Agilent 1260 Infinity Manual Injector

DRAFT

User Manual

Agilent Technologies

Notices

Manual Part Number

G1328-90013

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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 Agilent 1260 Infinity Manual Injector (G1328C).

1 Introduction

Operation and mechanical hardware

2 Installing the Manual Injector

Installation of the manual injector

3 Using the Manual Injector

How to use the manual injector

4 Maintenance

Instructions on simple, routine repair procedures

5 Parts and Materials for Maintenance

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6 Appendix

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1 Introduction

Operation and mechanical hardware

Introduction to the Manual Injector

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 21 and "Flow Connections" on page 14).

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

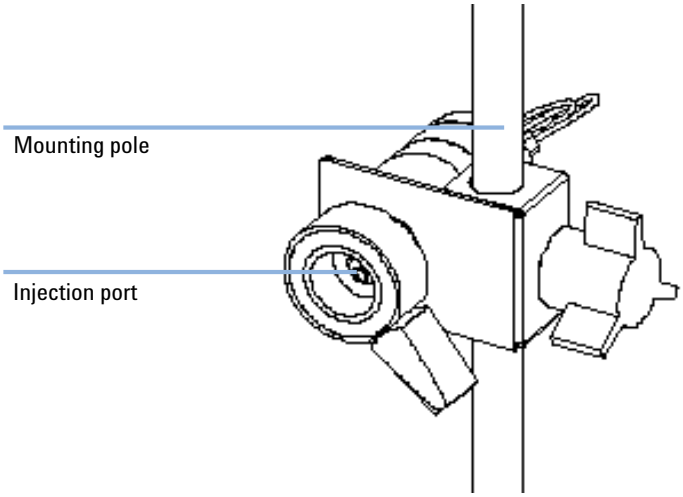


Figure 1 The Manual Injector installed to the mounting pole

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

Ensure all parts and materials have been delivered with the manual injector. The delivery checklist is shown in Table 1 on page 8. To aid in parts identification, please see "Parts and Materials for Maintenance" on page 35. 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
Connection capillary, 0.17 mm id, 500 mm (G1328-87600)	1
Base plate (G1328-44121)	1
Organizer plate (5042-8553)	1
Catch tube cap (5042-8576)	1

Table 1 Manual Injector Checklist

Description	Quantity
Valve syringe, fixed needle, 50 µL (5190-1501)	1
User Manual (G1328-90013)	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.

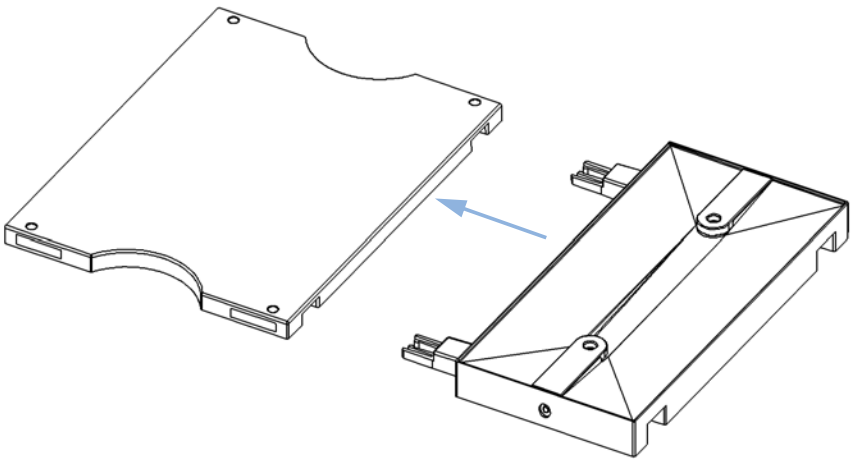


Figure 2 Connecting the Organizer Plates

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

4 Slide the manual injector onto the mounting pole (see Figure 3 on page 11). Tighten the mounting screw.

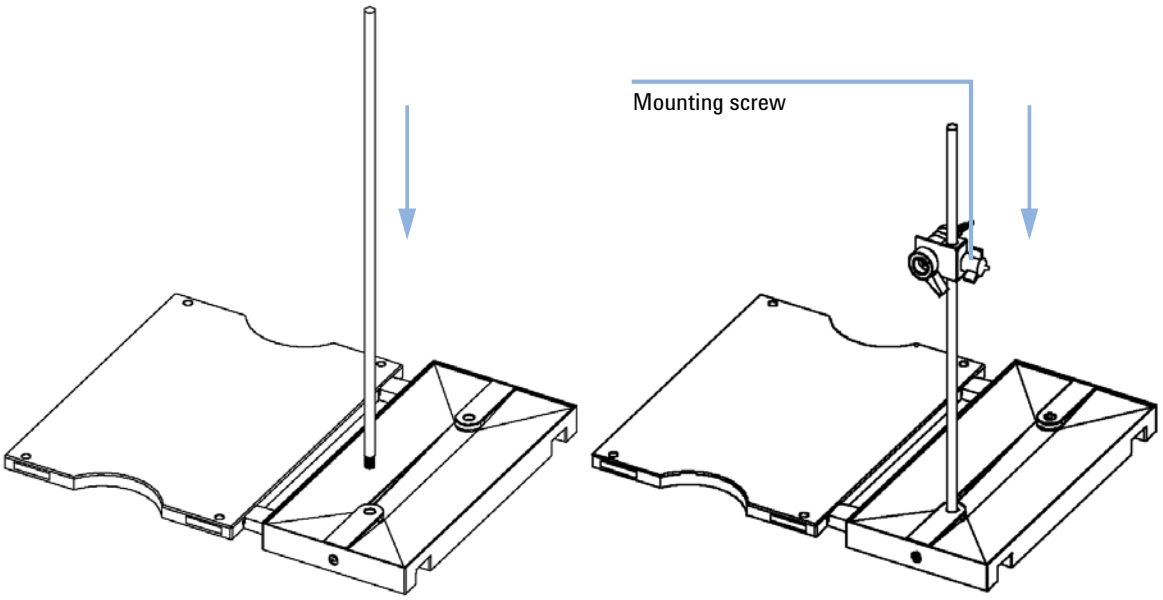


Figure 3 Installing the Mounting Pole and Manual Injector

5 Install other system modules on top of the manual injector baseplate (see Figure 4 on page 12).

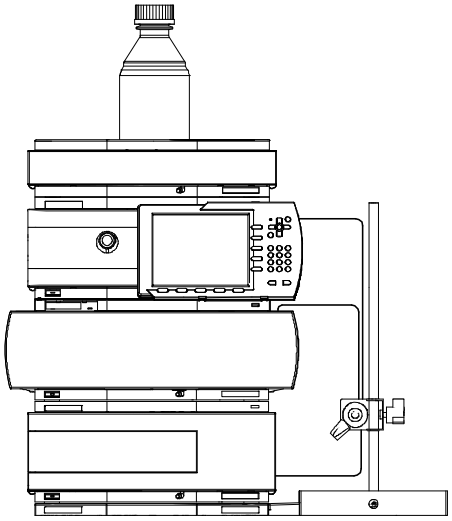


Figure 4 Installing the System

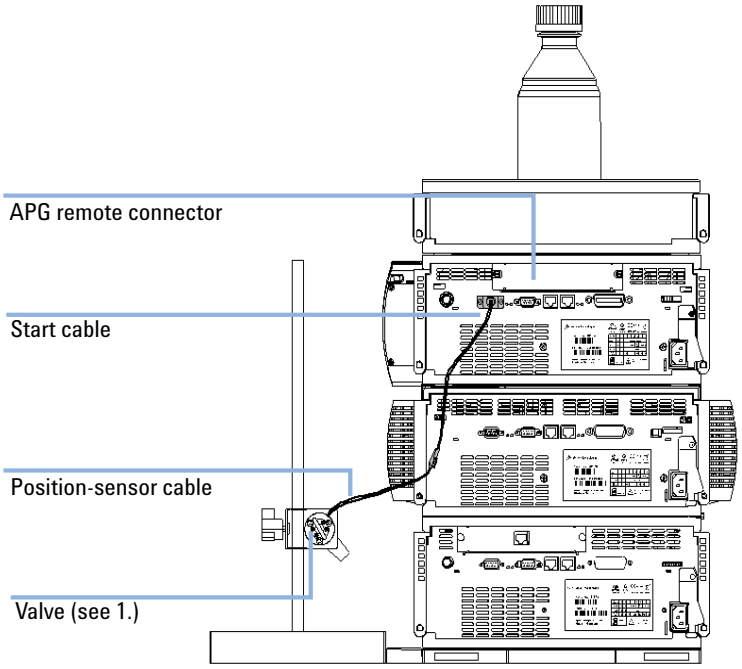


Figure 5 Installing the Start Cable

1. See Figure 6 on page 15

6 Connect the capillaries to the manual injector (see "Flow Connections" on page 14).

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.

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 7 on page 15).

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.

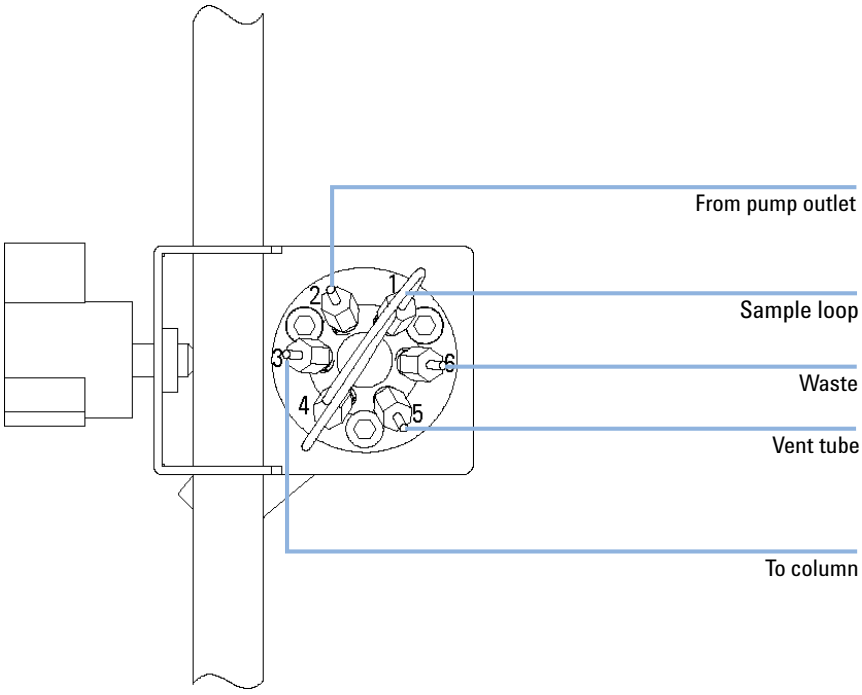


Figure 6 Flow Connections

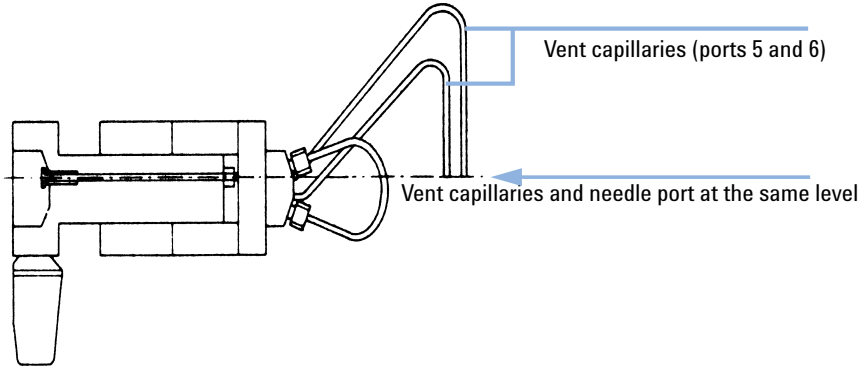


Figure 7 Vent Capillaries

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.

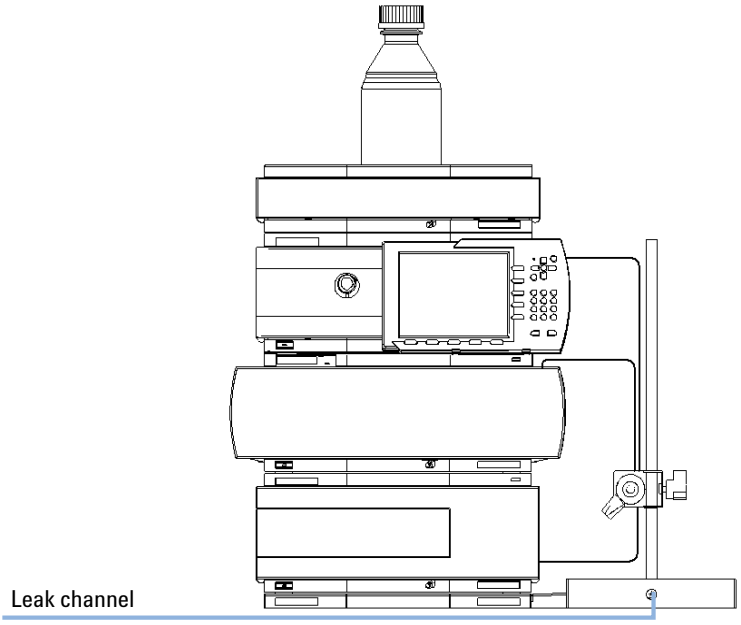


Figure 8 Leak Drainage

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 27.

Solvent Information

Observe the following recommendations on the use of solvents.

Flow Cell

Long term operation at pH > 11 should be avoided. Never leave strongly alkaline solutions in the flow cell without flow.

Solvents

Always filter solvents through 0.4 µm filters, small particles can permanently block filters, frits and capillaries. 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, 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 may attack steel.
- Mixtures of carbon tetrachloride with 2-propanol or THF. dissolve stainless steel.

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" on page 38).

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 PositionLOAD Position

In the LOAD position (see Figure 9 on page 22), 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.

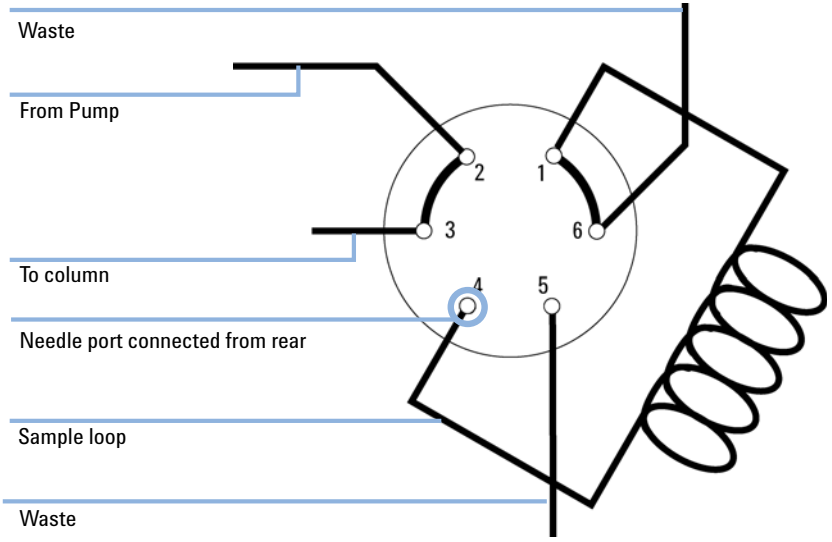


Figure 9 LOAD Position

INJECT Position

In the INJECT position (see Figure 10 on page 23), 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).

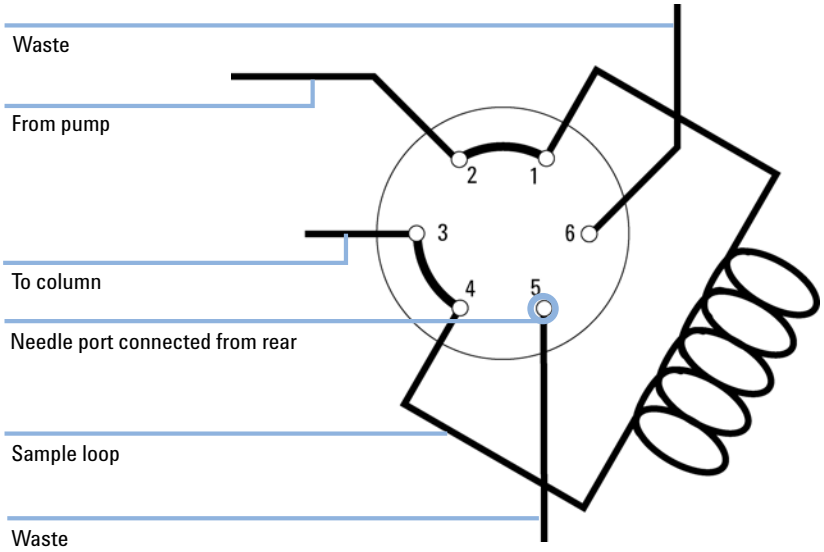


Figure 10 INJECT Position

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.

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 10 µL into a 20 µL 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.

4
Maintenance

Instructions on simple, routine repair procedures

Overview of Maintenance

Table 2 Overview of Repair Procedures

Procedure	Typical Frequency	Time Required	Notes
Flushing the injector	After using aqueous buffers or salt solutions	5 minutes	See "Flushing the Manual Injector" on page 27
Exchanging the injection-valve seal	After approximately 10000 to 20000 injections, or when the valve performance shows indication of leakage or wear	10 minutes	See "Injection-Valve Seal" on page 29
Exchanging the position-sensing switch	When cable damaged or when no start signal is sent when switching to the inject position	10 minutes	See "Position-Sensing Switch" on page 32

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.

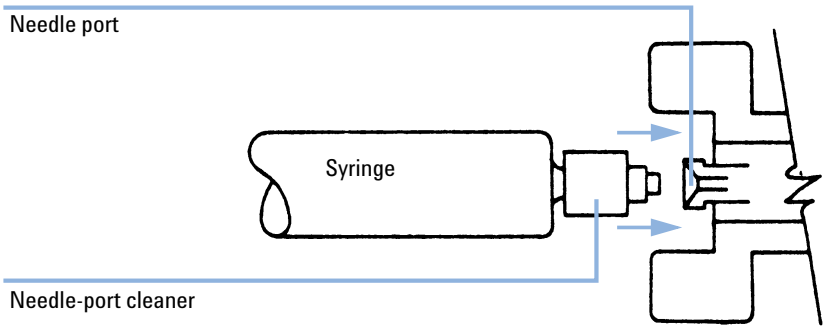


Figure 11 Needle-port Cleaner

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.

Injection-Valve Seal

When
- Poor injection-volume reproducibility
- Leaking injection valve

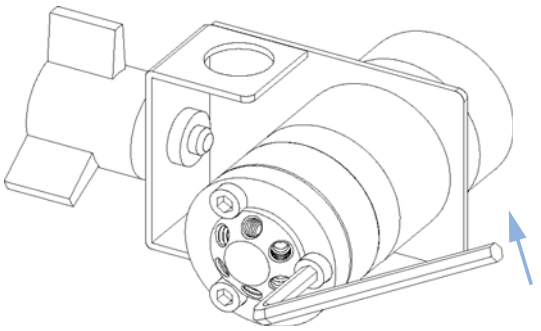
Tools required

Description
Hexagonal key, 9/64 inch

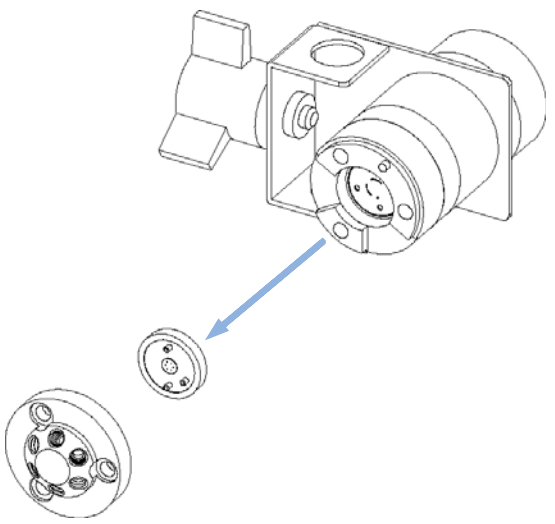
Parts required

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

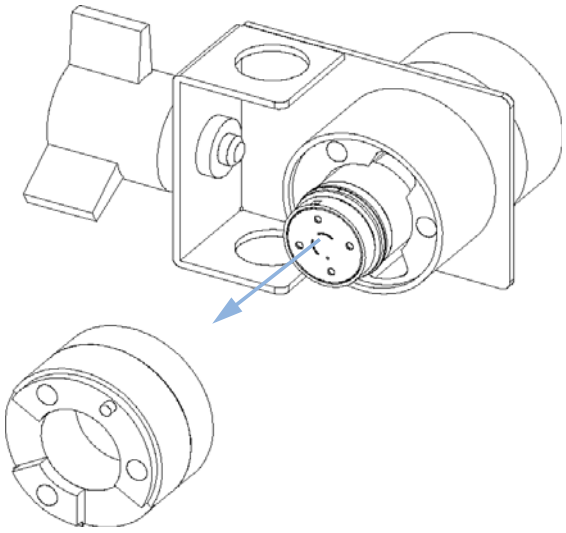
1 Loosen the three stator screws.



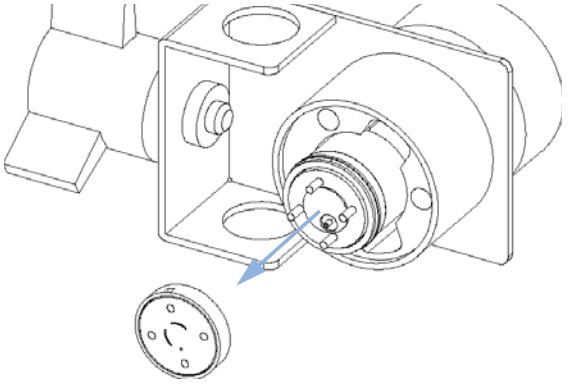
2 Remove the stator head.



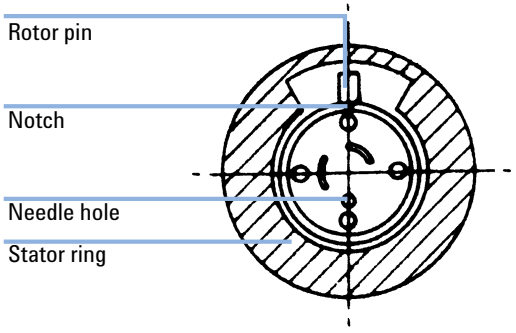
3 Remove the stator ring.



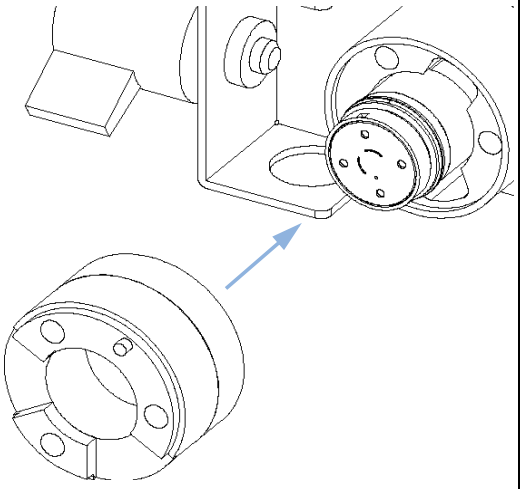
4 Remove the seal.



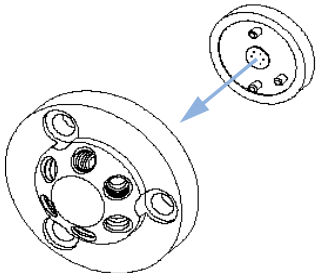
5 Install the new seal. Ensure the seal is positioned as shown.



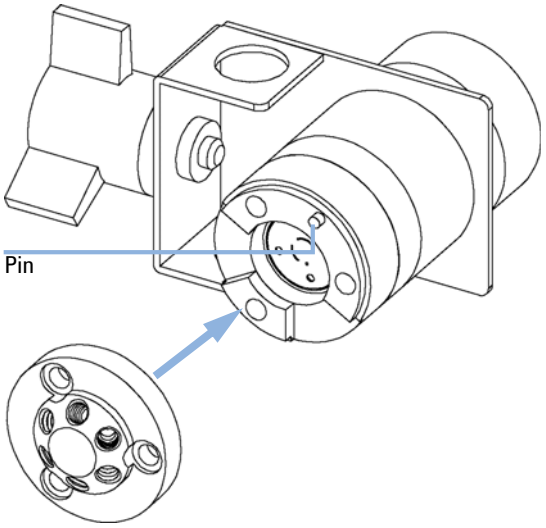
6 Install the stator ring. Ensure the pin in the stator ring is aligned with the hole in the valve body and the position sensoring switch is back in place.



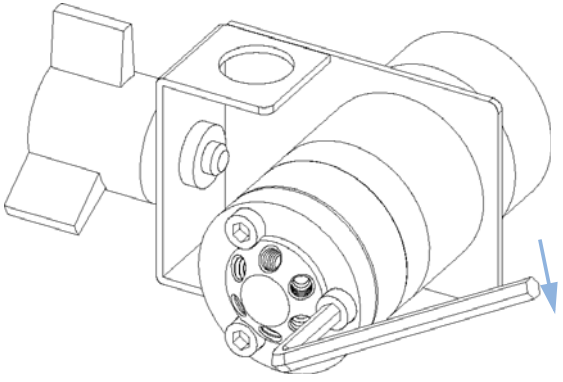
7 Insert the stator face onto the stator head.



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.



Position-Sensing Switch

When

- No start signal when switching to the inject position

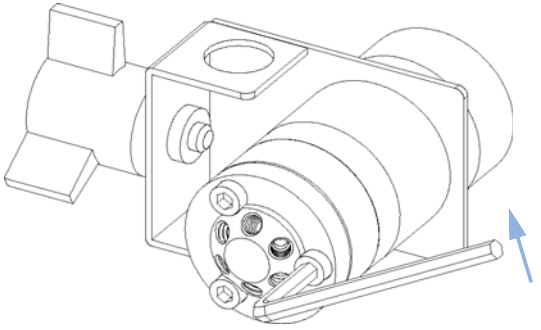
Tools required

Description
Hexagonal key, 9/64 inch

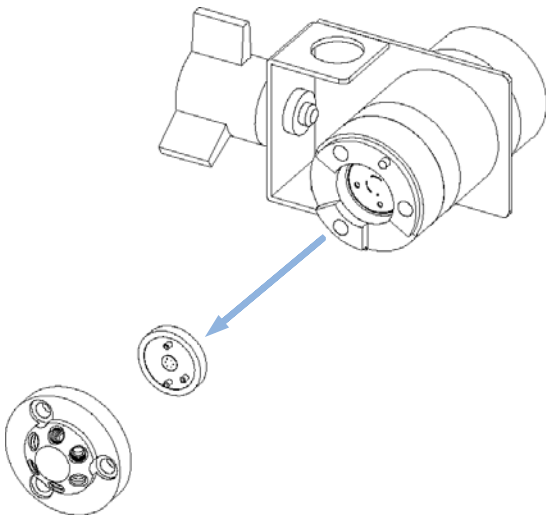
Parts required

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

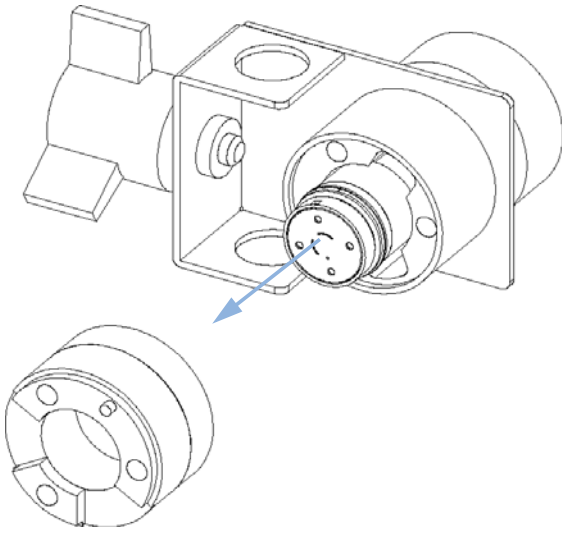
1 Loosen the three stator screws.



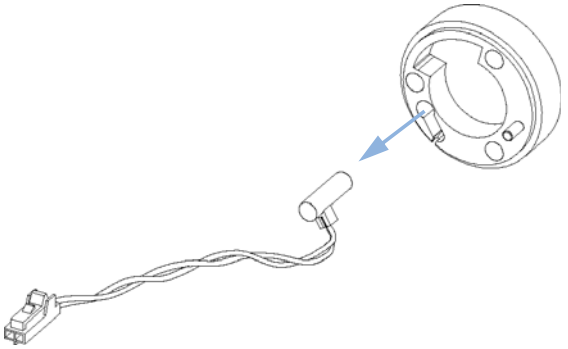
2 Remove the stator head.



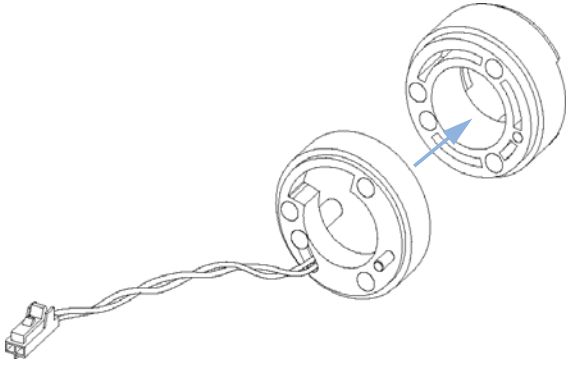
3 Remove the stator ring.



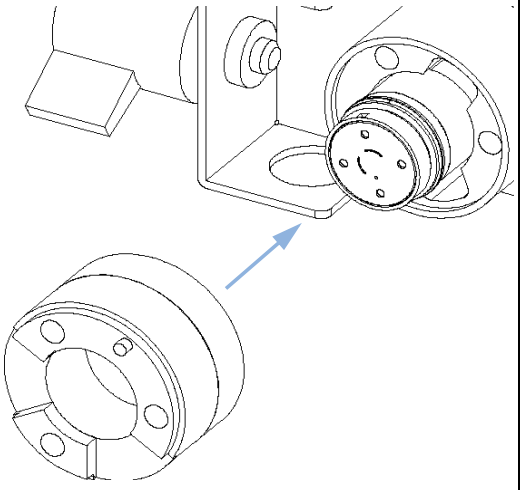
4 Disconnect the sensor cable from the start cable. Pull the sensing switch out of the stator ring.



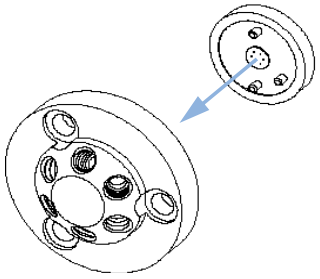
5 Insert the new sensing switch into the stator ring.



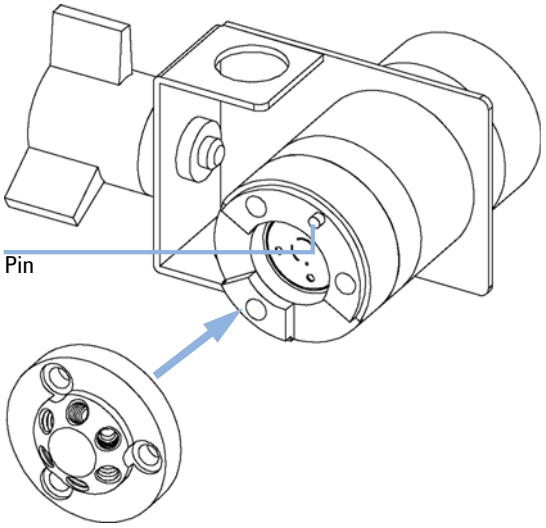
6 Install the stator ring. Ensure the pin in the stator ring is aligned with the hole in the valve body and the position sensoring switch is back in place.



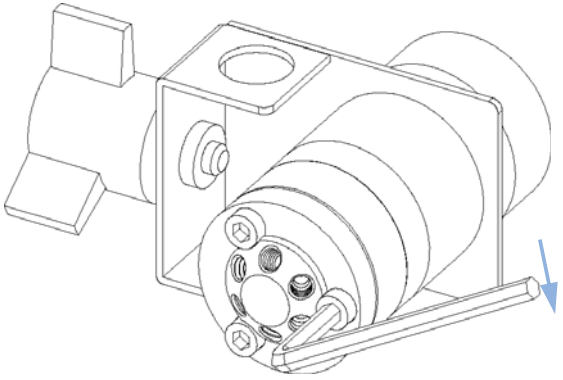
7 Insert the stator face onto the stator head.



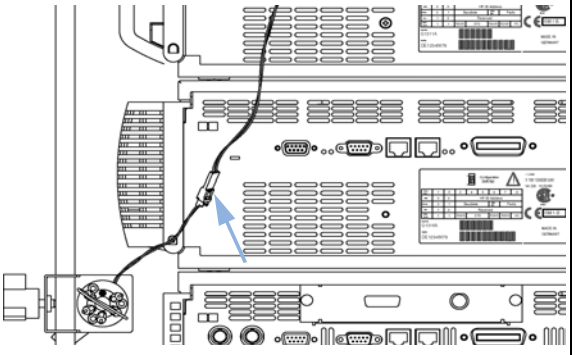
8 Install the stator head onto the valve. Ensure the pin in the stator ring is aligned with the hole in the stator head.



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.



5
Parts and Materials for Maintenance

Detailed illustrations and lists for identification of parts and materials

Manual Injector

Item	p/n	Description
1	5067-4191	Manual Front Loading Injector Valve, 600 bar
2	5001-3738	Mounting pole, stainless steel
3	G1328-44121	Base plate
4	5042-8553	Organizer plate
	5042-8576	Catch tube cap
5	5043-0208	Name plate
	5190-1501	Valve syringe, fixed needle, 50 µL
	G1328-87600	Connection capillary, 0.17 mm id, 500 mm
	0100-1677	Start cable

Manual injector valve see "Injection-Valve Assembly" on page 38.

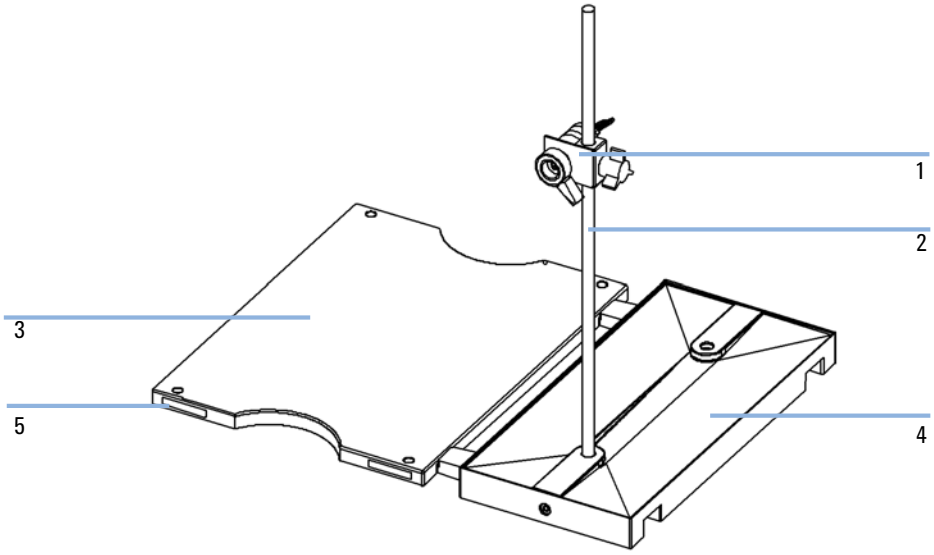


Figure 12 Manual Injector

Injection-Valve Assembly

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, (Qty 1, replacement)
2	1535-4046	Isolation seal
3	5068-0052	Rotor seal, PEEK
4	5068-0118	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

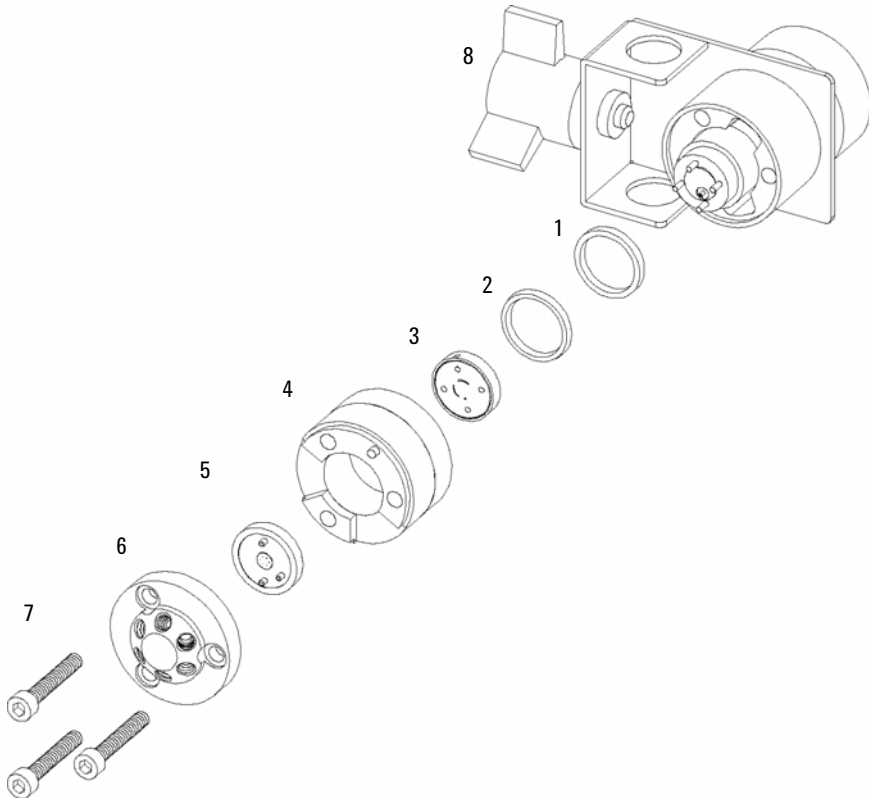


Figure 13 Injection-Valve Assembly

NOTE

Accuracy of sample loops

The actual volume of a sample loop can differ by +/- 10% for a 20ul 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
0101-1227	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

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Appendix

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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www.agilent.com

In This Book

This manual contains user information about the Agilent 1260 Infinity Manual Injector. 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.

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