

Gas Chromatography Syringes

The invention of the Microliter syringe by Clark Hamilton in 1947 enabled the development of gas chromatography. “At that time there was no convenient way to introduce microliter (or even smaller) volumes of liquids into a gas chromatograph,” wrote Professor Georges Guiochon, Professor and Distinguished Scientist at University of Tennessee. “In fact, it is not an exaggeration to say that without the Hamilton syringes, gas chromatography could not have become everybody’s technique” [Chromatographia 15(6), 333 (1982)]. Injection into a gas chromatograph may be manual or automatic. In both cases, a microsyringe is required to introduce the sample. The choice of the correct syringe depends on the type of injector used.



Manual Split/Splitless Injection

A split/splitless injector consists of a heated chamber with a glass liner into which the sample is injected through the septum. A microsyringe is used to inject the sample through a rubber septum into a flash vaporizer chamber at the head of the column. The sample vaporizes to form a mixture of carrier gas, vaporized solvent and vaporized analytes. In the split mode, only a proportion of this mixture reaches the column but most exits through the split outlet. This avoids overloading the column. In the splitless mode, the split vent is closed so that the vaporized analyte passes onto the column. This mode is more sensitive and adequate for trace analysis.

Common syringe features for split/splitless injection include:

- ▶ Microliter syringes for liquid samples and Gastight syringes for gas and liquid samples
- ▶ Common volume range between 0.5 to 50 μL
- ▶ Needle with point style 2 to pierce the rubber septum
- ▶ Needle length of 51 mm to reach the middle of the glass liner. Splitless injection of small volumes may be performed with a 70 mm needle to deposit the sample close to the column entrance.

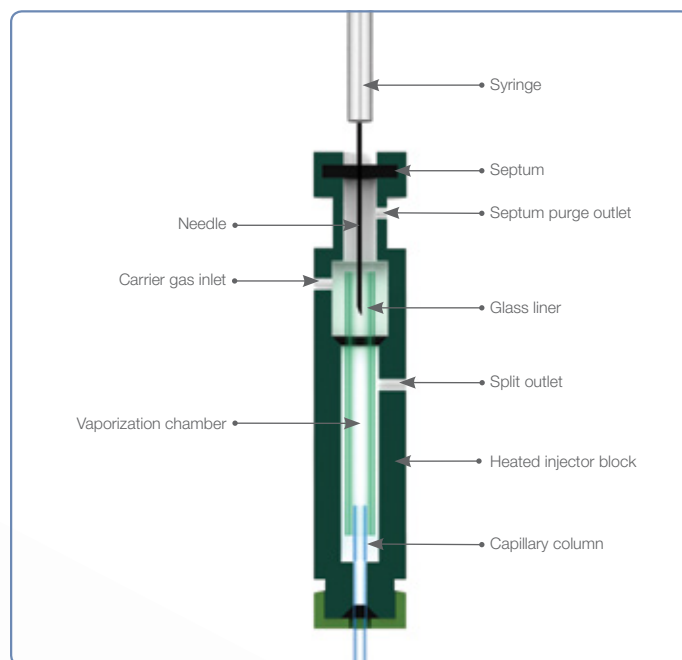
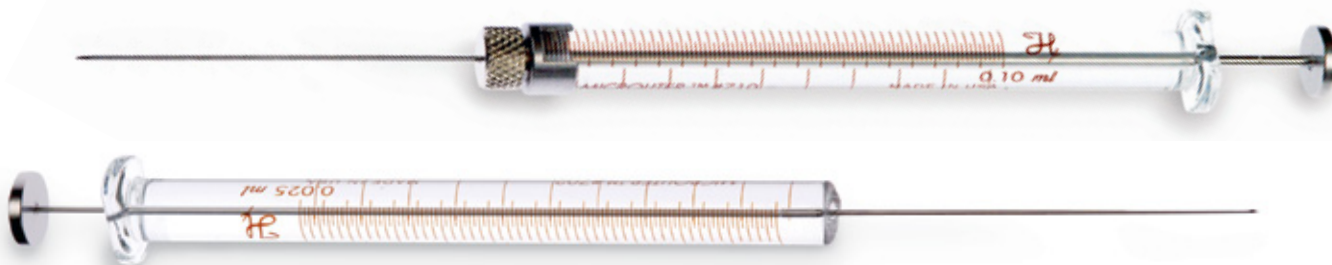


Illustration of a split/splitless injector



Injection of Liquid Samples

Syringes For Manual Injection of Liquid Samples

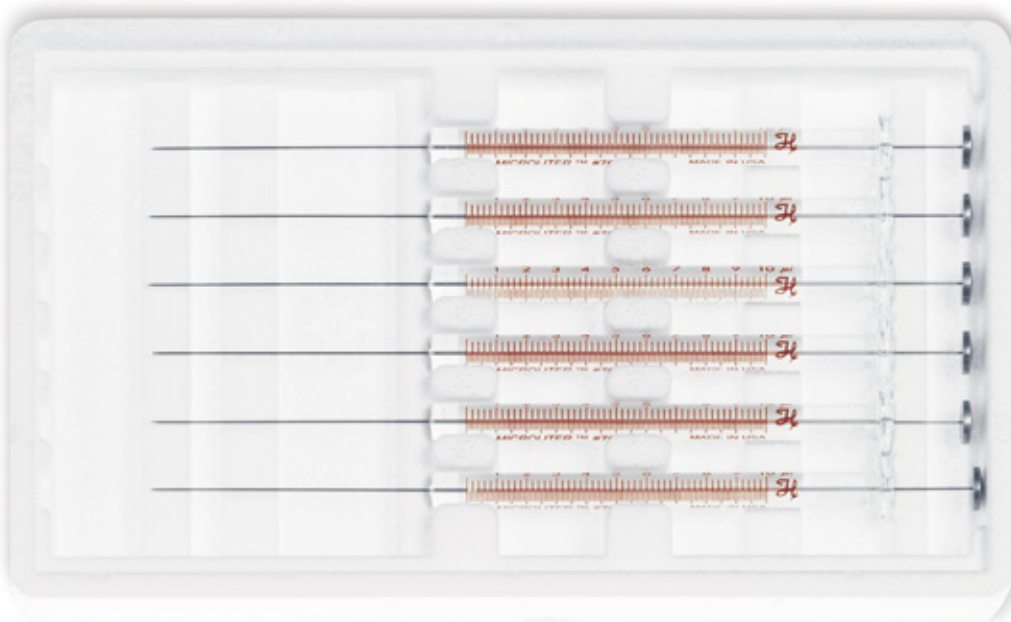
Volume	5 μL	10 μL	25 μL	50 μL	100 μL	250 μL	500 μL
Model	75	701	702	705	710	725	750
Gauge	26s	26s	22s	22s	22s	22s	22
Cemented Needle (N) Syringe (point style 2)	87900	80300 80366 (6 pk)	80400	80500	80600	80700	80800
Removable Needle (RN) Syringe (point style 2)	87930	80330 80336 (6 pk)	80430	80530	80630	80730	80830
Replacement Needle 6 pk (point style 2)	7758-02	7758-02	7758-03	7758-03	7758-03	7779-03	7779-01

Note: Needles are 51 mm

Zero Dead Volume Syringes

Volume	0.5 μL	1.0 μL	2.0 μL	5.0 μL
Model	7000.5	7001	7002	7105
Gauge	25	25	25	24
Knurled Hub (KH) Syringe (point style 2)	86259	80135	88411	88011
Standard Injection Spacer (25 mm)	86201	86201	86201	86201

Note: Needles are 70 mm



Tech Tip

Choose a syringe with a removable needle if working with halogenated solvents.

Injection of Gas and Liquid Samples

Syringes For Manual Injection of Gas and Liquid Samples

Volume	10 µL	25 µL	50 µL	100 µL	250 µL
Model	1701	1702	1705	1710	1725
Gauge	26s	22s	22s	22s	22s
Cemented Needle (N) Syringe (point style 2)	80000	80200	80900	81000	
Cemented Needle (LTN) Syringe (point style 2)					81100
Removable Needle (RN) Syringe (point style 2)	80030	80230	80930	81030	81130
Replacement Needle 6 pk (point style 2)	7758-02	7758-03	7758-03	7758-03	7779-03
Volume	500 µL	1000 µL	2500 µL	5000 µL	10000 µL
Model	1750	1001	1002	1005	1010
Gauge	22	22	22	22	22
Cemented Needle (LTN) Syringe (point style 2)	81217	81317	81417	81517	81617
Removable Needle (RN) Syringe (point style 2)	81230	81330	81430	81530	81630
Replacement Needle 6 pk (point style 2)	7779-01	7779-01	7779-01	7779-01	7779-01

Note: Needles are 51 mm

Reinforced Plunger Syringes

Volume	10 µL	25 µL	50 µL	100 µL	250 µL
Model	1801	1802	1805	1810	1825
Gauge	26s	22s	22s	22s	22s
Removable Needle (RN) Syringe (point style 2)	84877	84880	84883	84886	84889
Replacement Needle, 6 pk (point style 2)	7758-02	7758-03	7758-03	7758-03	7779-03

Note: Needles are 51 mm



Reinforced Plunger Syringe



Adapter For Repeated Manual Injection

Volume	10 μ L	25 μ L	50 μ L	100 μ L	250 μ L	500 μ L
Model	701/1701	702/1702	705/1705	710/1710	725/1725	750/1750
Reproducibility (Chaney) Adapter	14700	14725	14725	14725	14725	14725



Chaney Adapter



Tech Tip

Improve the reproducibility of multiple manual injections with the Chaney Adapter (p/n 14700 and 14725).



Manual On-Column Injection

On-column injection employs the direct introduction of the liquid sample into the column. This is very useful for the analysis of thermally unstable samples and avoids boiling point discrimination. On-column injection requires special syringes with the following features:

- ▶ Small outer diameter needles adjusted to the inner diameter of the column (0.17 mm needle for columns with 0.25 mm inner diameter, 32 gauge for columns with 0.32 mm inner diameter, and 26 gauge for columns with a 0.53 mm inner diameter)
- ▶ Longer needles tailored to pass through the injector and reach within the capillary column
- ▶ Point style 3 adapted to the typical septum of the on-column injector
- ▶ Small volume of 5 μL or 10 μL

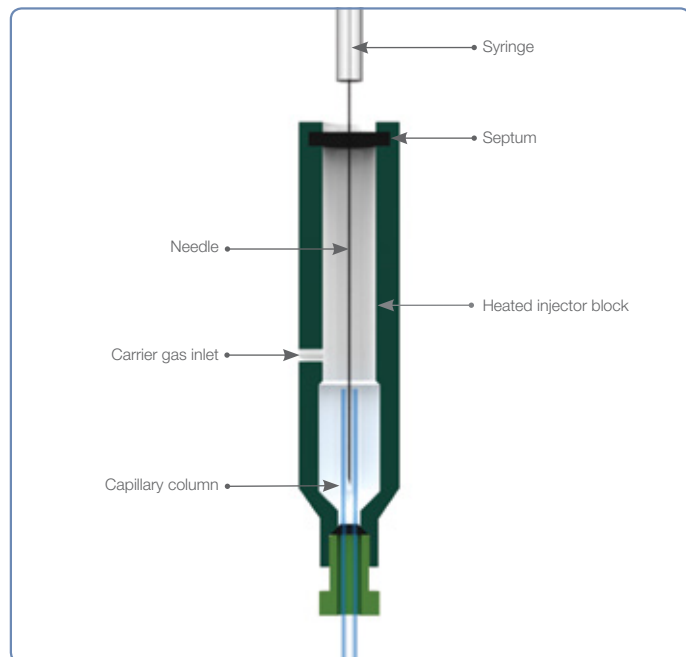
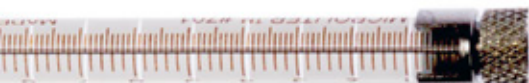


Illustration of an on-column injector



Syringes for On-Column Injection For Capillary Columns

Volume	10 μL	10 μL	10 μL
Model	701	701	701
Gauge	0.17 mm	32	26s
Column I.D.	0.25 mm	0.32 mm	0.53 mm

Fused Silica Needle Syringe (point style 3)	87402 ¹	80308 ²	80308 ²
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Note: Needles are 100 mm

1) This is an RN needle

2) These are stainless steel needles. Please specify gauge, length and point style.



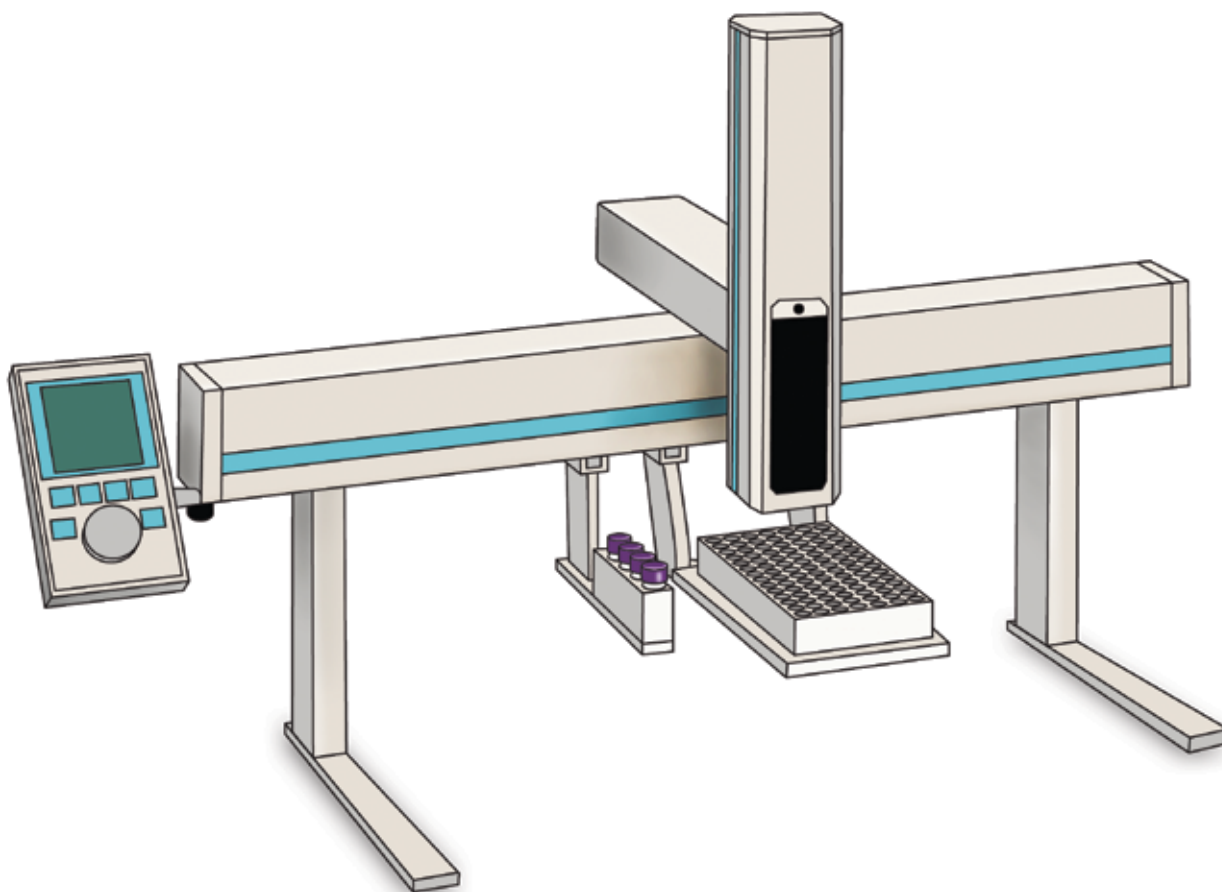
Gas Chromatography Autosampler Syringes

Autosamplers enable the automatic introduction of samples into the injector of the gas chromatograph (GC). Automatic injection has become very common as it improves reproducibility and speed.

Hamilton offers a wide range of autosampler syringes. The features of the autosampler syringes are adapted for an exact fit to a specific autosampler. The point style AS (for autosampler) has been specifically designed to withstand repeated penetration through the GC autosampler septa. Syringes for headspace injection usually have a point style 5, which is ideal for large gas volume injection. Autosampler syringes are available in two gauge types depending on the type of injector used.

Gauge	Application
23s	Durable needle for Merlin MicroSeal™ septa and split/splitless injections
26s	Versatile needle for all types of injections including split/splitless and on-column injections

For a full list of all syringes available, visit www.hamiltoncompany.com/syringes



CTC Autosampler

CTC PAL® COMBI-xt and PAL® GC-xt Autosampler Syringes

CTC PAL® autosamplers are one of the most popular sampling devices on the market today for GC and headspace analyses. Customers rely on its ability to sample from many different vial and well types and on its ultimate platform flexibility. The syringe is at the heart of every injection that the GC PAL® system performs and CTC chose Hamilton to provide this critical component.

C-Line Syringes

C-Line syringes incorporate several unique design features that ensure superior performance. The innovative direct attachment design of the needle to the barrel eliminates contact between the sample solvent and adhesive, reducing carryover and ghost peaks. The inert plunger tip polymer provides enhanced solvent compatibility and longer lifetime.

C-Line PAL® COMBI-xt and PAL® GC-xt Liquid Injection Syringes



Volume	1.2 µL	5 µL	10 µL	25 µL	100 µL	250 µL	500 µL
Model	7701.2	75	701	1702	1710	1725	1750
Gauge	26	26s	26s	26s	26s	26	26
Fixed Needle (FN) Syringe (point style AS)	203185 ¹	203189	203205 203361 ²	203043	203076 ³	203078	203080

Note: Needles are 51 mm

1) KH Termination

2) 23s gauge

3) Slimline syringe

Headspace Syringes for CTC PAL® Combi-xt

Modern GC headspace analysis requires injecting over large temperature ranges. Conventional headspace syringes on the market use a rubber O-ring sealed plunger which has a limited sealing performance at high temperatures due to varying thermal expansion between the different materials. The high dynamic HD-type syringe employs a unique spring in the plunger tip which compensates for the materials' different expansion coefficients, creating a better seal over a larger temperature range, and it also improves lifetime.



PAL® COMBI-xt Headspace Syringes

Volume	1000 µL	1000 µL	2500 µL	2500 µL	5000 µL	5000 µL
Model	1001	1001	1002	1002	1005	1005
Gauge	26	23	26	23	26	23
Cemented Needle (LTN) Syringe (point style 5)	203141	203082	203181	203084	203182	203086

Note: Needles are 51 mm



Agilent 7673, 7683, 7693 and 6850 Autosampler Syringes

Durable Syringes For Merlin Microseal™ Septa and Split/Splitless Injection

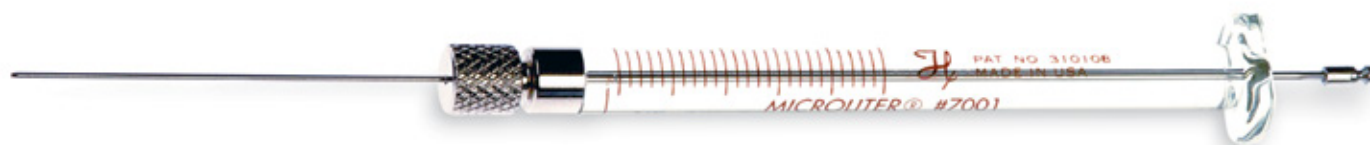
Volume	0.5 µL	1 µL	5 µL	10 µL	10 µL
Model	7000.5	7001	75	701	1701
Gauge	23	23	23s	23s	23s
Cemented Needle (N) Syringe (point style AS)			87987 87990 (6 pk)	80387 80390 (6 pk)	80080 80094 (6 pk)
Knurled Hub (KH) Syringe (point style AS)	86276	80176			

Note: Needles are 43 mm

Universal Syringes For Split/Splitless and On-Column Injection

Volume	5 µL	10 µL	10 µL
Model	75	701	1701
Gauge	23s-26s	23s-26s	23s-26s
Cemented Needle (N) Syringe (point style AS)	87993 87994 (6 pk)	80393 80391 (6 pk)	80079 80096 (6 pk)

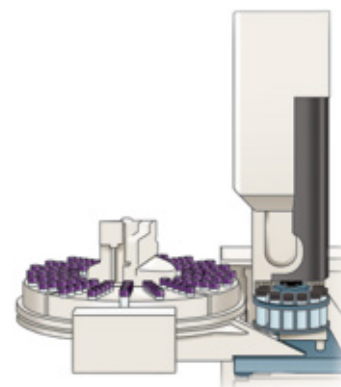
Note: Needles are 43 mm



Versatile Syringes For All Types of Injections, Including On-Column Injection

Volume	0.5 µL	5 µL	10 µL
Model	7000.5	75	701
Gauge	26	26s	26s
Cemented Needle (N) Syringe (point style AS)	86274 ¹	87988 87989 (6 pk)	80388 80389 (6 pk)

Note: Needles are 43 mm
1) KH termination



Agilent 7693 Autosampler

Thermo Scientific® Autosampler Syringes

AS 800, AS 2000 Syringes

Volume	10 µL
Model	701
Gauge	26s

Cemented Needle (N) Syringe (point style AS)	80318
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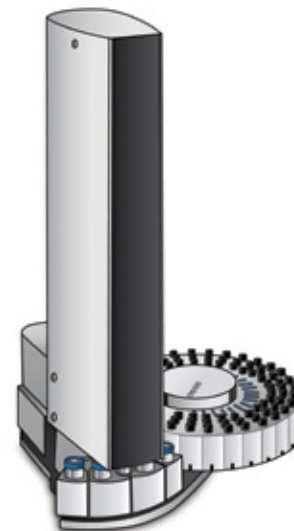
Note: Needles are 80 mm

Headspace HS 250/500/850 Syringes

Volume	2500 µL
Model	1002
Gauge	22

Cemented Needle (LTN) Syringe (point style 5)	202660
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Note: Needles are 56 mm



Thermo Scientific® Finnigan AS 2000 Autosampler

AI/AS 3000 Tri Plus Syringes

Volume	5 µL	10 µL
Model	75	701
Gauge	26s	26s

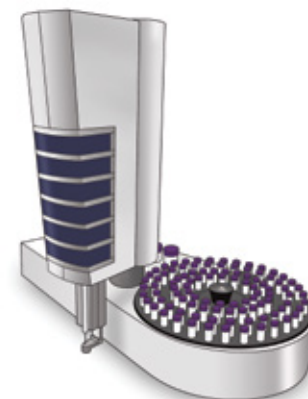
Cemented Needle (N) Syringe (point style AS)	204051	204052
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Cemented Needle (N) Syringe (point style 2)	204000	204001
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Note: Needles are 50 mm



Varian 8100/8200 Autosampler



Varian-Chrompack 8400 Autosampler

Varian-Chrompack Autosampler Syringes

Varian CP 8400/8410 CP9019/9050 Syringes

Volume	5 µL	10 µL
Model	75	701
Gauge	26s	26s

Cemented Needle (N) Syringe (point style 2)	87900	80300
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Cemented Needle (N) Syringe 6 pk (point style 2)		80366
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Note: Needles are 51 mm

Varian 8100/8200 Syringes

Volume	10 µL
Model	701
Gauge	0.48 mm

Removable Needle (RN) Syringe (point style 5)	202880
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Note: Needles are 50.5 mm



Shimadzu Autosampler Syringes

Shimadzu AOC-9 Syringes

Volume	5 μ L	10 μ L
Model	75	701
Gauge	26s	26s

Removable Needle (RN) Syringe (point style 2)	87930	80330
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Note: Needles are 51 mm

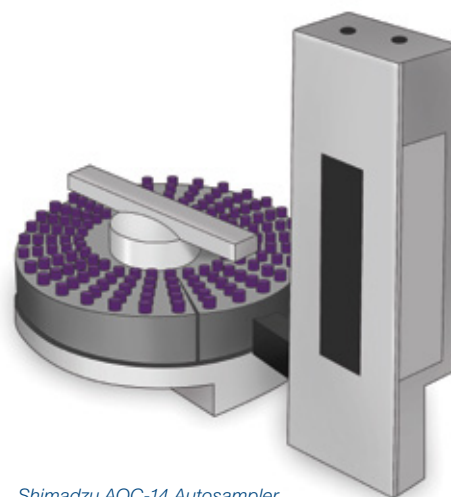
Shimadzu AOC-14/AOC-17/AOC-20 Syringes

Volume	5 μ L	10 μ L
Model	75	701
Gauge	22s	22s

Removable Needle (RN) Syringe (point style 2)	202630	202640
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Cemented Needle (N) Syringe (point style AS)		93898-01
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Note: Needles are 43 mm



Shimadzu AOC-14 Autosampler

