inch	mm*	µL/inch
33	.0080-.0085	0.21	.0035-.0050	0.11	0.002	0.05	0.20
32	.0090-.0095	0.24	.0035-.0050	0.11	0.002	0.05	0.20
31	.0100-.0105	0.26	.0045-.0060	0.13	0.0025	0.06	0.34
30	.0120-.0125	0.31	.0055-.0070	0.16	0.003	0.08	0.45
28	.0140-.0145	0.36	.0065-.0080	0.18	0.0035	0.09	0.63
27	.0160-.0165	0.41	.0075-.0090	0.21	0.004	0.10	0.80
26s	.0184-.0189	0.47	.0045-.0055	0.13	0.007	0.18	0.26
26	.0180-.0185	0.46	.0095-.0110	0.26	0.004	0.10	1.25
25	.0200-.0205	0.51	.0095-.0110	0.26	0.005	0.13	1.25
24	.0220-.0225	0.57	.0115-.0130	0.31	0.005	0.13	1.80
23	.0250-.0225	0.64	.0125-.0140	0.34	0.006	0.15	2.17
22s	.0280-.0285	0.72	.0055-.0065	0.15	0.011	0.28	0.45
22	.0280-.0285	0.72	.0155-.0170	0.41	0.006	0.15	3.35
21	.0320-.0325	0.82	.0195-.0210	0.51	0.006	0.15	5.19
20	.0355-.0360	0.91	.0230-.0245	0.60	0.006	0.15	6.71
18	.0495-.0505	1.27	.0315-.0345	0.84	0.0085	0.22	14.08
17	.0575-.0580	1.47	.0405-.0435	1.07	0.008	0.20	22.84
16	.0645-.0655	1.65	.0455-.0485	1.19	0.009	0.23	28.25
14	.0820-.0840	2.11	.0610-.0600	1.60	0.010	0.25	51.07
13	.0940-.0960	2.41	.0690-.0730	1.80	0.012	0.31	64.63
12	.1080-.1100	2.77	.0830-.0870	2.16	0.012	0.31	93.07
11	.1190-.1210	3.05	.0920-.0960	2.39	0.013	0.33	113.00
10	.1330-.1350	3.40	.1040-.1080	2.69	0.014	0.36	143.28

\*mm are nominal

# Accessories, Replacement Parts, and Services

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Hamilton offers a variety of accessories to improve durability and reproducibility, including the ones described below, as well as replacement parts for our syringes. Details can be found at [www.hamiltoncompany.com](http://www.hamiltoncompany.com)

## Cleaning Concentrate

The concentrate is a biodegradable cleaning agent for removal of stubborn residues. Hamilton Part No. 18311 (500 mL).

## Needle Cleaning Kit

Contains a selection of various diameter tungsten wires as well as a biodegradable cleaning concentrate for cleaning plugged needles. Hamilton Part No. 76620. Additional cleaning wires and concentrate can be purchased separately.

## Syringe Cleaner

The unit is designed to clean 7000 Series MICROLITER™ syringes with only heat (370 °C) or add a vacuum source (0.1 mm mercury) to remove suspected residuals. Hamilton Part No. 76610 (120VAC) and Part No. 76615 (220VAC).

## Syringe Guide

The guide is easily installed on a syringe to prevent the plunger from bending or being pulled out. Two models are offered for different syringe volumes and series.

## Reproducibility (Chaney) Adapter

The Chaney Adapter is easily installed on a syringe for consistent, reproducible injections. Also, the adapter prevents plunger bending while an adjustable stop provides increased precision and accuracy. Four models are available to accommodate a range of syringe volumes and series.

## PB600 Repeating Dispenser

The PB600 (Hamilton Part No. 83700 ) can be used with liquids or gases to consistently dispense 1/50th of the syringe volume. The dispenser fits MICROLITER and GASTIGHT syringes with volumes up to 2.5 mL.

## Digital Syringe™

The base unit can be used with Hamilton syringes in the 700, 1700, and 7000 series with nominal volumes between 0.5 µL and 500 µL. An easy-to-read LCD screen displays the volume contained in the syringe to within ±0.5% of the syringe's nominal volume. The Digital Syringe is ordered by adding 'DS' as a prefix to the required syringe part number.

Digital Syringes are automatically N.I.S.T. traceably calibrated to the base unit prior to shipment. Recalibration service is available for the Digital Syringe. Contact Hamilton Customer Service Department to obtain an RGA Number (Returned Goods Authorization Number). Include the syringe part number used with the base unit on the RGA and return the digital unit without the syringe. The customer will be charged the calibration fee plus the cost of a new syringe.

## N.I.S.T. Traceable Certification

This calibration service is available for most of our precision syringes. A Certificate of Calibration is shipped with the product and the procedure is performed with an unbroken chain of calibrations with N.I.S.T. traceable weights. Calibrated syringes must be specified at the time of ordering by adding the prefix 'CAL' to the beginning of the syringe's part number. For example, to order a 701N, 10 µL syringe (Hamilton Part No. 80300) as a calibrated syringe, request Part No. CAL80300.

# **Additional Technical Information at [www.hamiltoncompany.com](http://www.hamiltoncompany.com)**

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The following information is available on our web site and as pdfs.

## **Hamilton Precision Syringes Care and Use**

With proper care and handling, Hamilton syringes will provide unsurpassed performance year after year. See our complete *Guide to Maintaining and Using Hamilton GASTIGHT<sup>®</sup>, MICROLITER<sup>™</sup>, and Specialty Syringes*.

## **Determining the Performance of Hamilton Syringes**

Follow the protocol on this document to confirm the accuracy of a syringe. The Hamilton Company Quality System is ISO 9001-2000 certified.

## **Inner and Outer Dimensions**

For applications and projects where the physical dimensions of a syringe are important, specifications are provided for the most popular syringes in our product line.

## **Product Instruction Sheets**

Electronic versions of the documentation shipped with new products containing information on assembly, use, replacement parts, etc. Refer to these sheets, if you have misplaced an original instruction sheet or would like to see more information on a specific product prior to purchase.

## **Syringe Graduations**

Occasionally, users have asked for information relating to the scale divisions on a syringe to the delivery volume. A series of tables detail this information for all of our syringes.

# **Technical Support**

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## **Frequently Asked Questions**

Many of your questions can be answered by visiting the FAQ page of our web site at [www.hamiltoncompany.com](http://www.hamiltoncompany.com)

## **Online**

Our technical staff will promptly answer questions sent by email to [sales@hamiltoncompany.com](mailto:sales@hamiltoncompany.com)

## **Telephone**

For all other technical issues, call 1-888-525-2123 for Hamilton Technical Service assistance. For assistance outside the U.S., contact your local dealer.



**HAMILTON**  
THE MEASURE OF EXCELLENCE™

**Hamilton Company**

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**Quality Hamilton Products—**

MICROLITER™ Syringes  
GASTIGHT® Syringes  
Chromatography Syringes  
Syringes for Life Science  
Instrument Syringes  
SoftGrip™ Pipettes  
Miniature Valves  
Modular Valve Positioner  
Laboratory Fittings, Adapters, and Tubing  
Precision Syringe Pumps  
MICROLAB® Diluters and Dispensers  
Electrochemical Sensors  
DURACAL™ Buffer Solutions  
HPLC Columns and Resins

**Laboratory Automation for—**

Drug Discovery  
Genomics  
Proteomics  
Forensics  
In Vitro Diagnostics

<http://www.hamiltoncompany.com>  
**Sales and Support USA 1-888-525-2123**

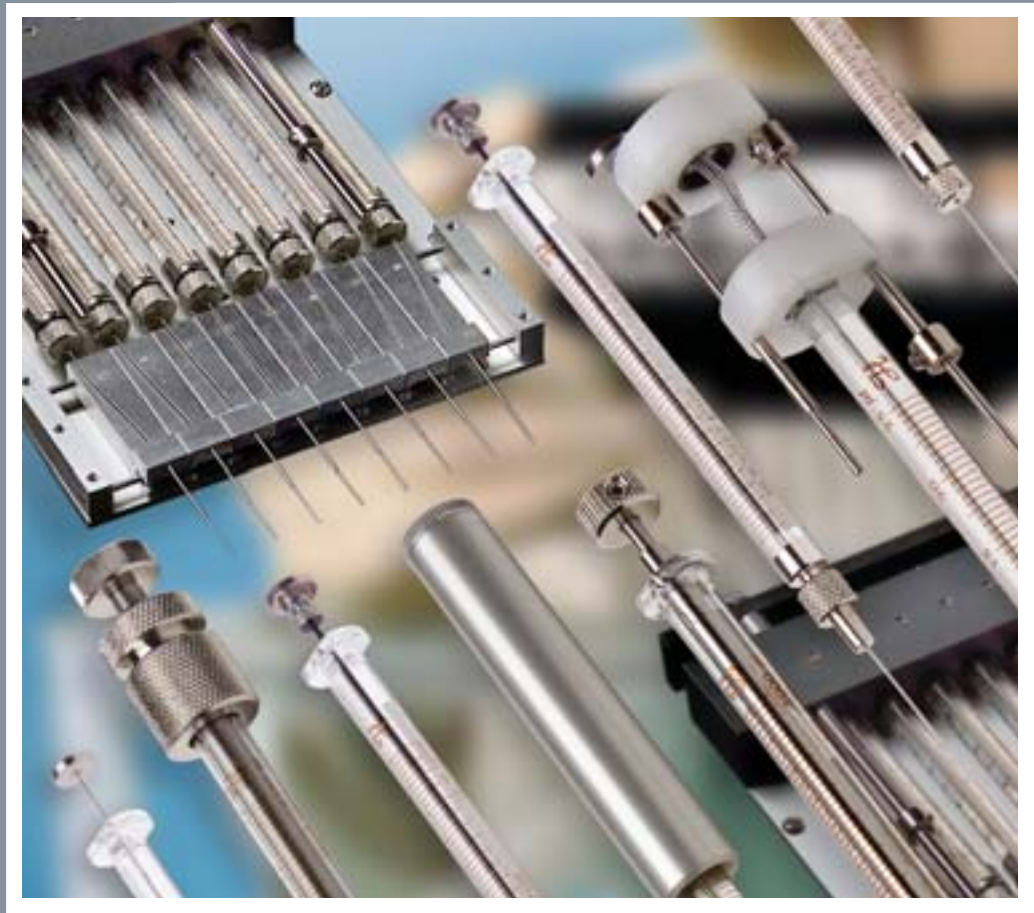
**The following are trademarks of Hamilton Company**

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Pipette Safe™  
SoftGrip™  
SoftTouch™  
SoftTop™  
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**The following company trademarks have been used in this catalog**

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# PRECISION LIQUID HANDLING



## Life Science Syringes



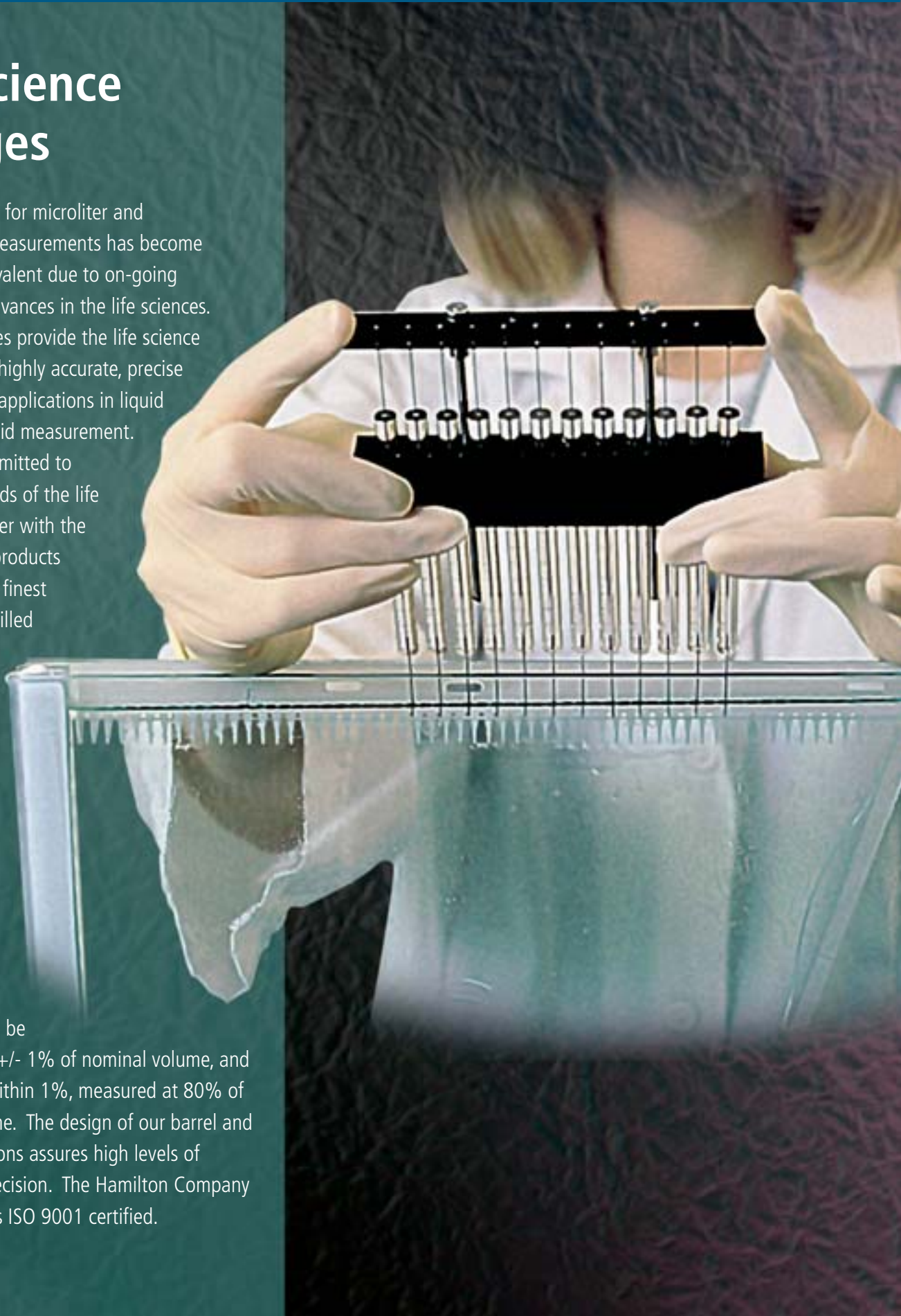
**HAMILTON**   
THE MEASURE OF EXCELLENCE™

# The Measure of Excellence

## Life Science Syringes

The requirement for microliter and sub-microliter measurements has become increasingly prevalent due to on-going technological advances in the life sciences. Hamilton syringes provide the life science researcher with highly accurate, precise tools for critical applications in liquid handling and fluid measurement. Hamilton is committed to meeting the needs of the life science researcher with the highest quality products crafted from the finest materials and skilled workmanship.

Hamilton syringes deliver unsurpassed accuracy and precision for your critical life science applications. Hamilton syringes are manufactured to be accurate within  $\pm 1\%$  of nominal volume, and with precision within 1%, measured at 80% of total scale volume. The design of our barrel and plunger dimensions assures high levels of accuracy and precision. The Hamilton Company Quality System is ISO 9001 certified.



## Syringe Terminations

Syringe terminations are offered in a number of different configurations designed to accommodate a broad range of applications. From cemented to removable needles, and luer taper to special syringe fittings, syringe barrel terminations serve a key function at the interface of a syringe and its mating connection.

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### **N, Cemented Needle**

Needles are cemented into the glass syringe barrel at a point corresponding to the zero graduation mark; not autoclavable.

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### **LTN, Luer Tip Cemented Needle**

Needles are cemented into the glass syringe barrel at a point corresponding to the zero graduation mark; not autoclavable.

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### **RN, Removable Needle**

Removable needles seat precisely to the zero graduation mark of the syringe; autoclavable when disassembled. Allows the use of different specification needles on the same syringe barrel.

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### **LT, Luer Tip**

Ground glass, syringe barrel with a male luer taper accepts most hypodermic needles; autoclavable when disassembled. Use Kel-F hub needles and connectors for a tight seal.

---

### **KH, Knurled Hub**

Removable needle, knurled hub is used on 7000 Series syringes, exclusively; autoclavable when disassembled. Knurled hub enables 6000 psig maximum injection pressures and the attachment of a spacer for repeatable depth injections.

## Needle Point Styles

Several different needle point styles are offered on Hamilton syringe and needle products depending upon the application. Syringes and needles manufactured by Hamilton Company are intended for scientific research and laboratory use only and are not intended for human in vivo use.

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### **Point Style 2:**

Beveled non-coring needle point recommended for septum penetration. Only needle gauges 26s – 22 are recommended for septum penetration.

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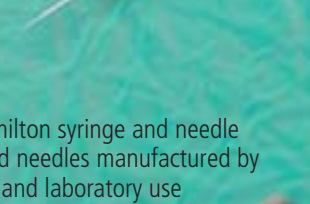
### **Point Style 3:**

Blunt needle point for sample pipetting.

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### **Point Style 4:**

10° – 12° beveled needle point recommended for life science applications. Special point styles such as 12°, 30°, and 45° are available on request.





# Life Science Syringes

- Needles and probes as fine as 33 gauge (.009"/.24 mm O.D.)
- Removable needles (RN) available with 12°, 30°, 45°, and 90° beveled point styles
- RN needles can be interchanged for gauge, length, and point style optimization and for field replacement of bent or plugged needles
- Suitable for mounting in mechanical micropositioners, microinjection systems, and stereotaxic instruments



- For use with liquid (GASTIGHT® syringes are for use with gas or liquids)
- Syringes are autoclavable when disassembled














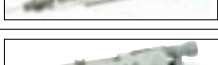
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## Replacement Needles

- RN Removable Needles for use with RN-style syringes and connectors
- KH Needle Repair Kit for MODIFIED MICROLITER™ syringes
- 304 stainless steel (sst.) needles



## Ordering Information

	Volume	.5 µL	.5 µL	1 µL	2 µL	5 µL	5 µL	5 µL	10 µL	10 µL
Model	7000.5 KHOC	7000.5 KHOC	7001 KH	7002 KH	7105 KH	75 RN	175 RN	701 RN	1701 RN	
Gauge**	32	25	25s	25	24	32	32	32	32	32
<b>MODIFIED MICROLITER™ KH (Knurled Hub)</b>			86257*	86250	80100	88400	88000			
<b>MICROLITER™ RN (Removable Needle)</b>							87931			
<b>MICROLITER RN (Removable Needle)</b>									80314	
<b>MICROLITER Syringe RN (Removable Needle)</b> (Needle not included)							7634-01		7635-01	
<b>GASTIGHT® RN (Removable Needle)</b>										80014
<b>GASTIGHT Syringe RN (Removable Needle)</b> (Needle not included)										7653-01
<b>PB600 Repeating Dispenser</b> (Syringe not included)									83700	83700
<b>Reproducibility (Chaney) Adapter</b> (Syringe not included)			14725	14725	14725	14725	14725	14700	14700	14700
<b>Syringe Guide</b> (Syringe not included)			14906	14906	14906	14906	14906	14806	14806	14806
<b>Digital Base Unit</b> (Syringe not included)										

Add the prefix "DS" to the beginning of the syringe's part number.  
(Base unit not sold separately)



**Syringe Calibration Service**

Add the prefix "CAL" to the beginning of the syringe's part number.

\* Needle length is 3.94"


## Typical Operating Parameters

- Maximum temperature for MODIFIED MICROLITER syringes is 50°C (122°F) and all others 115°C (239°F).
- Maximum pressure rating is 6000 psig for MODIFIED MICROLITER syringes, 2000 psig for MICROLITER syringes, 1000 psig for GASTIGHT syringes.

## KH Needle Repair Kit

	Volume	.5 µL	.5 µL	1 µL	2 µL	5 µL
Description	Model	7000.5OC	7000.5	7001	7002	7105
Repair Kit Point Style 3		86258	17187	17188	17191	17193

## Removable (RN) Needles, Standard and Special Length/Point Style (All needles sold in 6 packs)

Gauge	Nominal O.D. inch/mm	Nominal I.D. inch/mm	Volume µL/inch	(Gauge/Length/Pt Style)	 Point Style 3	Custom Needles Pt. Styles 2, 3, 4**
33	.008/.21	.004/.11	.20	(33/1.5"/3)	7762-06	7803-05
32	.009/.24	.004/.11	.20	(32/2"/3)	7762-05	7803-04
30	.012/.31	.006/.16	.45	(30/2"/3)	7762-03	7803-07
28	.014/.36	.007/.18	.63	(28/2"/3)	7762-02	7803-02
26s	.018/.47	.005/.13	.26	(26s/2"/3)	7768-01	7804-04
26	.018/.47	.010/.26	1.25	(26/2"/3)	7768-02	7804-03
22s	.028/.72	.006/.15	.45	(22s/2"/3)	7770-01	7804-02
22	.028/.72	.016/.41	3.35	(22/2"/3)	7770-02	7804-01

\* Custom needles are available in point styles 2, 3 or 4. When ordering, specify length and point style (for gauges 28-33 minimum length: .375"/9.37 mm; maximum length: 6"/150 mm; for gauges 22-26s minimum length: .375"/9.37 mm; maximum length: 15"/375 mm).

\*\* When ordering point style 4, specify length and degree of bevel, i.e. 12°, 30°, 45° or 90°

# Gel Loading Syringes

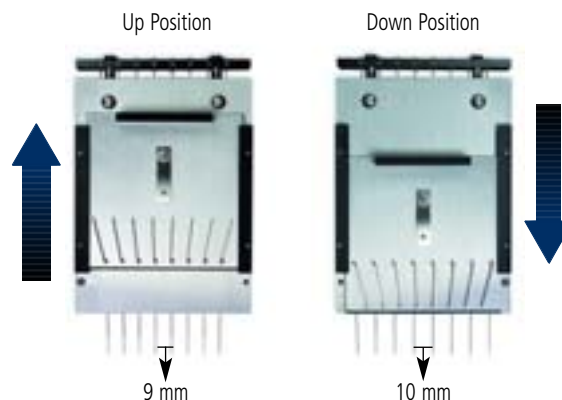
## Multi-Channel Gel Loading Syringes

- Fast accurate sample loading of 36-, 48-, and 64-lane gels on ABI PRISM® 377 DNA sequencing instrument
- GASTIGHT® syringes ensure accuracy to within  $\pm 1\%$  and adjustable stops allow for fast reproducible volume transfers of 0.2-10  $\mu\text{L}$
- Available in cemented needle or removable needle models



## Adjustable Gel Loading Syringes

- Simplify and speed sample loading of 96-lane gels on ABI PRISM 377 DNA sequencing instrument
- Eight samples at a time can be transferred directly from a microwell plate with 9 mm spacing to a 96-lane gel with 10.8 mm spacing
- Easy-to-use design for adjustment of needle spacing



## Ordering Information

Description*	0.2 mm needle design	0.3 mm needle design	0.4 mm needle design
12-Channel	84512	84501	84500
8-Channel (Removable Needles)	84711	84703	84702
8-Channel (Cemented Needles)	84511	84503	84502
Single Channel DNA Syringe, 10 µL (Cemented Needle)	80081	84505	
Single Channel DNA Syringe, 10 µL (Removable Needle)	80091		

\* All Multi-Channel Gel Loading Syringes contain 10 uL total volume syringes with 9 mm (0.36") spacing between needles.  
For information about larger or smaller volume syringes, or units with other than 9 mm spacing between needles, contact the Hamilton Company.

### Replacement Parts & Accessories — Removable Needle

Replacement Barrel (w/ needle)	4749-01	4749-02	4749-03
Replacement Needles, 3/pk	78733	78726	78727
Plunger Assembly	15948	15948	15948
Barrel w/out needle and nut	10399	10399	10399
RN Nut	30902	30902	30902
Needle Cleaning Wires, 10/pk	18306	18306	18302

### Replacement Parts & Accessories — Cemented Needle

Replacement Syringe (barrel and plunger)	80023	80022	80021
Syringe Barrel	10398	10396	10395
Plunger Assembly	15948	15948	15948
Stop Collars (2) w/ Allen Wrench	1993-01	1993-01	1993-01
Needle Cleaning Wires, 10/pk	18306	18306	18302

## Ordering Information

Description*	0.2 mm needle design	0.3 mm needle design	0.4 mm needle design
8-Channel Adjustable Gel Loading Syringe	84611	84603	84602

### Replacement Parts & Accessories

AGLS Needle, 4/pk	78633	78631	78628
Barrel w/out needle and nut	10399	10399	10399
Plunger Assembly	15948	15948	15948
Stop Collars (2) w/ Allen Wrench	1993-01	1993-01	1993-01
Needle Cleaning Wires, 10/pk	18306	18306	18302

*NOTE: For best results, select the needle design which most closely matches your gel thickness.*

# Special Syringes

## Microsyringe Pipettes

- Sample wets only the disposable PTFE tips, eliminating sample cross-contamination
- Spring loaded plunger and adjustable stops ensure excellent reproducibility



- Special 3/4" electrotapered needle allows easy attachment of the PTFE tips

## Threaded Plunger Syringes

- For applications requiring extremely precise plunger movement or minute fluid manipulation
- Dispense from .33 to 13.23  $\mu\text{L}$  per plunger revolution



Plunger Type



Sleeve Type

- Luer tip (LT) syringe terminations for easy connection of Kel-F<sup>®</sup> hub stainless steel needles; Kel-F hub PTFE tubing; and 1/4" O.D. x 1/8" I.D. Tygon<sup>®</sup> or rubber tubing

## Pipette Controllers

- Use in place of rubber bulbs to easily and precisely fill glass pipettes
- Free-sliding plunger coarsely fills the pipette, knurled plunger screw completes the fine volume adjustment



- Luer tip (LT) syringe termination for easy connection of tubing to glass pipettes

## Hub Needles

- Metal hub (N) or Kel-F hub (KF) needles in convenient six packs
- Metal hub (nickel plated brass) for use with TLL syringes and LT or TLL connectors
- Kel-F hub for use with LT and TLL syringes and connectors
- 304 stainless steel (sst.) needle
- Standard needle length: 2"/51 mm



Metal Hub Needles



Kel-F Hub Needles

## Ordering Information

Sample Volume	Syringe Model	Microsyringe Pipette Part #	Disposable Tip Part # 100/pk
.2 - 3 µL	701	84250	84255
.5 - 7 µL	702	84252	84254

## Ordering Information

Part #	Model	Volume	Description	µL per Revolution
80266	1702TPLT	25 µL	Sleeve type	.33 µL
81041	1710TPLT	100 µL	Sleeve type	1.32 µL
81141	1725TPLT	250 µL	Sleeve type	3.31 µL
81242	1750TPLT	500 µL	Plunger type	5.29 µL
81341	1001TPLT	1.0 mL	Plunger type	13.23 µL

## Ordering Information

Part #	Model	Volume
84001	0010PC	1.0 mL
84101	0020PC	2.5 mL

## Ordering Information

All needles sold in 6 packs.



Metal Hub (N)



Point Style 3

Custom Needles Pt. Styles 2, 3, 4\*\*

Gauge	Point Style 3	Custom Needles Pt. Styles 2, 3, 4**
33	91033	7747-01
32	91032	7747-02
30	91030	7748-16
28	91028	7748-14
26s	91039	7748-19
26	91026	7748-12
22s	91038	7748-18
22	91022	7748-08



Kel-F Hub (KF)



Point Style 3

Custom Needles Pt. Styles 2, 3, 4\*\*

Point Style 3	Custom Needles Pt. Styles 2, 3, 4**
90530	7750-21
90528	7750-19
90539	7750-24
90533	7750-17
90534	7750-23
90134	7750-13

\* Custom needles are available in point styles 2,3 or 4. When ordering, specify length and point style (for gauges 28-33 minimum length: .375"/9.37 mm; maximum length: 6"/150 mm; for gauges 22-26s minimum length: .375"/9.37 mm; maximum length: 15"/375 mm).

\*\* When ordering point style 4, specify length and degree of bevel, i.e. 12°, 30°, 45° or 90°

# General Ordering Information



**HAMILTON**  
THE MEASURE OF EXCELLENCE™

---

**Office Hours:**

Weekdays 7 am – 5 pm Pacific Standard Time

Toll Free 1-800-648-5950 or 1-775-858-3000  
Fax: 1-775-856-7259

---

**Toll Free Order Hotline:**

**1-888-525-2123**

For your convenience, please have your account number and your purchase order number ready when placing an order.

Major Credit Cards Accepted

**Order Online:**

[www.hamiltoncompany.com](http://www.hamiltoncompany.com)

**Via Email:**

[sales@hamiltoncompany.com](mailto:sales@hamiltoncompany.com)

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**Terms:**

After credit responsibility has been established with Hamilton Company, terms are net 30 days from the date of invoice. A finance charge will be applied to all invoices not paid within 30 days. Unestablished accounts can place an order with a credit card.

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**Shipping:**

All domestic shipments are FOB Reno, Nevada, U.S.A., by United Parcel Service unless otherwise specified. All international shipments are FOB Reno, Nevada, U.S.A., to be shipped as specified by purchaser.

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**Warranty:**

All Hamilton products are unconditionally guaranteed to be free of defects in materials and workmanship for one year (12 months) from date of purchase.

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**Returned Goods/  
Restocking Charges:**

Any product returned to Hamilton Company for repair, evaluation, or exchange must be accompanied by an assigned Returned Goods Authorization (RGA) tracking number. Unauthorized returns will be refused.

Products returned for credit must also have an assigned RGA tracking number and are subject to a 20% restocking fee. All returns must be sent to the following address:

Hamilton Company  
4990 Energy Way  
Reno, Nevada 89502

# Standard Conditions of Sales

## STANDARD CONDITIONS OF SALE (of Hamilton Company, "The Company")

### 1. GENERAL

All orders are accepted and executed on the understanding that the Purchaser is bound by the following Standard Conditions of Sale. Where there is any inconsistency between these Standard Conditions of Sale and any conditions which the Purchaser seeks to impose, these Standard Conditions of Sale shall prevail.

Any deviations from these Standard Conditions of Sale shall only be binding upon the Company if the latter has expressly agreed thereto in writing.

### 2. VALIDITY OF QUOTATIONS

The Company reserves the right to refuse the Purchaser's acceptance of a quotation unless such quotation is stated to be open for a specific period and is not withdrawn in such period.

### 3. PRICES AND DISCOUNTS

The published prices of the Company's Products are those ruling on the date of publication and are subject to alteration without notice. Prices and currency transactions are in U.S.A. dollars.

### 4. PAYMENT

Unless otherwise agreed by the Company in writing, the goods shall be paid for in cash within 30 days following the date of the relevant invoice. The Company's prices are net and are not subject to any settlement terms.

The Purchaser may not claim any set-off against the Company. In the event of a delay in payment, the Company shall be entitled to claim, without any notice of default being required and without prejudice to any further rights it may have, interest at a rate of one and a half percent (1 1/2%) per month or at the legal interest rate, whichever is the higher value. All costs of collection shall be fully for the Purchaser's account; extrajudicial costs shall be fixed at ten percent (10%) of the amount owed by the Purchaser and shall be at least fifteen hundred U.S. dollars (USD 1,500.00).

In the event that any payment in respect of Products supplied becomes overdue, the Company may immediately terminate the Purchaser's power of sale under clause 14 of this document and may without prior notice to the Purchaser enter upon the premises of the Purchaser to repossess unpaid goods.

### 5. NEW ACCOUNTS

Where a credit account is desired, a bank and as many as five trade references may be required. The Company reserves the right not to grant credit to any Purchaser for any reason whatsoever.

### 6. CARRIAGE

Unless otherwise agreed by the parties, goods are delivered by the Company FOB Reno, Nevada, U.S.A. to the Purchaser's registered office exclusive of duty, insurance, taxes, and VAT. When special delivery arrangements are requested, special rates will be charged.

All delivery times shall be approximate, except if a fixed time of delivery has been specifically agreed to in writing by the Company, in which case a delay in the delivery shall solely entitle the Purchaser to cancel, without costs, the order for the goods not delivered.

### 7. PACKING

A charge is made when it is necessary to dispatch goods in crates or cases, but this amount will be credited in full on the return, within one month, of the crates or cases in good condition carriage paid. No charge is made for any other form of packing and no credit will be allowed for its return.

### 8. LOSS OR DAMAGE IN TRANSIT

Clear receipts should be given only if goods have been examined, as an unqualified signature may react to the disadvantage of the Purchaser if the consignment should become the subject of a claim. In the event of short delivery or damage in transit, it is essential that the Company's dispatching depot be advised within two days of receipt of goods.

The following details should be sent in writing to the Company:

- Advice note number
- Carrier's name
- Condition of package
- Date of consignment received
- Extent of damage or shortage

In the event of non-delivery, the Company's dispatching depot should be advised within seven (7) days of the date of invoice. The Company will not be responsible for goods lost or damaged in transit unless the above conditions are observed.

### 9. DELIVERY

The Purchaser shall be obliged to cooperate in the delivery of the Products and to take receipt of same. The Company may keep any goods refused or not accepted by the Purchaser at the latter party's disposal for account and at the risk of the Purchaser.

### 10. LIABILITY FOR DELAY

Any times quoted for dispatch, delivery, repair, or replacement are to be treated as estimates only and the Company shall not be liable for failure to dispatch, deliver, repair, or replace within such time unless the Purchaser has suffered loss thereby and the amount payable in respect thereof shall have been agreed in writing as liquidated damages, in which case the Company's liability shall be limited to the amount so agreed to be paid.

In all cases, whether a time for dispatch, delivery, repair, or replacement be quoted or not, the time for dispatch, delivery, repair, or replacement shall be extended by a reasonable period if delay in dispatch, delivery, repair, or replacement is caused by instructions or lack of instructions from the Purchaser or by industrial dispute or by any cause whatsoever beyond the Company's reasonable control.

### 11. DEFAULT

The Company shall have the right to discontinue delivery and also at its discretion to terminate any agreement in respect of any undelivered goods if the Purchaser defaults in payment as stated under clause 4 of this document or in respect of its other obligations to the Company.

### 12. DEFECTS AFTER DELIVERY

The Company will make good, by repair at the Company's option, or by the supply of replacement, defects, which under proper use, appear in the goods within a period of 12 calendar months after the goods have been delivered and arise solely from faulty design, materials or workmanship; provided that no complaints shall be admissible unless submitted in writing to the Company within five (5) days after

the time of discovery of the defect or after the time the defect should have been discovered, whichever time comes first, it being understood that the Purchaser shall take reasonable care to discover any defect of whatever nature as soon as possible after taking delivery.

Provided further that in respect of parts or components not of the Company's manufacture, the Company will give the Purchaser a guarantee equivalent to the guarantee (if any) that the Company may have received from the supplier of such parts or components in respect thereof but not so as to impose on the Company in respect of such parts or components a liability greater than that imposed on it by the aforesaid period of this clause.

Save as aforesaid and as provided in clauses 8 and 10, the Company shall not be under any liability in respect of defects in goods delivered or for any injury, damage, or loss resulting from such defects or from any work done in connection therewith and its liability under this clause shall be in lieu of any warranty or condition implied by law as to the quality of fitness for any particular purpose of such goods.

### 13. SPECIAL ORDERS

All orders for non-standard products or package quantities not included in current Company catalogues and literature, are considered to be special orders and will be dealt with at the discretion of the Company.

### 14. RESERVATION OF OWNERSHIP/PASSING OF RISK

Products supplied to the Purchaser by way of sale shall remain the property of the Company until payment in full of all its claims on the Purchaser on whatsoever account has been received by the Company but risk in the same shall pass upon delivery.

The Purchaser acting as bailee shall deal with the goods separately and store according to the agreed methods of storage so that the goods not paid for may be clearly identified and shall not be mixed with other goods.

The Purchaser shall be entitled to pass ownership in unpaid goods to third parties provided that all sums received shall be held for the account of the Company.

### 15. RETURN OF GOODS

The Company does not accept the return of goods for credit unless it is a justified warranty claim. All returns must be authorized in advance. Unauthorized returns will be refused. In no circumstances may goods supplied against a firm order be returned without the Purchaser having first applied for and obtained both written consent and a Returned Goods Authorization (RGA) number from the Company.

The Company reserves the right to refuse the return of any Product that has been used with infectious, microbiological, or radioactive substances or other materials that may be deemed hazardous to the employees of the Company.

A handling charge amounting to not more than 20 percent of the invoice value of the returned goods may be deducted from any credit allowed where it is established that the reason for their return is not subject to the provision of clause 8 or 12 hereof or through any error on the part of the Company.

Goods approved for return must be received by the Company within 30 (thirty) days of the Company's written consent.

### 16. DESCRIPTIVE MATTER AND ILLUSTRATIONS

All descriptive and forwarding specifications, drawings, and particulars of weights and dimensions issued by the Company are approximate only, and are intended only to present a general idea of the goods to which they refer and shall not form part of a contract.

### 17. FORCE MAJEURE

Any party will be excused from performing under a sale agreement or any other agreement of which these Standard Conditions of Sale are part if prevented by an event of force majeure including strike, lockout, or other major trouble affecting labor relations.

If any such event of force majeure should last for more than two (2) consecutive months, any party may elect to terminate this Agreement immediately upon giving a written notice to the other party.

### 18. PATENTS

In the event of any claim being made or action being brought against the Purchaser in respect of infringement of local patents by the user or sale of goods supplied hereunder, the Purchaser is to notify the Company immediately, and the Company shall be at liberty with the Purchaser's assistance if required, but at the Company's expense, to conduct through the Company's own lawyers and experts all negotiations for the settlement of the same or any litigation that may arise therefrom; subject to such notifications and provided that no such goods, or any part thereof, shall be used for any purpose other than that for which the Company supply them, the Company will indemnify the Purchaser in respect of any such claims.

### 19. TRADEMARKS

- The only Hamilton trademarks that the Purchaser may display to advertise and sell the Products shall be those trademarks under which the Products are sold by the Company to the Purchaser hereunder or such other trademarks expressly authorized by the Company (hereinafter called "the said trademarks") and the Purchaser shall comply with the Company's instructions as to the manner and context in which the said trademarks and the statements to accompany them are displayed.
- No trademarks of the Products shall be undertaken by the Purchaser or any person on the Purchaser's behalf without the Company's prior written consent nor will the Purchaser alter, obliterate, add to, or otherwise interfere with the said trademarks.

### 20. LEGAL CONSTRUCTION

These Standard Conditions of Sale and all sale contracts to which the same apply shall be construed in accordance with the laws of the State of Nevada, U.S.A., and the authoritative text shall be that in the English language set out herein. Any disputes arising in connection with these Standard Conditions of Sale and all sale contracts to which the same apply shall be finally settled by arbitration in accordance with the laws and rules of the State of Nevada and such proceedings held and located in Reno, Nevada, U.S.A.





**HAMILTON**  
THE MEASURE OF EXCELLENCE™

**Hamilton Company**

4970 Energy Way  
Reno, Nevada 89520 USA  
Toll-Free: 800-648-5950  
Telephone: +1-775-858-3000  
Fax: +1-775-856-7259  
e-mail: sales@hamiltoncompany.com

**Hamilton Bonaduz AG**

Via Crusch 8  
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Bonaduz/Switzerland  
Telephone: +41-(0)81-660-60-60  
Fax: +41-(0)81-660-60-70  
e-mail: marketing@hamilton.ch

**Hamilton Deutschland GmbH**

Daimlerweg 5A  
64293 Darmstadt/Germany  
Telephone: +49-(0)6151-66706-0  
Fax: +49-(0)6151-66706-66  
e-mail: sales@hamiltongmbh.de

**Hamilton Northern Europe**

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Aston Science Park  
Birmingham, B7 4BH, U.K.  
Telephone: +44-(0)121 2600301  
Fax: +44-(0)121 2600302  
e-mail: sales@hamiltongb.co.uk

**Hamilton France S.A.R.L.**

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37 rue du Saule Trapu  
91300 MASSY  
France  
Telephone: +33-(0)1-69-75-16-16  
Fax: +33-(0)1-60-11-57-16  
e-mail: Hamilton.France@wanadoo.fr

**Quality Hamilton Products:**

MICROLITER™ Syringes  
GASTIGHT® Syringes  
Chromatography Syringes  
Syringes for Life Science  
Instrument Syringes  
SoftGrip™ Pipettes  
Miniature Valves  
Modular Valve Positioner  
Laboratory Fittings, Adapters & Tubing  
Precision Syringe Pumps  
MICROLAB® Diluters & Dispensers  
Electrochemical Sensors  
DURACAL™ Buffer Solutions  
HPLC Columns & Resins

**Laboratory Automation for:**

Drug Discovery  
Genomics  
Proteomics  
Forensics  
In Vitro Diagnostics

<http://www.hamiltoncompany.com>  
**Sales/Support USA 1-888-525-2123**

**TRADEMARKS:**

The following are trademarks of Hamilton Company

GASTIGHT®  
MICROLITER™  
MODIFIED MICROLITER™

The following company trademarks have been used in this catalog

ABI PRISM® 377  
Kei-F®

# AUTOMATED LIQUID HANDLING



## Instrument Syringes



**HAMILTON**   
THE MEASURE OF EXCELLENCE™

# The Measure of Excellence

## Automated Instrument Syringes

When it comes to precision fluid handling, rely on the leader. We've designed the world's most precise and reliable fluid handling and measuring systems for nearly 50 years. The standard GASTIGHT® 1000 and 1700 series syringes have been adapted for use on fluid handling systems.

Hamilton offers everything that is required of an instrument syringe: chemical inertness, long life, reduced friction and the well-known Hamilton precision and accuracy. Glass and PTFE construction provides an inert flow path for the most demanding applications. Interference fit between the PTFE plunger tip and the inner diameter of the glass barrel achieve the seal required for accurate operation.

## Long Life Syringes

The Hamilton Salt Line Syringes are a further development of the GASTIGHT 1000 and 1700 series syringes. They have a longer plunger tip life expectancy for demanding automated dispensing applications. They have an extremely long lifetime when used with aqueous solutions in the pH range of 1 – 13 that crystallize and scratch traditional PTFE plunger tips.

The plunger tip is made of durable ultra-high molecular weight polyethylene (UHMWPE) – a harder material than PTFE. They are designed to be compatible with our MICROLAB® 500 Series diluters and dispensers, the MICROLAB robotic sample processors, and OEM instrumentation including the PSD2, Precision Syringe Drive Module.

## Instrument Syringe Terminations

Instrument syringe terminations vary depending upon their application and complementary female fitting. These syringes are used with Hamilton instrumentation, i.e. diluters/dispensers, and for OEM applications.



### **AD, ACCUDIL™**

M8 x 0.75, male fitting; not autoclavable.  
Used with MICROLAB® 1000 PLUS diluter/dispenser.



### **C, Chem**

1/4-28 UNF male fitting; autoclavable.  
Used in low volume applications where system dead volumes need to be minimized.



### **D, Diluter**

TLL, PTFE Luer Lock, male fitting with M6 x 1 female, side port; autoclavable.  
Used with MICROLAB 500 Series diluters.



### **DAD, Diluter ACCUDIL**

M8 x 0.75 male fitting with M6 x 1 side port; not autoclavable.  
Used with MICROLAB 1000 PLUS diluter.



### **TLL/TLLX, PTFE Luer Lock (with or without slots)**

Male luer taper with nickel-plated brass hub accepts and locks in place luer hub needles and connectors; autoclavable when disassembled.  
Used with MICROLAB 500 Series diluters/dispensers and OEM instrumentation.

## Instrument Syringe Plungers

Plunger stops are recommended on syringes from 10  $\mu$ L to 1 mL which are used on automated syringe drives or pumps. They serve a triple purpose: 1) prevent damage of the syringe by a run-away syringe drive or pump 2) allow accurate attachment of the syringe to the drive arm mechanism 3) optimize zero stop adjustment.



### **AD w/s, ACCUDIL with stop • DAD w/s, Diluter ACCUDIL with stop**

The w/s-style plunger stop allows attachment to collet type, drive mechanisms, such as on the MICROLAB 1000 PLUS diluter/dispenser.



### **CX, Chem w/s • DX, Diluter w/s • TLLX, PTFE Luer Lock w/s**

The X-style plunger stop incorporates a 6-32 UNC female thread on the end of the stop to allow attachment to drive arm mechanisms, such as on the MICROLAB 500 Series diluters/dispensers.



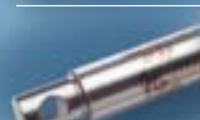
### **TLLX, PTFE Luer Lock with stop & TLL, PTFE Luer Lock**

This X-style plunger stop is designed specifically for the PSD3 (half-height syringe pump).



### **XP-3000 style plunger**

This plunger is specifically designed to fit on the XP-3000 modular digital syringe pump.



### **XL-3000 style plunger**

This plunger is specifically designed to fit on the XL-3000 modular digital syringe pump.

# Syringes for the MICROLAB<sup>®</sup> 500 Series











10  $\mu$ L - 25 mL

MICROLAB 500 Diluters; ML503A, ML530B, ML532BP, ML531C

MICROLAB 500 Dispensers; ML501A, ML510B, ML512BP, ML511C



## Ordering Information

	Volume	10 $\mu$ L	25 $\mu$ L	50 $\mu$ L	100 $\mu$ L	250 $\mu$ L	500 $\mu$ L	1 mL	2.5 mL	5 mL	10 mL	25 mL
	Model	1701	1702	1705	1710	1725	1750	1001	1002	1005	1010	1025
<b>CX, CHEM* with stop</b>												
		80062	80262	80962	81062	81162	81262					
* Requires a special valve with 1/4" - 28 threaded parts, PN 35788.												
<b>DX, Diluter with stop (Sample Syringe)</b>												
			80226	80926	81026	81126	81226	81326				
<b>TLLX, TLL with stop (Reagent Syringe)</b>												
			80222	80922	81022	81122	81222	81323				
<b>TLL, PTFE Luer Lock (Reagent Syringe)</b>												
									81320	81420	81520	81620 82521
<b>Salt Line Syringes TLL-SAL, PTFE Luer Lock</b>												
						203220	203230	203240	203250	203260	203270	

## Replacement Parts

	Volume	10 $\mu$ L	25 $\mu$ L	50 $\mu$ L	100 $\mu$ L	250 $\mu$ L	500 $\mu$ L	1 mL	2.5 mL	5 mL	10 mL	25 mL
	Model	1701	1702	1705	1710	1725	1750	1001	1002	1005	1010	1025
Plunger Assembly TLLX/DX/CX			13269	1117-01	1117-02	1117-03	1120-01	1578-01				
Plunger Assembly TLL								1359-01	1360-01	13230	13231	13271
Plunger Assembly TLL-SAL						203222	203232	203242	203252	203262	203272	

### Note:

- All TLL and TLLX syringes can be used on the left or right side of ML500 Series diluters and dispensers.
- All DX syringes are used only on the right side of ML500 Series diluters, i.e., ML503A, ML530B, ML532BP and ML531C.

# Syringes for Hamilton Precision Syringe Pumps

25  $\mu$ L - 25 mL  
"Full-height" (9") precision syringe pump, PSD2



12.5  $\mu$ L - 12.5 mL  
"Half-height" (4.5") precision syringe pump, PSD3



## Ordering Information

Volume	10 µL	25 µL	50 µL	100 µL	250 µL	500 µL	1 mL	2.5 mL	5 mL	10 mL	25 mL
Model	1701	1702	1705	1710	1725	1750	1001	1002	1005	1010	1025

### TLL, PTFE Luer Lock



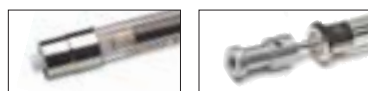
81320 81420 81520 81620 82521\*

### TLLX, TLL with stop



80222 80922 81022 81122 81222 81323

### TLLXB, TLL with stop & backbushing



80947 81047 81147 81247

### Salt Line Syringes

#### TLL-SAL, PTFE Luer Lock



203220 203230 203240 203250 203260 203270

\* For special applications only

## Replacement Parts

Volume	10 µL	25 µL	50 µL	100 µL	250 µL	500 µL	1 mL	2.5 mL	5 mL	10 mL	25 mL
Model	1701	1702	1705	1710	1725	1750	1001	1002	1005	1010	1025

Plunger Assembly TLLX 13269 1117-01 1117-02 1117-03 1120-01 1578-01

Plunger Assembly TLL 1359-01 1360-01 13230 13231 13271

Plunger Assembly TLL-SAL 203222 203232 203242 203252 203262 203272

## Ordering Information

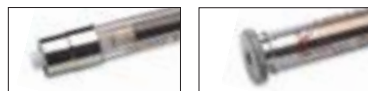
Volume	12.5 µL	25 µL	50 µL	125 µL	250 µL	500 µL	1.25 mL	2.5 mL	5 mL	12.5 mL
Model	1702.5	1705.5	1710.5	1725.5	1750.5	1001.5	1002.5	1005.5	1010.5	1025.5

### TLLX, TLL with stop



5495-10 5495-15 5495-20 5495-25 5495-30 5495-35

### TLL, PTFE Luer Lock



5495-40 5495-45 5495-50 5495-55

### Syringe Cleaning Tips

- The life of your GASTIGHT® syringe is directly related to its cleanliness!
- To clean syringes, it is best to use solvents known to be effective in solvating the sample and preferably are non-alkaline, non-phosphate and non-detergent based. A biodegradable, non-phosphate, organic Cleaning Concentrate is available from Hamilton; order part # 18311.
- High quality water and acetone prove to be good rinses.
- To clean the plunger, remove it from the syringe barrel and gently wipe with a lint-free tissue. Reinsert the plunger into the barrel and pump deionized water or acetone through the needle and syringe. Air dry the syringe for storage.

Note: When reinserting a PTFE-tipped plunger into a syringe barrel, wet (lubricate) the tip with deionized water or another solvent compatible with the sample.



# Syringes for OEM Applications



50  $\mu$ L - 10 mL  
XL-3000 modular digital syringe pump



50  $\mu$ L - 5 mL  
XP-3000 modular digital syringe pump





## Ordering Information

	Volume	50 $\mu$ L	100 $\mu$ L	250 $\mu$ L	500 $\mu$ L	1 mL	2.5 mL	5 mL	10 mL
	Model	1705TLL-XL	1710TLL-XL	1725TLL-XL	1750TLL-XL	1001TLL-XL	1002TLL-XL	1005TLL-XL	1010TLL-XL
<b>60 mm TLL, PTFE Luer Lock</b>									
		201790	201797	201802	201807	201812	201817	201822	201827

Both the 60 mm TLL-style and the 30 mm C-style syringes are compatible with many liquid handling instruments, including Tecan, Rosys, Cavro IQ Series sample processors and OEM liquid handling applications.

## Ordering Information

	Volume	50 $\mu$ L	100 $\mu$ L	250 $\mu$ L	500 $\mu$ L	1 mL	2.5 mL	5 mL
	Model	1705C-XP	1710C-XP	1725C-XP	1750C-XP	1001C-XP	1002C-XP	1005C-XP
<b>30 mm C, CHEM</b>								
		201720	201730	201740	201750	201760	201770	201780

### Sterilizing Syringes

Sterilize your Hamilton syringe using an appropriate chemical sterilizer. Rinse the syringe thoroughly after sterilization. In general, Hamilton Company does not recommend autoclaving syringes. Stainless steel expands faster than glass upon heating. Heating a syringe with a cemented, stainless steel needle may cause the glass barrel to split. Heating a syringe with cemented stainless steel hubs may result in adhesive deterioration and leakage. It is the responsibility of the user to determine the suitability of application and material compatibility of the products based on published specifications.

# Syringes for the MICROLAB<sup>®</sup>4000 Instruments

50  $\mu$ L - 500  $\mu$ L  
MICROLAB MPH-96 and MPH-48



MICROLAB MPH-96

25  $\mu$ L - 10 mL  
MICROLAB 4000/4200 MPH Series

Configurations:  
Single Probe  
MPH-4  
MPH-6  
MPH-8  
MPH-12





MICROLAB 4200 MPH-8

25  $\mu$ L - 10 mL  
MICROLAB 4000/4200 SPE



MICROLAB 4200 SPE







## Ordering Information\*

Volume	25 µL	50 µL	100 µL	250 µL	500 µL	1 mL	2.5 mL	5 mL	10 mL	25 mL
Model	1702	1705	1710	1725	1750	1001	1002	1005	1010	1025
<b>TLLXB, TLL with stop &amp; backbushing</b>										
		80947	81047	81147	81247					

### Benefits of back-bushing syringes:

- increases plunger tip life
- maintains proper plunger alignment
- reduces the particles generated by plunger to glass contact

## Ordering Information\*

Volume	25 µL	50 µL	100 µL	250 µL	500 µL	1 mL	2.5 mL	5 mL	10 mL	25 mL
Model	1702	1705	1710	1725	1750	1001	1002	1005	1010	1025
<b>TLLX, TLL with stop</b>										
						81323				
<b>TLLXB, TLL with stop &amp; backbushing</b>										
		80223	80947	81047	81147	81247				
<b>TLL, PTFE Luer Lock</b>										
							81420	81520	81620	

\* Contact Hamilton for information regarding probe head/syringe compatibility.

# Previously Manufactured Products



MICROLAB® 1000 Plus

Digital Diluter

## Ordering Information

### MICROLAB 1000 Plus

Volume	10 µL	25 µL	50 µL	100 µL	250 µL	500 µL	1 mL	2.5 mL	5 mL	10 mL	25 mL
Model	1701	1702	1705	1710	1725	1750	1001	1002	1005	1010	1025

#### AD, ACCUDIL™ with stop



201000 201050 201100 201150 201200 201250 201300 201350

#### DAD, Diluter ACCUDIL with stop



201500 201550 201600 201650 201700

### Digital Diluter & MICROLAB 400

#### DX, Diluter with stop



80226 80926 81026 81126 81226 81326

#### TLLX, TLL with stop



80922 81022 81122 81222

#### TLL, PTFE Luer Lock



81320 81420 81520 81620

Obsoleted from our product offering: MICROLAB® 1000, Digital Diluter, MICROLAB 400, M and 900

For your convenience, they are listed here to help you select replacement syringes.



MICROLAB 900



MICROLAB M

## Ordering Information

### MICROLAB M

Volume Model	10 µL	25 µL	50 µL	100 µL	250 µL	500 µL	1 mL	2.5 mL	5 mL	10 mL	25 mL
TLLX, TLL with stop			80922	81022	81122	81222	81323				
TLL, PTFE Luer Lock								81420	81520	81620	

### MICROLAB 900

#### CX, CHEM with stop

		80062*
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#### TLLX, TLL with stop

		80222	80922	81022	81122	81222	81323
--	--	-------	-------	-------	-------	-------	-------

#### DX, Diluter with stop

		80226	80926	81026	81126	81226	81326
--	--	-------	-------	-------	-------	-------	-------

#### TLL, PTFE Luer Lock

		81320	81420	81520	81620
--	--	-------	-------	-------	-------

\* Requires a special valve with 1/4"-28 threaded ports. ML900 Series Part #0159572.

# General Ordering Information



**HAMILTON**  
THE MEASURE OF EXCELLENCE™

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**Office Hours:**

Weekdays 7 am – 5 pm Pacific Standard Time

Toll Free 1-800-648-5950 or 1-775-858-3000  
Fax: 1-775-856-7259

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**Toll Free Order Hotline:**

**1-888-525-2123**

For your convenience, please have your account number and your purchase order number ready when placing an order.

Major Credit Cards Accepted

**Order Online:**

[www.hamiltoncompany.com](http://www.hamiltoncompany.com)

**Via Email:**

[sales@hamiltoncompany.com](mailto:sales@hamiltoncompany.com)

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**Terms:**

After credit responsibility has been established with Hamilton Company, terms are net 30 days from the date of invoice. A finance charge will be applied to all invoices not paid within 30 days. Unestablished accounts can place an order with a credit card.

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**Shipping:**

All domestic shipments are FOB Reno, Nevada, U.S.A., by United Parcel Service unless otherwise specified. All international shipments are FOB Reno, Nevada, U.S.A., to be shipped as specified by purchaser.

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**Warranty:**

All Hamilton products are unconditionally guaranteed to be free of defects in materials and workmanship for one year (12 months) from date of purchase.

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**Returned Goods/  
Restocking Charges:**

Any product returned to Hamilton Company for repair, evaluation, or exchange must be accompanied by an assigned Returned Goods Authorization (RGA) tracking number. Unauthorized returns will be refused.

Products returned for credit must also have an assigned RGA tracking number and are subject to a 20% restocking fee. All returns must be sent to the following address:

Hamilton Company  
4990 Energy Way  
Reno, Nevada 89502

# Standard Conditions of Sales

## STANDARD CONDITIONS OF SALE (of Hamilton Company, "The Company")

### 1. GENERAL

All orders are accepted and executed on the understanding that the Purchaser is bound by the following Standard Conditions of Sale. Where there is any inconsistency between these Standard Conditions of Sale and any conditions which the Purchaser seeks to impose, these Standard Conditions of Sale shall prevail.

Any deviations from these Standard Conditions of Sale shall only be binding upon the Company if the latter has expressly agreed thereto in writing.

### 2. VALIDITY OF QUOTATIONS

The Company reserves the right to refuse the Purchaser's acceptance of a quotation unless such quotation is stated to be open for a specific period and is not withdrawn in such period.

### 3. PRICES AND DISCOUNTS

The published prices of the Company's Products are those ruling on the date of publication and are subject to alteration without notice. Prices and currency transactions are in U.S.A. dollars.

### 4. PAYMENT

Unless otherwise agreed by the Company in writing, the goods shall be paid for in cash within 30 days following the date of the relevant invoice. The Company's prices are net and are not subject to any settlement terms.

The Purchaser may not claim any set-off against the Company. In the event of a delay in payment, the Company shall be entitled to claim, without any notice of default being required and without prejudice to any further rights it may have, interest at a rate of one and a half percent (11/2%) per month or at the legal interest rate, whichever is the higher value. All costs of collection shall be fully for the Purchaser's account; extrajudicial costs shall be fixed at ten percent (10%) of the amount owed by the Purchaser and shall be at least fifteen hundred U.S. dollars (USD 1,500.00).

In the event that any payment in respect of Products supplied becomes overdue, the Company may immediately terminate the Purchaser's power of sale under clause 14 of this document and may without prior notice to the Purchaser enter upon the premises of the Purchaser to repossess unpaid goods.

### 5. NEW ACCOUNTS

Where a credit account is desired, a bank and as many as five trade references may be required. The Company reserves the right not to grant credit to any Purchaser for any reason whatsoever.

### 6. CARRIAGE

Unless otherwise agreed by the parties, goods are delivered by the Company FOB Reno, Nevada, U.S.A. to the Purchaser's registered office exclusive of duty, insurance, taxes, and VAT. When special delivery arrangements are requested, special rates will be charged.

All delivery times shall be approximate, except if a fixed time of delivery has been specifically agreed to in writing by the Company, in which case a delay in the delivery shall solely entitle the Purchaser to cancel, without costs, the order for the goods not delivered.

### 7. PACKING

A charge is made when it is necessary to dispatch goods in crates or cases, but this amount will be credited in full on the return, within one month, of the crates or cases in good condition carriage paid. No charge is made for any other form of packing and no credit will be allowed for its return.

### 8. LOSS OR DAMAGE IN TRANSIT

Clear receipts should be given only if goods have been examined, as an unqualified signature may react to the disadvantage of the Purchaser if the consignment should become the subject of a claim. In the event of short delivery or damage in transit, it is essential that the Company's dispatching depot be advised within two days of receipt of goods.

The following details should be sent in writing to the Company:

- Advice note number
- Carrier's name
- Condition of package
- Date of consignment received
- Extent of damage or shortage

In the event of non-delivery, the Company's dispatching depot should be advised within seven (7) days of the date of invoice. The Company will not be responsible for goods lost or damaged in transit unless the above conditions are observed.

### 9. DELIVERY

The Purchaser shall be obliged to cooperate in the delivery of the Products and to take receipt of same. The Company may keep any goods refused or not accepted by the Purchaser at the latter party's disposal for account and at the risk of the Purchaser.

### 10. LIABILITY FOR DELAY

Any times quoted for dispatch, delivery, repair, or replacement are to be treated as estimates only and the Company shall not be liable for failure to dispatch, deliver, repair, or replace within such time unless the Purchaser has suffered loss thereby and the amount payable in respect thereof shall have been agreed in writing as liquidated damages, in which case the Company's liability shall be limited to the amount so agreed to be paid.

In all cases, whether a time for dispatch, delivery, repair, or replacement be quoted or not, the time for dispatch, delivery, repair, or replacement shall be extended by a reasonable period if delay in dispatch, delivery, repair, or replacement is caused by instructions or lack of instructions from the Purchaser or by industrial dispute or by any cause whatsoever beyond the Company's reasonable control.

### 11. DEFAULT

The Company shall have the right to discontinue delivery and also at its discretion to terminate any agreement in respect of any undelivered goods if the Purchaser defaults in payment as stated under clause 4 of this document or in respect of its other obligations to the Company.

### 12. DEFECTS AFTER DELIVERY

The Company will make good, by repair at the Company's option, or by the supply of replacement, defects, which under proper use, appear in the goods within a period of 12 calendar months after the goods have been delivered and arise solely from faulty design, materials or workmanship; provided that no complaints shall be admissible unless submitted in writing to the Company within five (5) days after

the time of discovery of the defect or after the time the defect should have been discovered, whichever time comes first, it being understood that the Purchaser shall take reasonable care to discover any defect of whatever nature as soon as possible after taking delivery.

Provided further that in respect of parts or components not of the Company's manufacture, the Company will give the Purchaser a guarantee equivalent to the guarantee (if any) that the Company may have received from the supplier of such parts or components in respect thereof but not so as to impose on the Company in respect of such parts or components a liability greater than that imposed on it by the aforesaid period of this clause.

Save as aforesaid and as provided in clauses 8 and 10, the Company shall not be under any liability in respect of defects in goods delivered or for any injury, damage, or loss resulting from such defects or from any work done in connection therewith and its liability under this clause shall be in lieu of any warranty or condition implied by law as to the quality of fitness for any particular purpose of such goods.

### 13. SPECIAL ORDERS

All orders for non-standard products or package quantities not included in current Company catalogues and literature, are considered to be special orders and will be dealt with at the discretion of the Company.

### 14. RESERVATION OF OWNERSHIP/PASSING OF RISK

Products supplied to the Purchaser by way of sale shall remain the property of the Company until payment in full of all its claims on the Purchaser on whatsoever account has been received by the Company but risk in the same shall pass upon delivery.

The Purchaser acting as bailee shall deal with the goods separately and store according to the agreed methods of storage so that the goods not paid for may be clearly identified and shall not be mixed with other goods.

The Purchaser shall be entitled to pass ownership in unpaid goods to third parties provided that all sums received shall be held for the account of the Company.

### 15. RETURN OF GOODS

The Company does not accept the return of goods for credit unless it is a justified warranty claim. All returns must be authorized in advance. Unauthorized returns will be refused. In no circumstances may goods supplied against a firm order be returned without the Purchaser having first applied for and obtained both written consent and a Returned Goods Authorization (RGA) number from the Company.

The Company reserves the right to refuse the return of any Product that has been used with infectious, microbiological, or radioactive substances or other materials that may be deemed hazardous to the employees of the Company.

A handling charge amounting to not more than 20 percent of the invoice value of the returned goods may be deducted from any credit allowed where it is established that the reason for their return is not subject to the provision of clause 8 or 12 hereof or through any error on the part of the Company.

Goods approved for return must be received by the Company within 30 (thirty) days of the Company's written consent.

### 16. DESCRIPTIVE MATTER AND ILLUSTRATIONS

All descriptive and forwarding specifications, drawings, and particulars of weights and dimensions issued by the Company are approximate only, and are intended only to present a general idea of the goods to which they refer and shall not form part of a contract.

### 17. FORCE MAJEURE

Any party will be excused from performing under a sale agreement or any other agreement of which these Standard Conditions of Sale are part if prevented by an event of force majeure including strike, lockout, or other major trouble affecting labor relations.

If any such event of force majeure should last for more than two (2) consecutive months, any party may elect to terminate this Agreement immediately upon giving a written notice to the other party.

### 18. PATENTS

In the event of any claim being made or action being brought against the Purchaser in respect of infringement of local patents by the user or sale of goods supplied hereunder, the Purchaser is to notify the Company immediately, and the Company shall be at liberty with the Purchaser's assistance if required, but at the Company's expense, to conduct through the Company's own lawyers and experts all negotiations for the settlement of the same or any litigation that may arise therefrom; subject to such notifications and provided that no such goods, or any part thereof, shall be used for any purpose other than that for which the Company supply them, the Company will indemnify the Purchaser in respect of any such claims.

### 19. TRADEMARKS

- The only Hamilton trademarks that the Purchaser may display to advertise and sell the Products shall be those trademarks under which the Products are sold by the Company to the Purchaser hereunder or such other trademarks expressly authorized by the Company (hereinafter called "the said trademarks") and the Purchaser shall comply with the Company's instructions as to the manner and context in which the said trademarks and the statements to accompany them are displayed.
- No trademarks of the Products shall be undertaken by the Purchaser or any person on the Purchaser's behalf without the Company's prior written consent nor will the Purchaser alter, obliterate, add to, or otherwise interfere with the said trademarks.

### 20. LEGAL CONSTRUCTION

These Standard Conditions of Sale and all sale contracts to which the same apply shall be construed in accordance with the laws of the State of Nevada, U.S.A., and the authoritative text shall be that in the English language set out herein. Any disputes arising in connection with these Standard Conditions of Sale and all sale contracts to which the same apply shall be finally settled by arbitration in accordance with the laws and rules of the State of Nevada and such proceedings held and located in Reno, Nevada, U.S.A.





**HAMILTON**  
THE MEASURE OF EXCELLENCE™

**Hamilton Company**

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Reno, Nevada 89520 USA  
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Telephone: +1-775-858-3000  
Fax: +1-775-856-7259  
e-mail: sales@hamiltoncompany.com

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Fax: +41-(0)81-660-60-70  
e-mail: marketing@hamilton.ch

**Hamilton Deutschland GmbH**

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64293 Darmstadt/Germany  
Telephone: +49-(0)6151-66706-0  
Fax: +49-(0)6151-66706-66  
e-mail: sales@hamiltongmbh.de

**Hamilton Northern Europe**

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Aston Science Park  
Birmingham, B7 4BH, U.K.  
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Fax: +44-(0)121 2600302  
e-mail: sales@hamiltongb.co.uk

**Hamilton France S.A.R.L.**

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F-92182 Antony Cedex  
France  
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Fax: +33-(0)1-55-59-18-19  
e-mail: Hamilton.France@wanadoo.fr

**Quality Hamilton Products:**

MICROLITER™ Syringes  
GASTIGHT® Syringes  
Chromatography Syringes  
Syringes for Life Science  
Instrument Syringes  
SoftGrip™ Pipettes  
Miniature Valves  
Modular Valve Positioner  
Laboratory Fittings, Adapters & Tubing  
Precision Syringe Pumps  
MICROLAB® Diluters & Dispensers  
Electrochemical Sensors  
DURACAL™ Buffer Solutions  
HPLC Columns & Resins

**Laboratory Automation for:**

Drug Discovery  
Genomics  
Proteomics  
Forensics  
In Vitro Diagnostics

<http://www.hamiltoncompany.com>  
Sales/Support USA 1-888-525-2123

**TRADEMARKS:**

The following are trademarks of Hamilton Company

ACCUDIL™

GASTIGHT®

MICROLAB®

# 7000 Series MODIFIED MICROLITER™ Syringe



*Congratulations! You have purchased the finest quality precision syringe available today. We at Hamilton Company combine top quality materials with skilled workmanship, ensuring the highest possible performance level of every precision fluid device we manufacture. With proper care and handling, MODIFIED MICROLITER syringes will provide unsurpassed performance in precision liquid handling year after year.*

The Hamilton 7000 Series MODIFIED MICROLITER syringes are used for gas chromatography (GC), thin layer chromatography (TLC), animal injections and micro-volume fluid transfers. This syringe series is unique, as the sample is held in the stainless steel needle. The tungsten plunger wire travels inside the needle, dispensing 100% of the sample when fully depressed. The knurled hub nut is seated against a sealing ferrule at the junction of the needle/glass barrel to ensure injection pressures up to 6000 psig. To maintain this seal periodically tighten the knurled hub nut until light resistance to plunger movement is felt. Use of pliers on the knurled hub nut may be required to achieve this tightness. The black PTFE-coated plunger sleeve makes it easy to read the exact volume.

Two sizes of spacers are available to control the depth of needle penetration. A standard spacer (P/N 86203), resulting in a 0.75 inch exposed needle length and a shorter spacer (P/N 86201) resulting in a 1.75 inch exposed needle length. The spacer also provides a convenient hand hold when inserting the needle.

Order 7000 Series MODIFIED MICROLITER syringes with your choice of two needle point styles. Point style #2 has a 22° bevel; point style #3 has a 90° blunt end. Both point styles work equally well for septum piercing. Point style #3 is recommended for transfer pipetting and micro-volumes.

Two accessories are available for use with the 7000 Series MODIFIED MICROLITER syringes. The reproducibility adapter assures repetitive plunger location. While the syringe guide aids in preventing plunger bending and accidental removal of the plunger.

Special 7000 Series syringes are available for use with the Hewlett-Packard® model 7673 autosampler (0.5 and 1.0 µL with either 26s or 23s gauge needle). Operation of these syringes is the same as for the standard 7000 Series syringes. However, spacers are not used with these special syringes, and the hub nuts are designed differently to fit the autosamplers.

**Syringes and needles manufactured by Hamilton Company are intended for scientific research and laboratory use only and are not intended for human in vivo use.**

## OPERATING THE 7000 SERIES SYRINGE

1. Ensure that your sample contains no minute particles.
2. Before filling, flush the syringe several times to help eliminate bubbles.
3. To fill the syringe, draw the plunger assembly back slowly to a point slightly beyond the desired volume. Move the plunger forward to the desired sample volume.
4. Fully and quickly press the plunger forward to dispense the sample.

**NOTE: When operating the syringe, avoid touching the needle, as body heat causes volume irregularities. Hold the spacer, if used, to stabilize the needle.**



## REPLACEMENT PARTS AND SYRINGE REPAIR

Replacement parts are available for in-field repair of syringes. Refer to Figure 1 and Table 1 for replacement parts.

### DISASSEMBLY OF THE 7000 SERIES SYRINGE

Refer to Figures 1 and 2 for references to part numbers in parentheses.

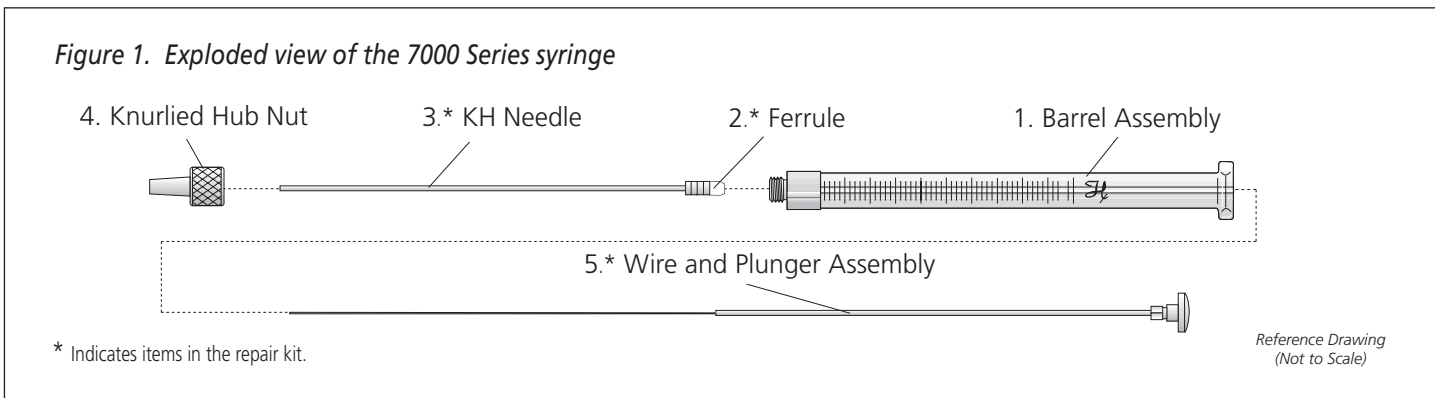
1. Loosen the knurled hub nut (4) from the glass syringe barrel (1) and remove it. NOTE: Some earlier versions of the 7000 Series syringes have two small washers located between the hub nut and the needle ferrule. Discard these washers.
2. Remove the needle (3) and ferrule (2) from the barrel.
3. Extract the plunger assembly (5) from the barrel.

### ASSEMBLING THE 7000 SERIES SYRINGE

Refer to Figures 1 and 2 for references to part numbers in parentheses.

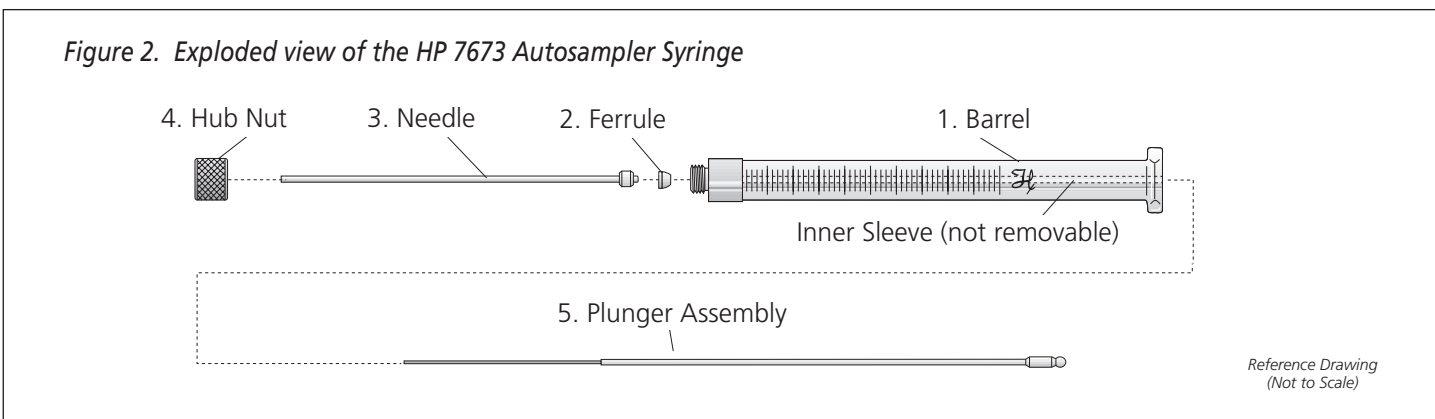
**NOTE: Avoid handling the plunger wire with your fingers. Oils and dirt from your fingers may cause the plunger wire to seize within the needle during assembly or operation. Use a lint-free tissue when handling the plunger wire.**

1. Remove the needle and ferrule (2 and 3) from the replacement plunger assembly.
2. Place the needle and ferrule into the end of the syringe barrel. Install the knurled hub nut (4) but do not tighten completely.
3. Using a lint-free tissue, carefully hold the plunger wire as close to the end as possible and insert it into the inner sleeve of the syringe barrel. Rotating the plunger wire back and forth will help thread the wire through the inner sleeve, ferrule, and needle.
4. Tighten the knurled hub nut until light resistance to plunger movement is felt.



### REPLACEMENT PARTS FOR THE 7000 SERIES SYRINGE

Part	Syringe Series						
	7000.5OC	7000.5	7001	7101	7002	7102	7105
Hub Nut	17658	17789	17789	17789	17789	17789	17789
Repair Kit, Pt. Style 2 Needle	-----	17887	17888	17890	17891	-----	17893
Repair Kit, Pt. Style 3 Needle	86258	17187	17188	17190	17191	17192	17193
Spacer, 1.0 inch	86201	86201	86201	86201	86201	86201	86201
Spacer, 2.0 inch	86203	86203	86203	86203	86203	86203	86203



## CLEANING AND MAINTAINING 7000 SERIES SYRINGES

For rapid cleaning of the 7000 Series MODIFIED MICROLITER™ syringe, Hamilton recommends its Syringe Cleaner (P/N 76610 for 120 VAC or 76615 for 220 VAC). This dry method of cleaning is normally sufficient to vaporize most common liquid samples used in GC applications without the need for vacuum assistance. You may include a vacuum source, if necessary to remove suspected residuals.

Follow these steps to clean 7000 Series syringes with Hamilton's syringe cleaner:

1. When the syringe cleaner has reached its full operational temperature (370 °C), insert the syringe needle through the septum and into the preheated chamber for 30 seconds.
2. Move the plunger in and out of the syringe several times. Do not remove the plunger assembly from the syringe. Remove the syringe and repeat the above procedure as necessary.

The 7000 Series MODIFIED MICROLITER syringes may also be cleaned with Hamilton Cleaning Solution (P/N 18310) or appropriate solvents by flushing the needle/plunger assembly thoroughly after each injection.

**NOTE: Do not heat the needle if the syringe has been used with a proteinaceous material or with a material not likely to evaporate at higher temperatures. This bakes the material onto the inner surface of the needle, and the needle will have to be replaced.**

## WARRANTY STATEMENT

Hamilton Company unconditionally guarantees its products to be free of defects in materials and workmanship. Any product which fails due to such defects will be repaired or replaced at our discretion without cost, provided the device is returned with an explanation. It is the responsibility of the purchaser to determine the suitability of application and material compatibility of the products based on the published specifications of the products.

## RETURN OF GOODS

Hamilton Company's return and repair policy is written to protect its employees from potentially hazardous materials (e.g., serum, radioactive materials, carcinogenic chemicals, etc.) or any substance that may cause them partial or permanent disability during the inspection or repair process. In returning a product, the customer acknowledges that the product is free from any hazardous materials. Furthermore, the customer assumes responsibility should the returned product be determined to be hazardous.

Trademarks:  
MODIFIED MICROLITER™ - Hamilton Company;  
Hewlett-Packard® - Hewlett-Packard Company;



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