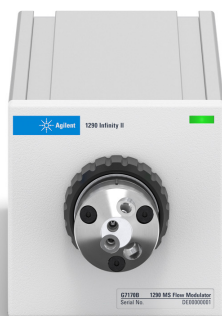




# Agilent InfinityLab LC Series 1290 Infinity II MS Flow Modulator

## User Manual



# Notices

## Document Information

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Agilent Technologies  
Hewlett-Packard-Strasse 8  
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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.

# In This Guide...

This manual covers the Agilent InfinityLab LC Series 1290 Infinity II MS Flow Modulator (G7170B)

## **1 Introduction**

This chapter gives an introduction to the module.

## **2 Site Requirements and Specifications**

This chapter provides information on environmental requirements, physical and performance specifications.

## **3 Installing the Module**

This chapter gives information about the installation of the valve drive and the valve heads.

## **4 Using the Module**

This chapter provides information on how to use the module.

## **5 Troubleshooting and Diagnostics**

Overview about the troubleshooting and diagnostic features.

## **6 Error Information**

This chapter describes the meaning of error messages, and provides information on probable causes and suggested actions how to recover from error conditions.

## **7 Maintenance**

This chapter describes the maintenance of the module.

## **8 Parts and Materials**

This chapter provides information on parts for maintenance.

## **9 Identifying Cables**

This chapter provides information on cables used with the modules.

## **10 Hardware Information**

This chapter describes the module in more detail on hardware and electronics.

## **11 Appendix**

This chapter provides addition information on safety, legal and web.

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# 1

## Introduction

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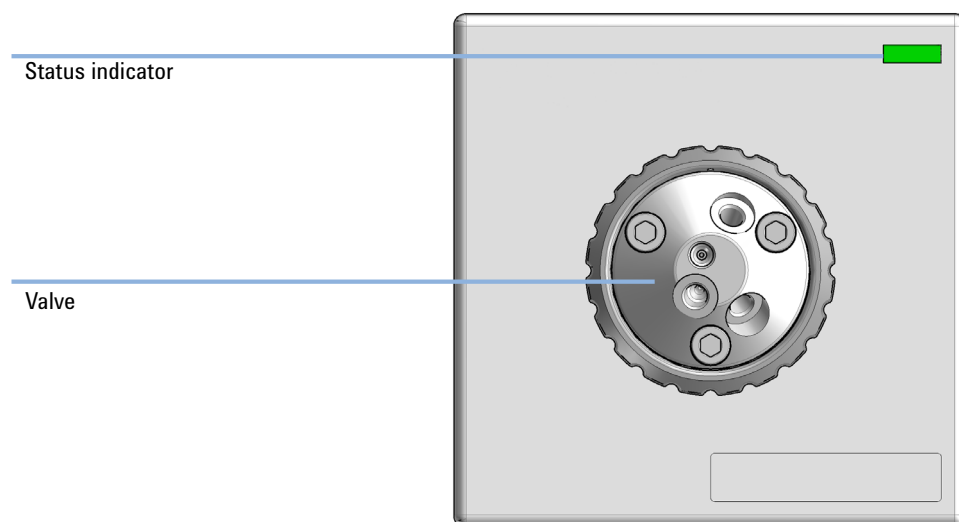
Operating Principle 12

This chapter gives an introduction to the module.



## 1290 Infinity II MS Flow Modulator

Based on technology in our InfinityLab Quick Change valves, the 1290 Infinity II MS Flow Modulator facilitates efficient flow control for mass-based fraction collection on all InfinityLab LC Purification Solutions. The Flow Modulator is a compact module suitable for flow rates up to 100 mL/min and supports split ratios between 40:1 and 400000:1 with split frequencies up to 2 Hz.



**Figure 1** Overview of the MS flow modulator

## Features (G7170B)

### Purification efficiency

- Supports wide range of split modes from 40:1 up to 400000:1 depending on flow rate
- Enables split frequencies of up to 2 Hz
- Handles flow rates up to 100 mL/min

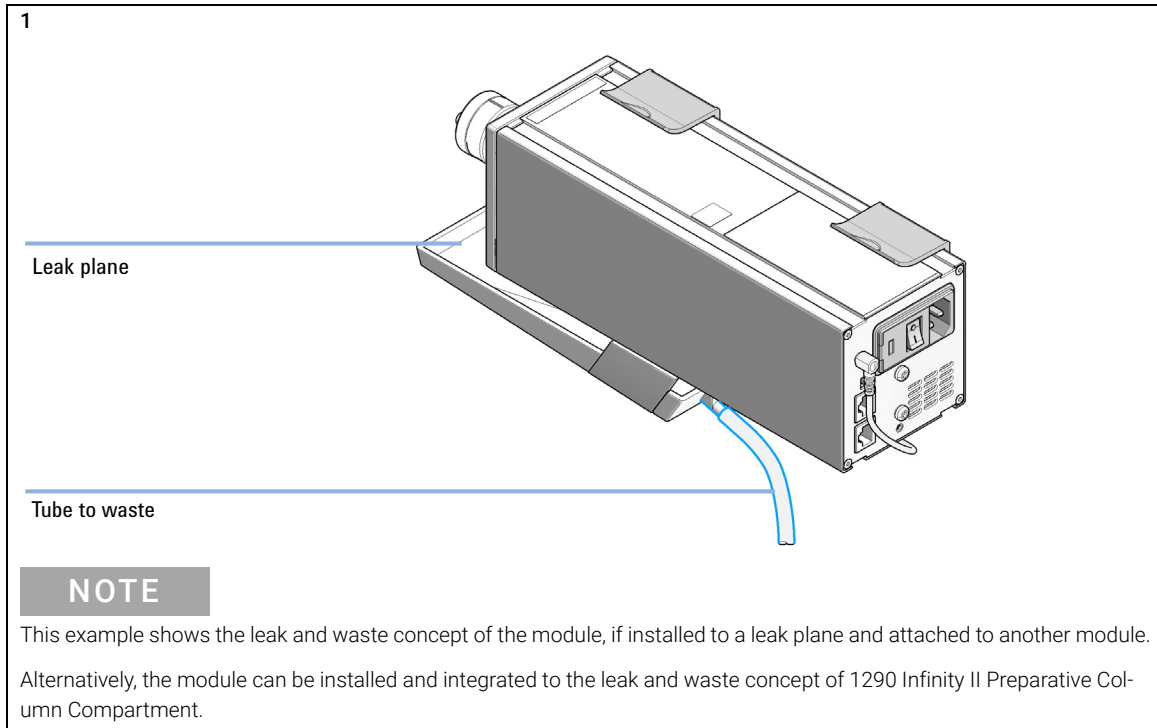
### Instrument efficiency

- Integrates into any InfinityLab LC Purification Solution through CAN-bus technology
- Supported by Agilent drivers – no additional software or macros required

### Laboratory efficiency

- Compact design and easy connection to any InfinityLab LC Purification Solution saves bench space
- Compatible with all InfinityLab LC Purification Solutions, enabling upgrade to mass-based fraction collection when needs demand
- Integrates seamlessly in OpenLAB CDS ChemStation for familiar and reliable operation

## Leak and Waste (G7170B)



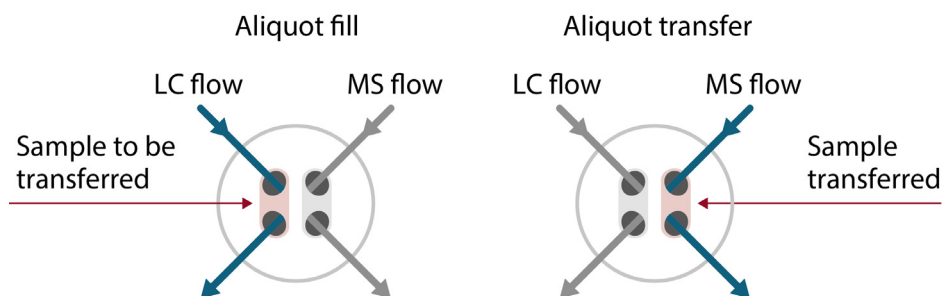
## Operating Principle

The flow modulator is a compact, active splitting device configured to deliver three different unique aliquots from a HPLC to a Single Quad Mass Spectroscopic Detector while maintaining uninterrupted flow.

### Aliquot Transfer

Principle of aliquot transfer (see also [Figure 2](#) on page 12):

- 1 In the Aliquot Fill position, HPLC effluent enters Port 1 where a portion of the stream is directed into one of the MS Flow Modulator's volume transfer chambers.
- 2 The LC stream exits from Port 2 and may be directed to a second detector or a fraction collector.
- 3 A Make-up pump connects to Port 3 and, in the Aliquot Transfer position, the volume captured is transferred through Port 4 into the analytical stream of the MS.

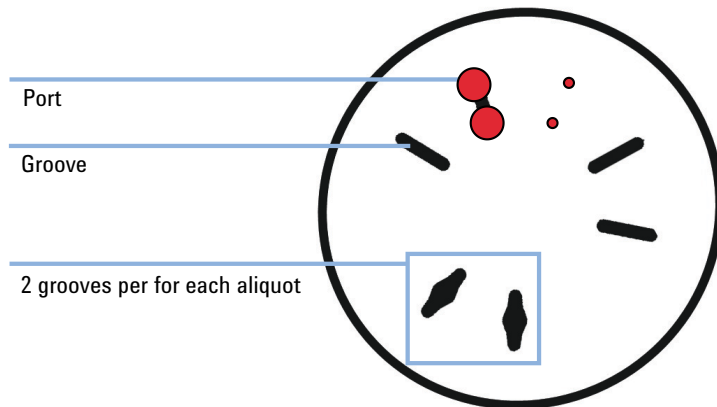


**Figure 2** Schematics of an active flow splitter, showing the fill and transfer positions of the valve

## Introduction

### Operating Principle

Calculation of the Split Ratio



- The MS Flow Modulator has 4 ports with 6 positions (2 x 3)
- The user can choose the size of aliquots, from three aliquots
- The valve will move the rotor between two of the same aliquots, backwards and forwards

The user can change the gating frequency of the valve from 14 different modes

The split ratio, resulting from the selected mode and the prep flow rate, is calculated internally and displayed in the method.



## 2

# Site Requirements and Specifications

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This chapter provides information on environmental requirements, physical and performance specifications.

## Site Requirements

A suitable environment is important to ensure optimal performance of the instrument.

### Power Considerations

The module power supply has wide ranging capability. It accepts any line voltage in the range described in [Table 1](#) on page 18. Consequently there is no voltage selector in the rear of the module. There are also no externally accessible fuses, because automatic electronic fuses are implemented in the power supply.

**WARNING**

**Hazard of electrical shock or damage of your instrumentation can result, if the devices are connected to a line voltage higher than specified.**

- ✓ Connect your instrument to the specified line voltage only.

**WARNING**

**Electrical shock hazard**

The module is partially energized when switched off, as long as the power cord is plugged in.

The cover protects users from personal injuries, for example electrical shock.

- ✓ Do not open the cover.
- ✓ Do not operate the instrument and disconnect the power cable in case the cover has any signs of damage.
- ✓ Contact Agilent for support and request an instrument repair service.

**WARNING**

**Inaccessible power plug.**

In case of emergency it must be possible to disconnect the instrument from the power line at any time.

- ✓ Make sure the power connector of the instrument can be easily reached and unplugged.
- ✓ Provide sufficient space behind the power socket of the instrument to unplug the cable.

## Power Cords

Country-specific power cords are available for the module. The female end of all power cords is identical. It plugs into the power-input socket at the rear. The male end of each power cord is different and designed to match the wall socket of a particular country or region.

Agilent makes sure that your instrument is shipped with the power cord that is suitable for your particular country or region.

---

**WARNING****Unintended use of power cords**

Using power cords for unintended purposes can lead to personal injury or damage of electronic equipment.

- ✓ Never use a power cord other than the one that Agilent shipped with this instrument.
- ✓ Never use the power cords that Agilent Technologies supplies with this instrument for any other equipment.
- ✓ Never use cables other than the ones supplied by Agilent Technologies to ensure proper functionality and compliance with safety or EMC regulations.

---

**WARNING****Absence of ground connection**

The absence of ground connection can lead to electric shock or short circuit.

- ✓ Never operate your instrumentation from a power outlet that has no ground connection.

---

**WARNING****Electrical shock hazard**

Solvents may damage electrical cables.

- ✓ Prevent electrical cables from getting in contact with solvents.
  - ✓ Exchange electrical cables after contact with solvents.
-



## Condensation

### CAUTION

Condensation within the module

Condensation can damage the system electronics.

- ✓ Do not store, ship or use your module under conditions where temperature fluctuations could cause condensation within the module.
  - ✓ If your module was shipped in cold weather, leave it in its box and allow it to warm slowly to room temperature to avoid condensation.
-

## Physical Specifications

**Table 1 Physical Specifications**

Type	Specification	Comments
Weight	2.2 kg (4.9 lbs)	
Dimensions (height x width x depth)	95 x 95 x 300 mm (3.7 x 3.7 x 11.8 inches)	
Line voltage	100 – 240 V~, ± 10 %	Wide-ranging capability
Line frequency	50 or 60 Hz, ± 5 %	
Power consumption	20 VA, 4 W	
Ambient operating temperature	4 – 40 °C (39 – 104 °F)	
Ambient non-operating temperature	-40 – 70 °C (-40 – 158 °F)	
Humidity	< 95 % r.h. at 40 °C (104 °F)	Non-condensing
Operating altitude	Up to 3000 m (9842 ft)	
Non-operating altitude	Up to 4600 m (15092 ft)	For storing the module
Safety standards: IEC, EN, CSA, UL	Installation category II, Pollution degree 2	For indoor use only.
ISM Classification	ISM Group 1 Class B	According to CISPR 11

## Performance Specifications

**Table 2 Performance Specifications 1290 Infinity II MS Flow Modulator (G7170B)**

Feature	Specification	Comment
External Leak Sensor	Yes	controlled via ERI
Flow rate	4 – 200 mL/min	
Maximum Pressure	69 bar (100 psi)	
Valve Options	5067-4292 Quick-Change valve head (user-exchangeable)	
Valve Identification	Via RFID tag	
Instrument Control	LC & CE Drivers A.02.17 or above Instrument Control Framework (ICF) A.02.04 or above Instant Pilot (G4208A) with firmware B.02.22 or above InfinityLab LC Companion (G7108A) Lab Advisor B.02.10 or above	For details about supported software versions refer to the compatibility matrix of your version of the LC and CE Drivers
Communications	CAN (2x)	G7170B is a hosted module. The LC stack needs to contain a LAN card for communication and control.
Maintenance and safety-related features	Leak handling with external leak sensor and leak pane. Leak detection, safe leak handling, leak output signal for shutdown of pumping system, and low voltages in major maintenance areas Extensive diagnostics, error detection and display with Agilent Lab Advisor software	
GLP features	Early maintenance feedback (EMF) for continuous tracking of instrument usage with user-settable limits and feedback messages. Electronic records of maintenance and errors	
Housing	All materials recyclable	



## 3 Installing the Module

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Mount the MS Flow Modulator to the 1290 Infinity II Preparative Column Compartment.	25
Install the MS Flow Modulator	26
Install the valve head and connecting capillaries	28

This chapter gives information about the installation of the valve drive and the valve heads.

## Unpacking the Module

### Damaged Packaging

If the delivery packaging shows signs of external damage, please call your Agilent Technologies sales and service office immediately. Inform your service representative that the instrument may have been damaged during shipment.

#### 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.**

### Delivery Checklist

Ensure all parts and materials have been delivered with your module. The delivery checklist is included to your shipment. For parts identification please check the illustrated parts breakdown in the chapter *Parts and Materials*. Please report any missing or damaged parts to your local Agilent Technologies sales and service office.

### Accessory Kit

The flow modulator is shipped with Accessory Kit (G7170-68705) (see "Accessory Kit for the Flow Modulator" on page 74).

## Installation of the MS Flow Modulator

The MS Flow Modulator can be installed in different ways.

- Mounted to another module

### NOTE

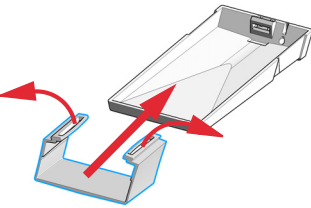
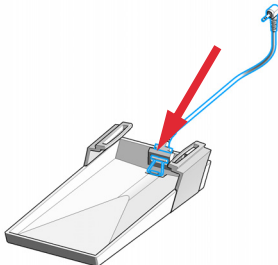
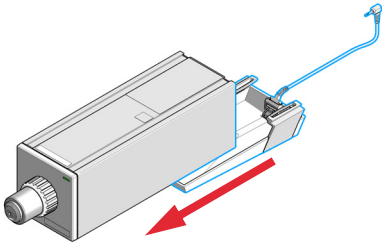
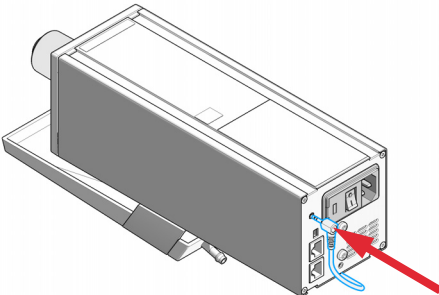
The MS Flow Modulator fits on Infinity I rails or Infinity II clamps.

- Inside the 1290 Infinity II Preparative Column Compartment

## Assembling and Installing the Leak Tray and Leak Sensor

**NOTE**

Only connect or disconnect the leak sensor while the module is powered off. The module must be 'powered off' for at least 10 s to recognize any hardware changes correctly.

<p><b>1</b> Attach the leak tray clamp to the leak tray.</p> 	<p><b>2</b> Push the leak sensor into its holder.</p> 
<p><b>3</b> Slide the leak tray onto the bottom of the MS Flow Modulator.</p> 	<p><b>4</b> Connect the leak sensor cable to the valve drive.</p> 

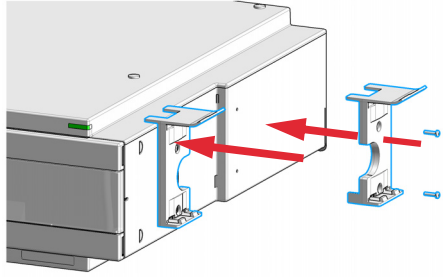
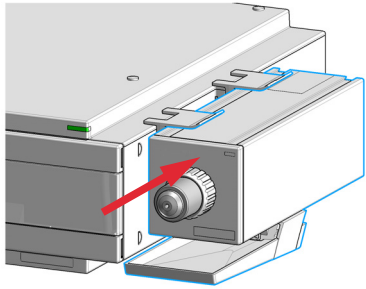
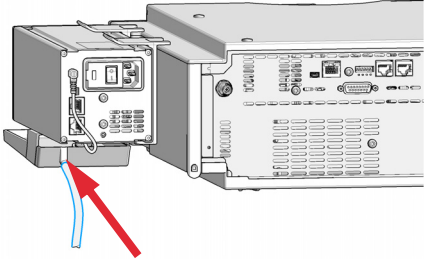
## Mounting the MS Flow Modulator to an Instrument

### 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.

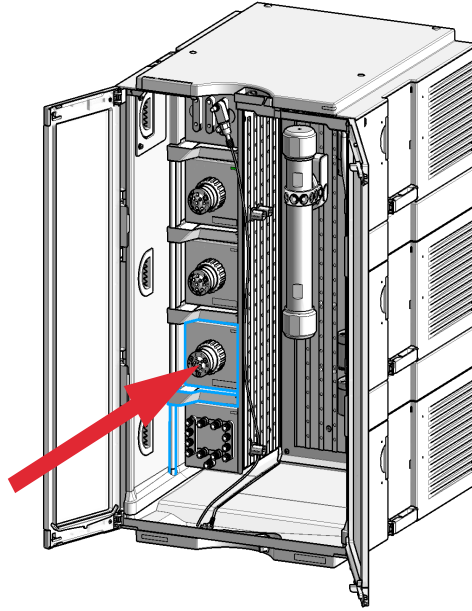
- ✓ Notify your Agilent sales and service office about the damage.
- ✓ An Agilent service representative will inspect the instrument at your site and initiate appropriate actions.

<p><b>1</b> Ensure the power switch at the rear of the module is OFF and the power connector is unplugged.</p>	<p><b>2</b> Identify the marks for the screws on the side panel of the cabinet assy and screw the clamp guides to the side panel of the cabinet.</p> 
<p><b>3</b> Slide the flow modulator into the clamp guides from front to back.</p> 	<p><b>4</b> Attach the waste tubing to the leak plane and guide it to a proper waste container.</p> 



## Mount the MS Flow Modulator to the 1290 Infinity II Preparative Column Compartment.

- 1 Slide the MS Flow Modulator into a free slot of the 1290 Infinity II Preparative Column Compartment. Position the module correctly above the leak tray.



# Install the MS Flow Modulator

- Software required**
- Agilent OpenLab CDS A.02.02/ C.01.07 SR3 HF1
  - LC drivers A.02.17
  - LabAdvisor B.02.10

**Firmware required Description**

Firmware Set: B/C/D.07.20

- 1** Mount the flow modulator to another module, see "Mounting the MS Flow Modulator to an Instrument" on page 24.

OR

Slide the flow modulator into a free slot inside the column compartment, see "Mount the MS Flow Modulator to the 1290 Infinity II Preparative Column Compartment." on page 25.

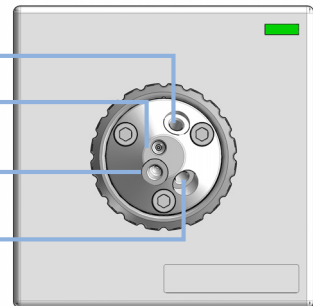
- 2** Plumb the UV-Detector, Fraction Collector, Make-up Pump and MSD lines to the 4 ports of the MS Flow Modulator.

From make-up pump

From LC detector or column

To fraction collector or valve module

To MSD

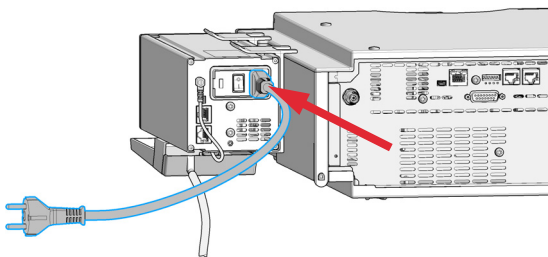


### NOTE

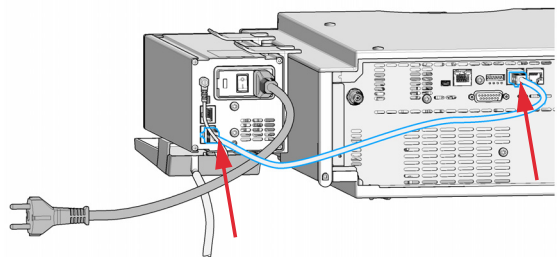
Use the finger tight 10-32 male threaded UHPFF fittings only, that are supplied with the splitter.

Note the different length for each fitting.

- 3** Connect the power cable to the power connector at the rear of the module.



- 4** Connect the CAN interface connection.



**Next Steps:**

- 5 Power on the flow modulator by switching the power button at the rear of the module.

**NOTE**

To power cycle the module (necessary for example after a valve head, or leak sensor installation), wait for at least 10 seconds before re-powering.

## Install the valve head and connecting capillaries

### CAUTION

The valve actuator contains sensitive optical parts, which need to be protected from dust and other pollution. Pollution of these parts can impair the accurate selection of valve ports and therefore bias measurement results.

- ✓ Always install a valve head for operation and storage. For protecting the actuator, a dummy valve head can be used instead of a functional valve. Do not touch parts inside the actuator.

### NOTE

For a correct installation of the valve head, the outside pin (red) must completely fit into the outside groove on the valve drive's shaft (red). A correct installation is only possible if the two pins (green and blue) on the valve head fit into their corresponding grooves on the valve drive's actuator axis. Their match depends on the diameter of the pin and groove.

### NOTE

The tag reader reads the valve head properties from the valve head RFID tag during initialization of the module. Valve properties will not be updated, if the valve head is replaced while the module is on. Selection of valve port positions can fail, if the instrument does not know the properties of the installed valve.

### NOTE

To allow correct valve identification, power off the module for at least 10 s.

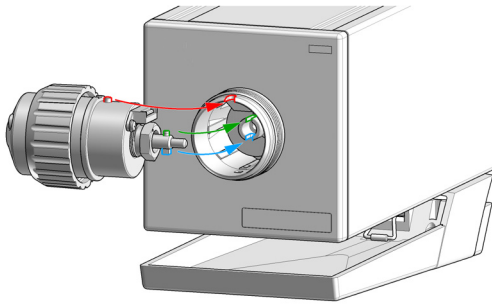
### NOTE

For firmware requirements see Information on new RFID Tag Assembly Version Technical Note (01200-90130) which is included to each valve head.

## Installing the Module

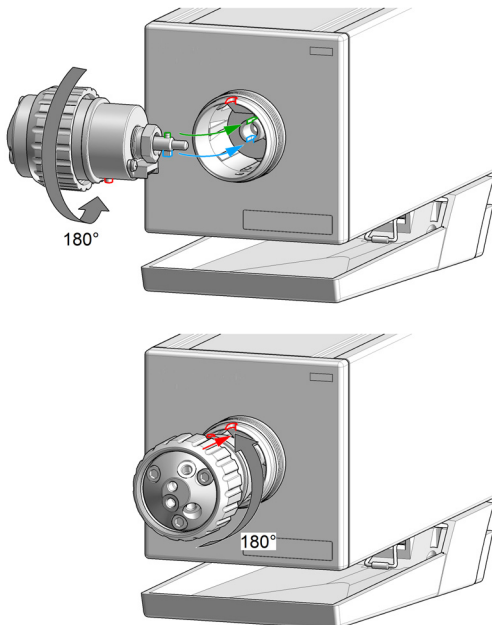
### Installation of the MS Flow Modulator

- 1 Insert the valve head into the valve shaft.

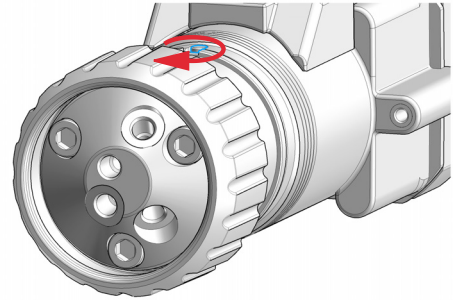


OR

If the outside pin does not fit into the outside groove, you have to turn the valve head until you feel that the two pins snap into the grooves. Now you should feel additional resistance from the valve drive while continuously turning the valve head until the pin fits into the groove.



- 2 When the outer pin is locked into the groove, manually screw the nut onto the valve head.



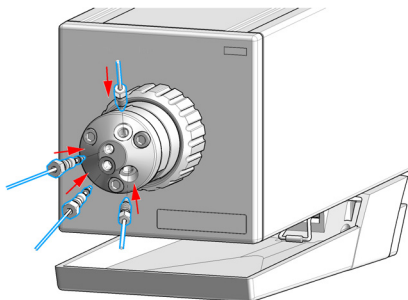
#### NOTE

Fasten the nut with the 5043-1767 Valve Removal tool.

### Installing the Module

#### Installation of the MS Flow Modulator

3 Install all required capillary connections to the valve.



4 Power on or power-cycle your module, so the valve head gets recognized during module initialization.



## 4 Using the Module

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This chapter provides information on how to use the module.

## Overview

The flow modulator is a compact, active splitting device capable of automated control. For details, see [“Operating Principle”](#) on page 12.

The split ratio depends on the main flow rate, the rotor seal groove size (aliquot volume) and the frequency (aliquots gated to the MS):

Use the controller software to establish the required split ratio, see [“Configure the Flow Modulator”](#) on page 43.



## Solvent Information

### Chemical Compatibility

**CAUTION**

Chemical compatibility of the valve parts

Corrosion of stator seal and rotor seal.

- ✓ Do not use sulfuric acid and generally avoid the use of concentrated acids.
- ✓ Use with care substances as Chlorobenzene, Chloroform, Dichlormethane, Dimethyl Sulfoxid, Toluene, and Ethyl Acetate.

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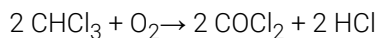
Observe the following recommendations on the use of solvents.

- Follow the recommendations for avoiding the growth of algae, see the 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 such as flow cells, valve materials etc. and recommendations in subsequent sections.

## Solvent compatibility for stainless steel in standard LC systems

Stainless steel is inert to many common solvents. It is stable in the presence of acids and bases in the pH range specified for standard HPLC (pH 1 – 12.5). It can be corroded by acids below pH 2.3. In general, the following solvents may cause corrosion and should be avoided with stainless steel:

- Solutions of alkali halides, their respective acids (for example, lithium iodide, potassium chloride, and so on) and aqueous solutions of halogenes
- High concentrations of inorganic acids such as nitric acid, sulfuric acid, and organic solvents, especially at higher temperatures (if your chromatography method allows, replace by phosphoric acid or phosphate buffer which are less corrosive to stainless steel).
- Halogenated solvents or mixtures that form radicals and/or acids, for example:



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.

## 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 aqueous 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 clad PEEK capillaries in bio-inert systems. The use of stainless steel clad 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 with 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).

## Using the Module

### Solvent Information

- Halogenated solvents or mixtures which form radicals and/or acids, for example:  
$$2 \text{CHCl}_3 + \text{O}_2 \rightarrow 2 \text{COCl}_2 + 2 \text{HCl}$$

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, diisopropylether). 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  $\mu\text{m}/\text{year}$ . 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  $\text{FeCl}_3$  or  $\text{CuCl}_2$ . 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 ( $\text{SiO}_2$ )

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 ( $\text{ZrO}_2$ )

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.

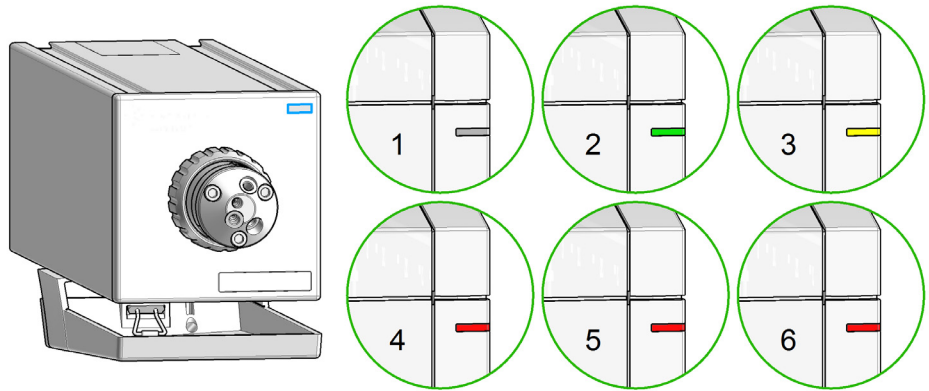
TFE/PDD copolymer tubings, which are used in all Agilent degassers except 1322A/G7122A, are not compatible with fluorinated solvents like Freon, Fluorinert, or Vertrel. They have limited life time in the presence of Hexafluoroisopropanol (HFIP). To ensure the longest possible life with HFIP, it is best 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 with the solvent DMF (dimethyl formamide).

Sapphire, Ruby and Al<sub>2</sub>O<sub>3</sub>-based ceramics

Sapphire, ruby and ceramics based on aluminum oxide Al<sub>2</sub>O<sub>3</sub> are inert to almost all common acids, bases and solvents. There are no documented incompatibilities for HPLC applications.

## Status Indicator



### Status indicators

- 1 Idle
- 2 Run mode
- 3 Not-ready. Waiting for a specific pre-run condition to be reached or completed.
- 4 Error mode - interrupts the analysis and requires attention (for example a leak or defective internal components).
- 5 Resident mode (blinking) - for example during update of main firmware.
- 6 Bootloader mode (fast blinking). Try to re-boot the module or try a cold-start. Then try a firmware update.



## Leak and Waste Handling

### 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.
- ✓ Do not use solvents with an auto-ignition temperature below 200 °C (392 °F). Do not use solvents with a boiling point below 56 °C (133 °F).
- ✓ Avoid high vapor concentrations. Always keep the temperature in the sample compartment at least 25 K below the boiling point of the solvent used.
- ✓ Do not operate the instrument in an explosive atmosphere.
- ✓ Do not use solvents of ignition Class IIC according IEC 60079-20-1 (for example, carbon disulfide).
- ✓ Reduce the volume of substances to the minimum required for the analysis.
- ✓ Never exceed the maximum permissible volume of solvents (8 L) in the solvent cabinet. Do not use bottles that exceed the maximum permissible volume as specified in the usage guideline for solvent cabinet.
- ✓ Ground the waste container.
- ✓ Regularly check the filling level of the waste container. The residual free volume in the waste container must be large enough to collect the waste liquid.
- ✓ To achieve maximal safety, regularly check the tubing for correct installation.

### NOTE

For details, see the usage guideline for the solvent cabinet. A printed copy of the guideline has been shipped with the solvent cabinet, electronic copies are available in the Agilent Information Center or via the Internet.

For details on correct installation, see separate installation documentation.

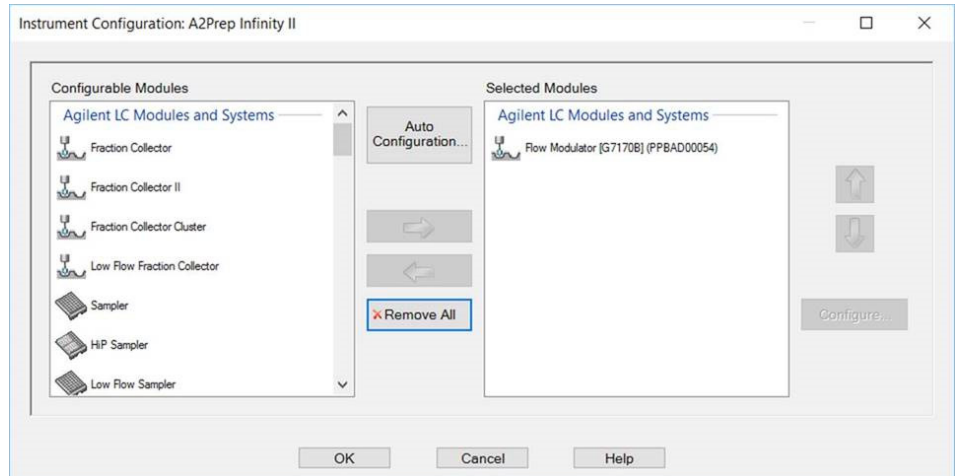
## Waste Concept

- 1 Agilent recommends using the 6 L waste can with 1 Stay Safe cap GL45 with 4 ports (5043-1221) for optimal and safe waste disposal. If you decide to use your own waste solution, make sure that the tubes don't immerse in the liquid.



# Configure the Flow Modulator

- 1 Choose your module from the list of **Modules**, click on >.

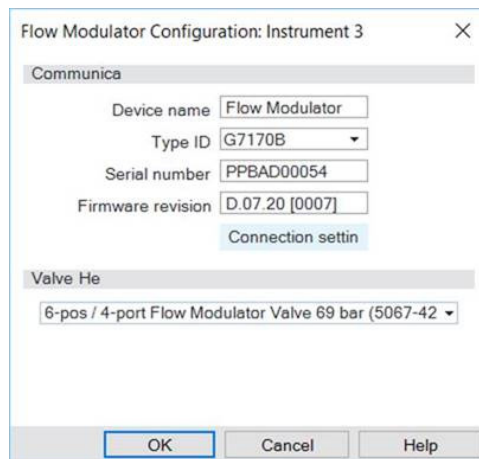


You can now configure your module.

- 2 Click **Autoconfig** to configure the module automatically.

OR

Click **Configure**, manually configure the module and click **OK** to confirm the configuration.

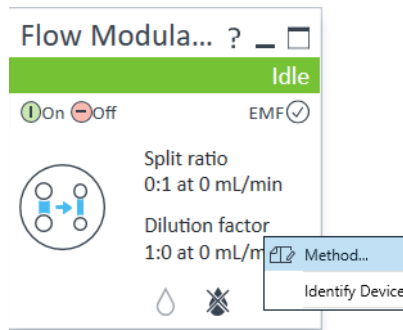


The module is ready for use.

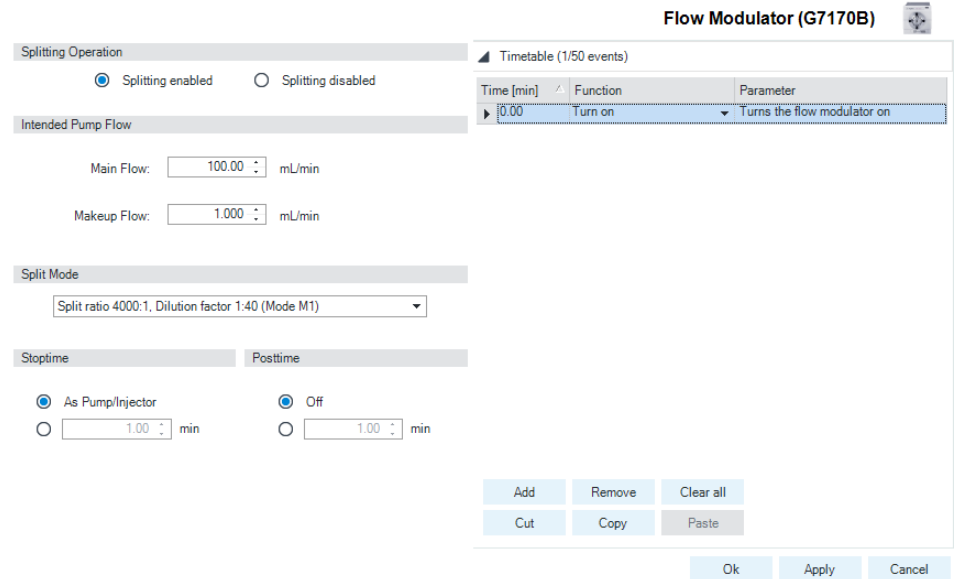
## Using the Module

### Configure the Flow Modulator

- 3 To create a method, right click on the dashboard and select **Method...**



- 4 Set the required parameters.

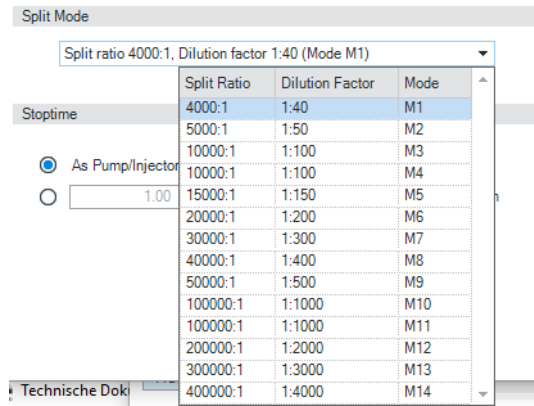


The possible **Split Modes** are calculated automatically by the software.

## Using the Module

### Configure the Flow Modulator

- 5 Select the **Split Mode**.



- 6 Click **Ok** to save the method.



## 5 Troubleshooting and Diagnostics

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Agilent Lab Advisor Software	48

Overview about the troubleshooting and diagnostic features.

## User Interfaces

- Depending on the user interface, the available tests and the screens/reports may vary.
- Preferred tool should be Agilent Lab Advisor Software, see [“Agilent Lab Advisor Software”](#) on page 48.
- The Agilent OpenLAB ChemStation C.01.03 and above do not include any maintenance/test functions.
- Screenshots used within these procedures are based on the Agilent Lab Advisor Software.

## Agilent Lab Advisor Software

The Agilent Lab Advisor Software is a standalone product that can be used with or without a chromatographic data system. Agilent Lab Advisor helps to manage the lab for high-quality chromatographic results by providing a detailed system overview of all connected analytical instruments with instrument status, Early Maintenance Feedback counters (EMF), instrument configuration information, and diagnostic tests. By the push of a button, a detailed diagnostic report can be generated. Upon request, the user can send this report to Agilent for a significantly improved troubleshooting and repair process.

The Agilent Lab Advisor software is available in two versions:

- Lab Advisor Basic
- Lab Advisor Advanced

Lab Advisor Basic is included with every Agilent 1200 Infinity Series and Agilent InfinityLab LC Series instrument.

The Lab Advisor Advanced features can be unlocked by purchasing a license key, and include real-time monitoring of instrument actuals, all various instrument signals, and state machines. In addition, all diagnostic test results, calibration results, and acquired signal data can be uploaded to a shared network folder. The Review Client included in Lab Advisor Advanced allows to load and examine the uploaded data no matter on which instrument it was generated. This makes Data Sharing an ideal tool for internal support groups and users who want to track the instrument history of their analytical systems.

The optional Agilent Maintenance Wizard Add-on provides an easy-to-use, step-by-step multimedia guide for performing preventive maintenance on Agilent 1200 Infinity and Agilent InfinityLab LC Series instrument.

The tests and diagnostic features that are provided by the Agilent Lab Advisor software may differ from the descriptions in this manual. For details, refer to the Agilent Lab Advisor software help files.





## 6 Error Information

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This chapter describes the meaning of error messages, and provides information on probable causes and suggested actions how to recover from error conditions.

## What Are Error Messages

Error messages are displayed in the user interface when an electronic, mechanical, or hydraulic (flow path) failure occurs which requires attention before the analysis can be continued (for example, repair, or exchange of consumables is necessary). In the event of such a failure, the red status indicator at the front of the module is switched on, and an entry is written into the module logbook.

If an error occurs outside a method run, other modules will not be informed about this error. If it occurs within a method run, all connected modules will get a notification, all LEDs get red and the run will be stopped. Depending on the module type, this stop is implemented differently. For example, for a pump the flow will be stopped for safety reasons. For a detector, the lamp will stay on in order to avoid equilibration time. Depending on the error type, the next run can only be started, if the error has been resolved, for example liquid from a leak has been dried. Errors for presumably single time events can be recovered by switching on the system in the user interface.

Special handling is done in case of a leak. As a leak is a potential safety issue and may have occurred at a different module from where it has been observed, a leak always causes a shutdown of all modules, even outside a method run.

In all cases, error propagation is done via the CAN bus or via an APG/ERI remote cable (see documentation for the APG/ERI interface).

## General Error Messages

General error messages are generic to all Agilent series HPLC modules and may show up on other modules as well.

### Timeout

**Error ID: 0062**

The timeout threshold was exceeded.

Probable cause	Suggested actions
<b>1</b> The analysis was completed successfully, and the timeout function switched off the module as requested.	Check the logbook for the occurrence and source of a not-ready condition. Restart the analysis where required.
<b>2</b> A not-ready condition was present during a sequence or multiple-injection run for a period longer than the timeout threshold.	Check the logbook for the occurrence and source of a not-ready condition. Restart the analysis where required.

## Shutdown

**Error ID: 0063**

An external instrument has generated a shutdown signal on the remote line.

The module continually monitors the remote input connectors for status signals. A LOW signal input on pin 4 of the remote connector generates the error message.

Probable cause	Suggested actions
<b>1</b> Leak detected in another module with a CAN connection to the system.	Fix the leak in the external instrument before restarting the module.
<b>2</b> Leak detected in an external instrument with a remote connection to the system.	Fix the leak in the external instrument before restarting the module.
<b>3</b> Shut-down in an external instrument with a remote connection to the system.	Check external instruments for a shut-down condition.
<b>4</b> The degasser failed to generate sufficient vacuum for solvent degassing.	Check the vacuum degasser for an error condition. Refer to the <i>Service Manual</i> for the degasser or the pump that has the degasser built-in.

## Remote Timeout

### Error ID: 0070

A not-ready condition is still present on the remote input. When an analysis is started, the system expects all not-ready conditions (for example, a not-ready condition during detector balance) to switch to run conditions within one minute of starting the analysis. If a not-ready condition is still present on the remote line after one minute the error message is generated.

Probable cause	Suggested actions
1 Not-ready condition in one of the instruments connected to the remote line.	Ensure the instrument showing the not-ready condition is installed correctly, and is set up correctly for analysis.
2 Defective remote cable.	Exchange the remote cable.
3 Defective components in the instrument showing the not-ready condition.	Check the instrument for defects (refer to the instrument's documentation).

## Lost CAN Partner

### Error ID: 0071

During an analysis, the internal synchronization or communication between one or more of the modules in the system has failed.

The system processors continually monitor the system configuration. If one or more of the modules is no longer recognized as being connected to the system, the error message is generated.

Probable cause	Suggested actions
1 CAN cable disconnected.	<ul style="list-style-type: none"> <li>• Ensure all the CAN cables are connected correctly.</li> <li>• Ensure all CAN cables are installed correctly.</li> </ul>
2 Defective CAN cable.	Exchange the CAN cable.
3 Defective main board in another module.	Switch off the system. Restart the system, and determine which module or modules are not recognized by the system.

## Leak Sensor Short

### Error ID: 0082

The leak sensor in the module has failed (short circuit).

The current through the leak sensor is dependent on temperature. A leak is detected when solvent cools the leak sensor, causing the leak sensor current to change within defined limits. If the current increases above the upper limit, the error message is generated.

Probable cause	Suggested actions
1 Defective leak sensor.	Please contact your Agilent service representative.
2 Leak sensor incorrectly routed, being pinched by a metal component.	Please contact your Agilent service representative.

## Leak Sensor Open

### Error ID: 0083

The leak sensor in the module has failed (open circuit).

The current through the leak sensor is dependent on temperature. A leak is detected when solvent cools the leak sensor, causing the leak-sensor current to change within defined limits. If the current falls outside the lower limit, the error message is generated.

Probable cause	Suggested actions
1 Leak sensor not connected to the main board.	Please contact your Agilent service representative.
2 Defective leak sensor.	Please contact your Agilent service representative.
3 Leak sensor incorrectly routed, being pinched by a metal component.	Please contact your Agilent service representative.

## Leak

**Error ID: 0064**

A leak was detected in the module.

The signals from the two temperature sensors (leak sensor and board-mounted temperature-compensation sensor) are used by the leak algorithm to determine whether a leak is present. When a leak occurs, the leak sensor is cooled by the solvent. This changes the resistance of the leak sensor which is sensed by the leak-sensor circuit on the main board.

Probable cause	Suggested actions
1 Loose fittings.	Ensure all fittings are tight.
2 Broken capillary.	Exchange defective capillaries.

## Module Specific Error Messages

### Initialization of Valve Failed

**Error ID: 24000**

During the initialization process the motor of the valve drive moves to some special positions depending on the installed valve head. A failure in this process means either that the movement couldn't be performed properly or it was not noticed correctly by the sensor.

Probable cause	Suggested actions
<b>1</b> Mechanical problems. Friction too high or blockages on the valve drive's motor or on the valve head.	<ul style="list-style-type: none"><li>• Check valve head for correct installation</li><li>• Try to identify the source of trouble by installing a different valve head if possible.</li><li>• Contact your Agilent Service representative.</li></ul>
<b>2</b> Defect Sensor on the Valve Drive Motor	<ul style="list-style-type: none"><li>• Check valve head for correct installation</li><li>• Try to identify the source of trouble by installing a different valve head if possible.</li><li>• Contact your Agilent Service representative.</li></ul>



## Valve Switching Failed

### Error ID: 24001

The valve drive was not able to operate the valve head correctly. Either due to mechanical reasons or the movement couldn't be detected correctly.

Probable cause	Suggested actions
<p><b>1</b> Mechanical problems. Friction too high or blockages on the valve drive's motor or on the valve head.</p>	<ul style="list-style-type: none"> <li>• Check valve head for correct installation</li> <li>• Try to identify the source of trouble by installing a different valve head if possible.</li> <li>• Contact your Agilent Service representative.</li> </ul>
<p><b>2</b> Defect Sensor on the Valve Drive Motor</p>	<ul style="list-style-type: none"> <li>• Check valve head for correct installation</li> <li>• Try to identify the source of trouble by installing a different valve head if possible.</li> <li>• Contact your Agilent Service representative.</li> </ul>

## Valve Tag Violation

### Error ID: 24006

The valve drive identified a different valve head than it had identified during the last initialization.

Probable cause	Suggested actions
<p><b>1</b> A valve head has been exchanged (hot-plugged) while the valve drive was still powered on.</p>	<p>Change the valve head. It is important to have the valve switched off for at least 10 s after or before a new valve head has been installed.</p>

#### NOTE

Soft power-down power supply of the valve drive.

Whenever you want to power cycle the valve drive for a re-boot, it needs to be powered off for at least 10 seconds.

# 7

## Maintenance

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Warnings and Cautions	60
Cleaning the Module	61
Replacing the Fuses of the Infinity Valve Drive	62
Replace Rotor and Stator	64
Replace Valve Heads	67
Replacing the Module Firmware	71
Module Specific Information	72

This chapter describes the maintenance of the module.

## Introduction to Maintenance

The module is designed for easy maintenance. Maintenance can be done from the front with module in place in the system.

**NOTE**

There are no serviceable parts inside.  
Do not open the module.

## Warnings and Cautions

---

**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 cover of the module.
- ✓ 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.
-

## Cleaning the Module

To keep the module case clean, use a soft cloth slightly dampened with water, or a solution of water and mild detergent.

### **WARNING**

**Liquid dripping into the electronic compartment of your module can cause shock hazard and damage the module**

- ✓ Do not use an excessively damp cloth during cleaning.
  - ✓ Drain all solvent lines before opening any connections in the flow path.
-

## Replacing the Fuses of the Infinity Valve Drive

**When** If the flow module shows no reaction.

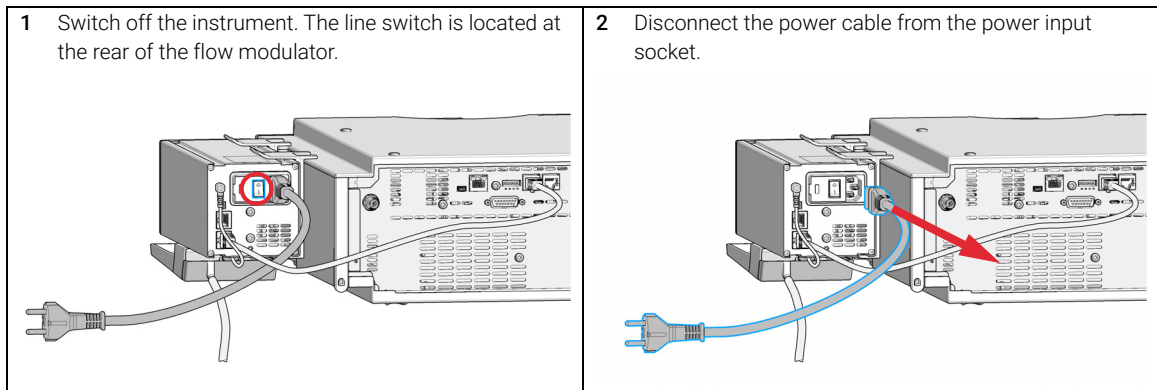
**Tools required** **Description**  
Screwdriver

Parts required	#	p/n	Description
	2	2110-1486	Fuse 2 AT250 V

### WARNING

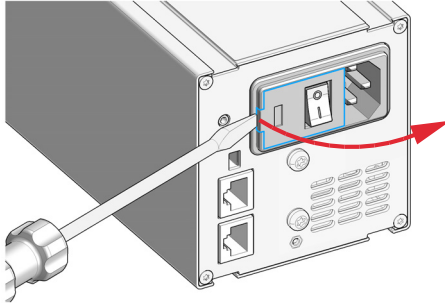
#### Electrical shock

- ✓ Disconnect the module from line power before changing a fuse or trying to open the hatch of the power input socket.
- ✓ Never reconnect the line power before having the power input socket closed.

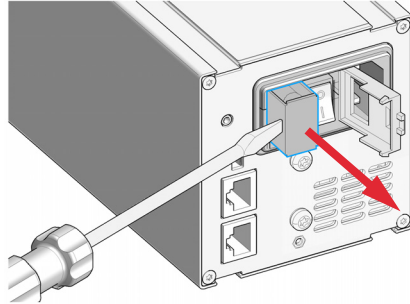


## Replacing the Fuses of the Infinity Valve Drive

- 3** To access the fuse drawer, gently lift the outer plastic housing of the power inlet socket using a flat screwdriver.

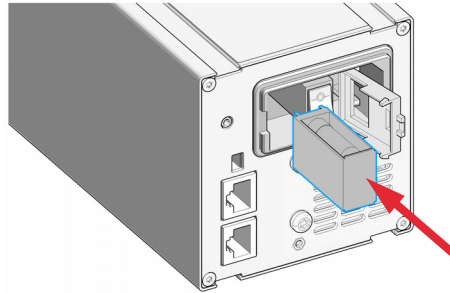


- 4** Pull out the fuse drawer as shown.

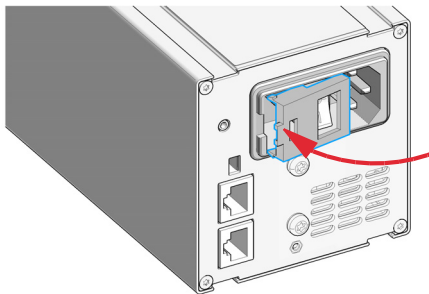


- 5** Replace the defect fuse(s).

- 6** Slide in the fuse drawer and push till it fits tightly.



- 7** Finally, close the fuse drawer housing, reconnect the instrument to the power line and switch it on.



## Replace Rotor and Stator

Parts required	p/n	Description
	1535-5215	RheBuilt kit

### NOTE

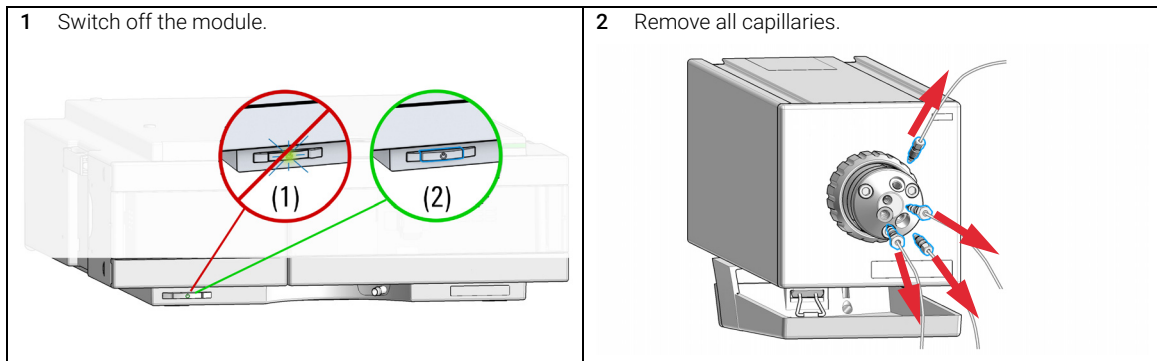
Always replace rotor and stator as pair.

### WARNING

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

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

- ✓ Be sure that no solvent can drop out of the solvent connections when removing them from your valve head.
- ✓ 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.

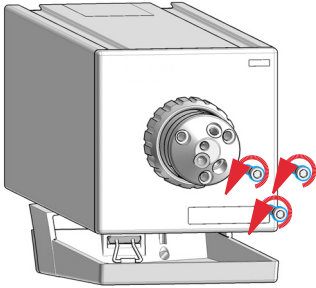




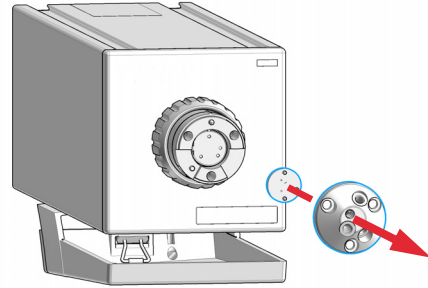
## Maintenance

### Replace Rotor and Stator

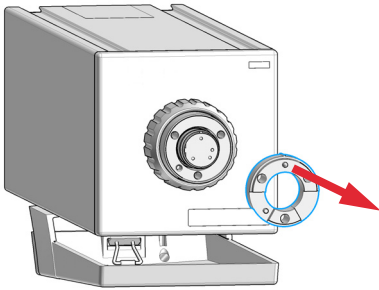
3 With the hex key remove the screws from the stator.



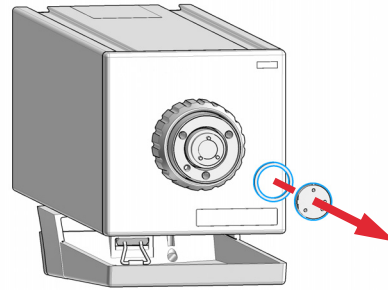
4 Remove the stator and stator seal from the stator ring (the stator seal usually remains on the stator).



5 Remove the stator ring.

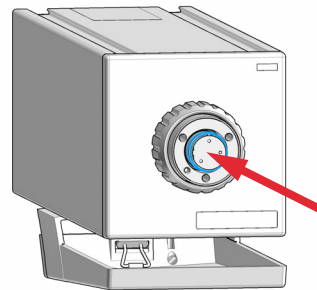


6 Remove the rotor seal from the valve body. The rotor seal is mounted on three pins and can be pulled off.



7 Use clean, filtered compressed gas to blow out the shaft assembly area of the valve

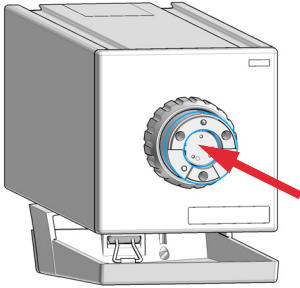
8 Mount the new rotor seal with the slots facing the stator. The three pins on the shaft assembly fit into the mating holes in the Rotor Seal only one way.



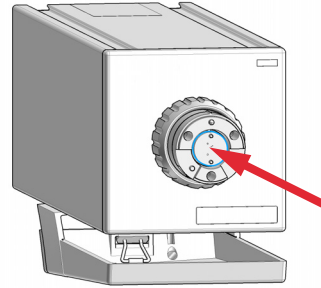
## Maintenance

### Replace Rotor and Stator

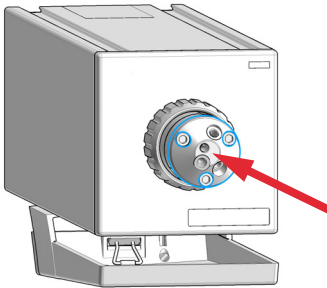
- 9** Replace the stator ring so the two short pins enter the include three sets of replacement mating holes in the body.



- 10** Mount the new stator seal onto the stator. The pins on the assembly fit into the mating holes in the stator only one way.



- 11** Install the stator. Secure the stator with the screws.



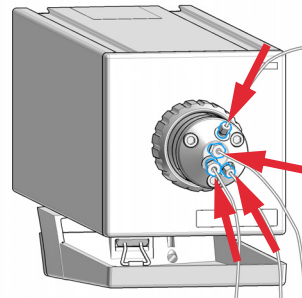
#### NOTE

Do not over-tighten the screws. The screws hold the assembly together and do not affect the sealing force. The sealing force is automatically set as the screws close the stator head against the valve body.

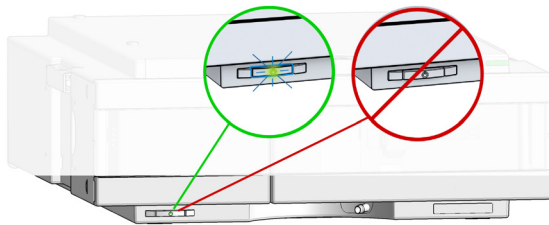
- 12** Reconnect the capillaries and tubes to the valve ports.

#### NOTE

Use the supplied tool to tighten the capillaries.



- 13** Switch on the module.



## Replace Valve Heads

Parts required	p/n	Description
	5067-4292	InfinityLab MS Flow Modulator Valve 100 mL

### WARNING

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

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

- ✓ Be sure that no solvent can drop out of the solvent connections when removing them from your valve head.
- ✓ 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.

### CAUTION

The valve actuator contains sensitive optical parts, which need to be protected from dust and other pollution. Pollution of these parts can impair the accurate selection of valve ports and therefore bias measurement results.

- ✓ Always install a valve head for operation and storage. For protecting the actuator, a dummy valve head (part of Transportation Lock Kit (G1316-67001 )) can be used instead of a functional valve. Do not touch parts inside the actuator.

### NOTE

The tag reader reads the valve head properties from the valve head RFID tag during initialization of the module. Valve properties will not be updated, if the valve head is replaced while the module is on.

Selection of valve port positions can fail, if the instrument does not know the properties of the installed valve.

### NOTE

To have the valve correctly recognized by the module you must have the module powered off for at least 10 seconds.

### NOTE

When there is any unusual behavior, the rotor and stator seals will need to be cleaned, or replaced. You can clean these seals by wiping with a tissue, and then sonicating in isopropanol.

## Maintenance

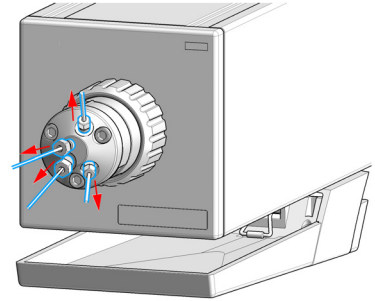
### Replace Valve Heads

1 Switch off the module.

2 Remove all capillary connections from the valve head

#### NOTE

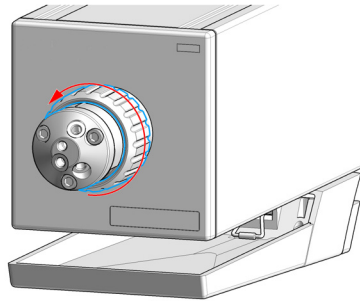
Use the provided Valve Removal tool if necessary.



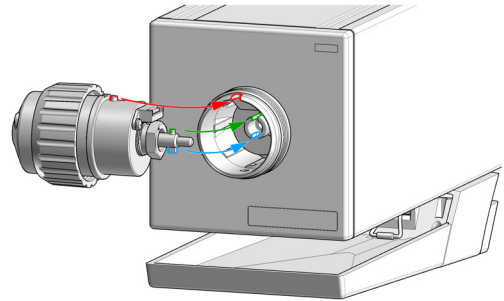
## Maintenance

### Replace Valve Heads

3 Unscrew the valve head.

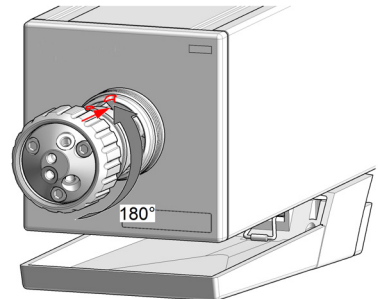
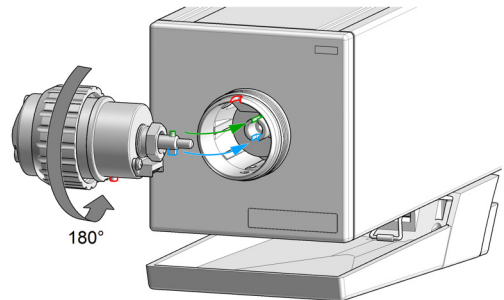


4 Insert the valve head into the valve shaft.



OR

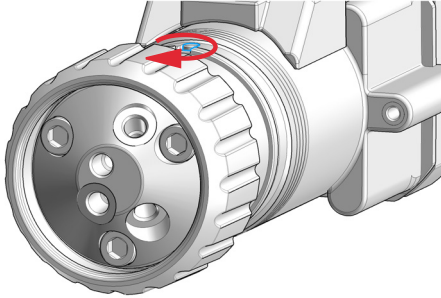
If the outside pin does not fit into the outside groove, you have to turn the valve head until you feel that the two pins snap into the grooves. Now you should feel additional resistance from the valve drive while continuously turning the valve head until the pin fits into the groove.



## Maintenance

### Replace Valve Heads

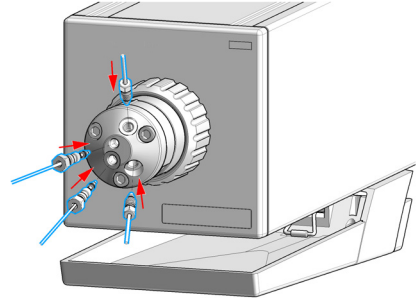
- 5 When the outer pin is locked into the groove, manually screw the nut onto the valve head.



#### NOTE

Fasten the nut with the 5043-1767 Valve Removal tool.

- 6 Install all required capillary connections to the valve.



- 7 Power on or power-cycle your module, so the valve head gets recognized during module initialization.

## Replacing the Module Firmware

<b>When</b>	<p>The installation of newer firmware might be necessary</p> <ul style="list-style-type: none"> <li>• if a newer version solves problems of older versions or</li> <li>• to keep all systems on the same (validated) revision.</li> </ul> <p>The installation of older firmware might be necessary</p> <ul style="list-style-type: none"> <li>• to keep all systems on the same (validated) revision or</li> <li>• if a new module with newer firmware is added to a system or</li> <li>• if third party control software requires a special version.</li> </ul>				
<b>Tools required</b>	<p><b>Description</b></p> <p>Agilent Lab Advisor software</p>				
<b>Parts required</b>	<table> <thead> <tr> <th>#</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Firmware, tools and documentation from Agilent web site</td> </tr> </tbody> </table>	#	Description	1	Firmware, tools and documentation from Agilent web site
#	Description				
1	Firmware, tools and documentation from Agilent web site				
<b>Preparations</b>	<p>Read update documentation provided with the Firmware Update Tool.</p> <p>To upgrade/downgrade the module's firmware carry out the following steps:</p> <ol style="list-style-type: none"> <li>1 Download the required module firmware, the latest FW Update Tool and the documentation from the Agilent web. <a href="http://www.agilent.com/en-us/firmwareDownload?whid=69761">http://www.agilent.com/en-us/firmwareDownload?whid=69761</a></li> <li>2 For loading the firmware into the module follow the instructions in the documentation.</li> </ol> <p><i>Module Specific Information</i></p> <p>Module is a hosted module and always needs to be connected to a host with matching firmware of same revision.</p>				

## Module Specific Information

**Table 3** Module Specific Information (G7170B)

Firmware Set	<b>B/C/D.07.20</b>
Agilent OpenLab CDS	<b>A.02.02/C.01.07 SR3 HF1</b>
LC drivers	<b>A.02.17</b>
LabAdvisor	<b>B.02.10</b>





## 8 Parts and Materials

Accessory Kit for the Flow Modulator 74

Optional Parts 76

This chapter provides information on parts for maintenance.

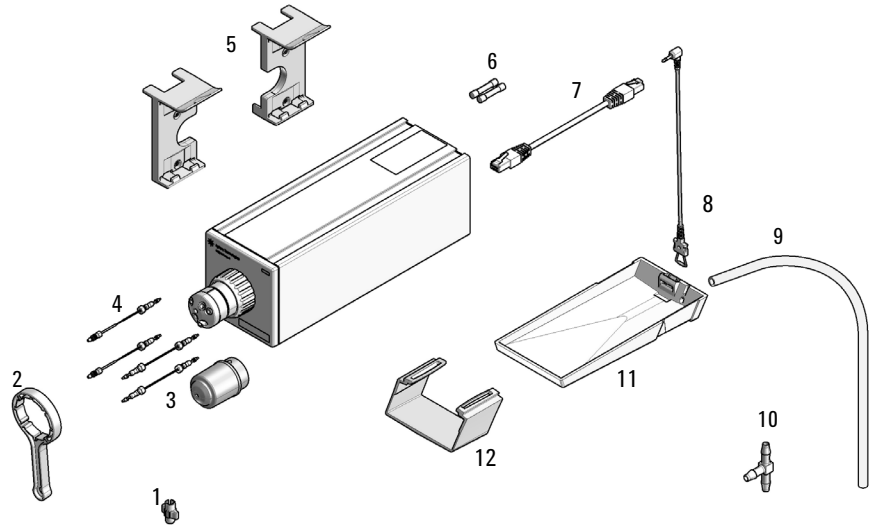
## Accessory Kit for the Flow Modulator

### Accessory Kit (G7170-68705)

Item	#	p/n	Description
1	1	5043-0915	Fitting mounting tool
2	1	5043-1767	Valve Removal tool
3	1	5067-6821	Capillary ST, 0.12x100 SX/SX
4	1	5067-6820	Capillary ST, 0.25x80 SX/RLO
5	1	5067-5685	Clamp Guide Kit-IF-II
6	2	2110-1486	Fuse 2 AT250 V
7	1	5181-1519	CAN cable, Agilent module to module, 1 m
8	1	5067-4792	Leak sensor assembly
9	1	5063-6527	Tubing assembly, i.d. 6 mm, o.d. 9 mm, 1.2 m (to waste)
10	1	5500-1156	T-Tube Connector ID6.4
11	1	5043-0270	Leak plane
12	1	5043-0271	Holder leak plane
	1	0100-1818	TEE, LOW DEAD VOLUME (not shown)

### Parts and Materials

Accessory Kit for the Flow Modulator



## Optional Parts

<b>p/n</b>	<b>Description</b>
5067-4292	InfinityLab MS Flow Modulator Valve 100 mL
1535-5215	Active Splitter Rebuild Kit (3 Stator/Rotor pairs)
1535-4045	Bearing ring
1535-4857	Stator screws
5067-1510	Rail assy for column organizer
5067-4634	Valve rail assembly for G7159B
G1369-60012	LAN Interface Card
G9321-60013	Rail assembly for Prep-Scale Fraction Collector



## 9

# Identifying Cables

Cable Overview	78
Analog Cables	80
Remote Cables	82
CAN/LAN Cables	86
Agilent Module to PC	87
USB	88

This chapter provides information on cables used with the modules.

## Cable Overview

**NOTE**

Never use cables other than the ones supplied by Agilent Technologies to ensure proper functionality and compliance with safety or EMC regulations.

### Analog cables

p/n	Description
35900-60750	Agilent 35900A A/D converter
01046-60105	Analog cable (BNC to general purpose, spade lugs)

### Remote cables

p/n	Description
5188-8029	ERI to general purpose
5188-8044	Remote Cable ERI – ERI
5188-8045	Remote Cable APG – ERI
5188-8059	ERI-Extension-Cable 1.2 m
5061-3378	Remote Cable to 35900 A/D converter
01046-60201	Agilent module to general purpose
5188-8057	Fraction Collection ERI remote Y-cable

### CAN cables

p/n	Description
5181-1516	CAN cable, Agilent module to module, 0.5 m
5181-1519	CAN cable, Agilent module to module, 1 m

**LAN cables**

p/n	Description
5023-0203	Cross-over network cable, shielded, 3 m (for point to point connection)
5023-0202	Twisted pair network cable, shielded, 7 m (for point to point connection)

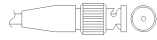
**RS-232 cables  
(not for  
FUSION board)**

p/n	Description
RS232-61601	RS-232 cable, 2.5 m Instrument to PC, 9-to-9 pin (female). This cable has special pin-out, and is not compatible with connecting printers and plotters. It is also called "Null Modem Cable" with full handshaking where the wiring is made between pins 1-1, 2-3, 3-2, 4-6, 5-5, 6-4, 7-8, 8-7, 9-9.
5181-1561	RS-232 cable, 8 m

**USB cables**

p/n	Description
5188-8050	USB A M-USB Mini B 3 m (PC-Module)
5188-8049	USB A F-USB Mini B M OTG (Module to Flash Drive)

# Analog Cables



One end of these cables provides a BNC connector to be connected to Agilent modules. The other end depends on the instrument to which connection is being made.

Agilent Module to 35900 A/D converters

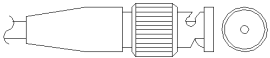
p/n 35900-60750	35900	Pin Agilent module	Signal Name
	1		Not connected
	2	Shield	Analog -
	3	Center	Analog +



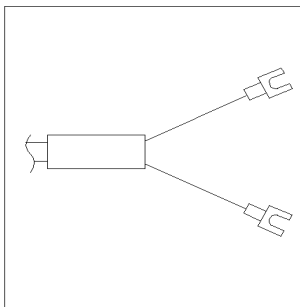
## Identifying Cables

### Analog Cables

#### Agilent Module to BNC Connector

p/n 8120-1840	Pin BNC	Pin Agilent module	Signal Name
	Shield	Shield	Analog -
	Center	Center	Analog +

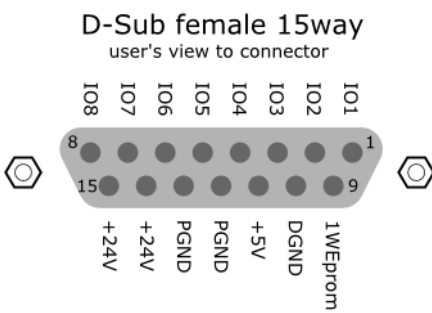
#### Agilent Module to General Purpose

p/n 01046-60105	Pin	Pin Agilent module	Signal Name
	1		Not connected
	2	Black	Analog -
	3	Red	Analog +

## Remote Cables

ERI (Enhanced Remote Interface)


- 5188-8029 ERI to general purpose (D-Sub 15 pin male - open end)
- 5188-8044 ERI to ERI (D\_Sub 15 pin male - male)
- 5188-8059 ERI-Extension-Cable 1.2 m (D-Sub15 pin male / female)

p/n 5188-8029	pin	Color code	Enhanced Remote	Classic Remote	Active (TTL)
<p><b>D-Sub female 15way</b> user's view to connector</p>  <p>108 107 106 105 104 103 102 101 8 15 9</p> <p>+24V +24V PGND PGND +5V DGND 1WEprom</p>	1	white	I01	START REQUEST	Low
	2	brown	I02	STOP	Low
	3	green	I03	READY	High
	4	yellow	I04	POWER ON	High
	5	grey	I05	NOT USED	
	6	pink	I06	SHUT DOWN	Low
	7	blue	I07	START	Low
	8	red	I08	PREPARE	Low
	9	black	1wire DATA		
	10	violet	DGND		
	11	grey-pink	+5V ERI out		
	12	red-blue	PGND		
	13	white-green	PGND		
	14	brown-green	+24V ERI out		
	15	white-yellow	+24V ERI out		
	NC	yellow-brown			

## Identifying Cables

### Remote Cables

- 5188-8045 ERI to APG (Connector D\_Subminiature 15 pin (ERI), Connector D\_Subminiature 9 pin (APG))


p/n 5188-8045	Pin (ERI)	Signal	Pin (APG)	Active (TTL)
	10	GND	1	
	1	Start Request	9	Low
	2	Stop	8	Low
	3	Ready	7	High
	5	Power on	6	High
	4	Future	5	
	6	Shut Down	4	Low
	7	Start	3	Low
	8	Prepare	2	Low
Ground	Cable Shielding	NC		

## Identifying Cables

### Remote Cables

- 5188-8057 ERI to APG and RJ45 (Connector D\_Subminiature 15 pin (ERI), Connector D\_Subminiature 9 pin (APG), Connector plug Cat5e (RJ45))

**Table 4** 5188-8057 ERI to APG and RJ45

p/n 5188-8057	Pin (ERI)	Signal	Pin (APG)	Active (TTL)	Pin (RJ45)
	10	GND	1		5
	1	Start Request	9	High	
	2	Stop	8	High	
	3	Ready	7	High	
	4	Fraction Trigger	5	High	4
	5	Power on	6	High	
	6	Shut Down	4	High	
	7	Start	3	High	
	8	Prepare	2	High	
	Ground	Cable Shielding	NC		

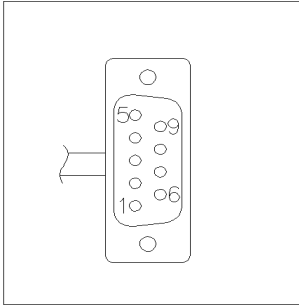


One end of these cables provides a Agilent Technologies APG (Analytical Products Group) remote connector to be connected to Agilent modules. The other end depends on the instrument to be connected to.

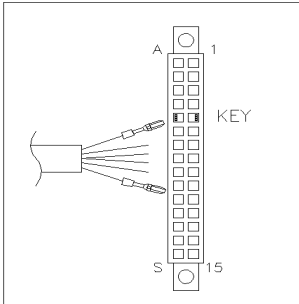
## Identifying Cables

### Remote Cables

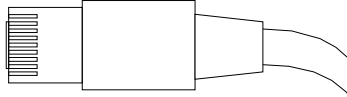
#### Agilent Module to Agilent 35900 A/D Converters

p/n 5061-3378	Pin 35900 A/D	Pin Agilent module	Signal Name	Active (TTL)
	1 - White	1 - White	Digital ground	
	2 - Brown	2 - Brown	Prepare run	Low
	3 - Gray	3 - Gray	Start	Low
	4 - Blue	4 - Blue	Shut down	Low
	5 - Pink	5 - Pink	Not connected	
	6 - Yellow	6 - Yellow	Power on	High
	7 - Red	7 - Red	Ready	High
	8 - Green	8 - Green	Stop	Low
	9 - Black	9 - Black	Start request	Low

#### Agilent Module to General Purpose

p/n 01046-60201	Wire Color	Pin Agilent module	Signal Name	Active (TTL)
	White	1	Digital ground	
	Brown	2	Prepare run	Low
	Gray	3	Start	Low
	Blue	4	Shut down	Low
	Pink	5	Not connected	
	Yellow	6	Power on	High
	Red	7	Ready	High
	Green	8	Stop	Low
	Black	9	Start request	Low

## CAN/LAN Cables



Both ends of this cable provide a modular plug to be connected to Agilent modules CAN or LAN connectors.

### CAN Cables

p/n	Description
5181-1516	CAN cable, Agilent module to module, 0.5 m
5181-1519	CAN cable, Agilent module to module, 1 m

### LAN Cables

p/n	Description
5023-0203	Cross-over network cable, shielded, 3 m (for point to point connection)
5023-0202	Twisted pair network cable, shielded, 7 m (for point to point connection)

## Agilent Module to PC

<b>p/n</b>	<b>Description</b>
RS232-61601	RS-232 cable, 2.5 m Instrument to PC, 9-to-9 pin (female). This cable has special pin-out, and is not compatible with connecting printers and plotters. It is also called "Null Modem Cable" with full handshaking where the wiring is made between pins 1-1, 2-3, 3-2, 4-6, 5-5, 6-4, 7-8, 8-7, 9-9.
5181-1561	RS-232 cable, 8 m

## USB

To connect a USB Flash Drive use a USB OTG cable with Mini-B plug and A socket.

<b>p/n</b>	<b>Description</b>
5188-8050	USB A M-USB Mini B 3 m (PC-Module)
5188-8049	USB A F-USB Mini B M OTG (Module to Flash Drive)





# 10

## Hardware Information

Electrical Connections 90

Serial Number Information (ALL) 90

Front and Rear View of the Module 91

Interfaces 92

Overview Interfaces 94

Config Switch Settings of the Infinity Valve Drive 98

This chapter describes the module in more detail on hardware and electronics.

## Electrical Connections

- The CAN bus is a serial bus with high speed data transfer. The two connectors for the CAN bus are used for internal module data transfer and synchronization.
- The power input socket accepts a line voltage of 100 – 240 VAC  $\pm 10\%$  with a line frequency of 50 or 60 Hz. Maximum power consumption varies by module. There is no voltage selector on your module because the power supply has wide-ranging capability. There are no externally accessible fuses, because automatic electronic fuses are implemented in the power supply.

### NOTE

Never use cables other than the ones supplied by Agilent Technologies to ensure proper functionality and compliance with safety or EMC regulations.

## Serial Number Information (ALL)

The serial number information on the instrument labels provide the following information:

CCXZZ00000	Format
CC	Country of manufacturing <ul style="list-style-type: none"> <li>• DE = Germany</li> <li>• JP = Japan</li> <li>• CN = China</li> </ul>
X	Alphabetic character A-Z (used by manufacturing)
ZZ	Alpha-numeric code 0-9, A-Z, where each combination unambiguously denotes a module (there can be more than one code for the same module)
00000	Serial number

## Front and Rear View of the Module

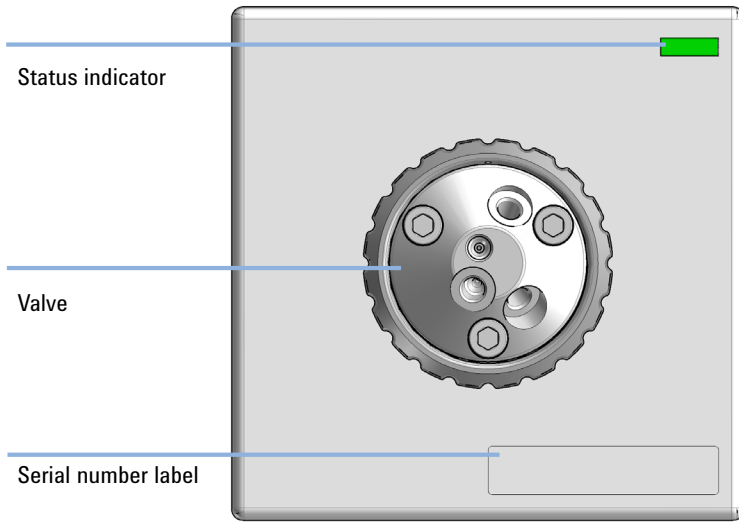


Figure 3 Front view of the flow modulator

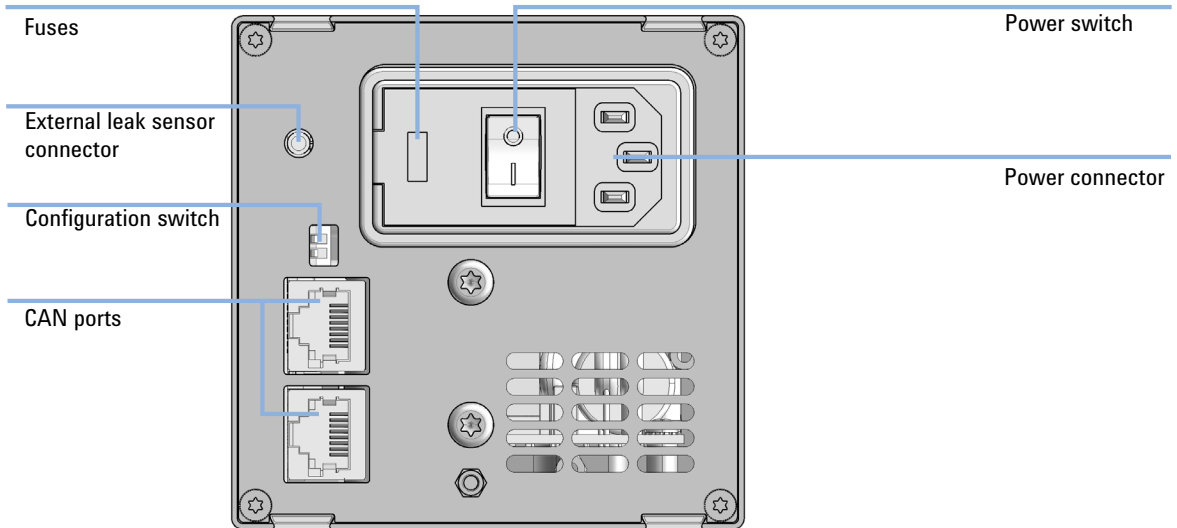


Figure 4 Rear view of the flow modulator

## Interfaces

The Agilent InfinityLab LC Series modules provide the following interfaces:

**Table 5** Agilent InfinityLab LC Series Interfaces

Module	CAN	USB	LAN (on-board)	RS-232	Analog	APG (A) / ERI (E)	Special
<b>Pumps</b>							
G7104A/C	2	No	Yes	Yes	1	A	
G7110B	2	Yes	Yes	No	No	E	
G7111A/B, G5654A	2	Yes	Yes	No	No	E	
G7112B	2	Yes	Yes	No	No	E	
G7120A	2	No	Yes	Yes	1	A	
G7161A/B	2	Yes	Yes	No	No	E	
<b>Samplers</b>							
G7129A/B/C	2	Yes	Yes	No	No	E	
G7167B/C, G5667A	2	Yes	Yes	No	No	E	
G7157A	2	Yes	Yes	No	No	E	
<b>Detectors</b>							
G7114A/B	2	Yes	Yes	No	1	E	
G7115A	2	Yes	Yes	No	1	E	
G7117A/B/C	2	Yes	Yes	No	1	E	
G7121A/B	2	Yes	Yes	No	1	E	
G7162A/B	2	Yes	Yes	No	1	E	
G7165A	2	Yes	Yes	No	1	E	

Table 5 Agilent InfinityLab LC Series Interfaces

Module	CAN	USB	LAN (on-board)	RS-232	Analog	APG (A) / ERI (E)	Special
<b>Fraction Collectors</b>							
G7158B	2	Yes	Yes	No	No	E	
G7159B	2	Yes	Yes	No	No	E	
G7166A	2	No	No	No	No	No	Requires a host module with on-board LAN with minimum FW B.06.40 or C.06.40, or with additional G1369C LAN Card
G1364E/F, G5664B	2	Yes	Yes	No	No	E	THERMOSTAT for G1330B
<b>Others</b>							
G7116A/B	2	No	No	No	No	No	Requires a HOST module via CAN
G7122A	No	No	No	Yes	No	A	
G7170B	2	No	No	No	No	No	Requires a host module with on-board LAN with minimum FW B.06.40 or C.06.40, or with additional G1369C LAN Card

**NOTE**

The detector (DAD/MWD/FLD/VWD/RID) is the preferred access point for control via LAN. The inter-module communication is done via CAN.

- CAN connectors as interface to other modules
- LAN connector as interface to the control software
- RS-232C as interface to a computer
- USB (Universal Series Bus) as interface to a computer
- REMOTE connector as interface to other Agilent products
- Analog output connector(s) for signal output

## Overview Interfaces

### CAN

The CAN is inter-module communication interface. It is a 2-wire serial bus system supporting high speed data communication and real-time requirement.

### LAN

The modules have either an interface slot for a LAN card (e.g. Agilent G1369B/C LAN Interface) or they have an on-board LAN interface (e.g. detectors G1315C/D DAD and G1365C/D MWD). This interface allows the control of the module/system via a PC with the appropriate control software. Some modules have neither on-board LAN nor an interface slot for a LAN card (e.g. G1170A Valve Drive or G4227A Flexible Cube). These are hosted modules and require a Host module with firmware B.06.40 or later or with additional G1369C LAN Card.

#### NOTE

If an Agilent detector (DAD/MWD/FLD/VWD/RID) is in the system, the LAN should be connected to the DAD/MWD/FLD/VWD/RID (due to higher data load). If no Agilent detector is part of the system, the LAN interface should be installed in the pump or autosampler.

### RS-232C (Serial)

The RS-232C connector is used to control the module from a computer through RS-232C connection, using the appropriate software. This connector can be configured with the configuration switch module at the rear of the module. Refer to *Communication Settings for RS-232C*.

#### NOTE

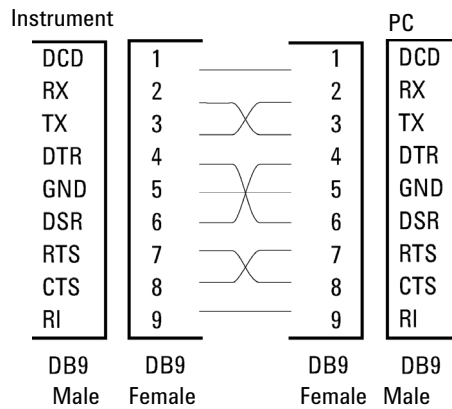
There is no configuration possible on main boards with on-board LAN. These are pre-configured for

- 19200 baud,
- 8 data bit with no parity and
- one start bit and one stop bit are always used (not selectable).

The RS-232C is designed as DCE (data communication equipment) with a 9-pin male SUB-D type connector. The pins are defined as:

**Table 6 RS-232C Connection Table**

Pin	Direction	Function
1	In	DCD
2	In	RxD
3	Out	TxD
4	Out	DTR
5		Ground
6	In	DSR
7	Out	RTS
8	In	CTS
9	In	RI


**Figure 5 RS-232 Cable**

### Analog Signal Output

The analog signal output can be distributed to a recording device. For details refer to the description of the module's main board.

## APG Remote

The APG Remote connector may be used in combination with other analytical instruments from Agilent Technologies if you want to use features as common shut down, prepare, and so on.

Remote control allows easy connection between single instruments or systems to ensure coordinated analysis with simple coupling requirements.

The subminiature D connector is used. The module provides one remote connector which is inputs/outputs (wired- or technique).

To provide maximum safety within a distributed analysis system, one line is dedicated to **SHUT DOWN** the system's critical parts in case any module detects a serious problem. To detect whether all participating modules are switched on or properly powered, one line is defined to summarize the **POWER ON** state of all connected modules. Control of analysis is maintained by signal readiness **READY** for next analysis, followed by **START** of run and optional **STOP** of run triggered on the respective lines. In addition **PREPARE** and **START REQUEST** may be issued. The signal levels are defined as:

- standard TTL levels (0 V is logic true, + 5.0 V is false),
- fan-out is 10,
- input load is 2.2 kOhm against + 5.0 V, and
- output are open collector type, inputs/outputs (wired- or technique).

**NOTE**

All common TTL circuits operate with a 5 V power supply. A TTL signal is defined as "low" or L when between 0 V and 0.8 V and "high" or H when between 2.0 V and 5.0 V (with respect to the ground terminal).



**Table 7 Remote Signal Distribution**

Pin	Signal	Description
1	DGND	Digital ground
2	PREPARE	(L) Request to prepare for analysis (for example, calibration, detector lamp on). Receiver is any module performing pre-analysis activities.
3	START	(L) Request to start run / timetable. Receiver is any module performing run-time controlled activities.
4	SHUT DOWN	(L) System has serious problem (for example, leak: stops pump). Receiver is any module capable to reduce safety risk.
5		Not used
6	POWER ON	(H) All modules connected to system are switched on. Receiver is any module relying on operation of others.
7	READY	(H) System is ready for next analysis. Receiver is any sequence controller.
8	STOP	(L) Request to reach system ready state as soon as possible (for example, stop run, abort or finish and stop injection). Receiver is any module performing run-time controlled activities.
9	START REQUEST	(L) Request to start injection cycle (for example, by start key on any module). Receiver is the autosampler.

### Special Interfaces

There is no special interface for this module.

# Config Switch Settings of the Infinity Valve Drive

## Configuration Switch Settings

Mode SELECT	1	2
<b>BOOT</b>	1	1
<b>Resident</b>	0	1
<b>FC</b>	1	0
<b>Reserved</b>	0	0

Figure 6 Config Switch

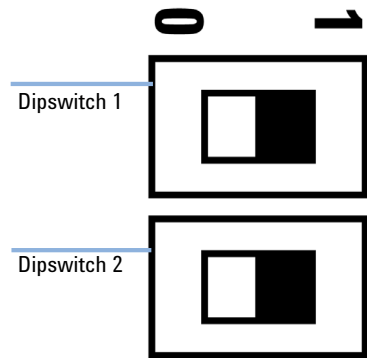


Figure 7 Dipswitch 1 and 2

Table 8 Configuration Switch Settings

Dipswitch 1	Dipswitch 2	Function
ON (1)	ON (1)	Default/Standard Operation Mode
ON (1)	OFF (0)	Forced Cold Start
OFF (0)	ON (1)	Resident Mode
OFF (0)	OFF (0)	Not Supported

## Special Settings

### Boot-Resident

Firmware update procedures may require this mode in case of firmware loading errors (main firmware part). If you use the following switch settings and power the instrument up again, the instrument firmware stays in the resident mode. It is not operable as a module. It only uses basic functions of the operating system for example, for communication. In this mode the main firmware can be loaded (using update utilities).

### Forced Cold Start

A forced cold start can be used to bring the module into a defined mode with default parameter settings.

#### CAUTION

#### Loss of data

**Forced cold start erases all methods and data stored in the non-volatile memory. Exceptions are calibration settings, diagnosis and repair log books which will not be erased.**

- ✓ Save your methods and data before executing a forced cold start.

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This chapter provides addition information on safety, legal and web.

## General Safety Information

### General Safety Information

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Agilent Technologies assumes no liability for the customer's failure to comply with these requirements.

**WARNING**

**Ensure the proper usage of the equipment.**

**The protection provided by the equipment may be impaired.**

- ✓ **The operator of this instrument is advised to use the equipment in a manner as specified in this manual.**

---

### Safety Standards

This is a Safety Class I instrument (provided with terminal for protective earthing) and has been manufactured and tested according to international safety standards.

### General

Do not use this product in any manner not specified by the manufacturer. The protective features of this product may be impaired if it is used in a manner not specified in the operation instructions.

## Before Applying Power

**WARNING**

Wrong voltage range, frequency or cabling  
Personal injury or damage to the instrument

- ✓ Verify that the voltage range and frequency of your power distribution matches to the power specification of the individual instrument.
- ✓ Never use cables other than the ones supplied by Agilent Technologies to ensure proper functionality and compliance with safety or EMC regulations.
- ✓ Make all connections to the unit before applying power.

**NOTE**

Note the instrument's external markings described under "Safety Symbols" on page 106.

## Ground the Instrument

**WARNING**

Missing electrical ground  
Electrical shock

- ✓ If your product is provided with a grounding type power plug, the instrument chassis and cover must be connected to an electrical ground to minimize shock hazard.
- ✓ The ground pin must be firmly connected to an electrical ground (safety ground) terminal at the power outlet. Any interruption of the protective (grounding) conductor or disconnection of the protective earth terminal will cause a potential shock hazard that could result in personal injury.

## Ground Solvent Lines

**WARNING**

Missing electrical ground

Electrical shock, fire, explosion

- ✓ Never use solvent guiding tubes, capillaries, and fittings other than the ones supplied by Agilent Technologies for use in preparative systems.
- 

## Do Not Operate in an Explosive Atmosphere

**WARNING**

Presence of flammable gases or fumes

Explosion hazard

- ✓ Do not operate the instrument in the presence of flammable gases or fumes.
- 

## Do Not Remove the Instrument Cover

**WARNING**

Instrument covers removed

Electrical shock

- ✓ Do Not Remove the Instrument Cover
  - ✓ Only Agilent authorized personnel are allowed to remove instrument covers. Always disconnect the power cables and any external circuits before removing the instrument cover.
- 

## Do Not Modify the Instrument

Do not install substitute parts or perform any unauthorized modification to the product. Return the product to an Agilent Sales and Service Office for service and repair to ensure that safety features are maintained.

## In Case of Damage

**WARNING**

Damage to the module

Personal injury (for example electrical shock, intoxication)

- ✓ Instruments that appear damaged or defective should be made inoperative and secured against unintended operation until they can be repaired by qualified service personnel.
-



## Solvents

**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.
- ✓ Do not use solvents with an auto-ignition temperature below 200 °C (392 °F). Do not use solvents with a boiling point below 56 °C (133 °F).
- ✓ Avoid high vapor concentrations. Always keep the temperature in the sample compartment at least 25 K below the boiling point of the solvent used.
- ✓ Do not operate the instrument in an explosive atmosphere.
- ✓ Do not use solvents of ignition Class IIC according IEC 60079-20-1 (for example, carbon disulfide).
- ✓ Reduce the volume of substances to the minimum required for the analysis.
- ✓ Never exceed the maximum permissible volume of solvents (8 L) in the solvent cabinet. Do not use bottles that exceed the maximum permissible volume as specified in the usage guideline for solvent cabinet.
- ✓ Ground the waste container.
- ✓ Regularly check the filling level of the waste container. The residual free volume in the waste container must be large enough to collect the waste liquid.
- ✓ To achieve maximal safety, regularly check the tubing for correct installation.

---

**NOTE**

For details, see the usage guideline for the solvent cabinet. A printed copy of the guideline has been shipped with the solvent cabinet, electronic copies are available in the Agilent Information Center or via the Internet.

---

## Safety Symbols

Table 9 Symbols













	The apparatus is marked with this symbol when the user should refer to the instruction manual in order to protect risk of harm to the operator and to protect the apparatus against damage.
	Indicates dangerous voltages.
	Indicates a protected ground terminal.
	The apparatus is marked with this symbol when hot surfaces are available and the user should not touch it when heated up.
	Cooling unit is designed as vapor-compression refrigeration system. Contains fluorinated greenhouse gas (refrigerant) according to the Kyoto protocol. For specifications of refrigerant, charge capacity, carbon dioxide equivalent (CDE), and global warming potential (GWP) see instrument label.
	Confirms that a manufactured product complies with all applicable European Community directives. The European Declaration of Conformity is available at: <a href="http://regulations.corporate.agilent.com/DoC/search.htm">http://regulations.corporate.agilent.com/DoC/search.htm</a>
	Manufacturing date.
	Power symbol indicates On/Off. The apparatus is not completely disconnected from the mains supply when the power switch is in the Off position
	Pacemaker Magnets could affect the functioning of pacemakers and implanted heart defibrillators. A pacemaker could switch into test mode and cause illness. A heart defibrillator may stop working. If you wear these devices keep at least 55 mm distance to magnets. Warn others who wear these devices from getting too close to magnets.

Table 9 Symbols

	<p>Magnetic field</p> <p>Magnets produce a far-reaching, strong magnetic field. They could damage TVs and laptops, computer hard drives, credit and ATM cards, data storage media, mechanical watches, hearing aids and speakers. Keep magnets at least 25 mm away from devices and objects that could be damaged by strong magnetic fields.</p>
	<p>Indicates a pinching or crushing hazard</p>
	<p>Indicates a piercing or cutting hazard.</p>

## WARNING

### A WARNING

alerts you to situations that could cause physical injury or death.

- ✓ Do not proceed beyond a warning until you have fully understood and met the indicated conditions.

## CAUTION

### A CAUTION

alerts you to situations that could cause loss of data, or damage of equipment.

- ✓ Do not proceed beyond a caution until you have fully understood and met the indicated conditions.

## Waste Electrical and Electronic Equipment (WEEE) Directive

This product complies with the European WEEE Directive marking requirements. The affixed label indicates that you must not discard this electrical/electronic product in domestic household waste.

**NOTE**

Do not dispose of in domestic household waste

To return unwanted products, contact your local Agilent office, or see <http://www.agilent.com> for more information.

## Radio Interference

Cables supplied by Agilent Technologies are screened to provide optimized protection against radio interference. All cables are in compliance with safety or EMC regulations.

### Test and Measurement

If test and measurement equipment is operated with unscreened cables, or used for measurements on open set-ups, the user has to assure that under operating conditions the radio interference limits are still met within the premises.

## Sound Emission

### Manufacturer's Declaration

This statement is provided to comply with the requirements of the German Sound Emission Directive of 18 January 1991.

This product has a sound pressure emission (at the operator position) < 70 dB.

- Sound Pressure  $L_p < 70$  dB (A)
- At Operator Position
- Normal Operation
- According to ISO 7779:1988/EN 27779/1991 (Type Test)

## Agilent Technologies on Internet

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

<http://www.agilent.com>

## In This Book

This manual contains technical reference information about the Agilent InfinityLab LC Series 1290 Infinity II MS Flow Modulator (G7170B)

The manual describes the following:

- Introduction
- Site Requirements and Specification
- Installation
- Using the Module
- Troubleshooting and Diagnostics
- Error Information
- Maintenance
- Parts and Materials
- Cables
- Safety

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