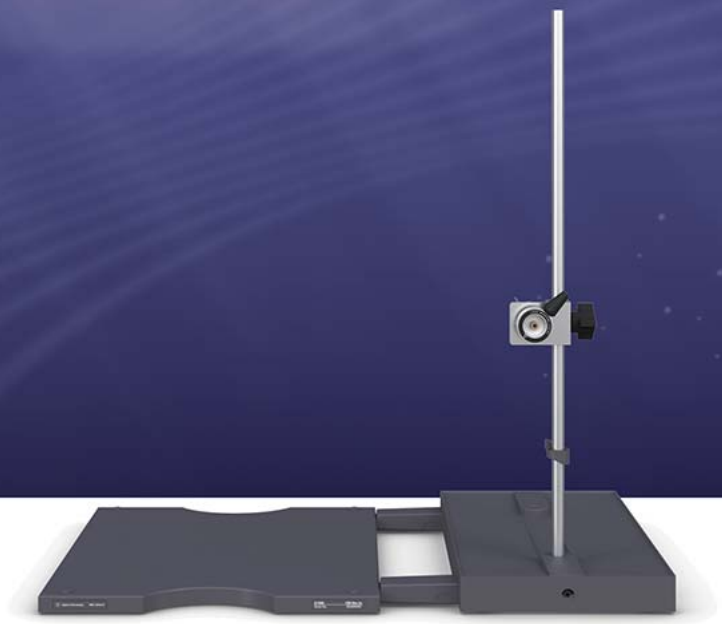
Agilent InfinityLab LC Series

Manual Injectors

User Manual



Agilent Technologies

Notices

Manual Part Number

G1328-90020 Rev. B

Edition

07/2018

Printed in Germany

Agilent Technologies
Hewlett-Packard-Strasse 8
76337 Waldbronn

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Safety Notices

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.

In This Guide

This manual covers the following InfinityLab LC Series modules:

- Agilent 1260 Infinity II Manual Injector (G1328C)
- Agilent 1260 Infinity II Bio-inert Manual Injector (G5628A)

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Operation and mechanical hardware

2 Installing the Manual Injector

Installation of the manual injector

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How to use the manual injector.

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1 Introduction

Operation and mechanical hardware

Product Description (G1328C)

Convenient modular accessory, dimensioned to match the footprint of all Agilent 1260 Infinity II modules. Stack to create a compact, affordable manual injection liquid chromatography. The Agilent 1260 Infinity II Manual Injector is compatible with up to 600 bar operating pressure.

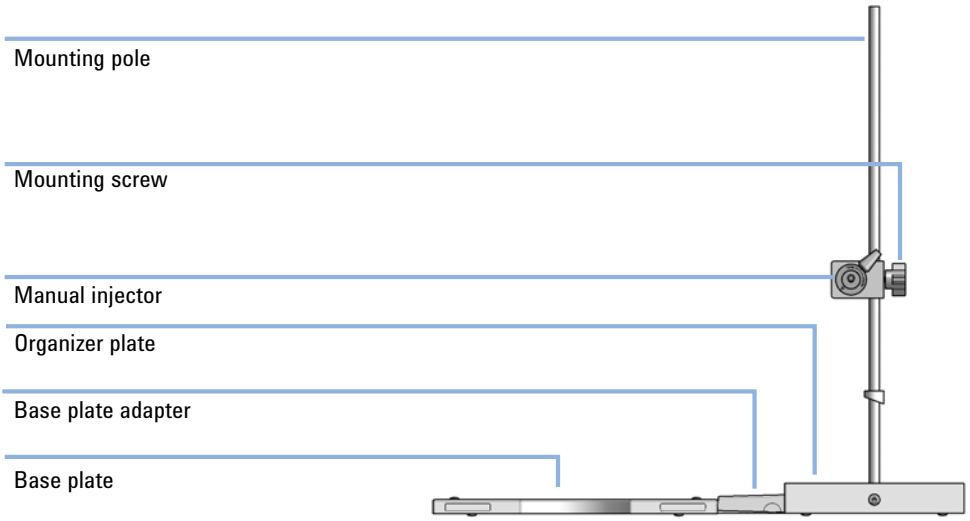


Figure 1 Overview of the Manual Injector

Product Description (G5628A)

Convenient modular accessory, dimensioned to match the footprint of all Agilent 1260 Infinity II modules. Stack to create a compact, affordable manual injection liquid chromatography. The Agilent 1260 Infinity II Bio-Inert Manual Injector is compatible with up to 600 bar operating pressure.

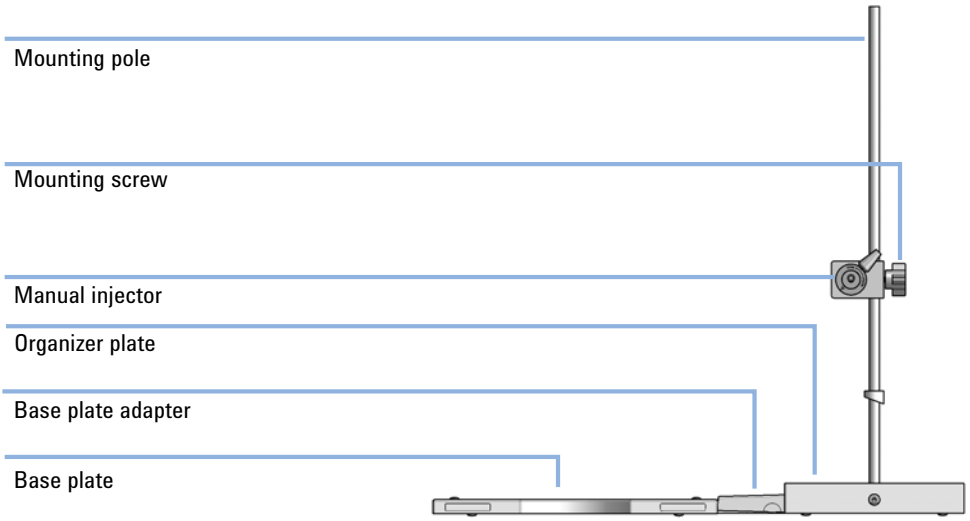


Figure 2 Overview of the Manual Injector

Features (G1328C)

- Lowest bench space requirements and highest flexibility with an external base
- Long valve life, up to 600 bar operating pressure
- High instrument uptime through proven parts, for example ceramic rotor faces

Features (G5628A)

- Lowest bench space requirements and highest flexibility with an external base
- Long valve life, up to 600 bar operating pressure
- High instrument uptime through proven parts, for example ceramic rotor faces

Overview of the Module (G1328C)

Sample is loaded into the external 20-µl sample loop through the injection port at the front of the valve. The valve has a ceramic stator and PEEK injection seal. PEEK is compatible with pH 0-14, incompatible with some concentrated mineral acids. A make-before-break passage in the stator ensures flow is not interrupted when the valve is switched between the INJECT and LOAD positions, and back again (see also "Needles" on page 30 and "Flow Connections (G1328C)" on page 22).

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

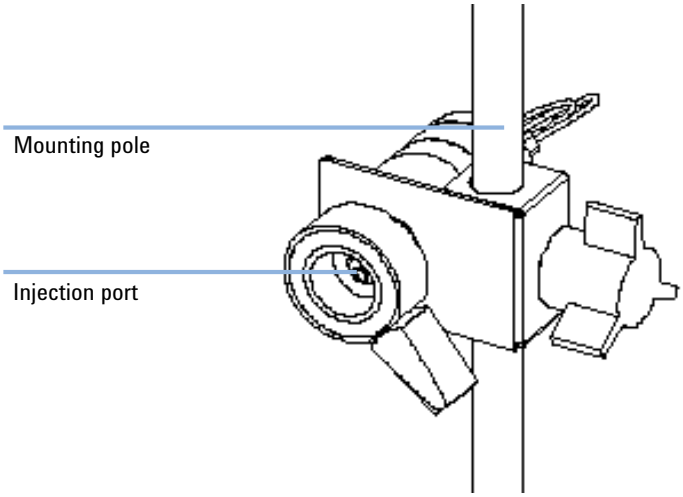


Figure 3 The Manual Injector installed to the mounting pole

Overview of the Module (G5628A)

The Agilent 1260 Infinity II 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 µL (optional 5 µL 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 µL sample loop through the injection port at the front of the valve. The valve has a PEEK injection seal. A make-before-break passage in the stator ensures that 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.

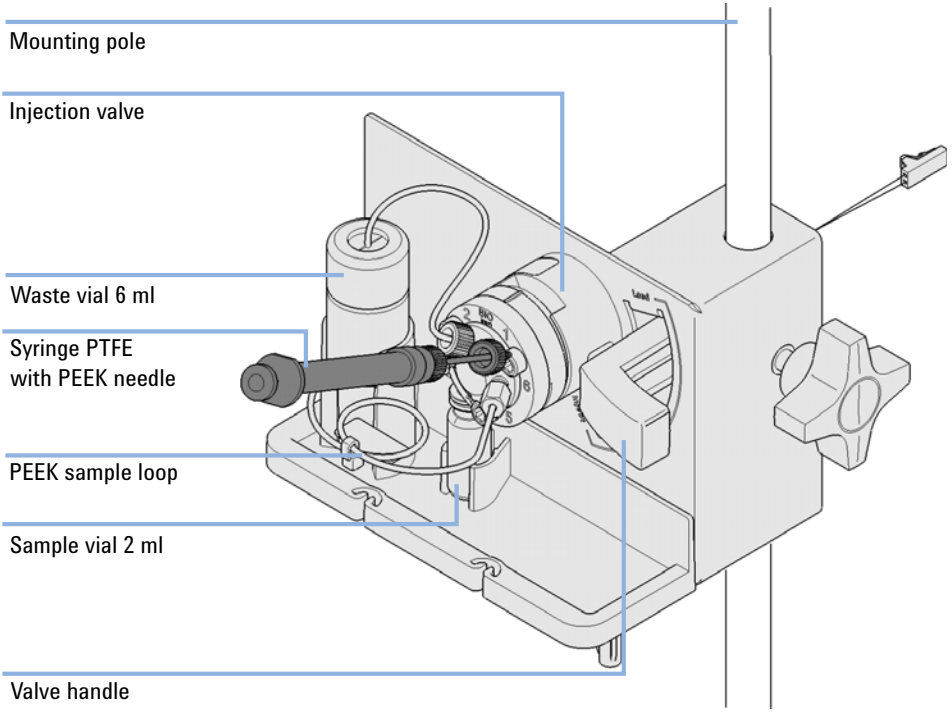


Figure 4 Agilent 1260 Infinity II Bio-inert Manual Injector

2
Installing the Manual Injector

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

Delivery Checklist (G1328C)

Ensure all parts and materials have been delivered with the manual injector. The delivery checklist is shown in Table 1 on page 16. To aid in parts identification, please see "Parts and Materials for Maintenance" on page 55. Please report missing or damaged parts to your local Agilent Technologies sales and service office.

Table 1 Manual Injector Checklist

Description	Quantity
Manual Front Loading Injector Valve, 600 bar (5067-4191). A 20 µL sample loop is connected between Ports 1 and 4. The valve is supplied with a start cable, Hex Keys (×2), Mounting Screws (×2) Vent Lines(×2), Needle Port Cleaner (×1), Long Nuts (×3), Extra Long Nut (×1), Ferrules (×4) and a mounting bracket.	1
Mounting pole, stainless steel (5001-3738)	1
Capillary ST 0.17 mm x 500 mm S/SL (G1328-87600)	1
Base plate (G1328-44121)	1
Organizer plate (5042-8553)	1
Catch tube cap (5042-8576)	1
Valve syringe, fixed needle, 50 µL (5190-1501)	1
Adaptor for Base plate (5043-1428)	2
Tubing assembly (5030-6527)	1
Manual Injector ERI Start-Cable (5188-8056)	1
User Manual on installation medium (part of the shipment - not module specific)	1

Delivery Checklist (G5628A)

Ensure all parts and materials have been delivered with the manual injector. The delivery checklist is shown in "Delivery Checklist (G5628A)" on page 17. To aid in parts identification, please see "Manual Injector (G5628A)" on page 58. 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 (G5628-60100)	1
Mounting pole, stainless steel (5001-3738)	1
Capillary PK/ST 0.17 mm x 500 mm RLO/RLO (bio-inert) (G5667-81005)	1
Base plate (G1328-44121)	1
Organizer plate (5042-8553)	1
Catch tube cap (5042-8576)	1
Syringe, 50 µL, PTFE FN luer lock (5190-1506)	1
Sample loop 20 µL (0101-1239)	1
PEEK luer lock needle AY (5190-0924)	1
Adaptor for Base plate (5043-1428)	2
Manual Injector ERI Start-Cable (5188-8056)	1
User Manual on installation medium (part of the shipment - not module specific)	1
Leak tubing assembly, 1 m (5063-6527)	1
Fingertight fitting long (5062-8541)	1
PTFE/silicone septa 16 mm pre-slit (5188-2758)	1
Waste capillary (G4280-87304)	1
Screw Cap Vial, clear, 6 mL (9301-1377)	1
Screw caps for 6 mL vials (9301-1379)	1

Installing the Manual Injector

This procedure shows the installation of the Agilent 1260 Infinity II Manual Injector (G1328C) as an example. The procedure is the same for the Agilent 1260 Infinity II Bio-Inert Manual Injector (G5628A)

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 Place the Base Plate Adaptor on the connectors of the organizer plate.
3 Connect the organizer plates with the base plate.

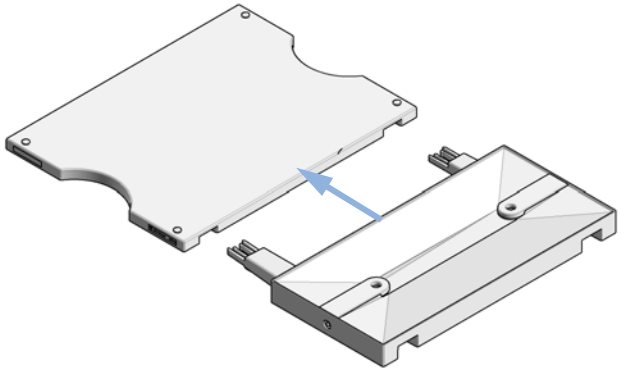


Figure 5 Connecting the Organizer Plates

4 Place (1.) and screw (2.) the mounting pole into one of the two holes in the organizer plate.

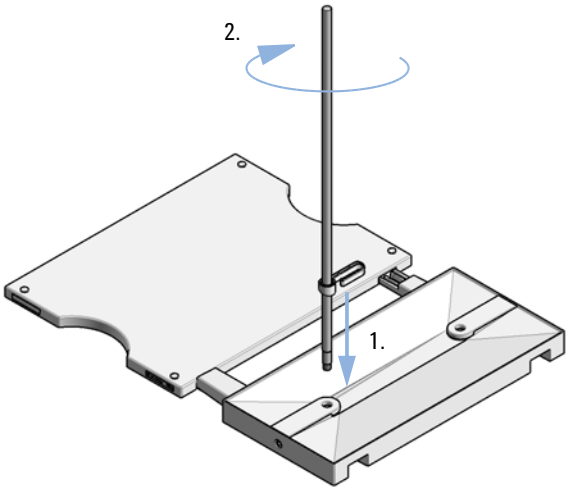


Figure 6 Installing the mounting pole

5 Slide the manual injector onto the mounting pole (1.) and tighten the mounting screw (2.).

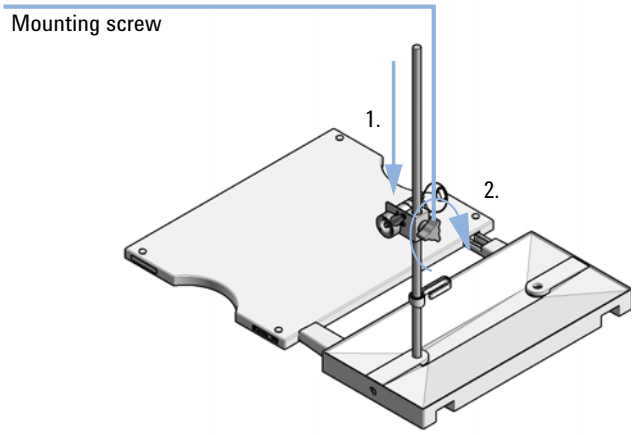


Figure 7 Installing the Manual Injector

6 Install other system modules on top of the manual injector baseplate (see Figure 8 on page 20).

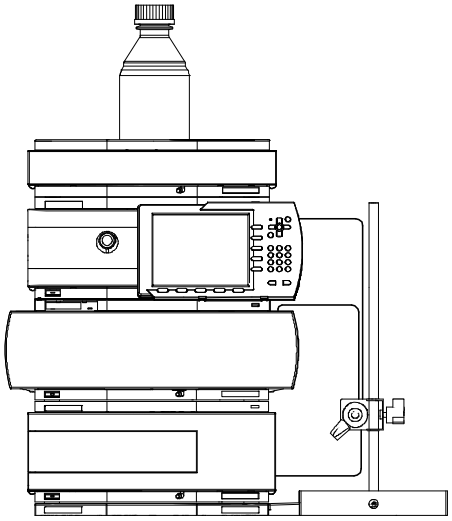


Figure 8 Installing the System

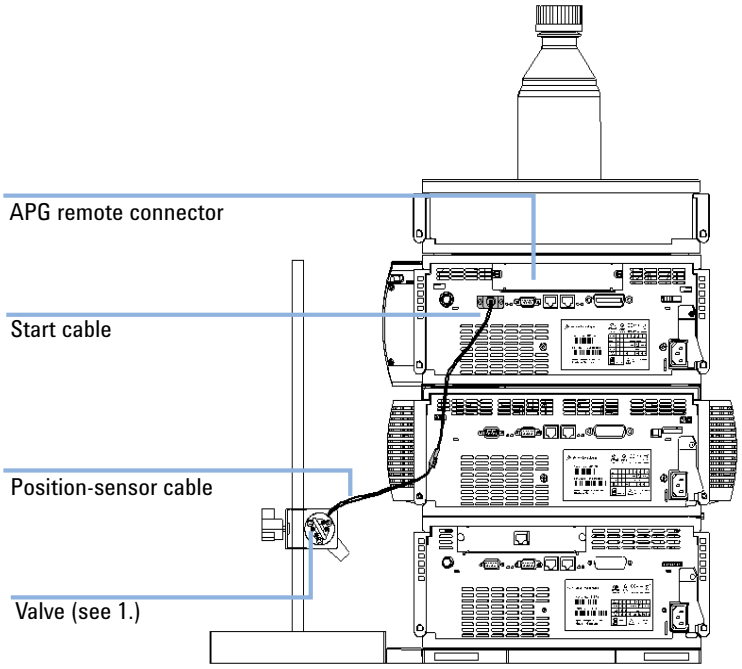


Figure 9 Installing the Start Cable

1. See Figure 10 on page 23

7 Connect the capillaries to the manual injector (see "Flow Connections (G1328C)" on page 22).

Flow Connections

Flow Connections (G1328C)

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.

CAUTION

Prevent siphoning

- ➔ The outlets of the two vent capillaries (ports 5 and 6) and the needle port must be at the same level to prevent siphoning (see Figure 11 on page 23).

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

4 Connect one vent capillary (supplied with valve) to port 5 and one to port 6.

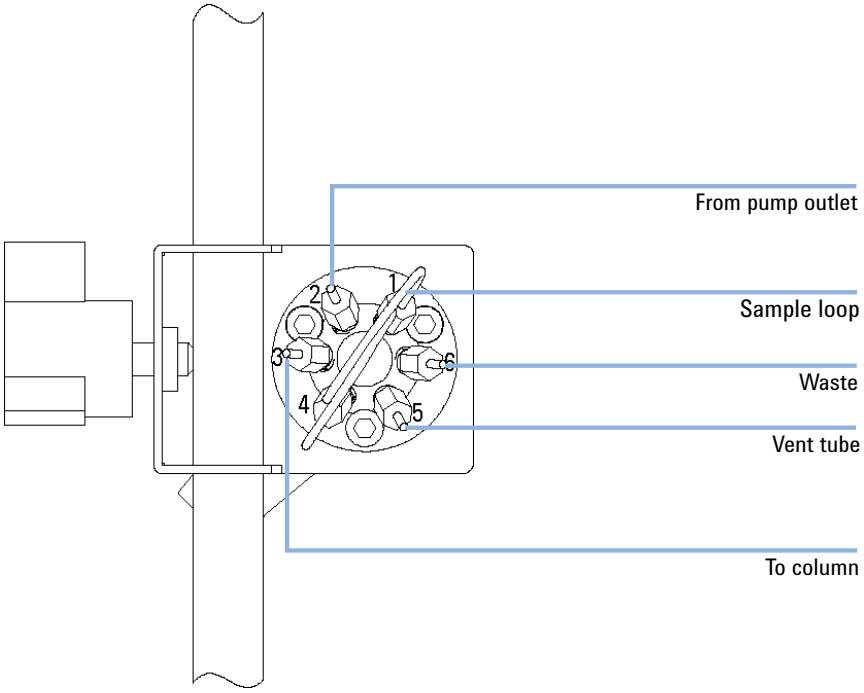


Figure 10 Flow Connections

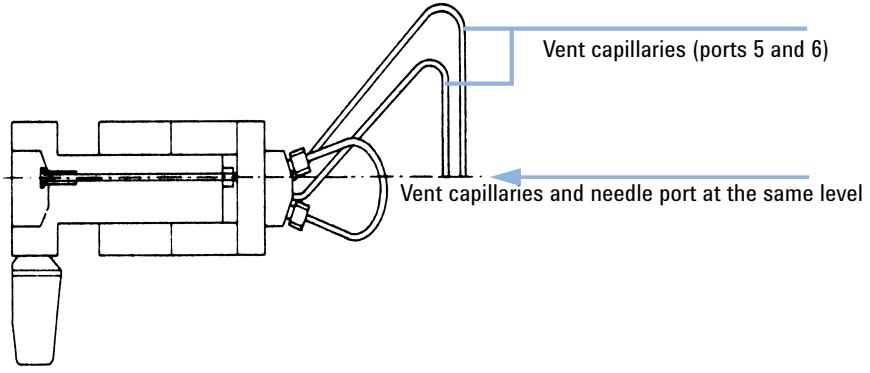


Figure 11 Vent Capillaries

Flow Connection (G5628A)

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.

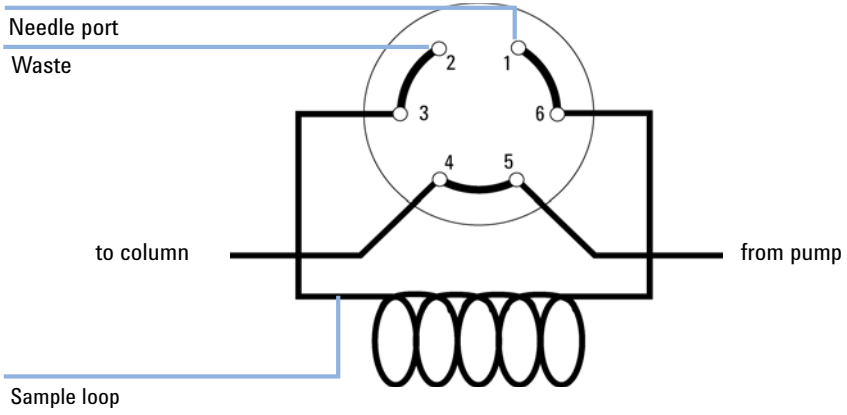


Figure 12 LOAD Position

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.

NOTE

The example below shows the leak drainage for the Agilent 1260 Infinity II Manual Injector (G1328C). The principle is the same for all Agilent Manual Injectors.

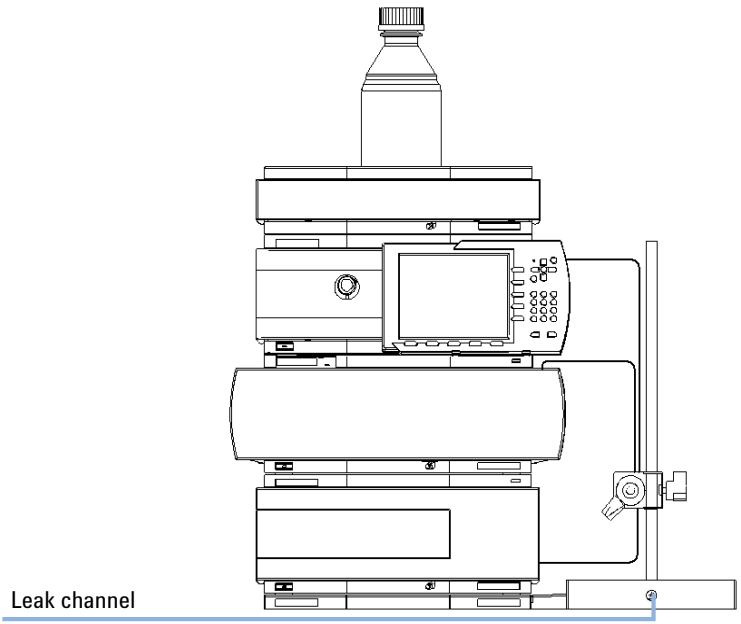


Figure 13 Leak Drainage

3
Using the Manual Injector

How to use the manual injector.

Warnings and Cautions

WARNING

Ejection of mobile phase

When using sample loops larger than 100 µL, 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.

WARNING

Splashing of solvent

➔ When using the Needle Port Cleaner, empty the syringe slowly to prevent solvent from splashing back at you.

➔ 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.

CAUTION

Potential damage to the valve

➔ Rinse the valve with water after using buffer solutions to prevent crystals from forming, which can cause scratches on the rotor seal.

See “Flushing the Manual Injector” on page 43.

Information on Injection Seal Material

The manual injector is supplied with a PEEK injection seal. PEEK is compatible with pH 0-14, incompatible with some concentrated mineral acids (see “Injection Valve Assembly (600 bar)” on page 60).

Needles

CAUTION

Needle can damage valve

➔ Always use the correct needle size.

Use needles with 0.028-inch outer diameter (22 gauge) × 2-inch long needle, without electro-taper, and with 90° point style (square tip).

Injecting Sample

LOAD Position

In the LOAD position (see Figure 14 on page 31), the pump is connected directly to the column (ports 2 and 3 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 vent tube connected to port 6.

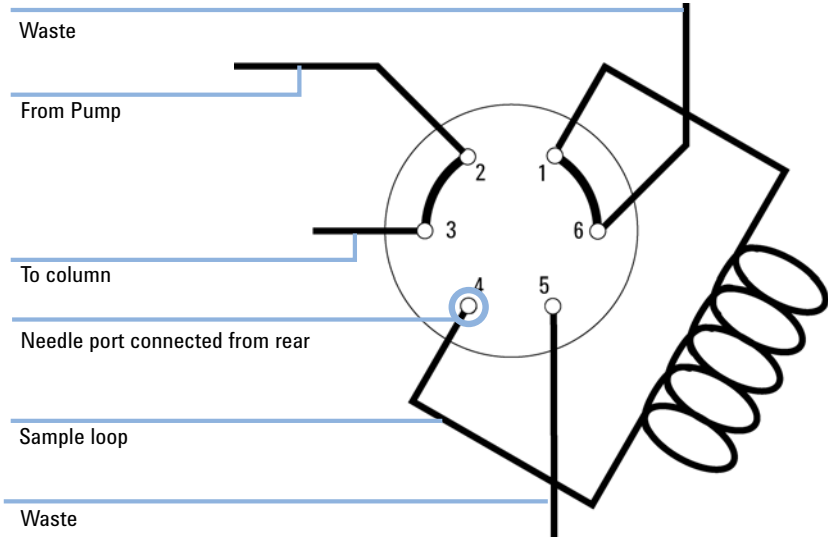


Figure 14 LOAD Position

INJECT Position

In the INJECT position (see Figure 15 on page 32), the pump is connected to the sample loop (ports 1 and 2 connected). All of the sample is washed out of the loop onto the column. The needle port is connected to the vent tube (port 5).

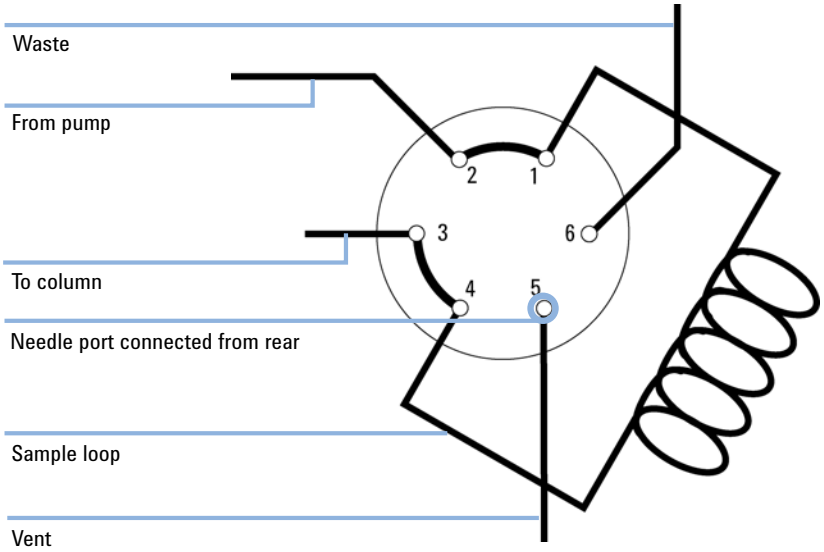


Figure 15 INJECT Position

Complete Loop Filling

In complete-filling, the volume of sample injected is set by the volume of the loop (this includes the valve passages). This method produces the highest precision.

- 3x when loop <= 100 µL
- 2x when loop = 100 – 500 µL
- 1.5x when loop >500 µL

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 vent tube connected to port 6.

An excess of sample is needed because mobile phase near the wall of the loop is displaced slowly due to the laminar flow effect.

1. Turn the handle to the LOAD position
2. Insert the syringe into the needle port. You should feel slight resistance as the needle passes through the needle seal before it stops against the stator face.
3. Load the sample slowly onto the loop. Repeat this step for higher precision.
4. Leave the syringe in and turn the handle to INJECT.

Partial Loop Filling

If you only have small quantities of sample, this is the method of choice. In the partialfilling method the volume of sample injected is set by the syringe. In this method, no more than half a loop volume of sample should be loaded into the loop. For example, load no more than 1 mL into a 2 mL loop. With larger than half the loop volume, some of the sample is lost out Vent Line 6. This is because sample flows down the center of the loop at twice the average velocity due to the laminar flow effect.

1. In INJECT, use the Needle Port Cleaner to flush out the needle port with about 1 mL of mobile phase to flush out contamination from the earlier injection. This liquid will exit out Vent Line 5.
2. Insert the syringe into the needle port. You should feel slight resistance as the needle passes through the needle seal before it stops against the stator face.
3. Load the sample slowly onto the loop.
4. Leave the syringe in and turn the handle to INJECT.

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 0.22 µm filters.
- Avoid or minimize the use of solvents that 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.

Recommended Wash Solvents

- water
- ethanol
- methanol
- water/acid (especially for basic compounds)
- water/base (especially for acidic compounds)
- water/acetonitrile

NOTE For different wash solvents as mentioned above, verify that the wash solvent is suitable for the silicone wash tubing.

Material Information

Materials in the flow path are carefully selected based on Agilent's experiences in developing highest quality instruments for HPLC analysis over several decades. These materials exhibit excellent robustness under typical HPLC conditions. For any special condition, please consult the material information section or contact Agilent.

Disclaimer

Subsequent data was collected from external resources and is meant as a reference. Agilent cannot guarantee the correctness and completeness of such information. Data is based on compatibility libraries, which are not specific for estimating the long-term life time under specific but highly variable conditions of UHPLC systems, solvents, solvent mixtures and samples. Information can also not be generalized due to catalytic effects of impurities like metal ions, complexing agents, oxygen etc. Apart from pure chemical corrosion, other effects like electro corrosion, electrostatic charging (especially for non-conductive organic solvents), swelling of polymer parts etc. need to be considered. Most data available refers to room temperature (typically 20 – 25 °C, 68 – 77 °F). If corrosion is possible, it usually accelerates at higher temperatures. If in doubt, please consult technical literature on chemical compatibility of materials.

PEEK

PEEK (Polyether-Ether Ketones) combines excellent properties regarding biocompatibility, chemical resistance, mechanical and thermal stability. PEEK is therefore the material of choice for UHPLC and biochemical instrumentation.

It is stable in the specified pH range (for the Bio-inert LC system: pH 1 – 13, see bio-inert module manuals for details), and inert to many common solvents.

There is still a number of known incompatibilities with chemicals such as chloroform, methylene chloride, THF, DMSO, strong acids (nitric acid > 10 %, sulphuric acid > 10 %, sulfonic acids, trichloroacetic acid), halogenes or aequous halogene solutions, phenol and derivatives (cresols, salicylic acid etc.).

When used above room temperature, PEEK is sensitive to bases and various organic solvents, which can cause it to swell. Under such conditions normal PEEK capillaries are very sensitive to high pressure. Therefore Agilent uses stainless-steel cladded PEEK capillaries in bio-inert systems. The use of stainless steel cladded PEEK capillaries keeps the flow path free of steel and ensures pressure stability to at least 600 bar. If in doubt, consult the available literature about the chemical compatibility of PEEK.

Polyimide

Agilent uses semi-crystalline polyimide for rotor seals in valves and needle seats in autosamplers. One supplier of polyimide is DuPont, which brands polyimide as Vespel, which is also used by Agilent.

Polyimide is stable in a pH range between 1 and 10 and in most organic solvents. It is incompatible with concentrated mineral acids (e.g. sulphuric acid), glacial acetic acid, DMSO and THF. It is also degraded by nucleophilic substances like ammonia (e.g. ammonium salts in basic conditions) or acetates.

Polyethylene (PE)

Agilent uses UHMW (ultra-high molecular weight)-PE/PTFE blends for yellow piston and wash seals, which are used in 1290 Infinity pumps, 1290 Infinity II pumps, the G7104C and for normal phase applications in 1260 Infinity pumps.

Polyethylene has a good stability for most common inorganic solvents including acids and bases in a pH range of 1 to 12.5. It is compatible to many organic solvents used in chromatographic systems like methanol, acetonitrile and isopropanol. It has limited stability with aliphatic, aromatic and halogenated hydrocarbons, THF, phenol and derivatives, concentrated acids and bases. For normal phase applications, the maximum pressure should be limited to 200 bar.

Tantalum (Ta)

Tantalum is inert to most common HPLC solvents and almost all acids except fluoric acid and acids with free sulfur trioxide. It can be corroded by strong bases (e.g. hydroxide solutions > 10 %, diethylamine). It is not recommended for the use with fluoric acid and fluorides.

Stainless Steel (ST)

Stainless steel is inert against many common solvents. It is stable in the presence of acids and bases in a pH range of 1 to 12.5. It can be corroded by acids below pH 2.3. It can also corrode in following solvents:

- Solutions of alkali halides, their respective acids (for example, lithium iodide, potassium chloride, and so on) and aqueous solutions of halogens.
- High concentrations of inorganic acids like nitric acid, sulfuric acid and organic solvents especially at higher temperatures (replace, if your chromatography method allows, by phosphoric acid or phosphate buffer which are less corrosive against stainless steel).

- Halogenated solvents or mixtures which form radicals and/or acids, for example:

  $2\ CHCl_3 + O_2 \rightarrow 2\ COCl_2 + 2\ HCl$

  This reaction, in which stainless steel probably acts as a catalyst, occurs quickly with dried chloroform if the drying process removes the stabilizing alcohol.
- Chromatographic grade ethers, which can contain peroxides (for example, THF, dioxane, di-isopropylether). Such ethers should be filtered through dry aluminium oxide which adsorbs the peroxides.
- Solutions of organic acids (acetic acid, formic acid, and so on) in organic solvents. For example, a 1 % solution of acetic acid in methanol will attack steel.
- Solutions containing strong complexing agents (for example, EDTA, ethylene diamine tetra-acetic acid).
- Mixtures of carbon tetrachloride with 2-propanol or THF.

Titanium (Ti)

Titanium is highly resistant to oxidizing acids (for example, nitric, perchloric and hypochlorous acid) over a wide range of concentrations and temperatures. This is due to a thin oxide layer on the surface, which is stabilized by oxidizing compounds. Non-oxidizing acids (for example, hydrochloric, sulfuric and phosphoric acid) can cause slight corrosion, which increases with acid concentration and temperature. For example, the corrosion rate with 3 % HCl (about pH 0.1) at room temperature is about 13 µm/year. At room temperature, titanium is resistant to concentrations of about 5 % sulfuric acid (about pH 0.3). Addition of nitric acid to hydrochloric or sulfuric acids significantly reduces corrosion rates. Titanium is sensitive to acidic metal chlorides like $FeCl_3$ or $CuCl_2$. 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 %.

Diamond-Like Carbon (DLC)

Diamond-Like Carbon is inert to almost all common acids, bases and solvents. There are no documented incompatibilities for HPLC applications.

Fused silica and Quartz (SiO_2)

Fused silica is used in Max Light Cartridges. Quartz is used for classical flow cell windows. It is inert against all common solvents and acids except hydrofluoric acid and acidic solvents containing fluorides. 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 greater than 12, the use of flow cells with sapphire windows is recommended.

Gold

Gold is inert to 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.

Zirconium Oxide (ZrO_2)

Zirconium Oxide is inert to almost all common acids, bases and solvents. There are no documented incompatibilities for HPLC applications.

Platinum/Iridium

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

Fluorinated polymers (PTFE, PFA, FEP, FFKM, PVDF)

Fluorinated polymers like PTFE (polytetrafluorethylene), PFA (perfluoroalkoxy) and FEP (fluorinated ethylene propylene) are inert to almost all common acids, bases, and solvents. FFKM is perfluorinated rubber, which is also resistant to most chemicals. As an elastomer, it may swell in some organic solvents like halogenated hydrocarbons.

TFE/PDD copolymer tubings, which are used in all Agilent degassers except G1322A, are not compatible with fluorinated solvents like Freon, Fluorinert, or Vertrel. They have limited life time in the presence of Hexafluoroisopropanol (HFIP). To ensure the longest possible life with HFIP, it is best to dedicate a particular chamber to this solvent, not to switch solvents, and not to let dry out the chamber. For optimizing the life of the pressure sensor, do not leave HFIP in the chamber when the unit is off.

The tubing of the leak sensor is made of PVDF (polyvinylidene fluoride), which is incompatible to the solvent DMF (dimethyl formamide).

Sapphire, Ruby and Al_2O_3-based ceramics

Sapphire, ruby and ceramics based on aluminum oxide Al_2O_3 are inert to almost all common acids, bases and solvents. There are no documented incompatibilities for HPLC applications.

Bio-inert Materials

For the 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 science scientists, as they are known for optimum inertness to biological samples and ensure best compatibility with 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 such as iron, nickel, cobalt, chromium, molybdenum or copper, which can interfere with biological samples. The flow downstream of the sample introduction contains no metals whatsoever.

Table 3 Used Bio-inert materials

Module	Materials
Agilent 1260 Infinity II Bio-inert Pump (G5654A)	Titanium, gold, platinum-iridium, ceramic, ruby, PTFE, PEEK
Agilent 1260 Infinity II Bio-inert Multisampler (G5668A)	Upstream of sample introduction: • Titanium, gold, PTFE, PEEK, ceramic Downstream of sample introduction: • PEEK, ceramic
Agilent 1260 Infinity II Bio-inert Manual Injector (G5628A)	PEEK, ceramic
Agilent 1260 Infinity II Bio-inert Analytical Fraction Collector (G5664B)	PEEK, ceramic, PTFE
Bio-inert Flow Cells:	
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) (G5615-60022) (*for Agilent 1260 Infinity II DAD G7115A, and MWD G7165A*)	PEEK, ceramic, sapphire, PTFE
Bio-inert flow cell, 8 µL, 20 bar (pH 1–12) includes Capillary Kit Flow Cells BIO (p/n G5615-68755) (G5615-60005) (*for Agilent 1260 Infinity II FLD G7121A/B*)	PEEK, fused silica, PTFE

Table 3 Used Bio-inert materials

Module	Materials
Bio-inert Heat Exchangers, Valves and Capillaries:	
Quick-Connect Heat Exchanger Bio-inert (G7116-60041) (*for Agilent 1260 Infinity II Multicolumn Thermostat G7116A*)	PEEK (steel-cladded)
Bio-inert Valve heads (G4235A, G5631A, G5632A, G5639A)	PEEK, ceramic (Al_2O_3 based)
Bio-inert Connection capillaries	Upstream of sample introduction: • Titanium Downstream of sample introduction: • Agilent uses stainless-steel-cladded PEEK capillaries, which keep the flow path free of steel and provide pressure stability up to 600 bar.

NOTE To ensure optimum bio-compatibility of your Agilent 1260 Infinity II 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 "Material Information" on page 34.

4
Maintenance

Instructions on simple, routine repair procedures

Overview of Maintenance

Table 4 Overview of Repair Procedures

Notes	Typical Frequency	Time Required
See "Flushing the Manual Injector" on page 43	After using aqueous buffers or salt solutions	5 minutes
See "Exchanging the Injection Valve Seal (G1328C)" on page 45	After approximately 10000 to 20000 injections, or when the valve performance shows indication of leakage or wear	10 minutes
See "Position-Sensing Switch (G1328C)" on page 50 (G1328C only)	When cable damaged or when no start signal is sent when switching to the inject position	10 minutes
See "Exchanging the Injection Valve Stator Face (G5628A)" on page 53 (G5628A only)	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.

3 Use the needle-port cleaner (supplied with the valve) and syringe to flush the needle port and vent capillary.

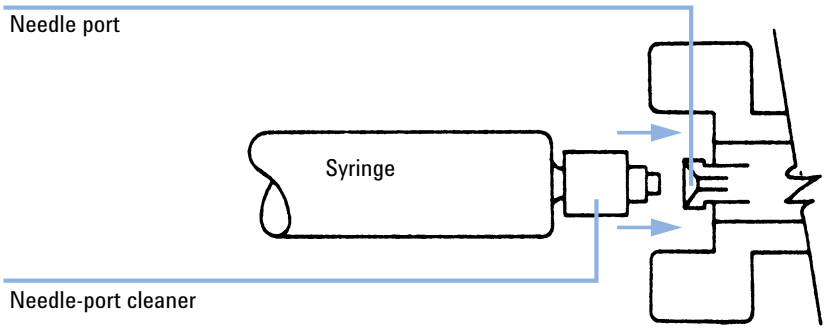


Figure 16 Needle-port Cleaner

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

Exchanging the Injection Valve Seal (G1328C)

When
- Poor injection volume reproducibility
- Leaking injection valve

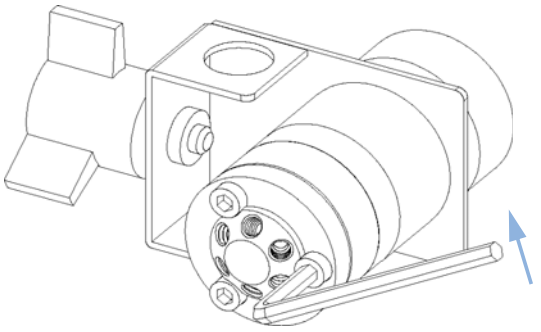
Tools required

Description
Hexagonal key, 9/64 inch

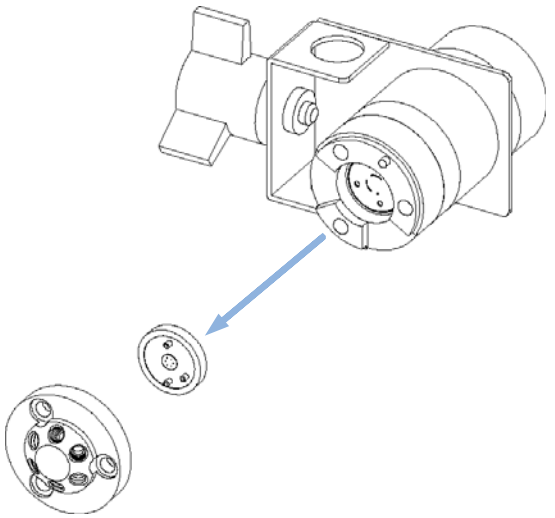
Parts required

#	p/n	Description
1	5068-0052	Rotor seal, PEEK

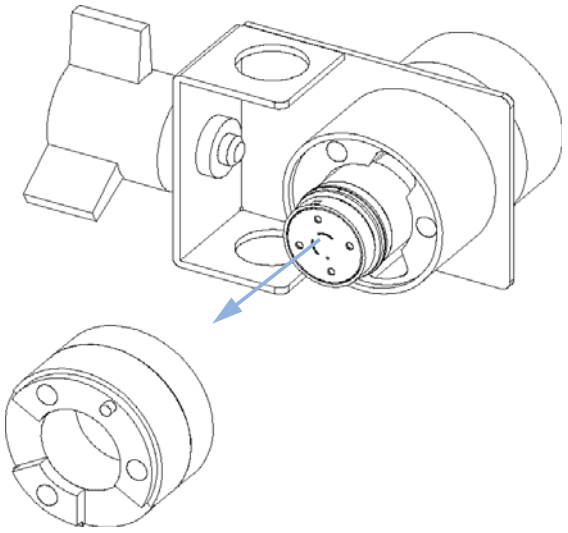
1 Loosen the three stator screws.



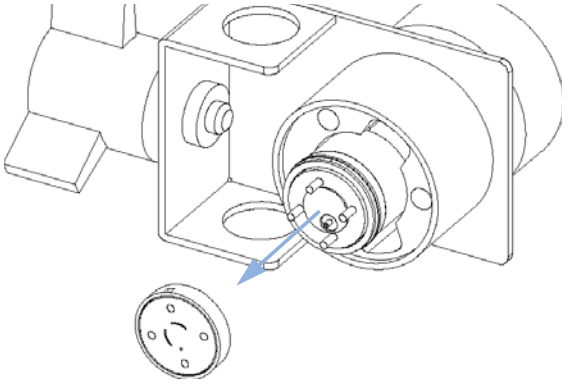
2 Remove the stator head.



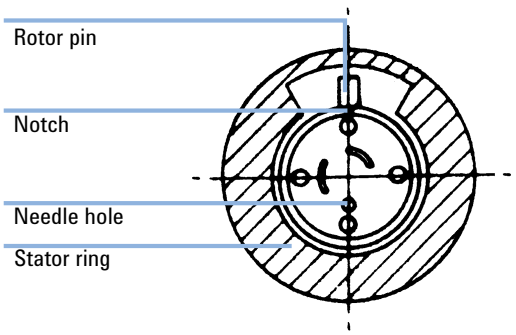
3 Remove the stator ring.



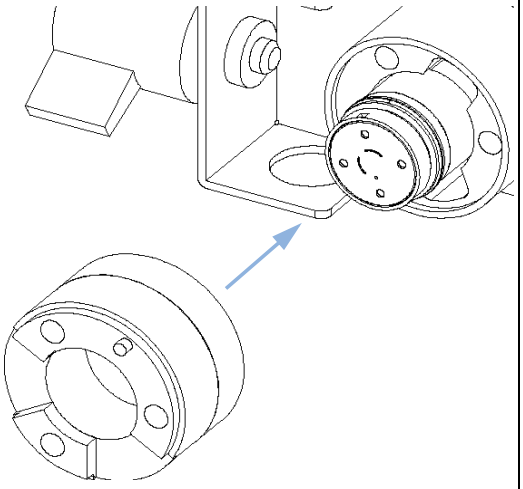
4 Remove the seal.



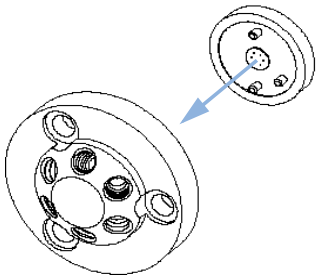
5 Install the new seal. Ensure the seal is positioned as shown.



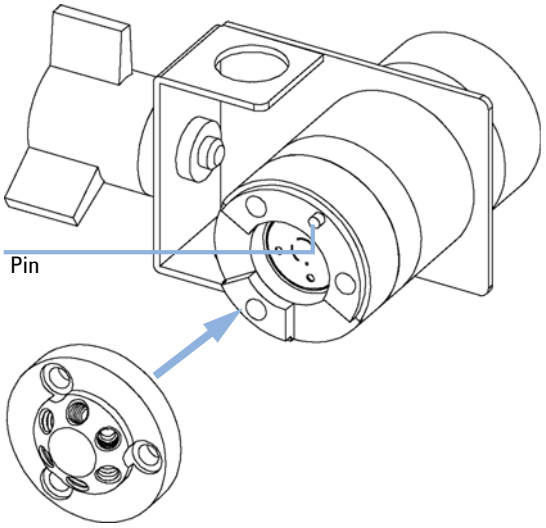
6 Install the stator ring. Ensure the pin in the stator ring is aligned with the hole in the valve body and the position sensoring switch is back in place.



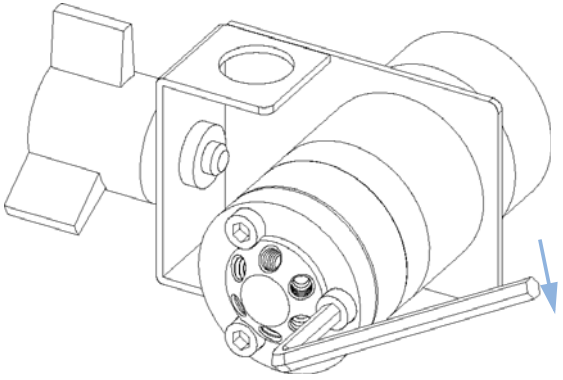
7 Insert the stator face onto the stator head.



8 Install the stator head onto the valve. Ensure the pin in the stator ring is aligned with the hole in the stator head.



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



Exchanging the Injection Valve Seal (G5628A)

When

- Poor injection volume reproducibility
- Leaking injection valve

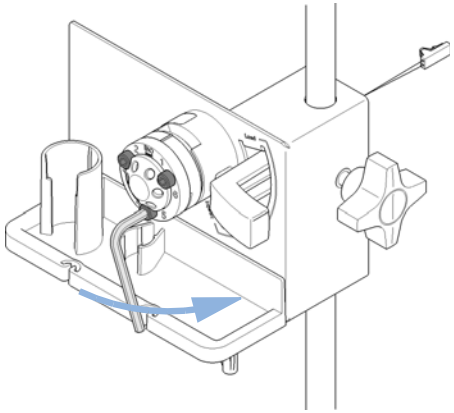
Tools required

Description
Hexagonal key, 9/64 inch

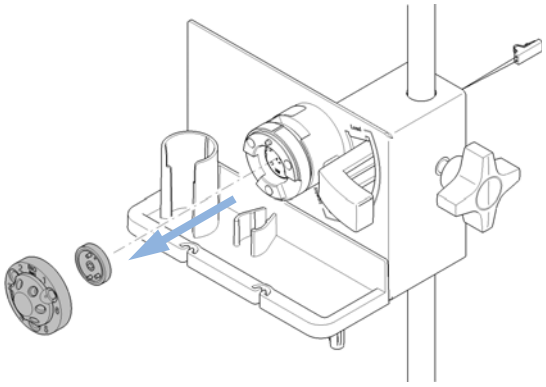
Parts required

p/n	Description
5068-0082	Rotor seal, PEEK

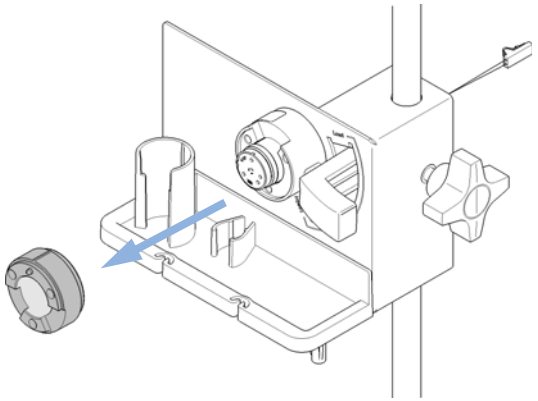
1 Loosen the three stator screws and remove the stator head.



2 Remove the stator head and stator face.



3 Remove the stator ring and rotor seal.



4 Install the new rotor seal.

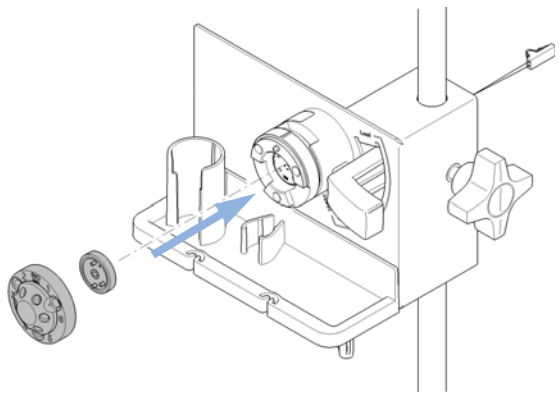
HINT

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

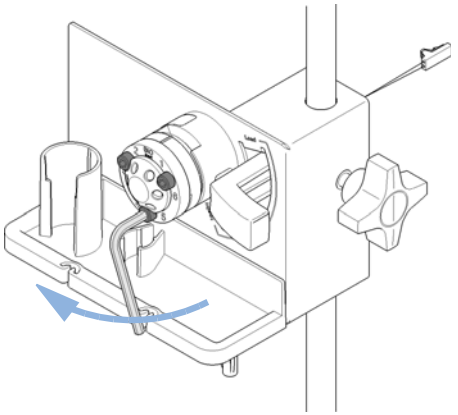
5 Install the stator ring, stator head and stator face onto the valve.

NOTE

Ensure the pin in the stator ring is aligned with the hole in the stator head.



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



Position-Sensing Switch (G1328C)

When

- No start signal when switching to the inject position

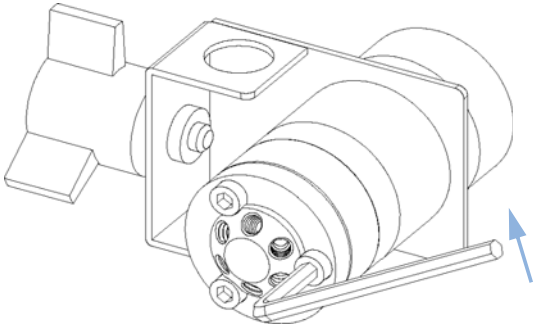
Tools required

Description
Hexagonal key, 9/64 inch

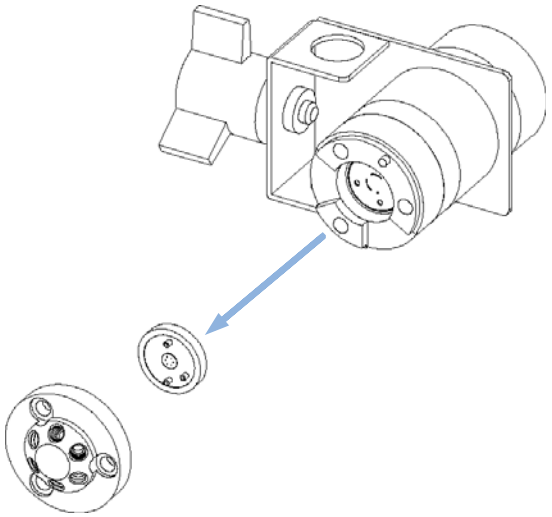
Parts required

#	p/n	Description
1	0490-1849	Position-sensing switch

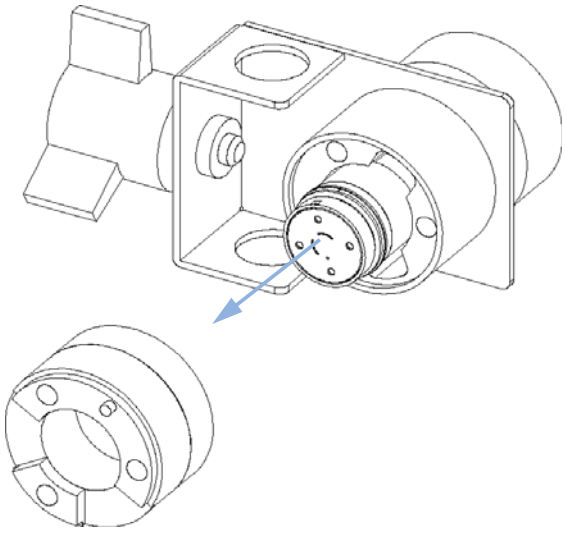
1 Loosen the three stator screws.



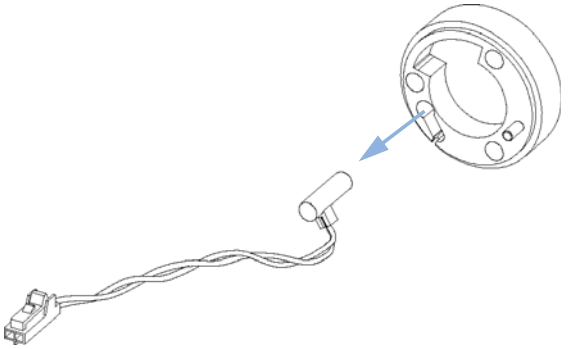
2 Remove the stator head.



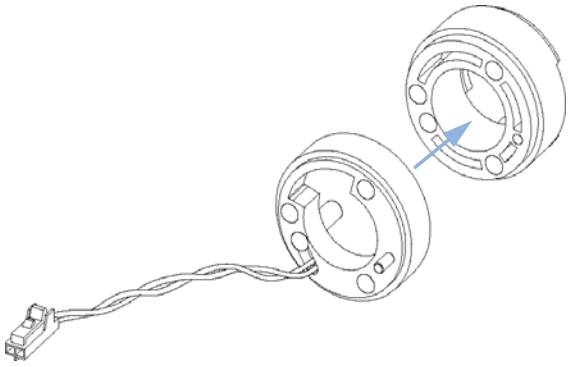
3 Remove the stator ring.



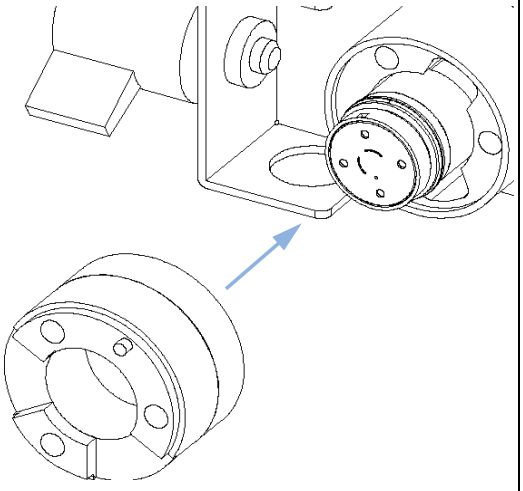
4 Disconnect the sensor cable from the start cable. Pull the sensing switch out of the stator ring.



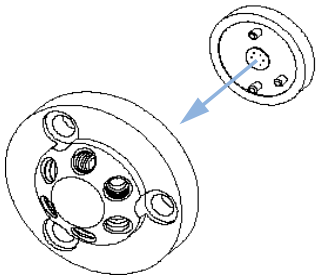
5 Insert the new sensing switch into the stator ring.



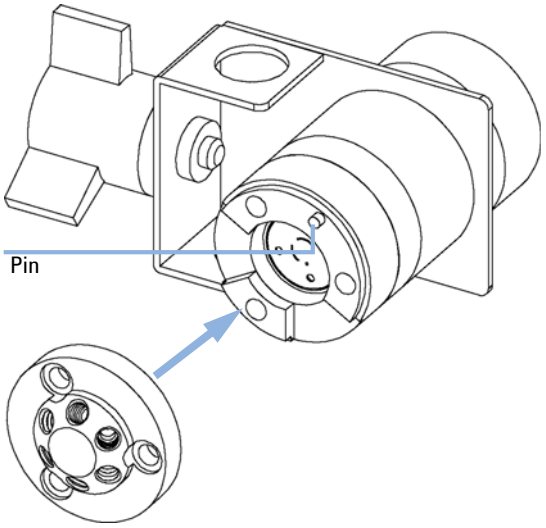
6 Install the stator ring. Ensure the pin in the stator ring is aligned with the hole in the valve body and the position sensoring switch is back in place.



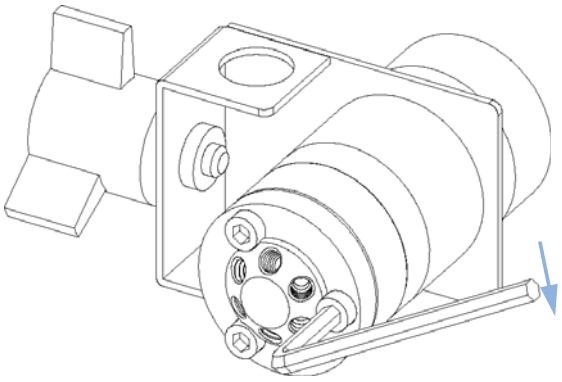
7 Insert the stator face onto the stator head.



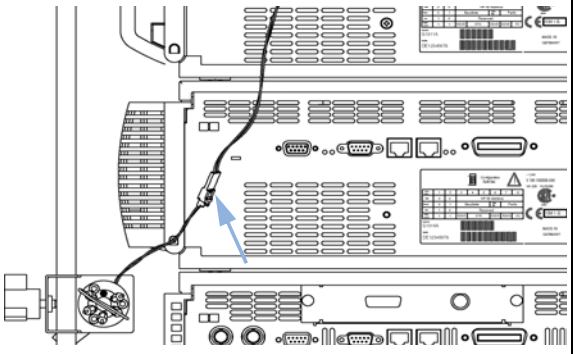
8 Install the stator head onto the valve. Ensure the pin in the stator ring is aligned with the hole in the stator head.



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



10 Reconnect the sensor cable to the start cable.



Exchanging the Injection Valve Stator Face (G5628A)

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

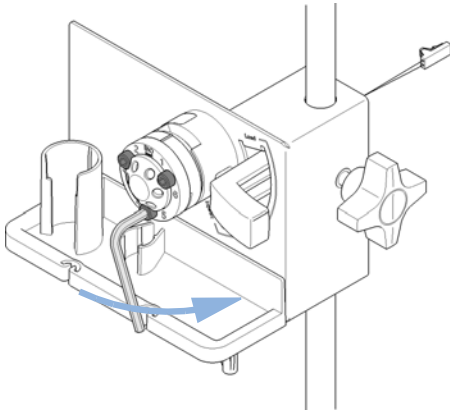
Tools required

Description
Hexagonal key, 9/64 inch

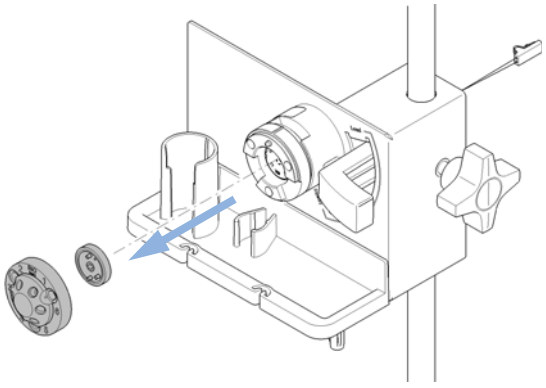
Parts required

p/n	Description
0100-1851	Stator face, ceramic

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



2 Remove the stator head and stator face.

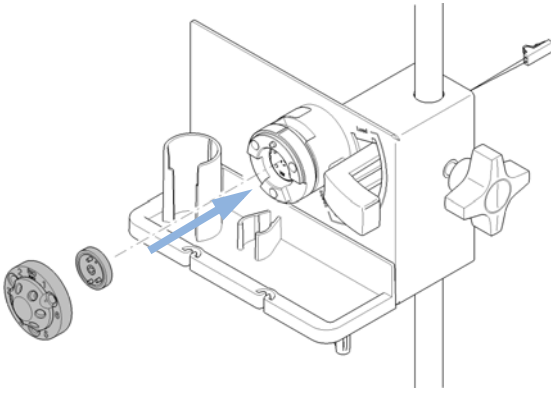


3 Insert the new stator face onto the stator head.

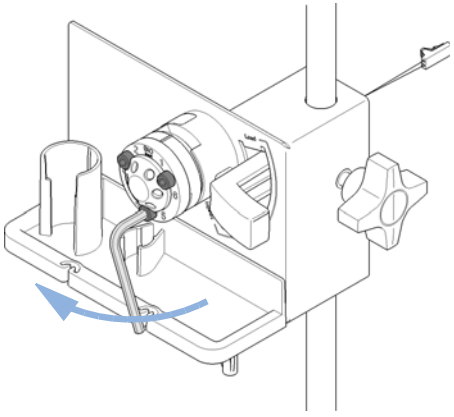
4 Install the stator ring, stator head and stator face onto the valve.

NOTE

Ensure the pin in the stator ring is aligned with the hole in the stator head.



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



5
Parts and Materials for Maintenance

Detailed illustrations and lists for identification of parts and materials

Manual Injector

Manual Injector (G1328C)

Item	#	p/n	Description
1	1	5067-4191	Manual Front Loading Injector Valve, 600 bar
2	1	5001-3738	Mounting pole, stainless steel
3	1	G1328-44121	Base plate
	2	5043-1428	Adaptor for Base plate
4	1	5042-8553	Organizer plate
	1	5042-8576	Catch tube cap
	1	5190-1501	Valve syringe, fixed needle, 50 µL
	1	G1328-87600	Capillary ST 0.17 mm x 500 mm S/SL
	1	0100-1677	Start cable
	1	5188-8056	Manual Injector ERI Start-Cable

Manual injector valve see “Injection Valve Assembly (600 bar)” on page 60.

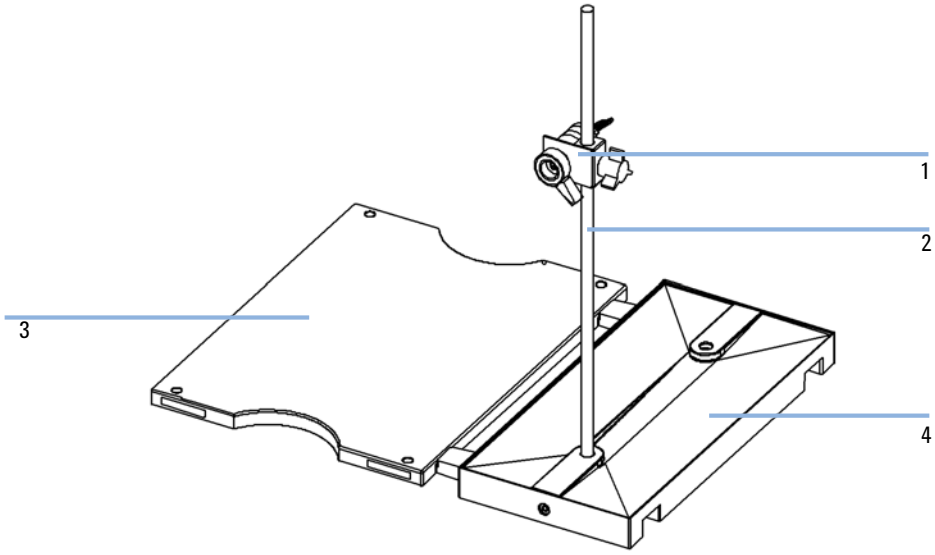


Figure 17 Manual Injector

Manual Injector (G5628A)

Item	#	p/n	Description
1	1	5067-4158	Bio-inert 6-port sample injection valve
2	1	5001-3738	Mounting pole, stainless steel
3	1	G1328-44121	Base plate
4	1	5042-8553	Organizer plate
	2	5043-1428	Adaptor for Base plate
	1	G5667-81005	Capillary PK/ST 0.17 mm x 500 mm RLO/RLO (bio-inert)
	1	5188-8056	Manual Injector ERI Start-Cable
	1	G4280-87304	Waste capillary
	1	9301-1379	Screw caps for 6 mL vials, 100/pk
	1	9301-1377	Screw Cap Vial, clear, 6 mL, 100/pk
	1	5188-2758	PTFE/silicone septa 16 mm pre-slit, 100/pk
	1	5190-1506	Syringe, 50 µL, PTFE Luer lock
	1	0101-1239	Sample loop 20 µL
	1	5062-8541	Fingertight fitting long 10/pk
	1	5190-0924	PEEK Luer lock needle AY
	1	5042-8576	Catch tube cap

Manual Injector valve see “Bio-Inert Injection Valve Assembly (600 bar)” on page 63.

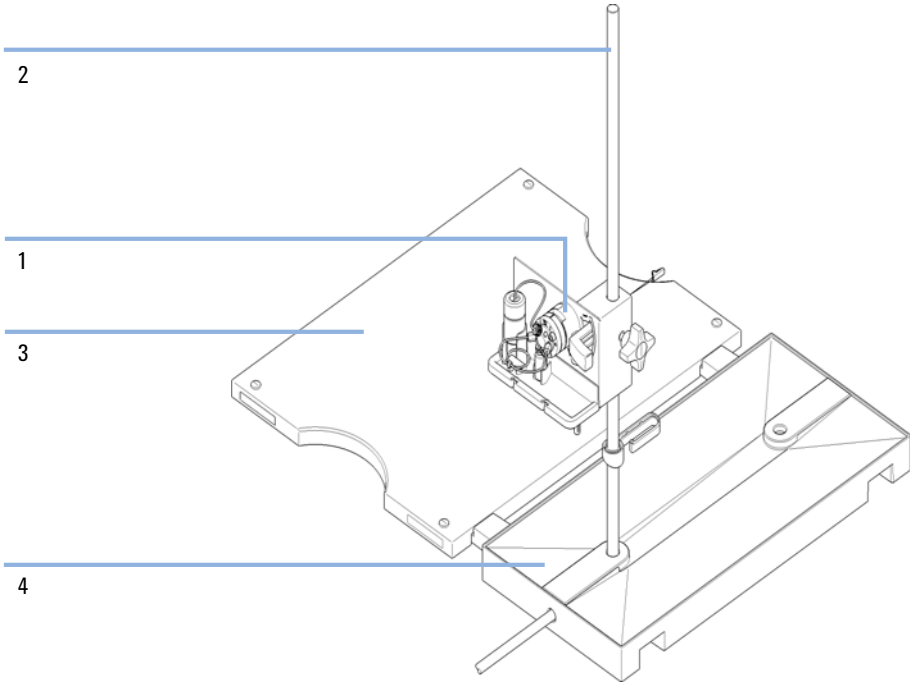


Figure 18 Manual Injector (G5628A)

Injection Valve Assembly

Injection Valve Assembly (600 bar)

Manual Front Loading Injector Valve, 600 bar (5067-4191) with starts cable (complete assembly), including operating instructions, needle port cleaner, vent tubes (×2) and fittings, 5/64 and 9/64-inch hex keys. Includes items 1 – 8.

Item	p/n	Description
1	1535-4045	Bearing ring
2	1535-4046	Isolation seal
3	5068-0052	Rotor seal, PEEK
4	5068-0119	Stator ring
5	0100-1859	Stator face
6	0100-1860	Stator head
7	5068-0020	Stator Screws, 10/pack
	8710-0060	Hex-key wrench, 9/64 inch
	0490-1849	Position-sensing switch
8	1400-3166	Ring stand, mounting bracket

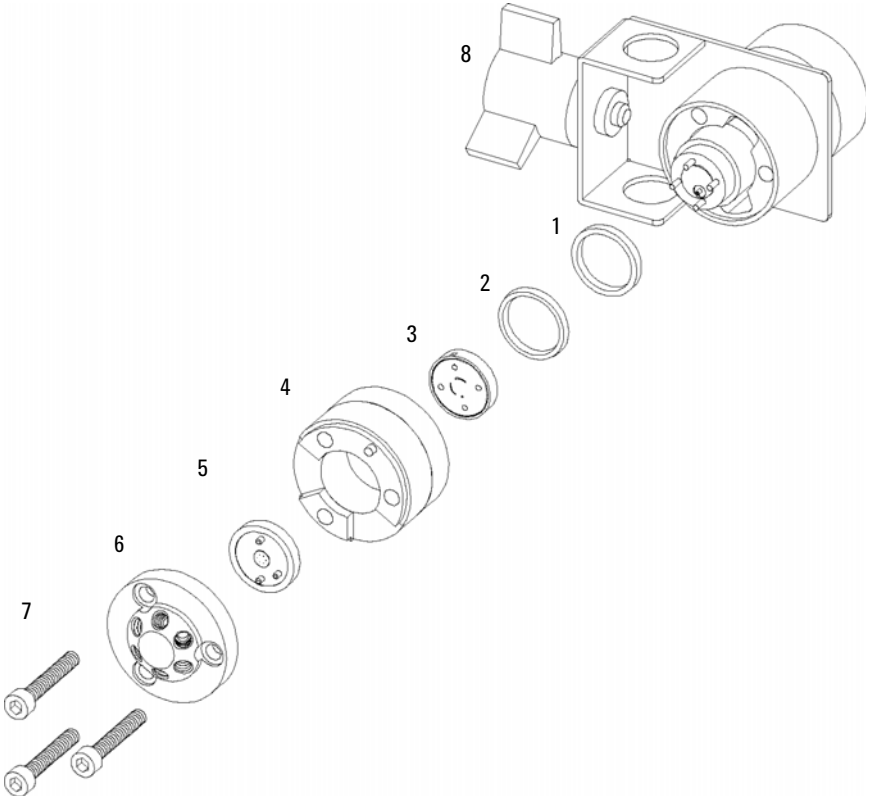


Figure 19 Injection Valve Assembly

NOTE

Accuracy of sample loops

The actual volume of a sample loop can differ by +/- 10 % for a 20 µL loop. Smaller loops can have a greater deviation and bigger loops a smaller one. Use partial loop filling if you must know the actual injected volume.

Sample loops stainless steel

p/n	Description
0101-1248	Sample loop 5 µL
0100-1923	Sample loop 10 µL
0100-1922	Sample loop 20 µL
0100-1924	Sample loop 50 µL
0100-1921	Sample loop 100 µL
0101-1247	Sample loop 200 µL
0101-1246	Sample loop 500 µL
0101-1245	Sample loop 1 mL
0101-1244	Sample loop 2 mL
0101-1243	Sample loop 5 mL

Sample loops PEEK

p/n	Description
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
0101-1237	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

Bio-Inert Injection Valve Assembly (600 bar)

Bio-inert 6-port sample injection valve (5067-4158) contains:

Item	p/n	Description
1	1535-4045	Bearing ring
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
	0100-1677	Start cable

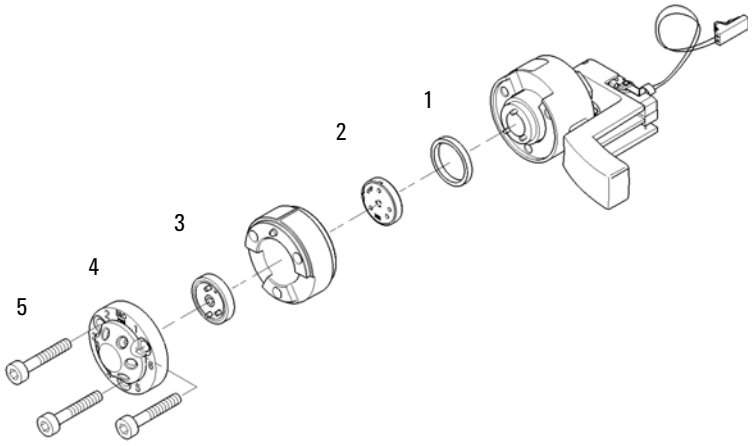


Figure 20 Injection Valve Assembly

Syringes

p/n	Description
5190-1506	Syringe, 50 µL, PTFE Luer lock
5190-1513	Syringe, 100 µL, PTFE Luer lock
5190-1527	Syringe, 500 µL, PTFE Luer lock
5190-1534	Syringe, 2.5 mL, PTFE Luer lock
5190-1457	Syringe, 10 mL, PTFE Luer lock

Accessories and Consumables

p/n	Description
5190-0924	PEEK Luer lock needle AY
5062-8541	PEEK Fittings long 1/16, 10/pk
5182-0544	Snap Top Vial, 2 mL, clear glass, 100/pk
9301-1377	Screw Cap Vial, clear, 6 mL, 100/pk
5188-2758	PTFE/silicone septa 16 mm pre-slit, 100/pk
9301-1379	Screw caps for 6 mL vials, 100/pk
G5667-81005	Capillary PK/ST 0.17 mm x 500 mm RLO/RLO (bio-inert)

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Appendix

Additional information

Solvent Information

Observe the following recommendations on the use of solvents.

- Brown glass ware can avoid growth of algae.
- Small particles can permanently block capillaries and valves. Therefore always filter solvents through 0.4 µm filters.
- Avoid the use of the following steel-corrosive solvents:
  - solutions of alkali halides and their respective acids (for example, lithium iodide, potassium chloride, and so on),
  - high concentrations of inorganic acids like sulfuric acid and nitric acid, especially at higher temperatures (if your chromatography method allows, replace by phosphoric acid or phosphate buffer which are less corrosive against stainless steel),
  - halogenated solvents or mixtures which form radicals and/or acids, for example:

    $2CHCl_3 + O_2 \rightarrow 2COCl_2 + 2HCl$

    This reaction, in which stainless steel probably acts as a catalyst, occurs quickly with dried chloroform if the drying process removes the stabilizing alcohol,
  - chromatographic grade ethers, which can contain peroxides (for example, THF, dioxane, diisopropyl ether) should be filtered through dry aluminium oxide which adsorbs the peroxides,
  - solvents containing strong complexing agents (e.g. EDTA),
  - mixtures of carbon tetrachloride with 2-propanol or THF.
- Avoid the use of dimethyl formamide (DMF). Polyvinylidene fluoride (PVDF), which is used in leak sensors, is not resistant to DMF.

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In This Book

This manual contains user information about the Agilent 1260 Infinity II Manual Injector (G1328C) and the Agilent 1260 Infinity II Bio-Inert Manual Injector (G5628A). The manual describes the following:

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

Printed in Germany
07/2018

G1328-90020
Rev. B

Agilent Technologies