



# Agilent 1260 Infinity Bio-inert Manual Injector

User Manual



**Agilent Technologies**

# Notices

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Hewlett-Packard-Strasse 8  
76337 Waldbronn

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### CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

### WARNING

A **WARNING** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a **WARNING** notice until the indicated conditions are fully understood and met.

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Operation and mechanical hardware

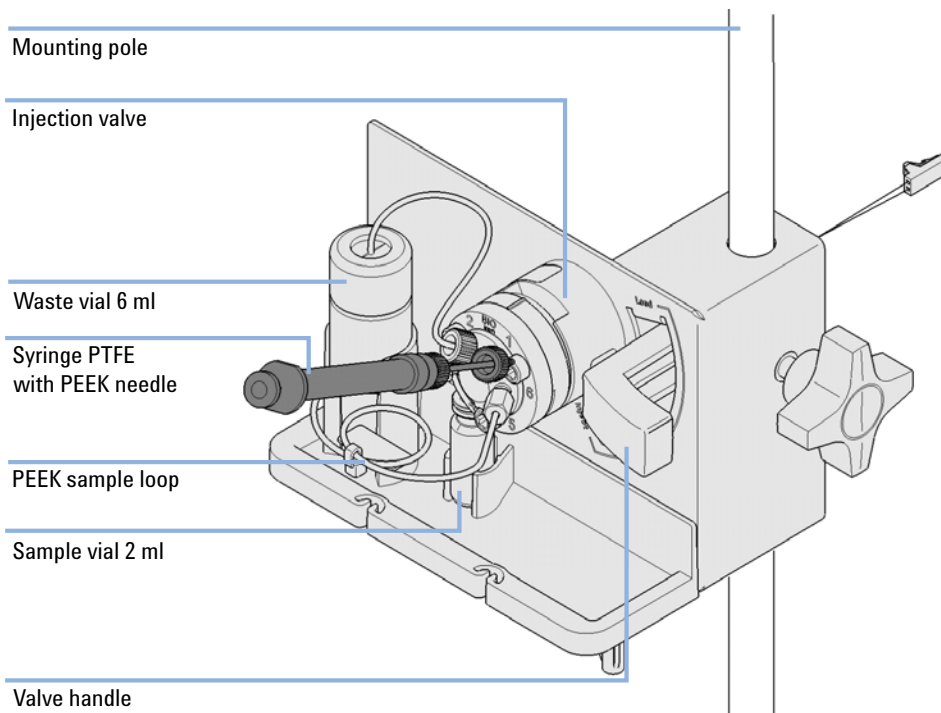


## Introduction

The Agilent 1260 Infinity Bio-inert Manual Injector G5628A can be used for manual operation or use of large injection volumes. It offers a standard injection volume of 20  $\mu\text{L}$  (optional 5  $\mu\text{L}$  to 5 mL) and ensures highest injection accuracy.

It uses a Bio-inert 6-port sample injection valve. Sample is loaded into the external 20  $\mu\text{L}$  sample loop through the injection port at the front of the valve. The valve has a PEEK injection seal. A make-beforebreak passage in the stator ensures flow is not interrupted when the valve is switched between the INJECT and LOAD positions, and back again.

The valve is mounted on a steel mounting pole, and can be installed at the left or right-hand side of the LC system.



**Figure 1** Agilent 1260 Infinity Bio-inert Manual Injector

## Bio-inert Materials

For the Agilent 1260 Infinity Bio-inert LC system, Agilent Technologies uses highest quality materials in the flow path (also referred to as wetted parts), which are widely accepted by life scientists, as they are known for optimum inertness towards biological samples and ensure best compatibility to common samples and solvents over a wide pH range. Explicitly, the complete flow path is free of stainless steel and free of other alloys containing metals like iron, nickel, cobalt, chromium, molybdenum or copper, which can interfere with biological samples. The flow downstream of the sample introduction does not contain metals at all.

**Table 1** Bio-inert Materials

Module	Materials
Agilent 1260 Infinity Bio-inert Quaternary Pump (G5611A)	Titanium, gold, platinum-iridium, zirconium oxide, ruby, PTFE, PEEK
Agilent 1260 Infinity Bio-inert High-Performance Autosampler (G5667A)	Upstream of sample-introduction: <ul style="list-style-type: none"><li>• Titanium, gold, PTFE, PEEK, zirconium oxide</li></ul> Downstream of sample-introduction: <ul style="list-style-type: none"><li>• PEEK, zirconium oxide</li></ul>
Agilent 1260 Infinity Bio-inert Manual Injector (G5628A)	PEEK, zirconium oxide
Agilent 1260 Infinity Bio-inert Analytical Fraction Collector (G5664A)	PEEK, zirconium oxide, PTFE

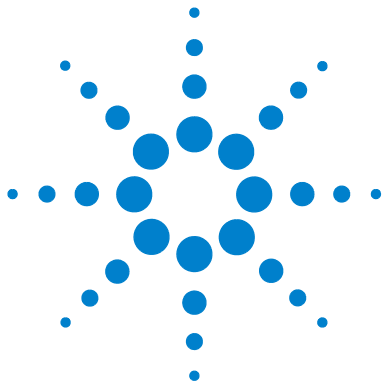


**Table 1** Bio-inert Materials

Module	Materials
<p><b>Bio-inert Flow Cells:</b> Standard flow cell bio-inert, 10 mm, 13 µl, 120 bar (12 MPa) for MWD/DAD, includes Capillary Kit Flow Cells BIO (p/n G5615-68755) (p/n G5615-60022) (for Agilent 1260 Infinity Diode Array Detectors DAD G1315C/D)</p>	PEEK, zirconium oxide, sapphire, PTFE
<p>Max-Light Cartridge Cell Bio-inert (10 mm, V(σ) 1.0 µl) (p/n G5615-60018) and Max-Light Cartridge Cell Bio-inert (60 mm, V(σ) 4.0 µl) (p/n G5615-60017) (for Agilent 1290 Infinity Diode Array Detectors DAD G4212A/B)</p>	PEEK, fused silica
<p>Bio-inert flow cell, 8 µL, 20 bar (pH 1–12) includes Capillary Kit Flow Cells BIO (p/n G5615-68755) (p/n G5615-60005) (for Agilent 1260 Infinity Fluorescence Detector FLD G1321B)</p>	PEEK, fused silica, PTFE
<p>Bio-inert heat-exchanger G5616-60050 for 1290 Infinity Thermostatted Column Compartment (G1316C)</p>	PEEK (steel-cladded)
<p>Bio-inert Valve heads</p>	G4235A, G5631A, G5639A: PEEK, ceramic (Al <sub>2</sub> O <sub>3</sub> based)
<p>Bio-inert Connection capillaries</p>	<p>Upstream of sample-introduction:</p> <ul style="list-style-type: none"> <li>• Titanium</li> </ul> <p>Downstream of sample-introduction:</p> <ul style="list-style-type: none"> <li>• Agilent uses stainless-steel-cladded PEEK capillaries, which keep the flow path free of steel and provide pressure stability to more than 600 bar.</li> </ul>

For ensuring optimum bio-compatibility of your Agilent 1260 Infinity Bio-inert LC system, do not include non-inert standard modules or parts to the flow path. Do not use any parts that are not labeled as Agilent “Bio-inert”. For solvent compatibility of these materials, see [“Solvent information for parts of the 1260 Infinity Bio-inert LC system”](#) on page 26.

**1 Introduction**  
**Bio-inert Materials**



## 2 Installing the Manual Injector

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Installation of the manual injector



## Unpacking the Manual Injector

### Damaged Packaging

Upon receipt of your manual injector, inspect the shipping containers for any signs of damage. If the containers or cushioning material are damaged, save them until the contents have been checked for completeness and the manual injector has been mechanically checked. If the shipping container or cushioning material is damaged, notify the carrier and save the shipping material for the carriers inspection.

## Delivery Checklist

Ensure all parts and materials have been delivered with the manual injector. The delivery checklist is shown in “[Delivery Checklist](#)” on page 13. To aid in parts identification, please see “[Parts and Materials for Maintenance](#)” on page 39. Please report missing or damaged parts to your local Agilent Technologies sales and service office.

**Table 2** Bio-inert Manual Injector Checklist

Description	Quantity
Bio-inert Manual injector Handling kit, incl. valve, leak tray, connector cable	1
Mounting pole, stainless steel (p/n 5001-3738)	1
PEEK/SST cap 0.17 mm ID, 500 mm long (p/n G5667-60501)	1
Base plate (p/n G1328-44111)	1
Organizer plate (p/n 5042-8553)	1
Catch tube cap (p/n 5042-8576)	1
Syringe, 50 µL, PTFE FN luer lock (p/n 5190-1506)	1
Sample loop 20 µL (p/n 0101-1239)	1
PEEK luer lock needle AY (p/n 5190-0924)	1
Agilent LC Hardware Documentation DVD (p/n G4800-64500)	1

## Installing the Manual Injector

### CAUTION

"Defective on arrival" problems

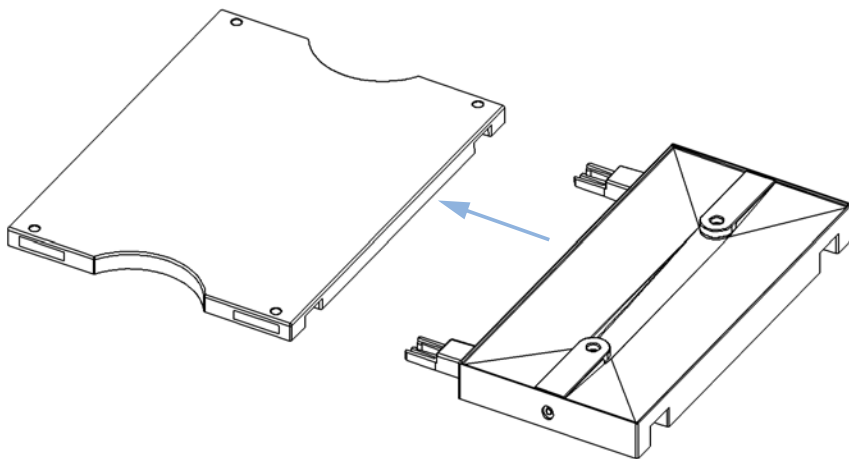
If there are signs of damage, please do not attempt to install the module. Inspection by Agilent is required to evaluate if the instrument is in good condition or damaged.

- Notify your Agilent sales and service office about the damage.
- An Agilent service representative will inspect the instrument at your site and initiate appropriate actions.

### NOTE

The manual injector can be installed at the left- or right-hand side of the instrument stack.

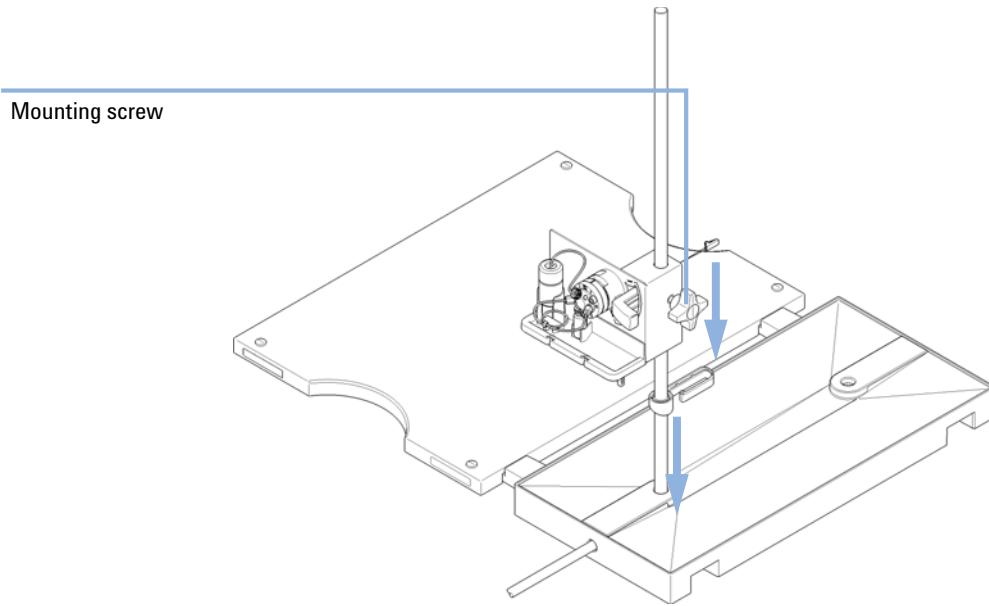
- 1 Place the baseplate on the bench.
- 2 Connect the two organizer plates to the base plate.



**Figure 2** Connecting the Organizer Plates

- 3 Screw the mounting pole into one of the two holes in the organizer plate.

- 4 Slide the manual injector onto the mounting pole. Tighten the mounting screw.

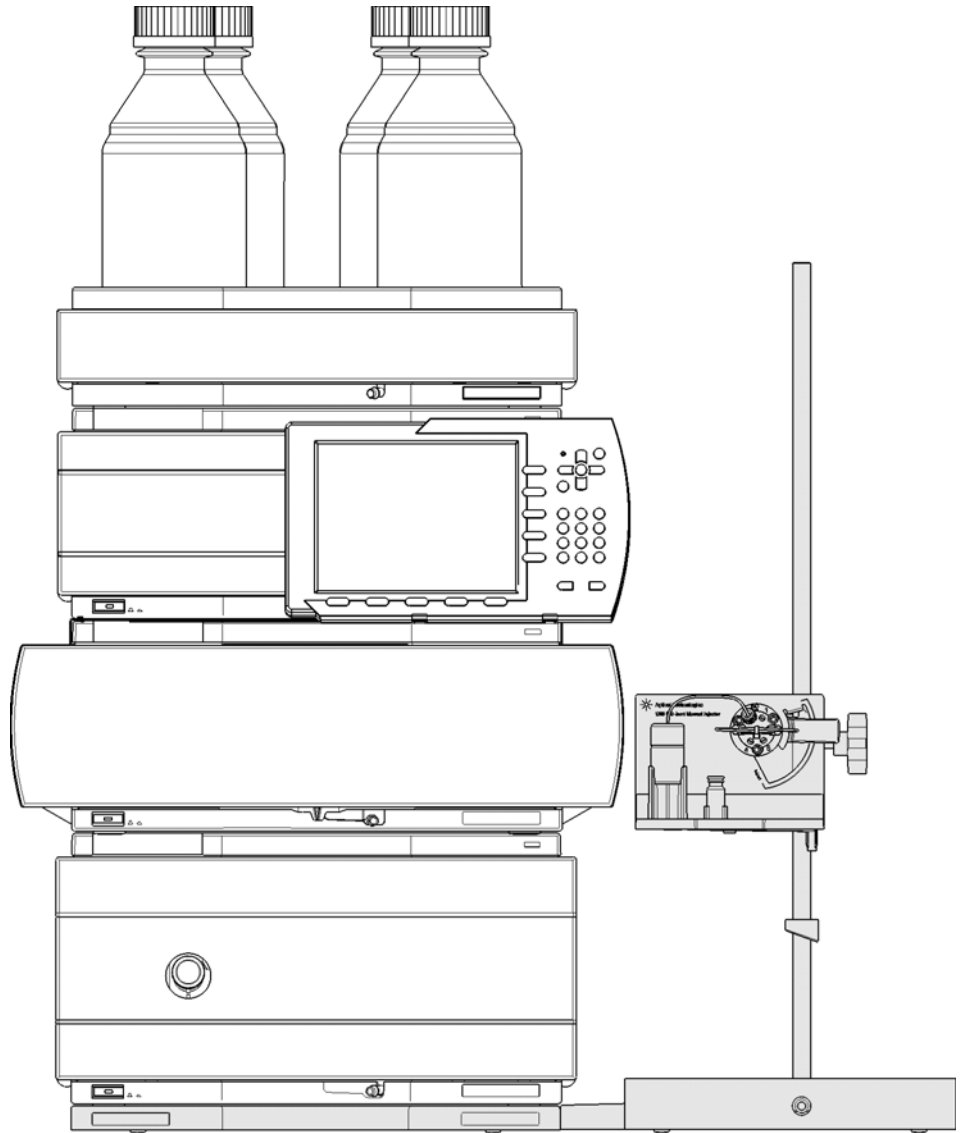


**Figure 3** Installing the Mounting Pole and Manual Injector

## 2 Installing the Manual Injector

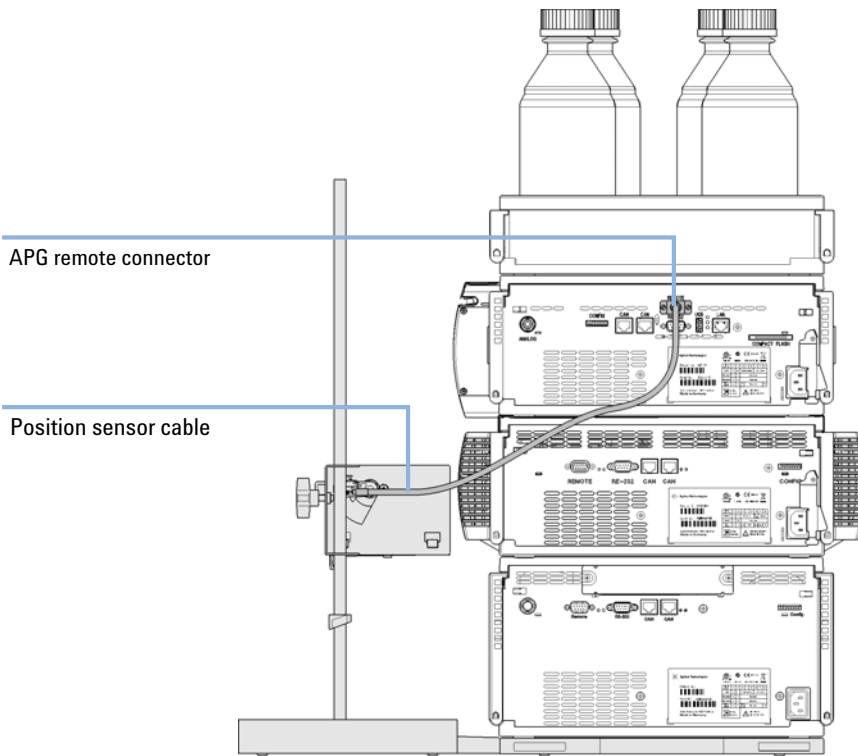
### Installing the Manual Injector

- 5 Install other system modules on top of the manual injector baseplate.



**Figure 4** Installing the System





**Figure 5** Installing the Start Cable

- 6 Connect the capillaries to the manual injector (see “Flow Connections” on page 18).

## Flow Connections

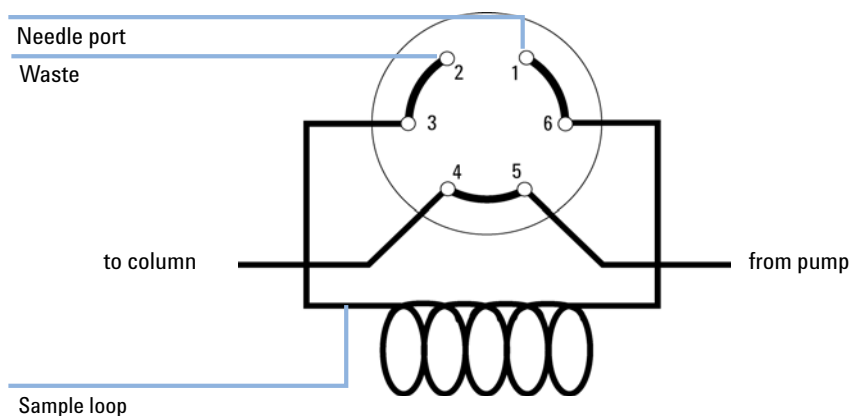
### WARNING

**Toxic, flammable and hazardous solvents, samples and reagents**

**The handling of solvents, samples and reagents can hold health and safety risks.**

- When working with these substances observe appropriate safety procedures (for example by wearing goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet supplied by the vendor, and follow good laboratory practice.
- The volume of substances should be reduced to the minimum required for the analysis.
- Do not operate the instrument in an explosive atmosphere.

- 1 Connect the pump outlet capillary to port 5.
- 2 Connect the column-compartment inlet capillary to port 4.
- 3 Connect the sample loop between ports 3 and 6.



**Figure 6** LOAD Position

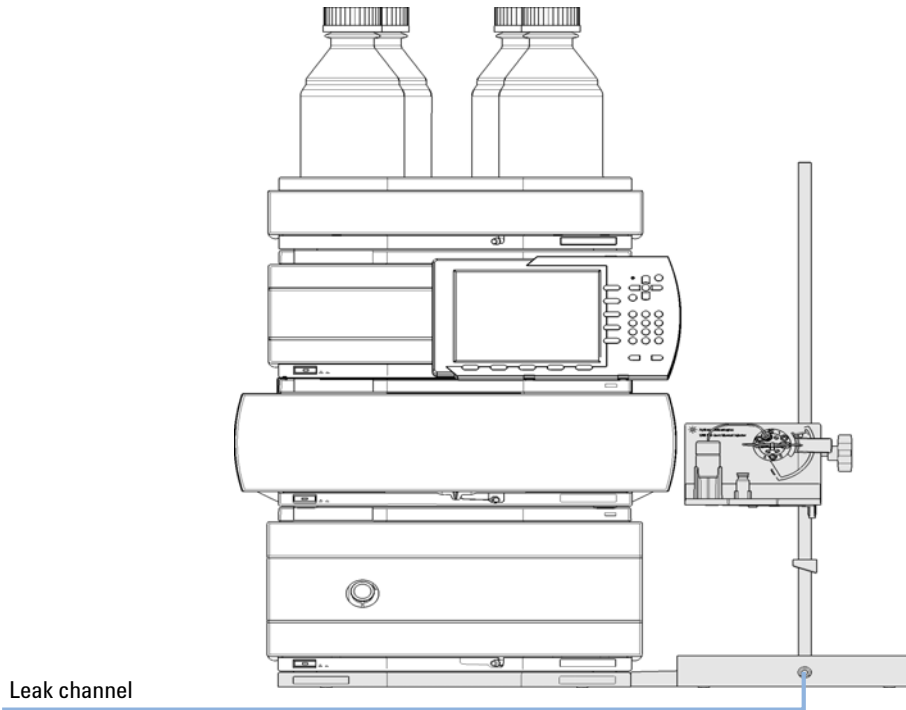
## Leak Drainage

**WARNING**

***Leaking injector fittings***

In the event of a leak, solvent will drop into the leak channel in the baseplate, from where it is channelled to the front and back of the baseplate.

→ Check the manual injector fittings periodically for signs of leakage.



**Figure 7** Leak Drainage

## **2 Installing the Manual Injector**

### **Leak Drainage**



### 3 Using the Manual Injector

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How to use the manual injector

### **3 Using the Manual Injector** Injection Seal

## **Injection Seal**

The Bio-inert Manual Injector is supplied with a PEEK injection seal.

## Needles

**CAUTION**

Needle can damage valve

→ Always use the correct needle size.

---

## Injecting Sample

### WARNING

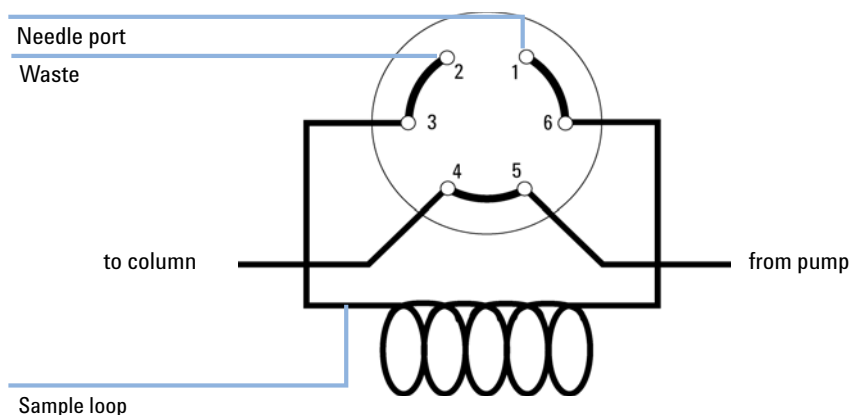
#### Ejection of mobile phase

When using sample loops larger than 100  $\mu\text{l}$ , mobile phase may be ejected from the needle port as the mobile phase in the sample loop decompresses.

- Please observe appropriate safety procedures (for example, goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet supplied by the solvent vendor, especially when toxic or hazardous solvents are used.

#### LOAD Position

In the LOAD position (see [Figure 8](#) on page 24), the pump is connected directly to the column (ports 4 and 5 connected), and the needle port is connected to the sample loop. At least 2 to 3 sample-loop volumes (more if better precision is required) of sample should be injected through the needle port to provide good precision. The sample fills the loop, and excess sample is expelled through the waste tube connected to port 2.

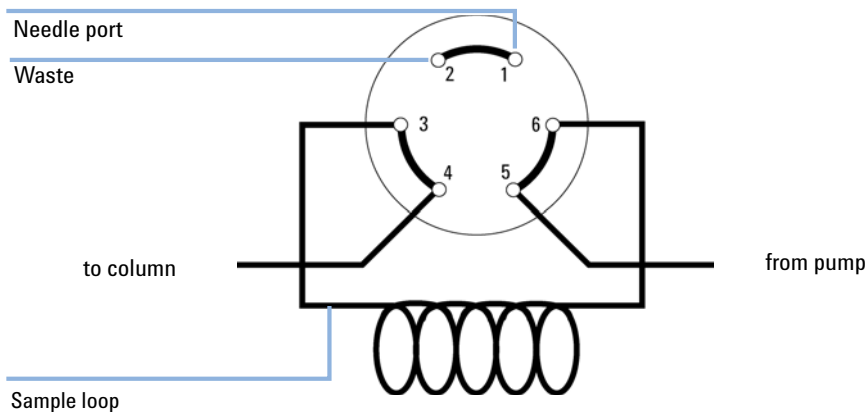


**Figure 8** LOAD Position



### INJECT Position

In the INJECT position (see [Figure 9](#) on page 25), the pump is connected to the sample loop (ports 5 and 6 connected). All of the sample is washed out of the loop onto the column. The needle port is connected to the waste tube (port 2).



**Figure 9** INJECT Position

## Solvent Information

### Solvent Information

Observe the following recommendations on the use of solvents.

- Follow recommendations for avoiding the growth of algae, see pump manuals.
- Small particles can permanently block capillaries and valves. Therefore always filter solvents through 0.4 µm filters.
- Avoid or minimize the use of solvents, which may corrode parts in the flow path. Consider specifications for the pH range given for different materials like flow cells, valve materials etc. and recommendations in subsequent sections.

### Solvent information for parts of the 1260 Infinity Bio-inert LC system

For the Agilent 1260 Infinity Bio-inert LC system, Agilent Technologies uses highest quality materials (see “[Bio-inert Materials](#)” on page 8) in the flow path (also referred to as wetted parts), which are widely accepted by life scientists, as they are known for optimum inertness towards biological samples and ensure best compatibility to common samples and solvents over a wide pH range. Explicitly, the complete flow path is free of stainless steel and free of other alloys containing metals like iron, nickel, cobalt, chromium, molybdenum or copper, which can interfere with biological samples. The flow downstream of the sample introduction does not contain metals at all.

However there are no materials, which combine suitability for versatile HPLC instrumentation (valves, capillaries, springs, pump heads, flow cells etc.) with complete compatibility to all possible chemicals and application conditions. This section gives recommendations, which solvents should be preferred. Chemicals which are known to cause issues should be avoided or exposure should be minimized, e.g. for short term cleaning procedures. After using potentially aggressive chemicals, the system should be flushed with compatible standard HPLC solvents.

## PEEK

PEEK (Polyether-Ether Ketones) combines excellent properties regarding biocompatibility, chemical resistance, mechanical and thermal stability and is therefore the material of choice for biochemical instrumentation. It is stable in the specified pH range and inert to many common solvents. There is still a number of known incompatibilities to chemicals like chloroform, methylene chloride, THF, DMSO, strong acids (nitric acid > 10 %, sulphuric acid > 10 %, sulfonic acids, trichloroacetic acid), halogenes or aqueous halogene solutions, phenol and derivatives (cresols, salicylic acid etc.).

When used above room temperature, it is sensitive to bases and various organic solvents, which can cause PEEK to swell. As normal PEEK capillaries are very sensitive to high pressure especially under such conditions, Agilent uses stainless-steel clad PEEK capillaries in order to keep the flow path free of steel and to ensure pressure stability to at least 600 bar. In case of doubt, please consult common literature about the chemical compatibility of PEEK.

## Titanium

Titanium is highly resistant to oxidizing acids (e.g. nitric, perchloric and hypochlorous acid) over a wide range of concentrations and temperatures, which is due to a thin oxide layer on the surface, which is stabilized by oxidizing compounds. Reducing acids (e.g. hydrochloric, sulfuric and phosphoric acid) can slightly corrode titanium, which increases with acid concentration and temperature. For example the corrosion rate of 3 % HCl (about pH 0.1) at room temperature is about 13  $\mu\text{m}/\text{year}$ . At room temperature, titanium is resistant to concentrations of about 5 % sulfuric acid (about pH 0.3). The addition of nitric acid to hydrochloric or sulfuric acids significantly reduces corrosion rates. Titanium is subject to corrosion in anhydrous methanol, which can be avoided by adding a small amount of water (about 3 %). Slight corrosion is possible with ammonia > 10 %.

## Fused silica

Fused silica is inert against all common solvents and acids except hydrofluoric acid. It is corroded by strong bases and should not be used above pH 12 at room temperature. The corrosion of flow cell windows can negatively affect measurement results. For a pH larger than 12, the use of flow cells with sapphire windows is recommended.

### **Gold**

Gold is inert against all common HPLC solvents, acids and bases within the specified pH range. It can be corroded by complexing cyanides and concentrated acids like aqua regia (a mixture of concentrated hydrochloric and nitric acid).

### **Zirconium Oxide**

Zirconium Oxide ( $ZrO_2$ ) is inert against almost all common acids, bases and solvents. There are no documented incompatibilities for HPLC applications.

### **Platinum/Iridium**

Platinum/Iridium is inert against almost all common acids, bases and solvents. There are no documented incompatibilities for HPLC applications.

### **PTFE**

PTFE (polytetrafluorethen) is inert against almost all common acids, bases and solvents. There are no documented incompatibilities for HPLC applications.

### **Sapphire, Ruby and $Al_2O_3$ -based ceramics**

Sapphire, Ruby and ceramics based on  $Al_2O_3$  are inert against almost all common acids, bases and solvents. There are no documented incompatibilities for HPLC applications.

Data above were collected from external resources and are meant as a reference. Agilent cannot guarantee for the completeness and correctness of such information. Information can also not be generalized due to catalytic effects of impurities like metal ions, complexing agents, oxygen etc. Most data available refers to room temperature (typically 20 – 25 °C, 68 – 77 °F). If corrosion is possible it usually increases at higher temperatures. In case of doubt, additional resources should be consulted.



## 4 Maintenance

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Instructions on simple, routine repair procedures



## Cautions and Warnings

### WARNING

#### Toxic, flammable and hazardous solvents, samples and reagents

**The handling of solvents, samples and reagents can hold health and safety risks.**

- When working with these substances observe appropriate safety procedures (for example by wearing goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet supplied by the vendor, and follow good laboratory practice.
  - The volume of substances should be reduced to the minimum required for the analysis.
  - Do not operate the instrument in an explosive atmosphere.
- 

### WARNING

#### Electrical shock

**Repair work at the module can lead to personal injuries, e.g. shock hazard, when the cover is opened.**

- Do not remove the metal top cover of the module. No serviceable parts inside.
  - Only certified persons are authorized to carry out repairs inside the module.
- 

### WARNING

#### Personal injury or damage to the product

**Agilent is not responsible for any damages caused, in whole or in part, by improper use of the products, unauthorized alterations, adjustments or modifications to the products, failure to comply with procedures in Agilent product user guides, or use of the products in violation of applicable laws, rules or regulations.**

- Use your Agilent products only in the manner described in the Agilent product user guides.
-

**CAUTION**

Safety standards for external equipment

- If you connect external equipment to the instrument, make sure that you only use accessory units tested and approved according to the safety standards appropriate for the type of external equipment.
- 

**CAUTION**

Sample degradation and contamination of the instrument

Metal parts in the flow path can interact with the bio-molecules in the sample leading to sample degradation and contamination.

- For bio-inert applications, always use dedicated bio-inert parts, which can be identified by the bio-inert symbol or other markers described in this manual.
  - Do not mix bio-inert and non-inert modules or parts in a bio-inert system.
-

## Overview of Maintenance

**Table 3** Overview of Maintenance Procedures

<b>Procedure</b>	<b>Typical Frequency</b>	<b>Time Required</b>
"Flushing the Manual Injector" on page 33	After using aqueous buffers or salt solutions	5 minutes
"Exchanging the Injection Valve Seal" on page 35	After approximately 10000 to 20000 injections, or when the valve performance shows indication of leakage or wear	10 minutes
"Exchanging the injection-valve stator face" on page 37	When visibly scratched, or when the valve performance shows indication of leakage or wear	10 minutes



## Flushing the Manual Injector

### CAUTION

#### *Damage through crystal formation*

The use of aqueous buffers or salt solutions can lead to crystal formation which may cause scratches on the injection seal.

→ Always rinse the valve with water after using aqueous buffers or salt solutions.

---

- 1 Switch the valve to the INJECT position.
- 2 Use the pump to flush the sample loop and seal grooves.

## **Cleaning the Manual Injector**

The manual injector base should be kept clean. Cleaning should be done with a soft cloth slightly dampened with water or a solution of water and a mild detergent.

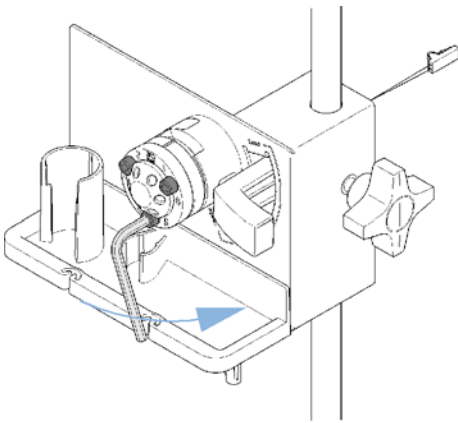
## Exchanging the Injection Valve Seal

**When** Poor injection-volume reproducibility  
Leaking injection valve

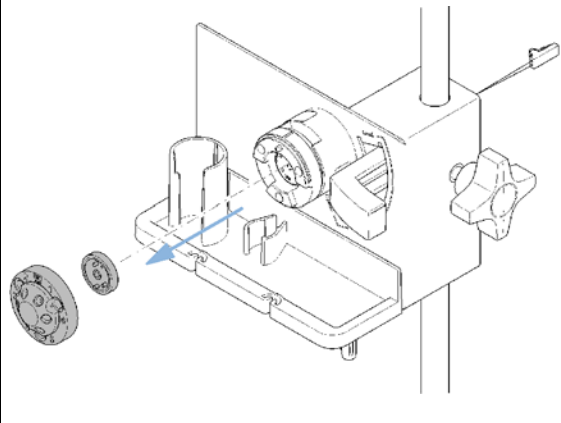
**Tools required** **Description**  
Hexagonal key, 9/64 inch

**Parts required** **p/n** **Description**  
5068-0082 Rotor seal, PEEK

**1** Loosen the three stator screws and remove the stator head.



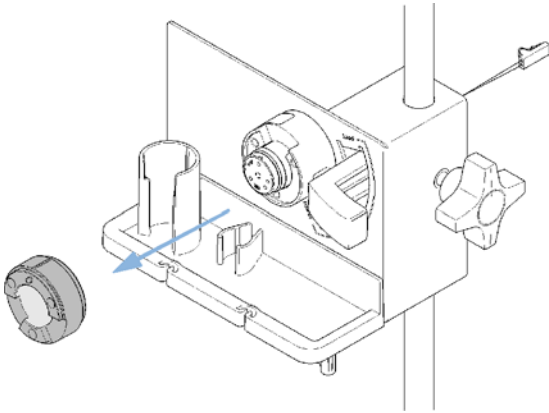
**2** Remove the stator head and stator face.



## 4 Maintenance

### Exchanging the Injection Valve Seal

**3** Remove the stator ring and rotor seal.

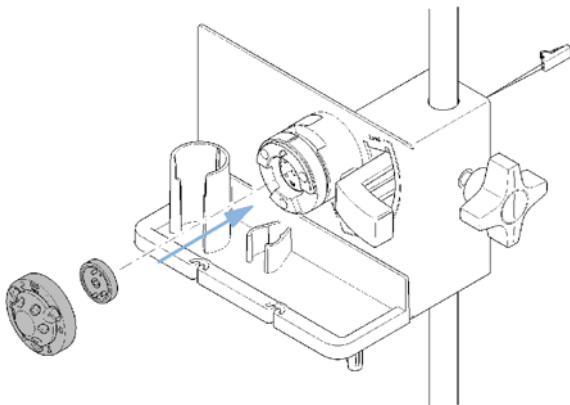


**4** Install the new rotor seal.

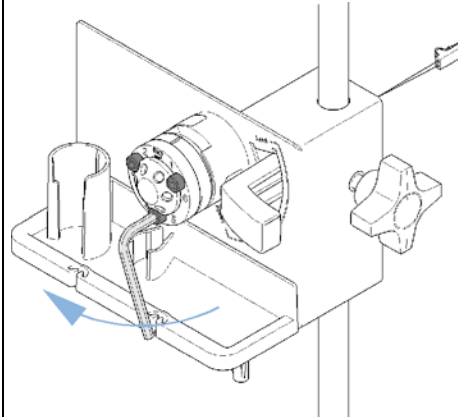
#### HINT

Beware of correct orientation. The rotor seal grooves must be visible.

**5** Install the stator ring, stator head and stator face onto the valve.



**6** Secure stator head in place with the stator screws. Tighten each screw alternately ¼-turn until the stator head is secure.



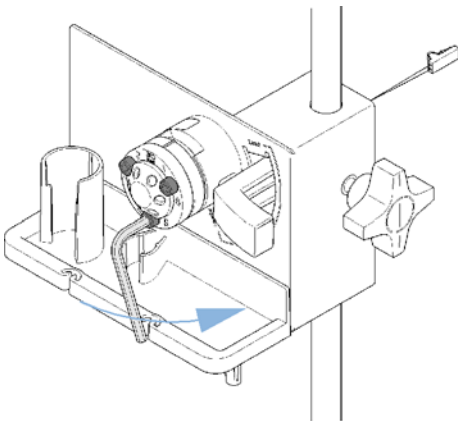
## Exchanging the injection-valve stator face

**When** When visibly scratched, or when the valve performance shows indication of leakage or wear.

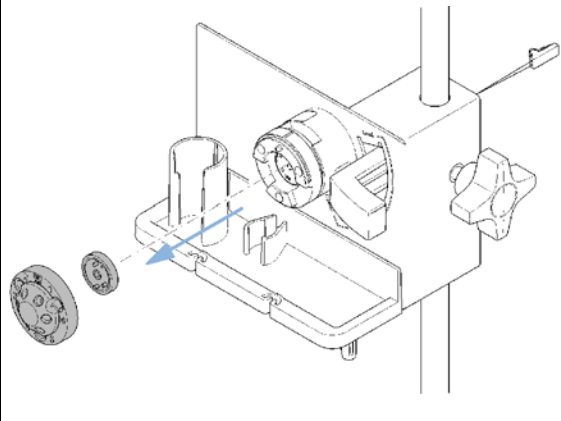
**Tools required**      **Description**  
Hexagonal key, 9/64 inch

**Parts required**      **p/n**      **Description**  
0100-1851      Stator Face

**1** Loosen the three stator screws and remove the stator head.



**2** Remove the stator head and stator face.

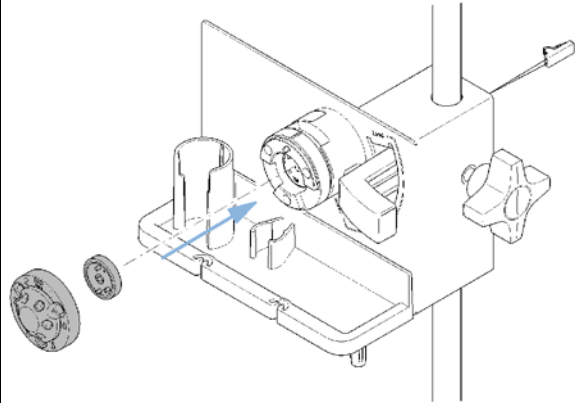


## 4 Maintenance

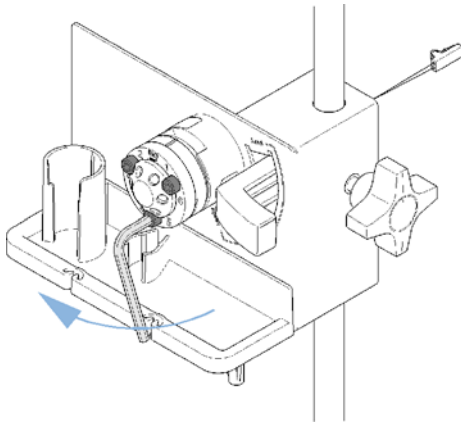
### Exchanging the injection-valve stator face

**3** Insert the new stator face onto the stator head.

**4** Install the stator ring, stator head and stator face onto the valve.



**5** Secure stator head in place with the stator screws. Tighten each screw alternately  $\frac{1}{4}$ -turn until the stator head is secure.





## 5 Parts and Materials for Maintenance

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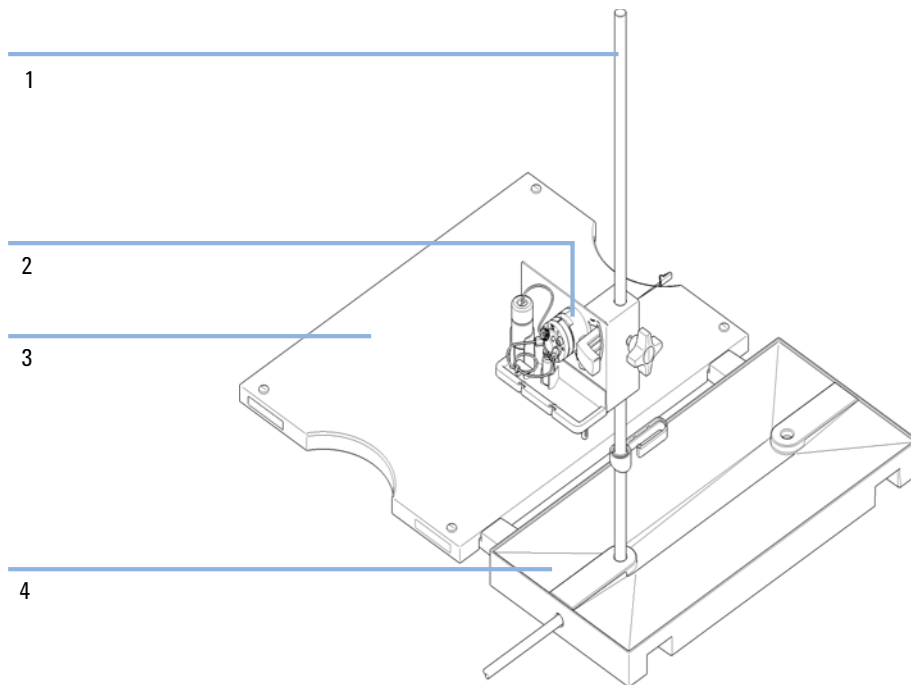
Detailed illustrations and lists for identification of parts and materials



## Manual Injector

Item	p/n	Description
1	5067-4158	Bio-inert 6-port sample injection valve
2	5001-3738	Mounting pole, stainless steel
3	G1328-44111	Base plate
4	5042-8553	Organizer plate
	G5667-60501	PEEK/SST cap 0.17 mm ID, 500 mm long

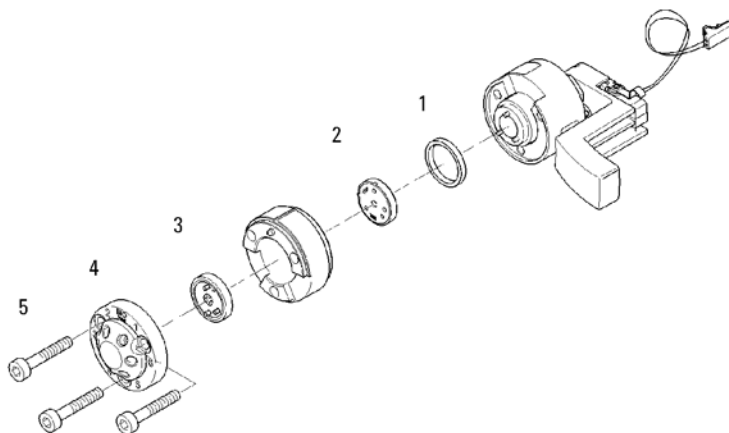
Manual Injector valve see “[Bio-Inert Manual Injection-Valve Assembly 600 bar](#)” on page 41.





## Bio-Inert Manual Injection-Valve Assembly 600 bar

Item	p/n	Description
1	1535-4045	Bearing Ring, (Qty 1, replacement)
2	5068-0082	Rotor seal, PEEK
3	0100-1851	Stator face, ceramic
4	5068-0060	Bio-inert stator head
5	1535-4857	Stator screws, 10/Pk
	5067-4158	Bio-inert 6-port sample injection valve



**Figure 10** Injection Valve Assembly

## Sample Loops PEEK

<b>p/n</b>	<b>Description</b>
0101-1241	Sample loop 5 µL
0101-1240	Sample loop 10 µL
0101-1239	Sample loop 20 µL
0101-1238	Sample loop 50 µL
0101-1242	Sample loop 100 µL
0101-1227	Sample loop 200 µL
0101-1236	Sample loop 500 µL
0101-1235	Sample loop 1 mL
0101-1234	Sample loop 2 mL
0101-1230	Sample loop 5 mL

## Syringes

<b>p/n</b>	<b>Description</b>
5190-1506	Syringe, 50 $\mu$ L, PTFE FN luer lock
5190-1513	Syringe, 100 $\mu$ L, PTFE FN luer lock
5190-1527	Syringe, 500 $\mu$ L, PTFE FN luer lock
5190-1534	Syringe, 2.5 mL, PTFE FN luer lock
5190-1457	Syringe, 10 mL, PTFE FN luer lock

## Accessories and Consumables

<b>p/n</b>	<b>Description</b>
5190-0924	PEEK luer lock needle AY
5062-8541	PEEK Fittings 10/PK
5188-6593	Snap vial 2 mL, fixed insert, clear, 100/pk
9301-1377	Screw Cap Vial, clear, 6 mL 100/PK
5188-2758	PTFE/silicone septa 16mm pre-silt 100/pk
9301-1379	Screw caps for 6 mL vials 100/PK
G5667-60501	PEEK/SST cap 0.17 mm ID, 500 mm long



## 6 Appendix

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Additional information



## **Agilent Technologies on Internet**

For the latest information on products and services visit our worldwide web site on the internet at:

<http://www.chem.agilent.com>

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## In This Book

This manual covers the Agilent 1260 Infinity Bio-inert Manual Injector (G5628)

This manual contains user information about the Agilent 1260 Infinity Bio-inert Manual Injector. The manual describes the following:

- Introduction
- installing the manual injector,
- using the manual injector,
- maintenance of the manual injector,
- parts and materials, and
- additional information.

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