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235/235P Autoinjector
User's Guide

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January 2003

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Declaration of Conformity

Application of Council Directives:

89/336/EEC, 73/23/EEC

Standards to which Conformity is Declared:

EN61326, EN61000-3-3, EN61000-3-2, EN61010-1

Manufacturer's Name ..... Gilson, Inc.

Manufacturer's Address ..... 3000 W. Beltline Highway
Middleton, WI 53562

EC Office Address ..... Gilson S.A.S.
19 Avenue des Entrepreneurs, B.P. 145
F-95400 Villiers-le-Bel, France

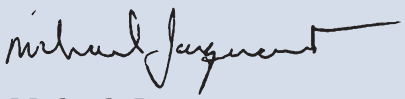
Type of Equipment ..... Laboratory Equipment

Model. ..... **235 Autoinjector**

Beginning with Serial Number: **249K8B001**

Month and Year of Manufacture: **October 1998**

I, the undersigned, hereby declare that the equipment
specified above conforms to the above Directives and Standards.



Place: Middleton, WI (USA)
Issue Date: November 1998

Michael Jacquart
Senior Vice President
Corporate Technology Development

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Declaration of Conformity

Application of Council Directives:

89/336/EEC, 73/23/EEC

Standards to which Conformity is Declared:

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Manufacturer's Name ..... Gilson, Inc.

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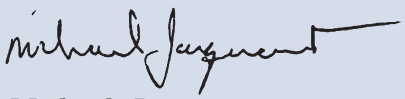
Type of Equipment ..... Laboratory Equipment

Model. ..... **235P Autoinjector**

Beginning with Serial Number: **249B9C001**

Month and Year of Manufacture: **February 1999**

I, the undersigned, hereby declare that the equipment
specified above conforms to the above Directives and Standards.



Place: Middleton, WI (USA)
Issue Date: March 1999

Michael Jacquart
Senior Vice President
Corporate Technology Development

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Declaration of Conformity

Application of Council Directives:

89/336/EEC, 73/23/EEC

Standards to which Conformity is Declared:

EN61326, EN61000-3-3, EN61000-3-2, EN61010-1

Manufacturer's Name ..... Gilson, Inc.

Manufacturer's Address ..... 3000 W. Beltline Highway
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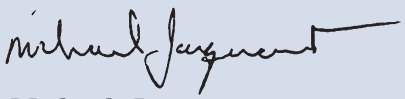
Type of Equipment ..... Laboratory Equipment

Model. ..... **235P Peltier Controller**

Beginning with Serial Number: **249B9D001**

Month and Year of Manufacture: **February 1999**

I, the undersigned, hereby declare that the equipment
specified above conforms to the above Directives and Standards.



Place: Middleton, WI (USA)
Issue Date: March 1999

Michael Jacquart
Senior Vice President
Corporate Technology Development

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Introduction 1

The 235/ 235P Autoinjector is an XYZ robot that can hold a large number of samples in a small footprint. It can inject from four 96-well microplates, four 384-well microplates, 0.7 mL vials, or 2 mL vials for a total of up to 1,536 samples. The 235 is ideal for direct injection from microplates onto HPLC and LC/ MS systems. The built-in syringe pump provides for accurate and precise handling of liquids. Samples can be heated and cooled using the 235P with a Peltier Controller (sold separately).



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Safety Precautions

For safe and correct use of this instrument, it is recommended that both operation and service personnel follow the instructions contained in this guide when installing, cleaning, and maintaining this instrument.



Because the probe installed on the Z-arm may contain a dangerous substance, do not interfere in the work area of the instrument until the autoinjector has completed its procedures. Gilson recommends that the door open safety option within the 235 Setup utility be engaged to reduce the possibility of injury. If dangerous liquids are used, adequate protection such as proper ventilation, safety glasses, etc. should be used.

The syringe pump panel on the 235/ 235P Autoinjector has an open path for syringe travel in the vertical direction. Keep all body parts out of the path of the syringe.

Always switch the power to off when making adjustments to the autoinjector. The potential exists for bodily harm if you interfere with the work area of the instrument while it is running.

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Unpacking

The 235/ 235P Autoinjector is delivered with all major components already assembled. Keep the original container and packing assembly in case the autoinjector must be returned to the factory.

The 235/ 235P Autoinjector and its components are shipped in two (or three, if you ordered a Peltier Controller) containers:

- One container holds the 235 or 235P Autoinjector and its standard accessory package.
- The other container holds any additional accessories you may have ordered with your system
- If you ordered a 235P with a Peltier Controller, your third container contains the Peltier Controller and AC power cord.

To remove the autoinjector from its container:

1 Lift the cover of the shipping box.

2 Lift the autoinjector up and out of the foam packing material. Place it on a lab bench or cart.

Warning: Your 235/ 235P Autoinjector weighs up to 20 kg (44 lbs.) You may require two people to lift the autoinjector.

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Standard Equipment

Once the autoinjector and the accessories have been unpacked, you should have the following:

235 or 235P Autoinjector; includes a Rheodyne RV700-120 valve with a 20 µL loop, probe and probe holder, and 1.1 mL coiled transfer tubing

Fuse drawers, fuses and power cords

235 Autoinjector Software

235/235P Autoinjector User's Guide

Accessory package which includes:

- inlet tubing assembly
- 0.010" ID PEEK tubing
- 0.8 mm ID TFE tubing
- Rheflex® PEEK short fitting set
- PEEK injection port/ seal with drain and drain tubing
- 10 pin terminal block connector
- 8 pin terminal block connector
- 100 µL syringe
- assorted Allen wrenches

Accessories

Based upon your configuration, you will also receive additional accessories such as syringes, transfer tubing, racks, Peltier Controller, or a Peltier connector cable. If necessary, refer to ***Appendix A*** for part numbers.

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Technical Specifications

Please be aware of the following before operating the autoinjector or Peltier controller.

Note: Changes or modifications to these devices not expressly approved by Gilson could void your factory-authorized warranty.

These devices have been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC commercial environment. These devices generate, use, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of these devices in a residential area is likely to cause harmful interference, in which case you will be required to correct the interference at your own expense.

Shielded cables must be used with these units to ensure compliance with the Class A FCC limits.

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235/235P Autoinjector	
Technical Specification	*Definition*
Arm speed	Maximum 10.16 cm/sec. (4.0 in./sec.) in X dimension Maximum 8.76 cm/sec. (3.5 in./sec.) in Y dimension
Available sample loops	1 µL internal, 5 µL, 10 µL, 20 µL (standard accessory), 50 µL, 100 µL, 200 µL, 500 µL, 1 mL, 2 mL, 5 mL
Available valves	Rheodyne RV700-100 analytical injection valve (SP 235/SP 235P) Rheodyne RV700-120 analytical injection valve (235/235P)
Carryover	Lower than 0.0035% with the following rinse volumes: Injection port rinse: 500 µL Outside probe rinse: 500 µL *Septum Piercing 235/235P Autoinjector*: Lower than 0.0070% with the above rinse volumes. See ***Appendix B*** for information on the method used to determine carryover.
Contact control	Four inputs (contact closure), four relay outputs, and one switched +12V DC, 0.5A output
Dead volume	1.5 µL, volume from PEEK injection port to sample loop
Environmental conditions	Indoor use Altitude: up to 2000 m Temperature range: 5°–40°C Air pressure: 75–105 kPa Pollution degree: 1 or 2 in accordance with IEC 66 Humidity: maximum relative humidity 80% for temperatures up to 31°C, decreasing linearly to 50% relative humidity at 40°C
Front panel	STOP/HOME soft key and LED indicator lights for power, ready, inject, load, and error

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Injection reproducibility	See ***Appendix B*** for details about the configuration and test procedure that Gilson used to determine the specification below. The reproducibility listed is a maximum. Under most circumstances, you can expect performance that surpasses this value. CV<0.5% with 20 µL loop, 100 µL syringe and total loop filling method.
Liquid contact materials	316L stainless steel, 304 stainless steel, Ceramic, PEEK
Manufacturing standards	Safety certification: • UL 3101-1 • CSA C22.2 –No. 1010.1-92 • EN 61010-1 EMC certification: • EN 61326 • EN 61000-3-2 1995 • EN 61000-3-3 1995 • FCC Part 15
Physical space requirement	25.9 x 61.2 x 35.1 cm (10.2 x 24.1 x 13.8 in.)
Power requirements	Frequency: 47 to 63 Hz Voltage: 85V to 245V Current rating: 2.0A for 100–120V or 1.0A for 220–240V
Probe rinse	Probe rinsing occurs through a dedicated rinse station for rinsing the inside and outside of the probe; selectable rinse volume and flow rate. The rinse station may also be used for a flow through rinse.
Rack capacity	Up to four 96- or 384-well microplates, 192 2-mL vials, or 384 0.7-mL vials* *Racks for the 235P Autoinjector only accept microplates.
Sampler type	XYZ with stationary rack design
Software control	235 Autoinjector Software, 735 Sampler Software, or UniPoint™ System Software
Syringe capacity	100 µL, 250 µL, 500 µL, 1 mL, 5 mL, 10 mL

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Syringe pump	Integral high-precision single piston syringe pump
Temperature range	As low as 8°C and up to 40°C* *Actual temperature is a function of the ambient temperature and the style of microplates used.
Valve switching speed (mS)	Less than 200 milliseconds
Vertical punch strength	1.8 kg (4.0 lbs.)
Weight	17.7 kg (39 lbs.) 20 kg (44 lbs.) for the 235P

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Peltier Controller	
Technical Specification	*Definition*
Contact control	Two input contact closures (one for each 235P controlled)
Environmental conditions	Indoor use Altitude: up to 2000 m Temperature range: 5°–40°C Air pressure: 75–105 kPa Pollution degree: 1 or 2, in accordance with IEC 66 Humidity: Maximum relative humidity 80% for temperatures up to 31°C, decreasing linearly to 50% relative humidity at 40°C
Front panel	LED indicator lights for POWER, HEAT or COOL (unit 1), and HEAT or COOL (unit 2) Two 3-position switches and two temperature control knobs (one for each 235P controlled)
Manufacturing standards	Safety certification: • UL 3101-1 • CSA C22.2—No. 1010.1-92 • EN 61010-1 EMC certification: • EN 61326 • EN 61000-3-2 1995 • EN 61000-3-3 1995 • FCC Part 15
Physical space requirement	26.5 x 43.5 x 15.6 cm (10.4 x 17.1 x 6.2 in.)
Power requirements	Frequency: 47 to 63 Hz Voltage: 100–240V Current rating: 5.0A for 100–120V or 2.5A for 220–240V
Weight	7.14 kg (15.75 lbs.)

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Customer Service

Gilson, Inc. and its worldwide network of authorized representatives provide you with the following types of assistance: sales, technical, applications, and instrument repair.

If you need assistance and are in the United States please contact your regional Gilson representative or call the Gilson Customer Service Department at 800-445-7661 or 608-836-1551.

You can also contact Gilson Customer Service via its e-mail address: service@gilson.com. Outside the United States, contact your Gilson representative for assistance. For specific contact information, refer to the Gilson web site at www.gilson.com.

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Installation 2



Gilson 235 Autoinjector

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Autoinjector Setup

Armlock Removal

The armlock on the autoinjector secures the Z-arm during shipment. **You must remove the armlock before operating the instrument.**

If you need to move the autoinjector, always reinstall the armlock. This safeguards against mechanical damage.

To remove the armlock:

1 Using a Phillips screwdriver, loosen the shipping screw/ armlock (located top-center of the rear panel) that immobilizes the Z-arm.





2 Store the shipping screw/ armlock in the rear panel (as shown above) for future use.

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Syringe Installation

The piston operating rod of the syringe pump will be shipped in the down position. If the rod is not in the down position, please refer to the instructions for changing a syringe in ***Section 4***. Those instructions detail how to lower the rod.

The following procedure is important for correct syringe piston alignment. Improper alignment may cause premature piston seal failure.

1 Remove the valve and the syringe from their packages.

2 Lubricate the piston with reservoir solvent to reduce piston seal friction during syringe installation.

3 Loosely screw the syringe into the valve. Do not fully tighten.

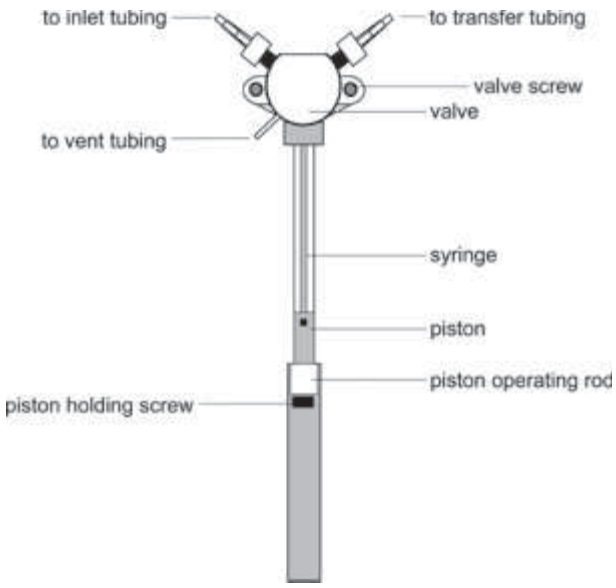
4 Loosely attach the valve to the syringe pump with the supplied valve screws.

5 Pull down the piston so it comes into contact with the piston operating rod and firmly tighten the piston holding screw.

6 Fully tighten the valve screws to secure the valve.

7 Fully tighten the syringe to the valve.

Note: Remember the size of the syringe you are installing for later software configuration (you can write the size in the margin here for reference).



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Plumbing Connections

Inlet and Vent Tubing Installation

1 Install the 1/ 4"-28 fitting of the 2 mm ID inlet tubing (part number 3645357) to the inlet side of the syringe pump. Refer to the diagram on page 2-3 if necessary.

2 Place the filtered end of the assembly into the bottle containing your diluent or probe rinse solution.

Note: If you need to lengthen your inlet tubing, use the supplied tubing (part number 49948392) and coupling (part number F1410153).

3 Slip the vent tubing (part number F4420577) onto its port on the valve. Refer to the diagram on page 2-3.

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Transfer Tubing Installation

To install the transfer tubing, first open the top door of the autoinjector. Then, attach the loose end of the transfer tubing to its port on the syringe pump valve. Refer to the diagram on page 2-3.

Note: You will need to thread the tubing through the notch in the top door of the autoinjector to be able to close the door for operation. See circled area in the picture below.

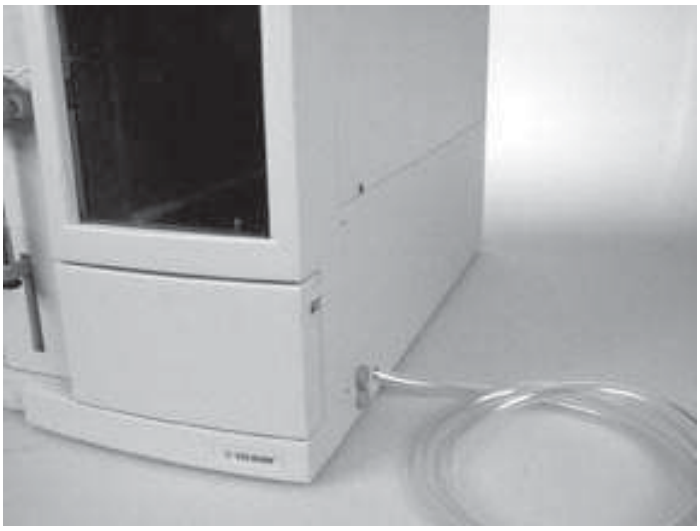


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Rinse Station and Drain Tubing Installation

You'll clean the probe using the rinse station. To eliminate carryover of liquids, the rinsing procedure pumps an excess volume of diluent or probe washing solution through the probe and out into the rinse station. The design of the rinse station allows for efficient rinsing of both the inside and outside surfaces of the probe.

The rinse station comes factory-installed on your 235/ 235P Autoinjector with the Tygon drain tubing attached. The autoinjector has an outlet hole for the drain tubing on both side panels of the instrument. You will need to thread the drain tubing out either hole as shown in the picture below.



Place a waste bottle (ordered separately) below the level of the base of the autoinjector. Using a razor blade, trim the drain tubing so that it terminates just inside the neck of the waste bottle. Be sure that the drain tubing is routed at a continuous downward slope.

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Waste Tubing

Connect one end of the teflon waste tubing (part number 495031) to port six of the injection valve. Connect one end of the silicone tubing to the injection port/ seal drain (see page 4-18). Thread the free ends of the tubing out of the autoinjector and into a waste receptacle. Make sure that the outlet of the waste tubing is lower than the waste port of the injection valve.

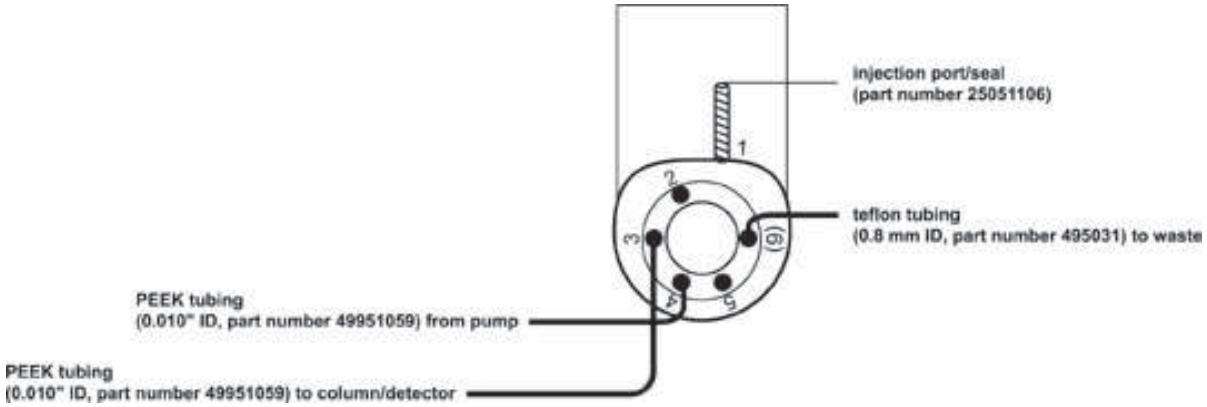
Sample Loop

The autoinjector is shipped with a 20 µL external sample loop (part number 49677522) connected to port two and port five of the injection valve and stator face assembly (part number 496775027) installed.

Column and Pump Tubing

One piece of PEEK tubing comes connected to port three of the injection valve. Connect the other end of this tubing to your column/ detector using an outlet hole on either side panel of the autoinjector.

Another piece of PEEK tubing comes connected to port four of the injection valve. Connect the other end of this tubing to your pump using an outlet hole on either side panel of the autoinjector.



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Rack Installation

The 235/ 235P Autoinjector is equipped to inject from several different racks. The following pages describe the types of racks available for the autoinjectors and how to install them. Refer to ***Appendix A, Replacement Parts and Accessories*** for a listing of compatible microplates.



Code 350 Rack

For four shallow-well microplates
Material: aluminum
Vessels and maximum capacity: 96-well microplates
384-well microplates
Part number: 24014050



Code 351 Rack

For four deep-well microplates
Material: aluminum
Vessels and maximum capacity: 96-well microplates
Part number: 24014051



Code 353 Rack

For 384 microvials
Material: aluminum
Vessels and maximum capacity: 7 x 40 mm (0.7 mL)
Part number: 24014053

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Code 354 Rack



For Peltier heating and cooling of four shallow-well microplates
Material: aluminum
Vessels and maximum capacity: 96-well microplates
Part number: 24014054

Code 355 Rack



For Peltier heating and cooling of four shallow-well microplates (96-well Nalge, Nunc, and Dynex or 384-well Nalge and Nunc styles only)
Material: aluminum
Vessels and maximum capacity: 96-well microplates
384-well microplates
Part number: 24014055

Code 356 Rack



For 192 autoinjector vials
Material: aluminum
Vessels and maximum capacity: 11.6 x 32 mm (2 mL)
Part number: 24014056

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Rack pre-installation instructions:

1 Remove the rack cover by unscrewing the two spring-loaded screws on the front of the rack.

2 Lift the cover up and out of the securing notches at the rear of the rack.



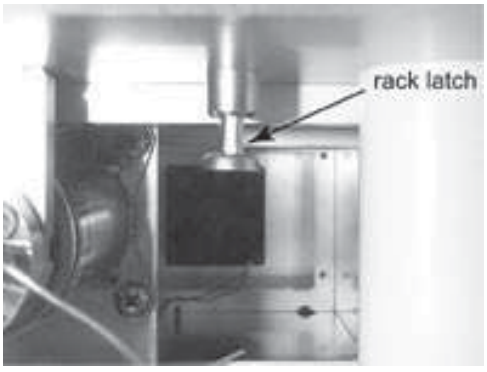


3 Refer to the picture at left and set the microplate(s) in the rack (Code 350, 351, and 354) ***or*** set the vials in the rack (Code 353 or 356). The microplates should fit fairly snugly in the rack.

4 Replace the cover and finger tighten the spring-loaded screws.

Rack installation instructions:

1 Lock the rack latch in the down position. To do this you will need to grasp it, pull it downward, and turn it 1/ 4 turn in either direction.



2 Open the door to a 90 degree angle to ensure free movement of the rack in and out of the autoinjector.

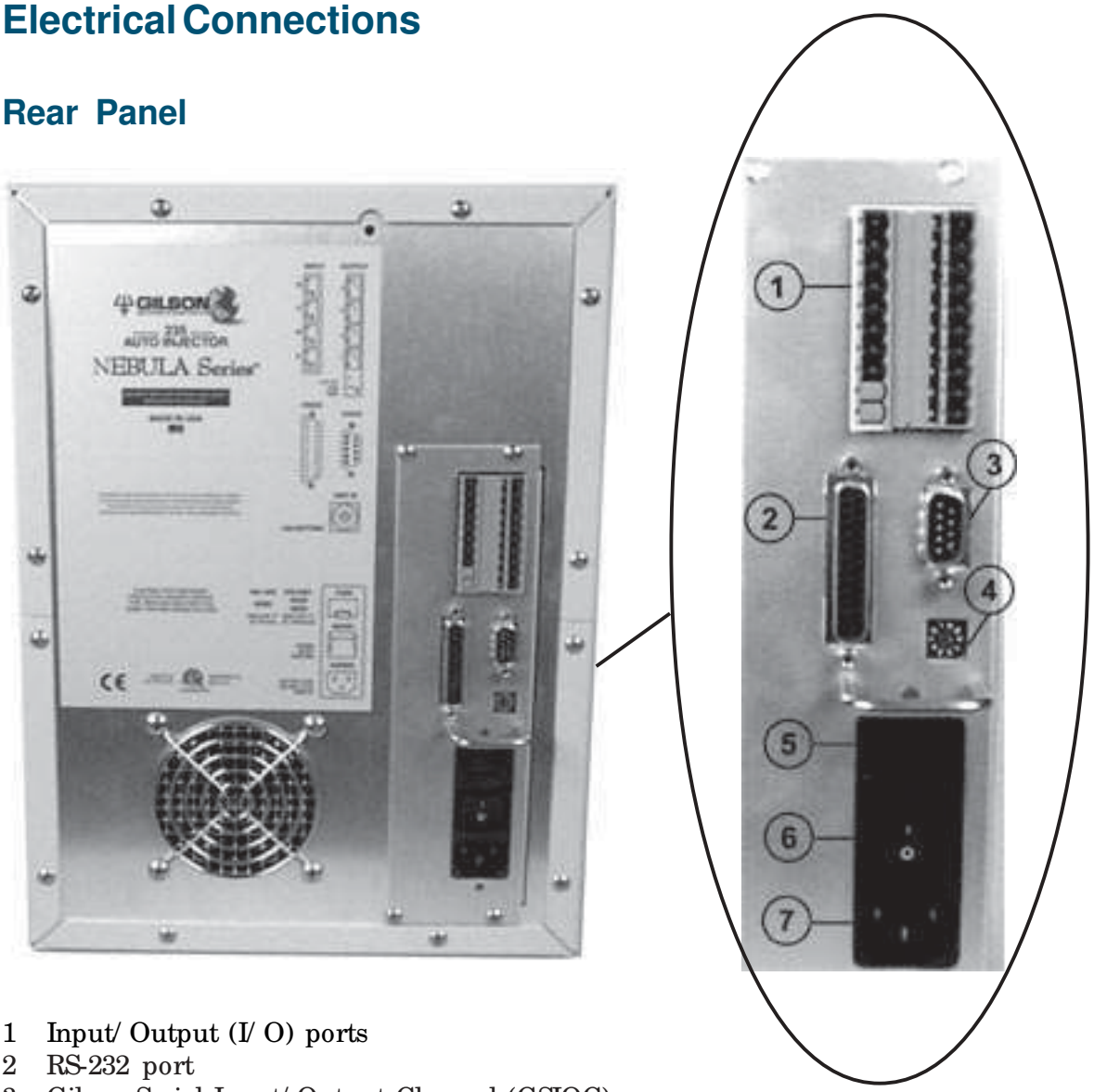
3 Slide the rack into the autoinjector through the groove in the guide rails. Push the tray slowly until you feel the resistance of the rear guide pin.

4 To lock the rack in place, turn the rack latch until you feel it spring upwards.

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Electrical Connections

Rear Panel



1 Input/ Output (I/ O) ports
2 RS-232 port
3 Gilson Serial Input/ Output Channel (GSIOC) port
4 Unit ID selector
5 Fuse drawer
6 Power switch
7 Power receptacle

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Peltier Controller (235P only)

Samples can be heated and cooled using the 235P with a Peltier Controller (ordered separately, part number 241142). The following instructions explain how to install and operate the Peltier Controller with a 235P Autoinjector.

Installing the Peltier Controller

1 Locate the accessory package containing the fuse drawer appropriate for your line voltage. Discard the other fuse drawer.

2 Locate the accessory package containing the 6.3A "T" Slo-Blo (5 x 20 mm size) fuses.

3 Install the fuse(s) into the fuse drawer. The fuse drawer for 100/ 120V accepts one fuse. The fuse drawer for 220/ 240V accepts two fuses.

4 Insert the fuse drawer into its receptacle located above the power switch in the rear panel of the Peltier Controller.

5 Locate the 6-pin Peltier connector cable (part number 7040620133) in the 235P accessory package.

6 Locate the Peltier Controller Port located below the fan on the rear panel of the 235P.

7 Connect the female end of the connector cable into the Peltier Controller Port.

8 Connect the male end of the cable into one of the two corresponding ports on the back of the Peltier Controller. Remember if the port you use is labeled UNIT 1 or UNIT 2.

9 Locate the appropriate power cord for your line voltage. Discard the other power cord.

10 Use the power cord to connect the Peltier Controller from the power receptacle to an AC power source.

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Operating the Peltier Controller

The Peltier Controller can control heating and cooling of samples in up to two 235P Autoinjectors simultaneously. Each unit has a set of control switches; a 3-position switch and temperature control knob for UNIT 1 and a 3-position switch and temperature control knob for UNIT 2. If you are only controlling one unit, verify which port (UNIT 1 or UNIT 2) the connector cable is in and use that set of control switches on the front panel.

1 Choose HEAT, STANDBY, or COOL (labeled settings) using the 3-position switch on the front panel of the Peltier Controller.

2 Adjust the setting of the temperature control knob to maximize or minimize heating or cooling.



3 Turn on the MAINS switch, located on the rear panel of the Peltier Controller and ensure that output contact three on the autoinjector is open. The contact is open by default when the autoinjector is powered on.

Using contact coordination

To use the *On at Start* or *Off at End* options in the 235 Autoinjector Software, you will need to make a contact connection between the 235P Autoinjector and the Peltier Controller.

1 Locate the pre-wired terminal block connector (part number 24013047) in the 235P accessory package.

2 Verify which port (UNIT 1 or UNIT 2) the connector cable is in. Insert the 2-pin terminal block connector in the corresponding contact input port on the Peltier Controller. Insert the 10-pin terminal block connector on the other end in the output port on the rear panel of the 235P Autoinjector.

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Input/Output Ports

You can use the input and output contacts found on the rear panel of the autoinjector to control peripheral devices. Refer to the picture on page 2-11 for the location of the input/ output ports.

Contact inputs

The input terminal block of the autoinjector has eight connections. All of the inputs are paired, and each pair include a GROUND reference (⏚).

The contact input pairs are labeled A, B, C, and D.

A contact is connected if it has a short across the input or is held low by a TTL output or other device.

Never connect voltages higher than 5V DC to an input. When using TTL signals, be sure to match GROUND connections.

Contact outputs

The output terminal block has 10 connections.

Pins 9 and 10 supply a +12V DC output. **Do not use this output unless the receiving device can accept 12V power.**

Pins 1 through 8 are paired, isolated-relay contact closures and are labeled 4, 3, 2, and 1.

Items you'll need

To make connections, you'll need the following:

- 2-conductor cable (22–30 gauge for each wire)
- wire insulation stripper
- small flat blade screwdriver

You can purchase a 6-foot piece of suitable cable (part number 709910206) or a package of five cables with identification markers (part number 36078155) from Gilson.

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Making connections

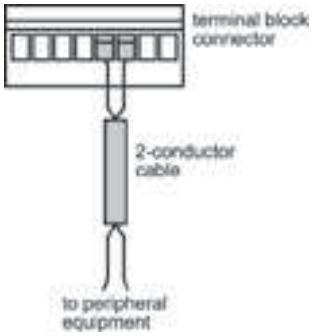
To prepare and make connections with the 2-conductor cable:

1 Cut the cable into pieces of appropriate length.

2 Strip about 0.25 cm of insulation from each end of the cable.

3 Remove the green terminal block connector from the autoinjector.

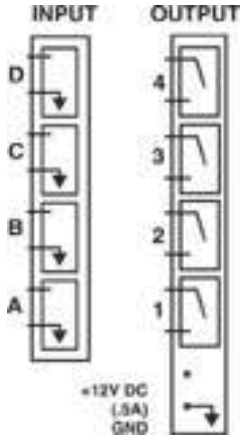
4 Insert each wire into the appropriate slot on the connector.



Note: When making connections, be sure to maintain the correct orientation of the connector relative to the port.

Push the wire all the way in; then tighten its corresponding pin screw.

5 Reconnect the terminal block connector to the autoinjector. The wires will be facing left on the inputs or right on the outputs and the pin screws will be facing you as you look at the rear of the instrument. Push the connector in as far as it will go. It is designed to fit snugly into the port.



6 Connect the opposite ends of the wires to the other device(s). Be sure to match ground connections.

7 Label each cable to identify the purpose of the connection.

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Contact Input/Output Definitions

Input		*Output*	
A	This input receives contact communication by detecting an open or closed contact output from an external device. When a closed contact is detected, the autoinjector turns its injection valve to load. When an open contact is detected the autoinjector turns its injection valve to inject. This contact is required for coordination with other control software when the 235 Autoinjector Software is in contact coordination mode.	**1**	Sends a pulse to a controller or other controlling device when the injection valve is switched from load to inject when an injection is made. This contact is required for coordination with other control software when the 235 Autoinjector Software is in contact coordination mode.
B	Undefined	**2**	This contact closes when the injection valve turns to load. The contact opens when the injection valve is switched from load to inject when an injection is made. It is used for coordination with other devices (such as a strip chart or mass spec detector) when the 235 Autoinjector Software is in contact coordination mode.
C	Undefined	**3**	This contact turns the Peltier device in the 235P Autoinjector on or off. When the contact is closed the Peltier is off. When it is open the Peltier is on.
D	This input can read an error from an external device using contact communication. The 235 Setup utility (Error Handling tab) allows you to tell the 235/235P Autoinjector how to read the error (open or closed contact). When an error is read, the autoinjector goes into an error state.	**4**	The 235 Setup utility (Error Handling tab) allows you to tell the 235/235P Autoinjector to open or close this contact when the autoinjector's STOP/HOME button is pressed, a safety input is activated, or an error is caused by the autoinjector.

For more information, refer to ***Appendix D, System Variables and Methods (235 Autoinjector Software)***.

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RS-232 Port

The RS-232 port is used to transfer information between the autoinjector and a computer. For the location of the RS-232 port, refer to the diagram on page 2-11.

Be sure your computer is turned off before making any connections.

To connect your computer to the autoinjector, you'll need an RS-232 cable. Obtain a cable with D-connectors that are appropriate for the autoinjector and your computer. The autoinjector requires a 25-pin male D-connector. Refer to the back panel of your computer or its documentation to determine which type of D-connector it requires. RS-232 cables are available from Gilson and your local computer store.

Connecting RS-232 cable

Attach the male end of the RS-232 cable to the RS-232 port located on the back panel of the 235 Autoinjector. Tighten the retaining screws.

Attach the other end of the RS-232 cable to the computer's RS-232 serial communications port (do not mistake it for the female 25-pin parallel printer port!) Again, tighten the retaining screws.

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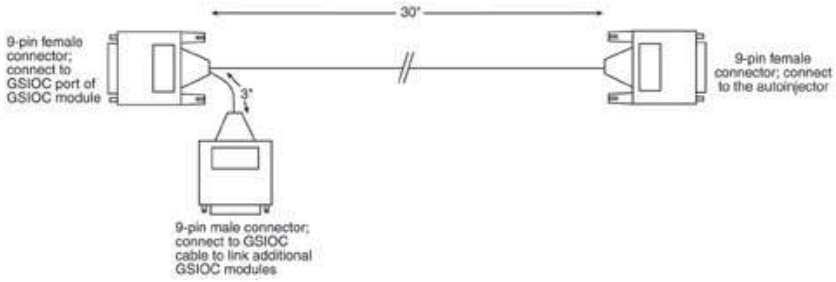
GSIOC Port

Gilson systems feature a two-way communication interface between the computer and most Gilson modules. Communication occurs along the Gilson Serial Input/ Output Channel (GSIOC).

The autoinjector can convert the RS-232 signal levels used by computers to the RS-422/ 485 signal levels required by the GSIOC and *vice versa* (see page 2-17 for information on making the RS-232 connection between the autoinjector and the computer).

GSIOC cable

Use the GSIOC cable to link an additional Gilson GSIOC module to the autoinjector and control both devices via a program executed on the computer. Connect the female connector, located individually at one end of the cable, into the GSIOC port of the autoinjector. Tighten the retaining screws.



Connect the other female connector, located on the same end as the male connector, to the Gilson module. Tighten the retaining screws.

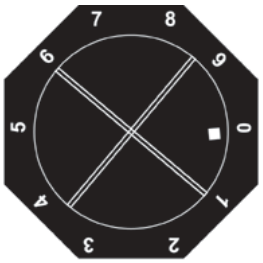
If you're connecting another Gilson module, use the male connector to join another GSIOC cable and make the necessary connection to the next Gilson module.



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Unit ID Selection

At the factory, Gilson set the autoinjector unit ID to 20. The unit ID identifies the 235 Autoinjector to Gilson software packages that can issue GSIOC commands to Gilson devices. **There is no need to change the unit ID unless it is the same as that assigned to another Gilson device connected along the GSIOC.**



Unit ID = 20 + setting

To change the unit ID:

1 Gently insert a small flat blade screwdriver into the Unit ID selector on the rear panel and turn it.

2 Align the white square with one of the numbers. The unit ID is 20 plus the selected number.

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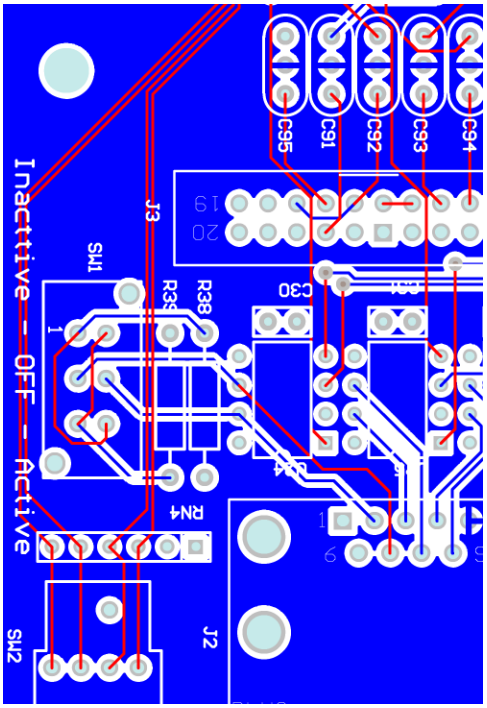
Termination Switch Selection

The termination switch is located on the circuit board of the autoinjector. The switch has 3 positions: inactive (up or left), off (middle), and active (down or right). The default position is off which is appropriate if you are controlling a single 235/235P Autoinjector with the 235 Autoinjector Software or 735 Sampler Software (via RS-232) or with UniPoint System Software (via GSIOC).

If you are controlling multiple autoinjectors, you must set the switch accordingly dependent on the control cable being used (RS-232 for the master, GSIOC for the slaves). Refer to the diagram below.



Note: For additional information on the GSIOC interface, request a copy of the *Gilson GSIOC Technical Manual* (part number LT2181).



To change the position of the termination switch:

1 Turn off power to the autoinjector.

2 Remove the four screws securing the circuit board in the rear panel of the autoinjector.

3 Pull the circuit board out of the rear panel using the pull handle attached.

4 Locate **SW1** in the bottom left corner of the circuit board (refer to the picture at left).

5 Use your fingers to move the switch between positions.

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Fuses

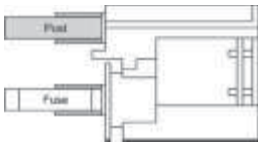
To install the fuses on your autoinjector:

1 Locate the accessory package containing the fuse drawer appropriate for your line voltage. Discard the other fuse drawer.

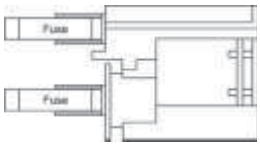
2 Locate the accessory package containing the 2.5A “T” Slo-Blo (5 x 20 mm size) fuses.

3 Install the fuse(s) into the fuse drawer. The fuse drawer for 100/ 120V accepts one fuse. The fuse drawer for 220/ 240V accepts two fuses.

4 Insert the fuse drawer into its receptacle in the autoinjector. See rear panel diagram on page 2-11.



Fuse installation for 100/120 voltage



Fuse installation for 220/240 voltage

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Power Cord Connection

Locate the appropriate power cord for your line voltage. Discard the other power cord.

Use the power cord to connect the autoinjector from the power receptacle to an AC power source.

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Operation 3

The 235/ 235P Autoinjector is controlled by a program (235 Autoinjector Software, 735 Sampler Software or UniPoint™ System Software) that is run from a personal computer.

This section describes how to control the 235/ 235P Autoinjector using the 235 Autoinjector Software. If you are using UniPoint System Software or 735 Sampler Software to control the autoinjector, refer to the documentation supplied with the software.

Note: Before operating the autoinjector you must remove the shipping screw from the rear panel of the instrument and the warning label from the front of the instrument.

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Front Panel

The front panel of the autoinjector has a STOP/ HOME button and POWER, READY, INJECT, LOAD, and ERROR indicator lights.

STOP/HOME button

The STOP/ HOME button is a soft key that can be pressed to stop the autoinjector from responding to any more commands coming from the running program and/ or will home the instrument.

In a situation where an emergency stop is required, pressing the STOP/ HOME button immediately stops the autoinjector.

POWER indicator light

This indicator lights when you turn on power to the autoinjector using the power switch located on the rear panel (refer to diagram on page 2-11).

READY indicator light

This indicator lights when the autoinjector is ready to run your method.

INJECT and LOAD indicator lights

These lights identify the position of the injection valve.

INJECT light	LOAD light	Condition
Off	On	Valve at LOAD position
On	Off	Valve at INJECT position
On	On	Valve is turning
Off	Off	Unknown valve position

ERROR indicator light

This light flashes when there is a problem and it indicates that the autoinjector is unable to receive commands.

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Start Up

To start the autoinjector:

1 Make sure the autoinjector is connected to a power source.

2 Turn on the autoinjector using the power switch located on the rear panel (refer to the rear panel diagram on page 2-11 if necessary). The power indicator light on the front panel lights.

3 As the autoinjector powers up, the LOAD light flashes. When only the POWER light remains lit, press the STOP/ HOME button. This initiates the homing sequence that allows the autoinjector to determine its mechanical reference positions. The sequence takes approximately one minute to complete.

While the homing sequence progresses, the READY light flashes. When the sequence completes, the READY light illuminates.

Note: If the program controlling the autoinjector does not include commands for homing the instrument, perform step three before starting the program.

The utility program supplied with the autoinjector homes the instrument if necessary.

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Installing the 235 Autoinjector Software

1 Turn on the computer.

2 Determine the letter designation of your CD-ROM drive.

3 Insert the compact disc into your CD-ROM drive.

4 On the Windows desktop, click on Start, located in the lower left of the screen.

5 From the *Start* menu, click *Run*.

6 When the Run box appears, type e:\setup.exe (e: representing your CD-ROM drive) Then click *OK*.

7 Follow the on-screen instructions to install the 235 Autoinjector Software.

8 If prompted, elect to restart your computer at the end of the installation process.

9 When the installation is complete, remove the compact disc from the CD-ROM drive.

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Using the 235 Setup Utility

The autoinjector comes from the factory with its configuration set by Gilson. Configuration information is stored in the nonvolatile memory of the autoinjector. Prior to using the autoinjector for the first time, it is important to review and adjust the default configuration to make sure it is correct for your application.

The 235 Setup utility in the Gilson Applications folder on your desktop is a program that allows you to review and change the configuration options set for the autoinjector.

When you execute the 235 Setup program, the following selectable tabs appear:

- Adjust XY
- Home Phase
- Syringe
- Bearing Life
- Error Handling
- Options
- About

Refer to the online help for a description of the options on each tab.

Priming the Autoinjector

Gilson recommends priming the syringe and transfer tubing line before using the autoinjector for the first time or if the instrument has not been used for some time. This will eliminate any air that remains in the liquid line. To do this, open the 235 Setup utility (Syringe tab) and click on *Prime* or click on the *Prime Syringe and Rinse Probe* button under Control-Manual Control in the 235 Autoinjector Software.

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Using the 235 Autoinjector Software

The 235 Autoinjector Software controls the Gilson 235/ 235P Autoinjector. When you run the 235 Autoinjector Software, you are prompted to enter information that customizes a control parameter file to meet your needs. For example, you select a type of injection technique (total loop, partial loop, or centered loop) and an injection volume, and you choose how to synchronize injection with the analytical system(s). You will learn about how to use the 235 Autoinjector Software on the following pages.

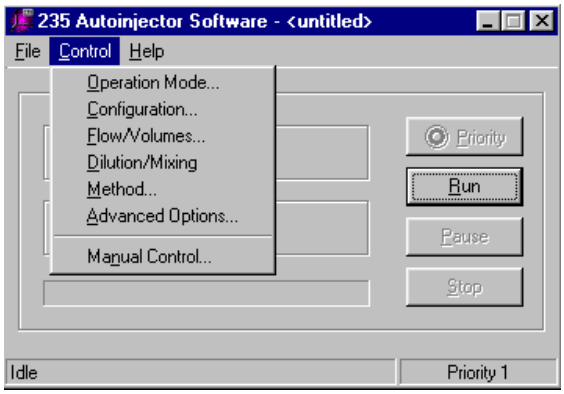
Creating a Control Parameter File

To begin creating a control parameter file:

1 Start the 235 Autoinjector Software by double-clicking its icon in the Gilson Applications folder on your desktop.

2 From the File menu, select New.

3 From the Control menu, select each sub-menu and set your parameters within that sub-menu.



For descriptions of the parameters, refer to the online help provided with the 235 Autoinjector Software.

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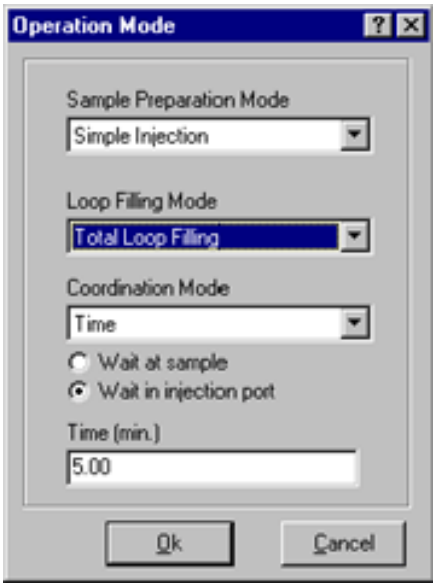
Operation Mode

Sample Preparation Mode

The sample preparation mode that you choose will influence the parameters available to you.

Refer to the table below for a description of the sample preparation modes available.

Note: For more time efficient large volume dilutions, use a larger volume syringe.



Simple Injection	Samples are injected in an order determined by the tray file
Simple Injection with Dilution	Sample is dispensed to a process zone where it is mixed with diluent. The diluted sample is then injected. Samples are prepared and injected in an order determined by the tray file
External Standard	Standards and samples are injected in an order determined by the tray file. Standard sets may be injected at defined intervals between sample injections.
External Standard with Dilution	Sample or standard is dispensed to a process zone where it is mixed with diluent. The diluted sample or standard is then injected. Standards and samples are prepared and injected in an order determined by the tray file. Standard sets may be injected at defined intervals between sample injections.
Internal Standard	Sample or standard is dispensed to a process zone where it is mixed with internal standard. The mixed sample or standard is then injected. Standards and/or samples are prepared and injected in an order determined by the tray file. External standard sets may be injected at defined intervals between sample injections.
Internal Standard with Dilution	Sample or standard is dispensed to a process zone where it is mixed with internal standard and diluent. The diluted sample or standard is then injected. Standards and/or samples are prepared and injected in an order determined by the tray file. External standard sets may be injected at defined intervals between sample injections.

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Loop Filling Mode

Select a loop filling mode based on the amount of sample available. The following choices are available and the descriptions follow on the next few pages.

- Total Loop Filling
- Partial Loop Filling
- Centered Loop Filling

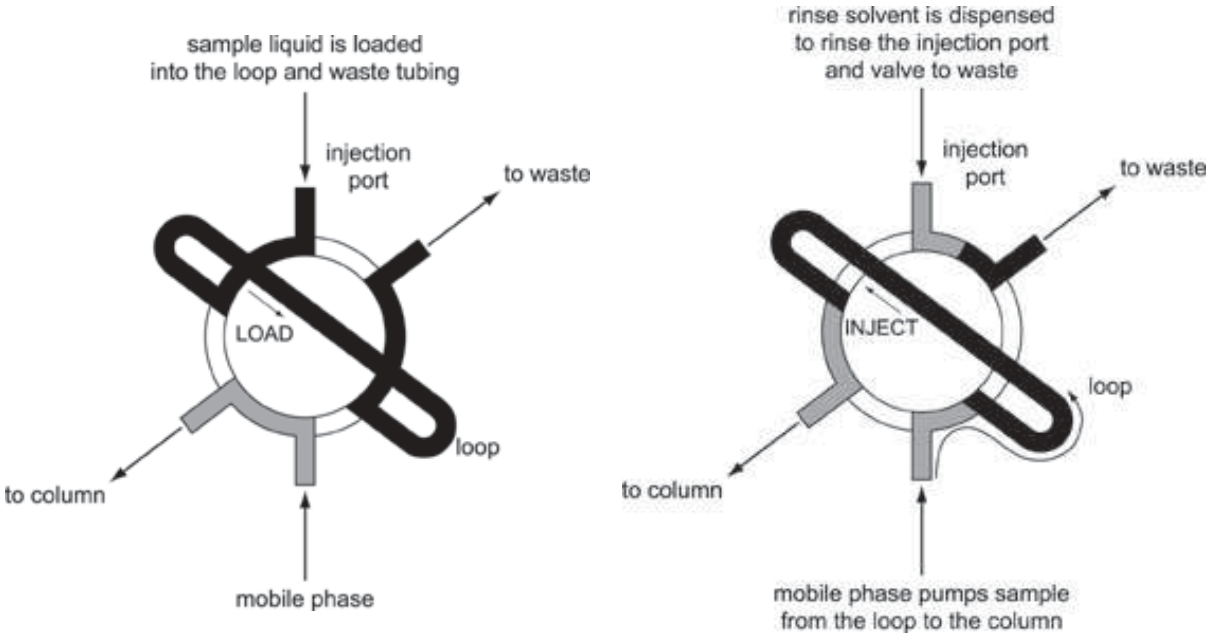
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Total Loop Filling

The total loop filling method of sample injection results in the highest precision; however, a significant volume of sample is used to overfill the sample loop. Both a loop filling coefficient (number of times to overfill the loop) and injection flush volume (volume to pre-fill the injection port/ seal dead volume) need to be defined when a total loop filling method is used. For the best precision, a volume of sample equal to three to five times the loop volume must be loaded into the loop.

For a sample loop volume of 20 µL with a loop filling coefficient of four and an injection flush volume of 15 µL, the volume of sample required is 95 µL (injection loop volume multiplied by the loop filling coefficient plus the injection flush volume). The sample volume injected is equal to the sample loop volume (20 µL in this example).

With the valve in the LOAD position, the aspirated sample volume is dispensed into the sample loop; extra volume flows out of the valve waste port. This technique ensures a precise sample volume that is equal to the loop volume is injected to the HPLC system.



Total Loop Filling-LOAD (left) and INJECT (right) Valve Positions

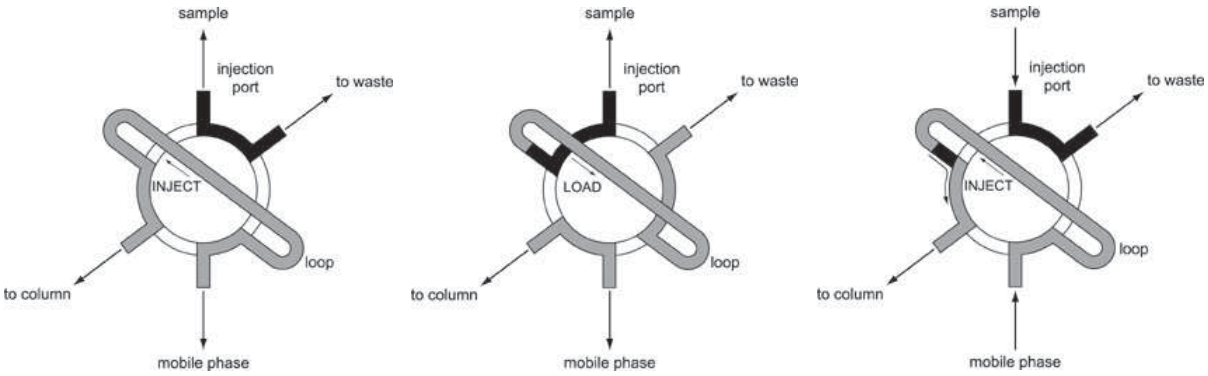
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Partial Loop Filling

The partial loop filling method of sample injection allows you to precisely inject variable volumes of sample; this method is used when sample volume is limited. A user-set "injection flush volume" of sample is dispensed through the injection port to waste. This ensures that the actual sample volume in the loop will be accurate. In general, linearity is assumed for injection volumes up to half of the sample loop volume for partial loop injection.

For a sample injection volume of 5 µL with an injection flush volume of 15 µL, the volume of sample liquid required is 20 µL (injection volume plus the injection flush volume).

With the valve in the INJECT position, the injection flush volume is dispensed to flush the injection port with sample. The valve is switched to the LOAD position and the injection volume is dispensed into the sample loop. When the valve moves back into the INJECT position, the sample is injected and the injection port and waste tubing are rinsed.



Partial Loop Filling-LOAD and INJECT Valve Positions

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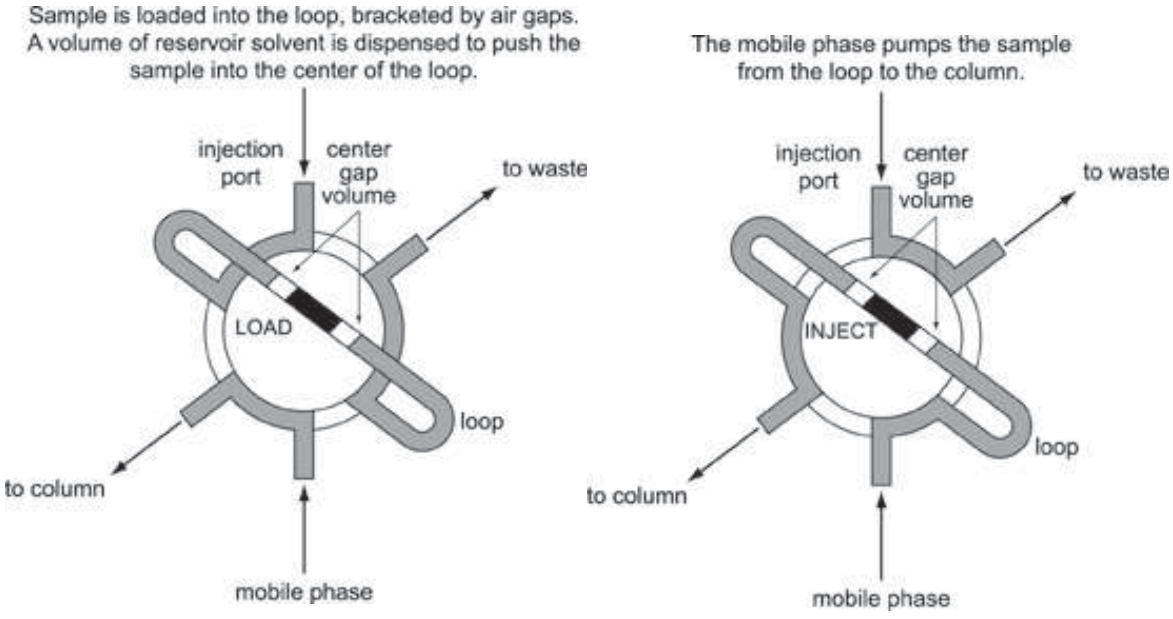
Centered Loop Filling

The centered loop filling method of sample injection allows accurate injection volumes with no sample loss. The recommended maximum injection volume is half the sample loop volume or less.

When using the centered loop filling method, the autoinjector will aspirate an air gap, then aspirate the sample injection volume followed by a second air gap. The air gaps "isolate" the sample in the probe and transfer tubing to avoid dilution with the reservoir liquid. The total aspirated volume (the two air gaps plus injection volume) must not exceed the sample loop size.

For a sample injection of 5 µL, the volume of sample liquid required is 5 µL since no loop overfill or injection flush volume are required for this loop filling method.

With the valve in the LOAD position, the injection volume plus the two air gaps are pushed into the center of the sample loop by the syringe pump reservoir liquid. The valve is switched to the INJECT position and the sample is injected to the HPLC system.



Centered Loop Filling-LOAD (left) and INJECT (right) Valve Positions

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Coordination Mode

Refer to the following pages for descriptions of the available coordination modes.

Time coordination mode

This mode allows you to set the period of time the 235 Autoinjector Software will wait between injections.

After an injection, the next sample is aspirated or prepared (if necessary) as the specified coordination time elapses. The coordination time should reflect the time needed for data collection, the analysis time, and the time needed to print the report.

When an injection occurs, a pulse is sent from the output contact 1. This output contact can be connected to the start input contact of an integrator.

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Contact coordination mode

This mode enables the 235 Autoinjector Software to communicate with a control software using input contact A and output contact 1. The 235/ 235P Autoinjector can communicate with other devices using output contact 2.

The following order of events occur when contact coordination is used:

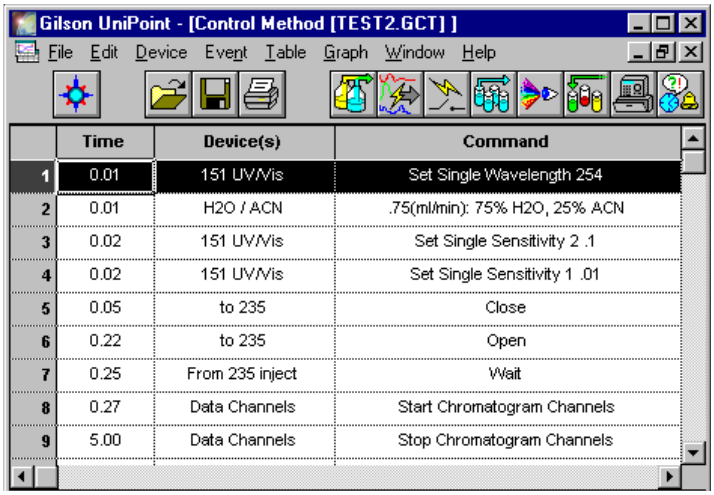
1 The autoinjector either prepares a sample and waits for input contact A to detect a closed contact signal from the other control software before loading the sample or waits at the sample site for input contact A to detect a closed contact signal before preparing and loading a sample.

2 The autoinjector closes output contact 2.

3 The autoinjector waits for input contact A to detect an open contact signal from the other control software before injecting the sample.

4 The autoinjector injects the sample, sends a pulse from output 1 and opens output contact 2 to signal the start of injection to another device. Steps one through four are repeated until the run is complete.

Note: To receive system error messages from other devices, label and use input contact D on the 235/ 235P Autoinjector. To send an error message use output contact 4. Refer to the contact descriptions on page 2-16.



	Time	Device(s)	Command
1	0.01	151 UV/Vis	Set Single Wavelength 254
2	0.01	H2O / ACN	.75(ml/min): 75% H2O, 25% ACN
3	0.02	151 UV/Vis	Set Single Sensitivity 2 .1
4	0.02	151 UV/Vis	Set Single Sensitivity 1 .01
5	0.05	to 235	Close
6	0.22	to 235	Open
7	0.25	From 235 inject	Wait
8	0.27	Data Channels	Start Chromatogram Channels
9	5.00	Data Channels	Stop Chromatogram Channels



Example UniPoint control method for contact coordination with the 235 Autoinjector Software

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GSIOC coordination mode

This mode of coordination allows the 235 Autoinjector Software to communicate with UniPoint™ System Software using a Gilson Serial Input/ Output Channel (GSIOC) connection. UniPoint must have the three injector events listed below defined in the control method that will be used.

Wait for Display Message
The message string should be "Ready" (typed without the quotation marks).

Write to Display
The input should be "Go" (typed without the quotation marks).

Wait for Display Message
The message string should be "Done" (typed without the quotation marks).

If the UniPoint control method is written correctly, the following order of events will occur when GSIOC coordination is used:

1 UniPoint will Wait for Display Message "Ready" while the autoinjector prepares the sample.

2 When the autoinjector is ready to load the sample it will inform UniPoint that it is "Ready." This will allow UniPoint to continue with the control method. The autoinjector waits for a "Go" signal from UniPoint.

3 UniPoint will Write to Display "Go" when it is ready for the autoinjector to load the sample.

4 The autoinjector will respond to the "Go" command from UniPoint and proceed to load the sample.

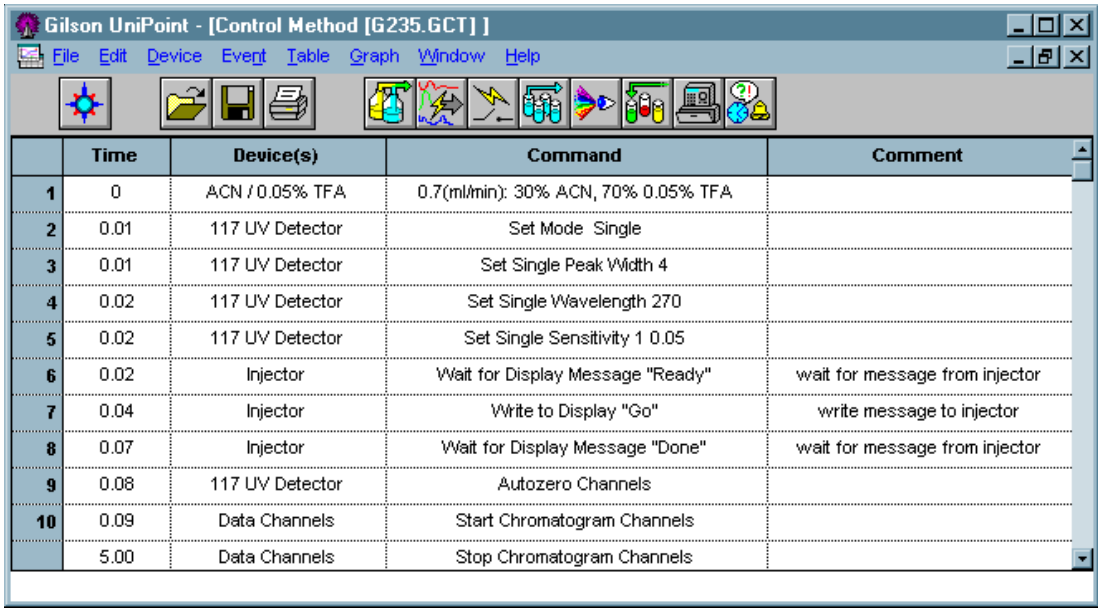
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5 UniPoint will Wait for Display Message "Done" while the autoinjector loads the sample.

6 When the autoinjector injects the sample it will inform UniPoint that it is "Done." This will allow UniPoint to continue with the control method and data collection.

7 The autoinjector rinses the injection port and probe and proceeds to prepare the next sample for injection.

8 Steps one through seven are repeated for each sample.



	Time	Device(s)	Command	Comment
1	0	ACN / 0.05% TFA	0.7(ml/min): 30% ACN, 70% 0.05% TFA	
2	0.01	117 UV Detector	Set Mode Single	
3	0.01	117 UV Detector	Set Single Peak Width 4	
4	0.02	117 UV Detector	Set Single Wavelength 270	
5	0.02	117 UV Detector	Set Single Sensitivity 1 0.05	
6	0.02	Injector	Wait for Display Message "Ready"	wait for message from injector
7	0.04	Injector	Write to Display "Go"	write message to injector
8	0.07	Injector	Wait for Display Message "Done"	wait for message from injector
9	0.08	117 UV Detector	Autozero Channels	
10	0.09	Data Channels	Start Chromatogram Channels	
	5.00	Data Channels	Stop Chromatogram Channels	

Example UniPoint control method using injector events for GSIOC coordination with the 235 Autoinjector Software

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Wait at sample

Instructs the probe to wait above the sample that will be injected. When the next injection is signaled (as determined by the coordination mode chosen), the following actions will occur:

1 The autoinjector will lower the probe into then aspirate the sample.

2 The probe will move into the injection port.

3 The autoinjector will load and inject the sample.

4 The next sample will be processed (if necessary).

5 The probe will wait above the processed sample for the next injection signal.

This option optimizes temperature control of the sample when using 235P Autoinjector Peltier heating or cooling.

Wait in injection port

Instructs the autoinjector to aspirate the next sample to be injected then move the probe into the injection port. The probe will wait in the injection port until the next injection is signaled (as determined by the coordination mode). The following actions will occur:

1 The autoinjector will load and inject the sample.

2 The next sample will be processed.

3 The autoinjector will aspirate the next sample.

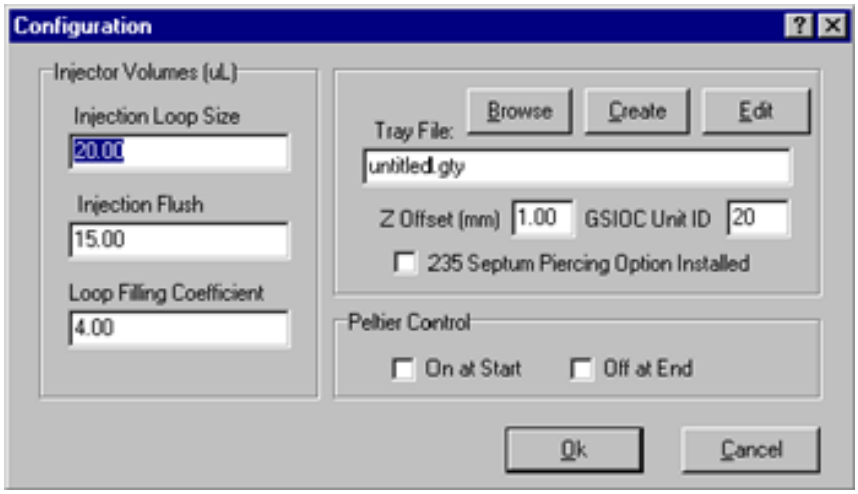
4 The probe will move into the injection port and wait for the next injection signal.

This is the most time efficient option.

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Configuration

This screen has dialog boxes that allow you to choose injector volumes, access the Tray Editor, vary the Z offset, type in the unit ID (if different than 20) of the instrument you are controlling, and specify Peltier control. More detailed descriptions of and defaults for the parameters (if applicable) are listed below.



Injection Loop Size

The volume (in whole microliters) of the installed injection loop. The default setting is 20 as this loop size is the standard accessory.

Injection Flush

This is the volume of sample (in microliters) that will be used to flush the injection port so that an accurate volume of sample will be injected into the sample loop. This parameter is only available for total and partial loop filling methods.

Loop Filling Coefficient

This is the number of loop volumes to be flushed through the injection loop. If the loop filling coefficient was 2 with an injection loop volume of 20 µL, a total of 40 µL of sample would be flushed through the injection loop. This parameter is only available for a total loop filling method.

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Tray File

A tray file contains rack, zone, and tube information for the autoinjector's tray. When you run the 235 Autoinjector Software, you create or select the tray file that you want the program to use when locating the samples to be injected. For additional information refer to ***Appendix F, Tray Editor Software*** or the Gilson Tray Editor online help.

Follow the instructions below to set up a tray file:

1 From the Control menu, select Configuration.

2 Click on *Browse* to search for and select an existing tray file or click on *Create* to make a new tray file. Click on *Edit* to edit an existing tray file at the path in the Tray File field.

3 If you are creating a new tray file, double-click on the gray tray at the left of your screen. This will give you the rack options:

- code_350.grk
- code_351.grk
- code_353.grk
- code_354.grk
- code_355.grk
- code_356.grk

Select the rack that you want to add and click on *OK*.

4 If you chose code_353.grk or code_356.grk, skip ahead to step 5. If you chose code_350.grk, code_351.grk, or code_354.grk you will see the screen shown below.



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If you chose **code_350.grk**, **code_354.grk** or **code_355.grk**, you will need to select which type of shallow microplate you will be using in each quadrant of the rack. You will do this by double-clicking in the quadrant and then choosing the corresponding rack file:

- mp_384.grk indicates a 384-well shallow microplate
- mp_96.grk indicates a 96-well shallow microplate

If you chose **code_351.grk**, you will need to double click each quadrant and then choose mp_96d.grk for deep well microplates.

5 Assign **required** zone names to groups of vessels by first selecting the zone from the drop-down menu and then selecting the vessels. Refer to the table below for descriptions of the zones.

Zone Names

(Required)

SAMPLE

Location of the raw or unprepared samples

INTERNAL

Location of the internal standard on the tray. Only one site/ vessel can be used for the internal standard.

PROCESS

Location of the sites where sample preparation (diluting/ mixing) occurs. One process zone site is required for every sample zone site, priority zone site, and standard zone site defined. Additional process sites are required for additional external standard sets.

PRIORITY

Location of sample sites where a priority sample may be placed. If sample diltion/ mixing is required, one process site is required for every priority site defined.

STANDARD

Location of unprepared external standards. Standards are always obtained from this zone even when standard sets are repeated intermittently between samples. This zone must be defined if any external standards are to be used in a method.

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Sample Preparation Mode	Required Zone Definitions	Optional Zone Definitions
Simple Injection	• SAMPLE	• PRIORITY
Simple Injection with Dilution	• SAMPLE • PROCESS	• PRIORITY
External Standard	• SAMPLE • STANDARD	• PRIORITY
External Standard with Dilution	• SAMPLE • PROCESS • STANDARD	• PRIORITY
Internal Standard	• SAMPLE • INTERNAL • PROCESS	• PRIORITY • STANDARD
Internal Standard with Dilution	• SAMPLE • INTERNAL • PROCESS	• PRIORITY • STANDARD

6 Save your tray file. To use it for any run, you will need to browse it into the Tray File field in the Configuration screen by clicking *Browse* and searching for the file.

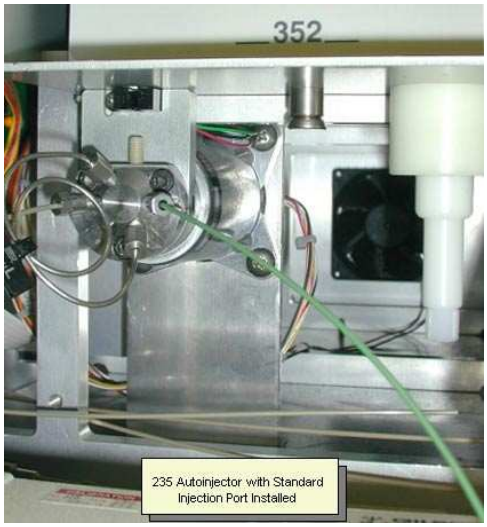
Note: If you want to create additional tray files, exit Gilson Tray Editor and then click on *Create* again.

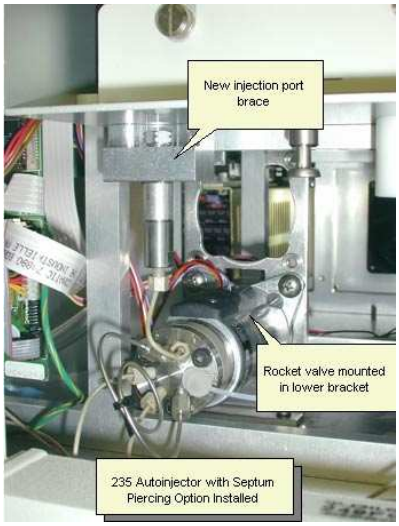
Your Control Parameter file will not run if you do not use the required zone names in the tray file.

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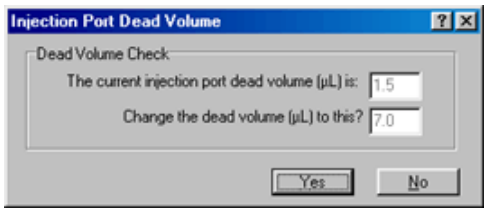
235 Septum Piercing Option Installed

Check this box if your 235 or 235P Autoinjector is equipped for a septum piercing probe. Refer to the pictures below to assist you in determining if your autoinjector is equipped for the 235 septum piercing option.





Next, you will see the following dialog box if you have indicated to the software that you have the 235 septum piercing option installed. This is where a recommended dead volume for the injection port is displayed when a septum piercing probe is installed.



The value in **The current injection port dead volume (µL) is:** field reads the injection port dead volume from the Advanced Options screen. The **Change the dead volume (µL) to this?** field displays the volume (in microliters) that was determined to be optimal when using the septum piercing probe. To change the dead volume enter a different volume in the **Injection Port Dead Volume (µL)** field on the Advanced Options screen.

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Z Offset

This parameter allows you to control the depth that the probe will travel down into the vessel. The default setting of 1.0 mm will place the probe approximately 1 mm above the bottom of the vessel. To make the probe stop further up in the vessel type in a number between 1.1 and 10.0. To make the probe sample further down in the tube type in a number between .9 and –10.0.

Caution: Usually you will not need to enter a negative number to sample from the true bottom of the vessel. Entering a negative number may cause the probe to penetrate the tube or microplate bottom and may damage the probe.

GSIOC Unit ID

This is where you identify to the 235 Autoinjector Software the unit ID of the autoinjector that you want to control. The default setting is 20. You will only need to change this setting if you will be controlling a second 235/ 235P Autoinjector or have another GSIOC unit set at Unit ID 20.

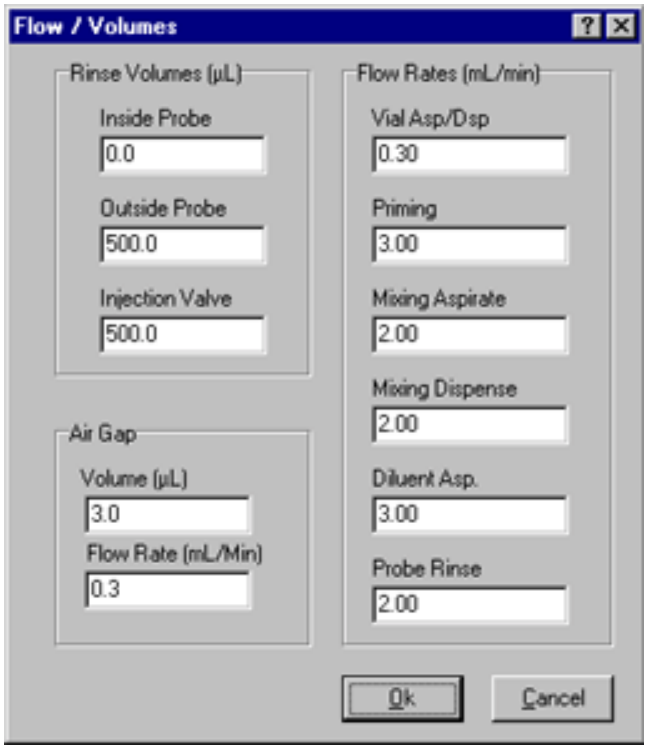
Peltier Control

This is where you coordinate the Peltier effect with a run of samples. If you check the *On at Start* box, the 235 Autoinjector Software will check to see if the Peltier device is on before starting a run. If it is on, it will remain on. If it is off, it will turn on and the software will ask you if the temperature is acceptable before continuing. If you check the *Off at End* box, the 235 Autoinjector Software will turn the Peltier device off when the run is finished.

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Flow/Volumes

This screen has dialog boxes that allow you to choose various rinse volumes, flow rates and the air gap volume and flow rate. More detailed descriptions of the parameters are listed below.



Inside Probe

The volume (in microliters) of reservoir solvent that will be used to rinse the inside of the probe.

Outside Probe

The volume (in microliters) of reservoir solvent that will be used to rinse the outside of the probe.

Injection Valve

The volume of reservoir solvent that will be used to rinse the injection port.

Air Gap Volume (µL)

This is the volume of air (in microliters) that is aspirated whenever an air gap is required.

Air Gap Flow Rate (mL/Min)

This is the rate at which the air gap is aspirated. The maximum flow rate is dependent on syringe size. Refer to the table on the next page for maximum flow rates for each syringe size.

Vial Asp/Dsp

The rate at which liquid is aspirated or dispensed to a vessel. The maximum flow rate is dependent on syringe size. Refer to the table on the next page for maximum flow rates for each syringe size.

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Syringe Size (µL)	Maximum Flow Rate (mL/min)
100	3
250	6
500	17
1000	34
5000	100
10000	100

Priming

This is the rate at which the probe and transfer tubing are primed with solvent from the syringe pump reservoir. The maximum flow rate is dependent on syringe size. Refer to the table above for maximum flow rates for each syringe size.

Mixing Aspirate

This is the rate at which a sample is aspirated for mixing in a process vessel. The maximum flow rate is dependent on syringe size. Refer to the table above for maximum flow rates for each syringe size.

Mixing

This is the rate at which a sample is dispensed for mixing in a process vessel. The maximum flow rate is dependent on syringe size. Refer to the table above for maximum flow rates for each syringe size.

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Diluent Asp.

This is the rate at which solvent is aspirated from syringe pump reservoir. The maximum flow rate is dependent on syringe size. Refer to the table on the previous page for maximum flow rates for each syringe size.

Probe Rinse

This is the rate at which solvent from the syringe pump reservoir is dispensed to rinse the inside and outside of the probe. The maximum flow rate is dependent on syringe size. Refer to the table on the previous page for maximum flow rates for each syringe size.

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Dilution/Mixing

Dilution Factor

The dilution factor is applied to all samples and standards to determine your final sample and standard concentrations after dilution. Define the dilution factor as a fraction of your initial sample and standard concentrations.

For example, define your dilution factor as 1/ 2 to have your raw sample (2 mg/ mL, for example) diluted to a concentration that is half of the original. 2 mg/ mL (raw sample concentration) multiplied by 1/ 2 (dilution factor) equals 1 mg/ mL (desired sample concentration).

Or as another example, define your dilution factor as 1/ 3 if you want your raw sample (2 mg/ mL) diluted to a concentration that is one third of the original (0.67 mg/ mL).

For no dilution of samples or standards, a "1" may be entered into the dilution factor denomination box.

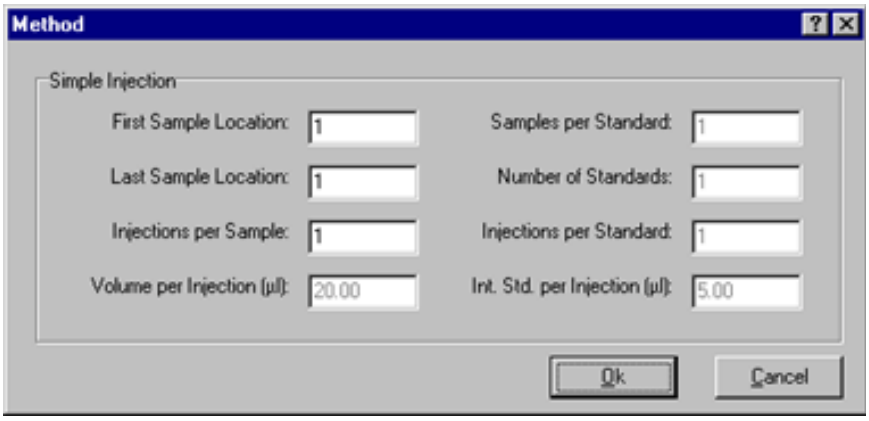
Mix Cycles

This is the number of times the sample is aspirated and dispensed for mixing in the process site. The number of mixing cycles only needs to be defined if an internal standard or dilution will be used.

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Method

This screen has dialog boxes that allow you to specify the sample volume and locations, standard injection frequency, and number of samples and standards. More detailed descriptions of the parameters (if applicable) are listed below.



First Sample Location

This is the number of the tube, as defined in the SAMPLE zone of the tray file, that will be prepared and/ or injected first.

Last Sample Location

This is the number of the tube, as defined in the SAMPLE zone of the tray file, that will be prepared and/ or injected last.

Injections per Sample

This is the number of times each sample will be injected from a SAMPLE or PROCESS zone site.

Volume per Injection (µL)

This is the volume that is injected throughout the run. Raw sample or external standard is injected in Simple Injection or External Standard preparation modes. Prepared samples, which may include an internal standard and/ or diluted sample or external standard, are injected when the other preparation modes are used. This volume is automatically set equal to the injection loop volume when a total loop filling method is used.

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Samples per Standard

This is the number of samples that will be run between sets of external standard. This parameter is not available when using Simple Injection or Simple Injection with Dilution preparation modes.

Number of Standards

This is the number of external standards that will be prepared and/ or injected in a standard set. The STANDARD zone in the current tray file should be large enough to accommodate the number of external standards.

Injections per Standard

This is the number of times each external standard in a standard set will be injected from the same STANDARD or PROCESS zone site.

For example: If you have 1 sample per standard, your number of standards is 1 (a standard set comprised of 1 standard), the number of injections per standard is 1 and an External Standard with Dilution preparation mode was selected, the following order of events would occur:

1 Raw standard is aspirated from the first site in the STANDARD zone and dispensed into the first process site.

2 The first standard is prepared (diluted) in the first process site.

3 The prepared standard is aspirated from the first process site then injected.

4 Raw sample is aspirated from the first sample location and dispensed into the second process site.

5 The sample is prepared (diluted) in the second process site.

6 The prepared sample is aspirated from the second process site then injected.

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7 Raw standard is aspirated from the first site in the STANDARD zone and dispensed into the third process site.

8 The second and final standard is prepared (diluted) in the third process site.

9 The second prepared standard is aspirated from the third process site then injected.

Note: The second raw standard in this example is aspirated from the same STANDARD zone site as for the first raw standard because the number of standards is 1. It is important to ensure that the vessels containing the external standard can hold enough standard for multiple standard injections. It is also important to have a PROCESS zone defined in your tray file that is large enough to accommodate multiple standards if sample preparation is required.

Int. Std. per Injection (µL)

This is the volume (in microliters) of each injection that is internal standard.

For example:

- If the internal standard per injection was defined as 5 µL and the volume per injection was defined as 10 µL, then half of the injection volume is composed of internal standard.

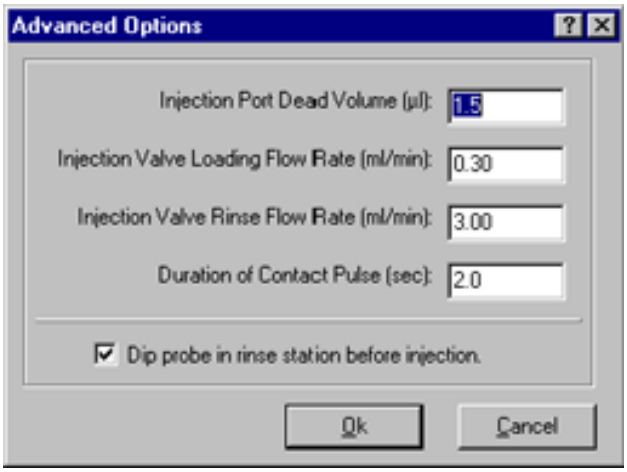
- If the internal standard per injection was defined as 5 µL and the volume per injection was defined as 5 µL, then all of the injection volume is composed of internal standard.

This parameter is only available when using Internal Standard or Internal Standard with Dilution preparation modes.

This parameter requires having one INTERNAL zone site defined in the current tray file. It is important to have an INTERNAL zone defined in your tray file that is large enough to accommodate multiple internal standards if sample preparation is required.

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Advanced Options



This screen has dialog boxes that allow you to specify the injection port dead volume, valve load and rinse rates, and contact pulse duration. More detailed descriptions of the parameters are listed below.

Injection Port Dead Volume (µL)

This is the dead volume (in microliters) of the injection port. The default value is 1.5 µL. It is the standard dead volume for the 235/ 235P Autoinjector.

Injection Valve Loading Flow Rate (mL/min)

The rate at which liquid is dispensed into the injection valve through the injection port. The maximum flow rate is dependent on syringe size. Refer to the table on page 3-24 for maximum flow rates for each syringe size.

Injection Valve Rinse Flow Rate (mL/min)

The rate at which the injection valve is rinsed with solvent from the syringe pump reservoir. The maximum flow rate is dependent on syringe size. Refer to the table on page 3-24 for maximum flow rates for each syringe size.

Duration of Contact Pulse (sec)

This is the duration (in seconds) of the pulse from output contact 1 that occurs with an injection. The default value is 2 seconds.

Dip probe in rinse station before injection

When this option is checked the autoinjector will move the arm to and briefly lower the probe into the rinse station before each injection. The option is checked as the default.

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Manual Control



Injection Valve Load/Inject

These buttons allow you to switch the injection valve from the LOAD position to the INJECT position or from the INJECT position to the LOAD position.

Syringe Top/Bottom

These buttons allow you to raise or lower the syringe to the top or bottom of its stroke. If the syringe is raised, the probe will move over the rinse station to avoid solvent spillage.

Peltier On/Off

These buttons are only applicable if you have a 235P Autoinjector. These buttons manually open and close output 3 thus causing the Peltier device to turn on or off. The default setting is Peltier On.

Probe Top/Bottom

These buttons allow you to raise or lower the probe. If the probe is lowered, it will move to the rinse station to avoid "bottoming out." This manual function is useful when replacing the probe.

Rinse Injection Port

Clicking on this button will cause the probe to move into the injection port. The autoinjector will rinse the injection port and injection loop until stopped by the user.

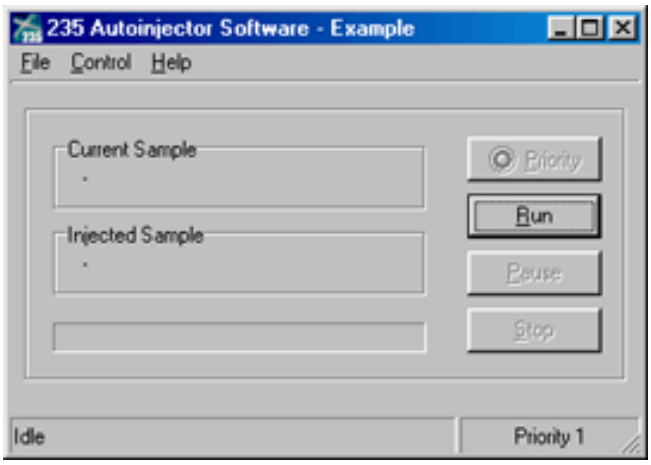
Prime Syringe and Rinse Probe

Clicking on this button will cause the probe to move over the rinse station where the outside of the probe is rinsed. The syringe will aspirate and dispense diluent at the Priming Flow Rate defined in the Flow/ Volumes dialog box. Priming will continue until stopped by the user.

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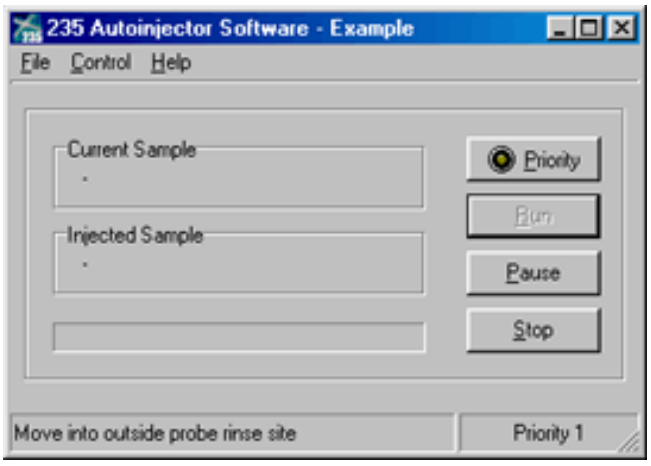
Running a Control Parameter File

1 When you select File-New or File-Open the following run screen will be displayed.



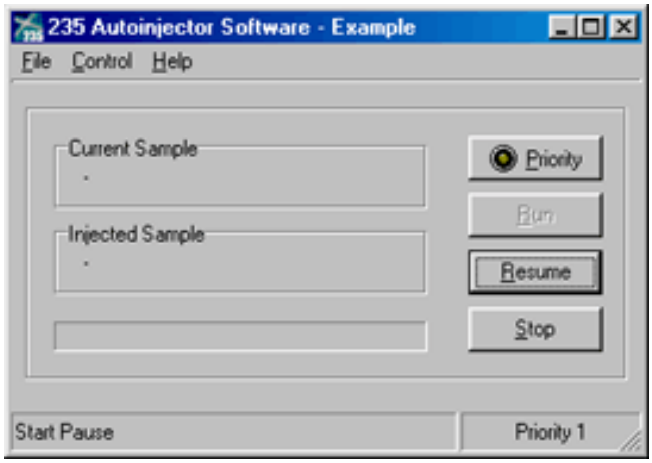
2 After creating and saving your control parameters file, click *Run* to start processing and/ or injecting samples.

3 To interrupt your run and then resume it, click *Pause* and then *Resume*.



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4 If a priority zone has been defined in your tray file, the Priority button is available. Click *Priority* to run the priority sample shown in the status bar at the bottom of the screen. The priority sample will be processed and/ or injected after the current sample has been injected.

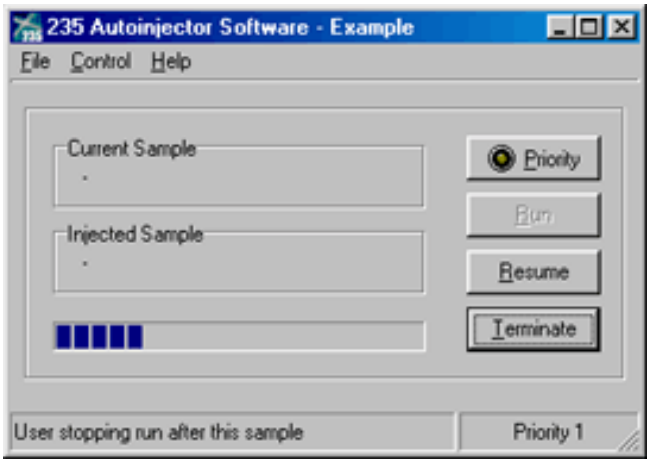


The same control parameters (sample preparation mode, injection mode etc). will be used for the priority sample injection.

Note: To run a priority sample, first pause your run when the probe is at the top of its stroke. This will enable you to open the door to remove the rack and rack cover so you can load your priority sample. After replacing the rack cover and rack and closing the door, click *Priority*. Click *Resume* to continue the run.

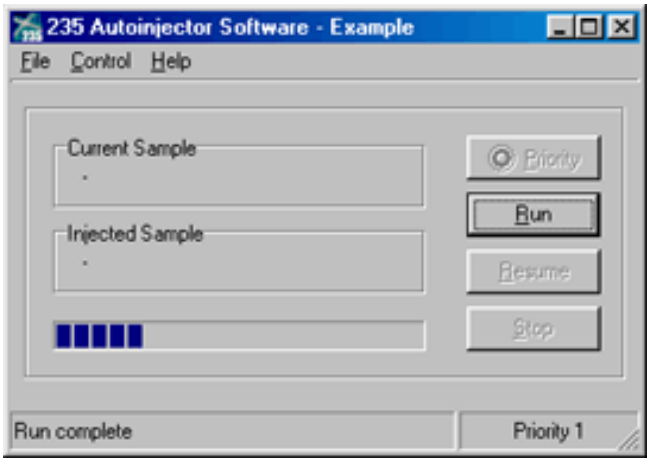
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5 To stop the autoinjector after the current sample has been processed and/ or injected click on *Stop*. Click *Terminate* to stop the run immediately.



Note: In a situation where an emergency stop is required, pressing the STOP/ HOME button also immediately stops the autoinjector.

6 When the run is complete you will see the following screen.



Click on File-Exit to close the program.

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Viewing a Log File

The log file lists the commands issued to the 235 or 235P Autoinjector during a run. It can be used to identify communication errors.

The software automatically names the log files in numerical order. The log file is named 235auto_<control parameter file name>_1xxx.log. To view the log file, use any text editor or word processing program, such as Windows Notepad. The log file is automatically stored to the same folder as the 235AUTO.EXE program.

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Maintenance 4

To obtain optimum performance and maximum life from the autoinjector, it is important to keep the instrument well-maintained.

In order to keep your autoinjector at peak performance, Gilson recommends that you do the following:

- Change tubing regularly to maintain performance.
- Flush the injection port, valve, and tubing daily with distilled or deionized water.
- Periodically check the fittings to ensure that they are tight.
- Wipe up all spills immediately.
- Replace the injection port every four months if used daily.

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Cleaning the Autoinjector

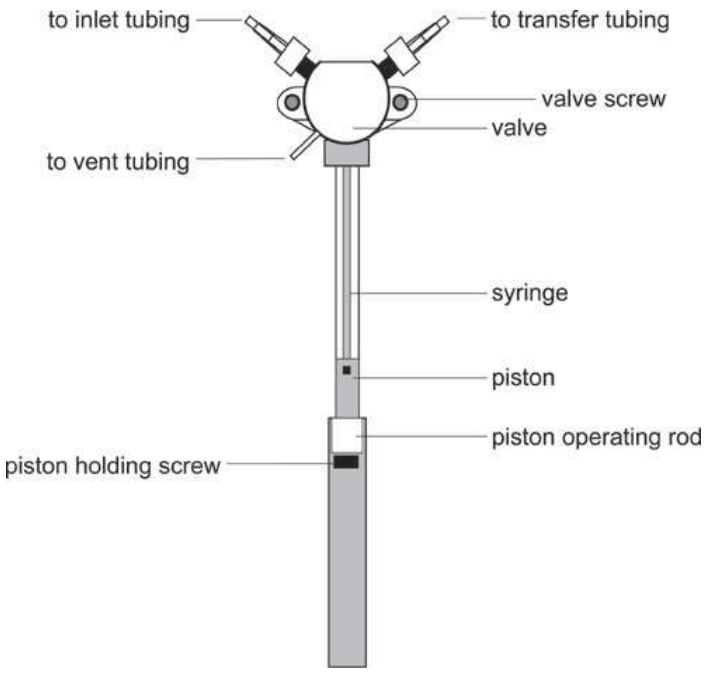
The autoinjector should be cleaned occasionally using a dry, clean cloth. Or, if necessary, use a cloth dipped in soapy water. If liquid is accidentally spilled on the autoinjector, wipe the instrument using a dry, clean cloth.

Cleaning the Syringe

It may be necessary to clean the syringe when some or all of the following occurs:

- Corrosive or hazardous liquids have been pumped
- Possible back flow of liquids into the waste tubing
- Leakage
- Aspiration of samples or reagents into the syringe

To clean the syringe, follow the procedures on the next page and use the diagram below as a reference.



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Removing the syringe

1 Start the 235 Setup utility from your Gilson Applications folder on your desktop.

2 Click on the Syringe tab. The installed syringe capacity radio button is selected.

3 Click on *Lower Syringe*. This causes the piston operating rod to descend as the syringe pump aspirates from the reservoir. The syringe pump will stop at the bottom of its stroke.

4 Disconnect the syringe piston from the piston operating rod by unscrewing the piston holding screw on the underside of the rod.

5 Remove the syringe from the valve by unscrewing the top of the syringe from the valve.

Cleaning the syringe

Once the syringe has been removed, it can be cleaned:

1 Place the syringe in a beaker containing methanol. Aspirate and dispense several volumes of methanol through the syringe.

2 Place the syringe in a beaker containing distilled or deionized water. Aspirate and dispense several volumes of water through the syringe.

3 Hold the syringe housing in one hand. Clean the syringe using a non-abrasive cloth dampened with alcohol. Remove the piston and clean the piston with a non-abrasive cloth dampened with alcohol.

4 Dry the syringe and piston using a clean, lint-free cloth.

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Reinstalling the syringe

When the syringe is clean, reinstall it:

1 Lubricate the piston with diluent in order to reduce friction on the piston seal during reinstallation. Carefully reinsert the piston into the syringe housing.

2 Loosely screw the syringe into the valve. Do not fully tighten.

3 Pull down the piston so it comes into contact with the piston operating rod and firmly tighten the piston holding screw.

4 Fully tighten the syringe into the valve.

5 Click on *Raise Syringe* in the 235 Setup utility.

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Cleaning the Fluid Path

Depending upon your use of the autoinjector, it may be necessary to flush the entire fluid path.

It's important to clean the fluid path if you won't be using the autoinjector for a while or if you are using a solution with a high salt concentration for a probe wash or as a diluent.

1 If necessary, place the syringe pump's inlet tubing into a beaker containing distilled or deionized water. Check the beaker during the priming sequence to ensure it always has liquid in it.

2 Start the 235 Setup utility. Click on the Syringe tab. Click on *Prime* to begin priming, click on *Stop Prime* when finished.

3 Inspect the syringe pump for leaks.

4 Wipe up all spills on and around the syringe pump immediately.

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Cleaning methods

Depending on the samples or reagents that come into contact with the fluid path, you may need to vary your cleaning methods accordingly. Use the following cleaning protocols as references and make any changes to them as required for the samples and reagents used for your application.

Proteins and peptides

Follow this procedure if the fluid path is in contact with proteins and peptides:

1 Place the syringe pump's inlet tubing into a beaker containing a weak detergent solution.

2 Start the 235 Setup utility (Syringe tab) and select *Prime* until the entire fluid path has been flushed with detergent. Click on *Stop Prime*.

3 Click on *Lower Syringe* to lower it to the bottom of its stroke.

4 After 30 minutes, remove the inlet tubing from the detergent solution and immerse it in a bottle containing distilled or deionized water.

5 Click on *Prime* to continue the priming sequence and to pump the remaining detergent from the syringe and tubing into a waste container.

6 Prime the fluid path a minimum of 10 cycles with reservoir solvent.

7 When you're satisfied that the entire fluid path has been flushed with water, select *Stop Prime* to end the priming sequence.

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Acidic and basic compounds

Follow this procedure if the fluid path is in contact with acidic and basic compounds:

1 Place the syringe pump's inlet tubing into a beaker containing 0.1N NaOH.

2 Start the 235 Setup utility (Syringe tab) and select *Prime* until the entire fluid path has been flushed with 0.1N NaOH. Click on *Stop Prime*.

3 Click on *Lower Syringe* to lower it to the bottom of its stroke.

4 After 10 minutes, remove the inlet tubing from the 0.1N NaOH and immerse it in a beaker containing distilled or deionized water.

5 Click on *Prime* to continue the priming sequence until the fluid path has been flushed with water. Click on *Stop Prime*.

6 Click on *Lower Syringe* to lower it to the bottom of its stroke.

7 Place the syringe pump's inlet tubing into a beaker containing 0.1N HCl.

8 Click on *Prime* to continue the priming sequence. Continue to prime until the fluid path has been flushed with 0.1N HCl. Click on *Stop Prime*.

9 Click on *Lower Syringe* to lower it to the bottom of its stroke.

10 After 10 minutes, remove the inlet tubing from the 0.1N HCl and immerse it in a beaker containing distilled or deionized water.

11 Select *Prime* to continue the priming sequence. Continue to prime until the fluid path has been flushed with water. Click on *Stop Prime*.

12 When you're satisfied that the entire fluid path has been flushed with water, click on *Stop Prime*.

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Biological fluids

Follow this procedure if the fluid path is in contact with biological fluids such as blood products:

1 Make a solution of 10% bleach by adding one part of commercial bleach to nine parts of water.

2 Place the syringe pump's inlet tubing into a beaker containing the bleach solution.

3 Start the 235 Setup utility (Syringe tab) and select *Prime* until the entire fluid path has been flushed with bleach. Click on *Stop Prime*.

4 Click on *Lower Syringe* to lower it to the bottom of its stroke.

5 After 30 minutes, remove the inlet tubing from the bleach solution and immerse it in a beaker containing distilled or deionized water.

6 Select *Prime* to continue the priming sequence and pump the remaining bleach solution from the syringe and tubing into a waste container.

7 Prime the fluid path a minimum of 10 cycles with distilled or deionized water.

8 When you're satisfied that the entire fluid path has been flushed with water, click on *Stop Prime* to end the priming sequence.

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Cleaning the Valve

Clean the syringe pump's valve with a non-abrasive cloth after any of the following situations have occurred:

- Corrosive or hazardous liquids have been pumped
- Possible back flow of liquids into the waste tubing
- Leakage

Removing the valve

To clean the valve, first remove it from the syringe pump:

1 Disconnect the inlet, transfer and vent tubing from the valve.

2 Disconnect the syringe from the valve (see page 4-3).

3 Remove the two screws securing the valve to the syringe pump panel and then remove the valve and syringe assembly.

Disassembling the valve

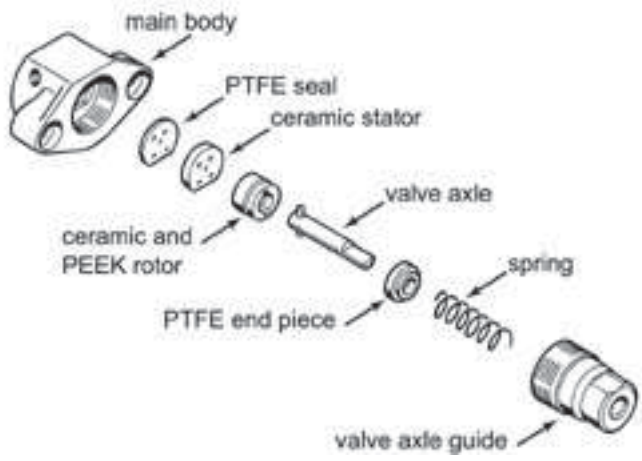
1 Hold the valve body firmly in one hand. Using a 17 mm open-ended wrench, turn the valve axle guide counterclockwise and separate the two halves.

2 Pull the valve axle guide away from the valve main body.

3 Separate the ceramic stator from the ceramic and PEEK rotor.

4 Tap the valve axle guide against a solid level surface to remove the spring and PTFE end piece.

Note: Do not remove the ceramic stator from the valve main body.



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Cleaning and reinstalling the valve

The disassembled parts of the valve can be cleaned using a non-abrasive cloth dampened with alcohol or by autoclaving.

1 Dry the components using a clean, lint-free cloth.

2 Reassemble the valve parts by reversing the above procedure.

3 Reinstall the valve and syringe assembly by replacing the two screws that secure the valve to the syringe pump panel.

4 Reinstall the syringe by following the instructions on page 4-4.

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Replacing Parts

Replacing the Syringe

Removing the syringe

1 Start the 235 Setup utility.

2 Click on the Syringe tab. The installed syringe capacity radio button is selected.

3 Select *Lower Syringe*. This causes the piston operating rod to descend as the syringe pump aspirates from the reservoir. The syringe pump will stop at the bottom of its stroke, switching the valve to the outlet position.

4 Disconnect the syringe piston from the piston operating rod by unscrewing the piston holding screw on the underside of the rod.

5 Remove the syringe from the valve by unscrewing the top of the syringe from the valve.

Mounting new syringe

1 Lubricate the piston on the new syringe with diluent in order to reduce friction on the piston seal during reinstallation.

2 Loosely screw the new syringe into the valve. Do not fully tighten.

3 Pull down the piston so it comes into contact with the piston operating rod and firmly tighten the piston holding screw.

4 Fully tighten the syringe into the valve.

5 Select *Raise Syringe*.

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Replacing the Valve

To replace the syringe pump's valve, follow the instructions below. If necessary, refer to the syringe pump diagram on page 4-2.

1 Disconnect the inlet, transfer and vent tubing from the valve.

2 Disconnect the syringe from the syringe pump. Refer to the procedure for **Replacing the Syringe** on page 4-11.

3 Remove the valve. Refer to the procedure for **Removing the valve** on page 4-9.

4 Reinstall the syringe and the replacement valve.

5 Reconnect the inlet, transfer and vent tubing to the newly installed valve.

Replacing the Piston Seal

To change the syringe piston seal, refer to the instructions supplied with the replacement seal. For part numbers for replacement seals, contact Gilson Customer Service at 800-445-7661 or 608-836-1551. You can also contact the Customer Service Department via its e-mail address: service@gilson.com.

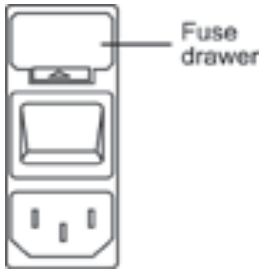
Outside the United States, contact your Gilson representative.

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Replacing a Fuse

A blown fuse may indicate the existence of another problem in the instrument. If the replacement fuses blow, don't try others. Contact your local representative or Gilson. See **Before calling us** in ***Section 5***.

To change a fuse, follow these steps.



1 Disconnect the power cord from the power outlet and from the rear panel receptacle.

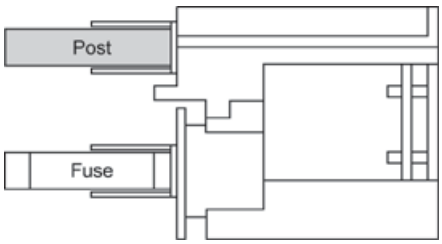
2 Locate the fuse drawer on the rear panel. See page 2-11 if necessary.

3 Insert a small flat blade screwdriver into the notch next to the fuse drawer.

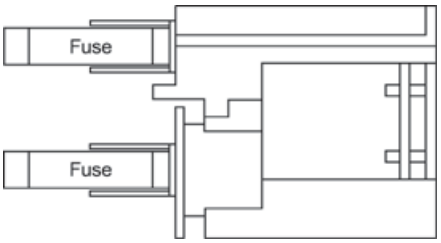
4 Twist the screwdriver to open and remove the fuse drawer. The fuse drawer contains one 2.5A "T" Slo-Blo fuse (5 x 20 mm size) for a 100/ 120 voltage selection. It contains two 2.5A fuses for a 220/ 240 voltage selection.

5 Remove the old fuse(s) and insert the new fuse(s).

6 Insert the fuse drawer into its receptacle in the autoinjector.



Fuse drawer for 100/120 voltage selection



Fuse drawer for 220/240 voltage selection

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Replacing the Rotor Seal and Stator Face Assembly

The 235/ 235P Autoinjector is shipped with a 20 µL external sample loop (part number 49677522) and stator face assembly (part number 496775027) installed. To use an internal sample loop on the autoinjector, replace the external sample loop and stator face assembly with the stator face/ 1 µL internal loop assembly (part number 4967123227).

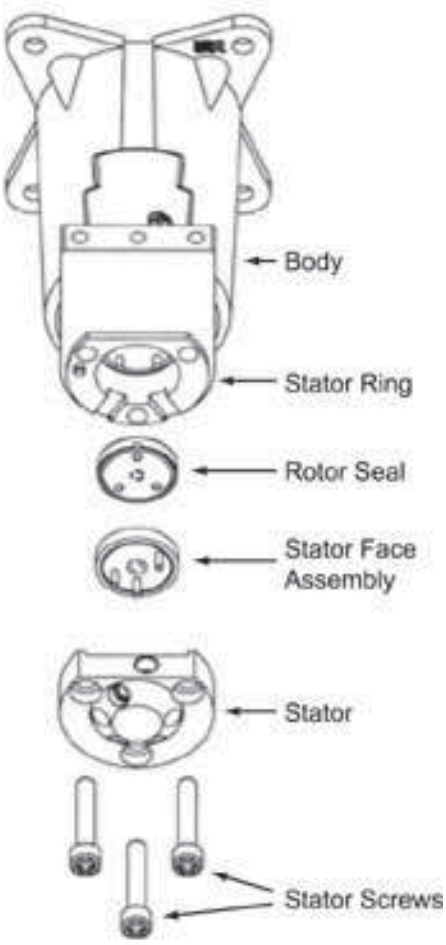
Refer to the diagrams when replacing the rotor seal (part number 496775055) and stator face assembly (part number 496775027 for external loop; 4967123227 for internal loop).

To replace the rotor seal and/or stator face assembly:

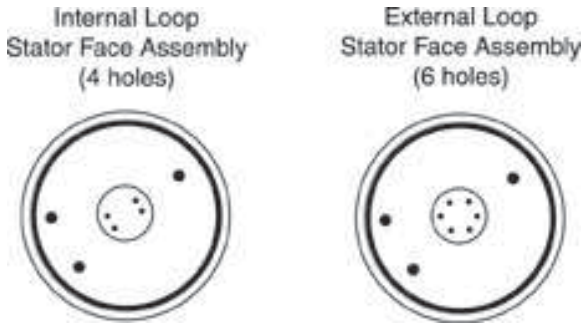
1 Remove the stator screws with the 9/ 64" Allen wrench provided (part number 4311402).

2 Remove the stator and stator face assembly from the stator ring.

3 Mount the new stator face assembly on the stator by inserting the three-pin side of the assembly into the corresponding holes on the stator. Skip to step eleven for reassembly instructions or continue to step four to replace the rotor seal.



Exploded View of Motorized Valve



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4 Remove the two screws from the top of the valve using a Phillips screwdriver (refer to the picture at right).

5 Remove the stator ring.

6 Remove the rotor seal by pulling it off of its three-pin mounting on the shaft assembly in the body of the valve.

7 Mount the new rotor seal with the grooves facing you. The rotor seal fits onto the three pins on the shaft assembly only one way.

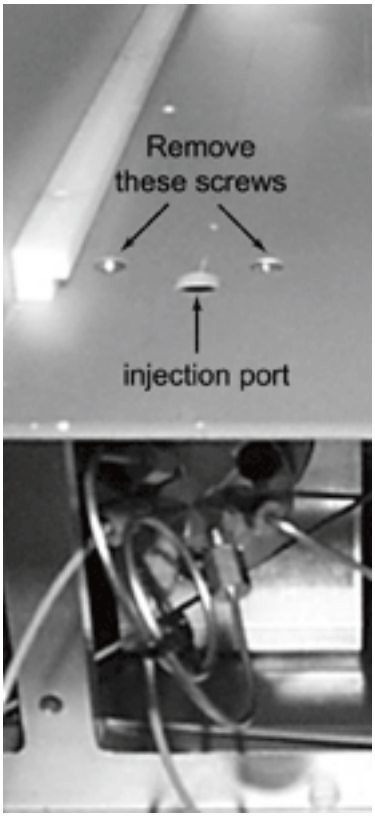
8 Replace the stator ring so the two short pins on the ring enter the unthreaded mating holes in the body.

9 Replace the two screws in the top of the valve using a Phillips screwdriver.

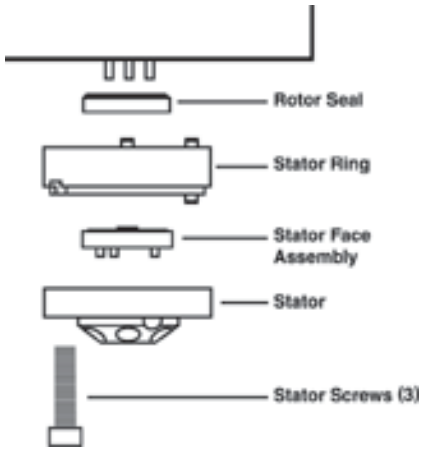
10 Mount the new stator face assembly onto the stator. Confirm that the pins on the assembly fit in the mating holes on the stator.

11 Replace the stator and stator face assembly on the valve so that the pin in the stator ring enters the mating hole in the stator.

12 Replace the stator screws in the stator. Using the 9/ 64" Allen wrench, tighten each screw an equal amount until snug.



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Exploded view of motorized valve

Replacing the Rotor Seal and Stator Face Assembly on a Septum Piercing 235/235P Autoinjector

Refer to the diagram when replacing the rotor seal and stator face assembly.

To replace the rotor seal and stator face assembly:

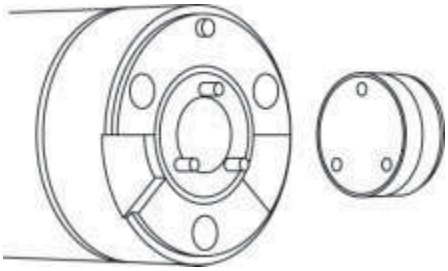
1 Remove the stator screws with the 9/ 64" allen head screwdriver provided.

2 Remove the stator and stator face assembly from the stator ring.

3 Remove the stator ring.

4 Remove the rotor seal by pulling it off from its 3-pin mounting on the stator ring.

5 Mount the new rotor seal with the grooves facing you. The shaft assembly with 3 pins fits into the mating holes in the rotor seal only one way.



6 Replace the stator ring so the two short pins on the ring enter the unthreaded mating holes in the body.

7 Mount the new stator face assembly onto the stator. Confirm that the pins on the assembly fit in the mating holes on the stator.

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8 Replace the stator and stator face assembly on the valve so that the pin in the stator ring enters the mating hole in the stator.

9 Replace the hex screws in to the stator. Finger tighten each an equal amount until snug. Tighten with the 9/ 64" allen head screwdriver.

10 Set the flow rate on the HPLC pump. Check for leaks by touching the underside of the valve.

11 If there is a leak you will need to tighten each hex screw on the leaking valve equally in gradual increments.

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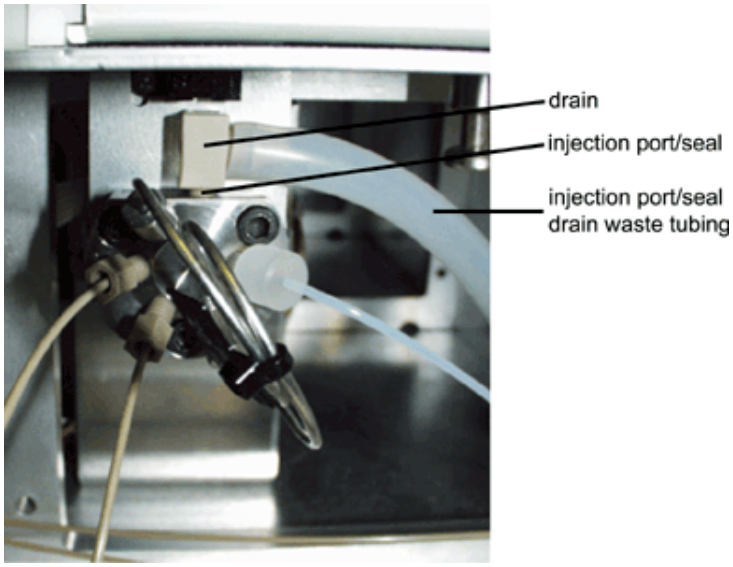
Replacing the Injection Port/Seal

To replace the injection port/seal:

1 Obtain a replacement injection port/ seal and drain (part number 25051107).

2 Disconnect the waste tubing from the injection port/ seal drain.

3 Remove the stator face assembly. Refer to **Replacing the Rotor Seal and Stator Face Assembly** on page 4-14.



4 Insert a flat blade screwdriver head between the drain and the valve stator. Twist the screwdriver until the drain becomes loose and you are able to remove it.

5 Insert the 5/ 64" Allen wrench (part number 4310782) into the injection port/ seal and turn it counterclockwise to remove the injection port/ seal.

6 Install the replacement injection port/ seal into port one of the injection valve by turning the Allen wrench clockwise until the injection port/ seal is snug, taking care not to overtighten it.

7 Push the drain onto the top of the injection port/ seal. It is a tight fit, but will snap onto the injection port/ seal.

8 Put the stator face assembly back on the valve.

9 Reattach the waste tubing to the injection port/ seal drain.

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Replacing the Injection Port/Seal on a Septum Piercing 235/235P Autoinjector

To replace the injection port/seal:

1 Remove the screw on each side of the injection port. Refer to the picture on page 4-15.

2 Using a 1/ 4" offset wrench, disconnect the calibrated tubing from the injection port.

3 Remove the injection port assembly and the injection port brace.

4 Remove the injection port assembly from the injection port brace, then use a 10 mm wrench to disconnect the seal retainer and spacer from the probe guide.

5 To remove the seal from the top of the seal retainer, insert a #6 wood screw into the seal, then pull. Discard the old seal.

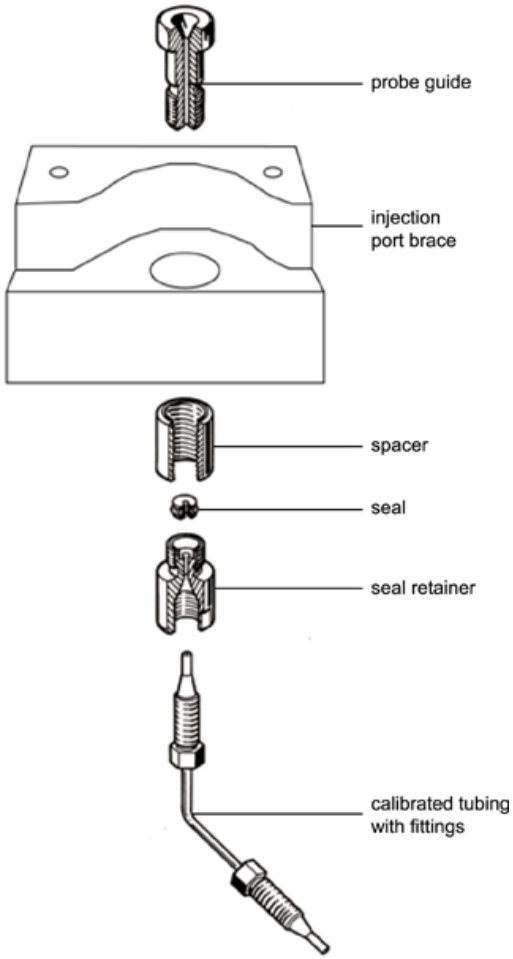
6 Using your fingers, push the replacement seal into place in the seal retainer.

7 Finger tighten the seal retainer to the spacer. When secure, use 10 mm offset wrench to tighten until snug.

8 Insert the probe guide into the injection port brace. Reattach the spacer and the seal retainer to the probe guide by tightening clockwise with the 10 mm offset wrench.

Note: The injection port assembly should fit loosely in the injection port brace.

9 Re-mount the injection port brace to the autoinjector using the screws you removed in step one.

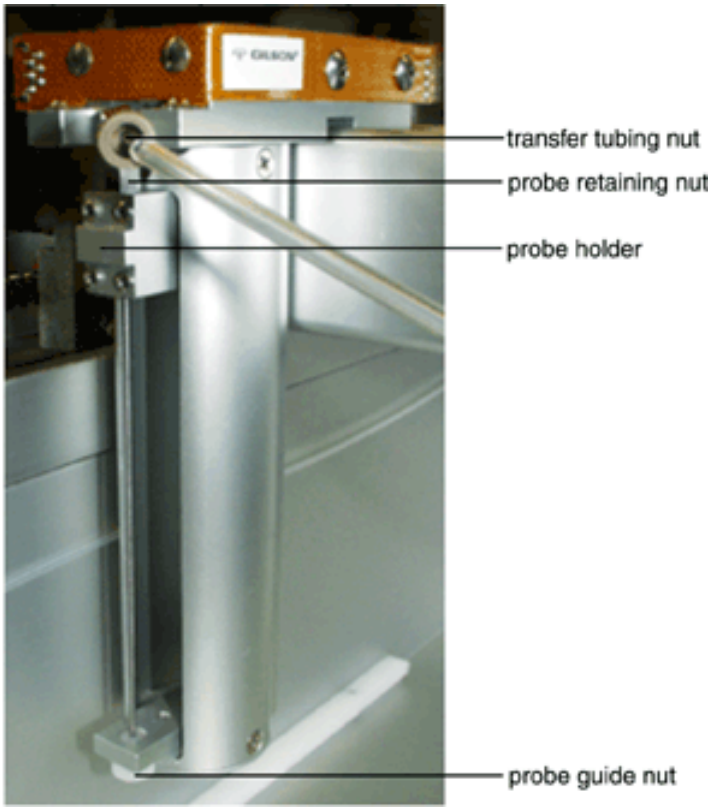


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Replacing the Probe

1 To replace the probe you will need to move the probe to the rinse station and then lower it to the bottom of its stroke. To do this, click on Control-Manual Control in the 235 Autoinjector Software and then select the Probe Bottom radio button.

Warning! It is very important to turn the power to the autoinjector OFF before removing the probe.



2 Disconnect the transfer tubing from the probe.

3 Turn the probe retaining nut counterclockwise until it is fully loosened. Carefully lift the probe from the probe holder.

4 Insert the new probe into the probe holder. Turn the probe retaining nut clockwise until snug.

5 Reattach the transfer tubing to the probe.

6 Click on *Prime Syringe and Rinse Probe* in the 235 Autoinjector Software (Manual Control) to rinse the new probe with reservoir solvent.

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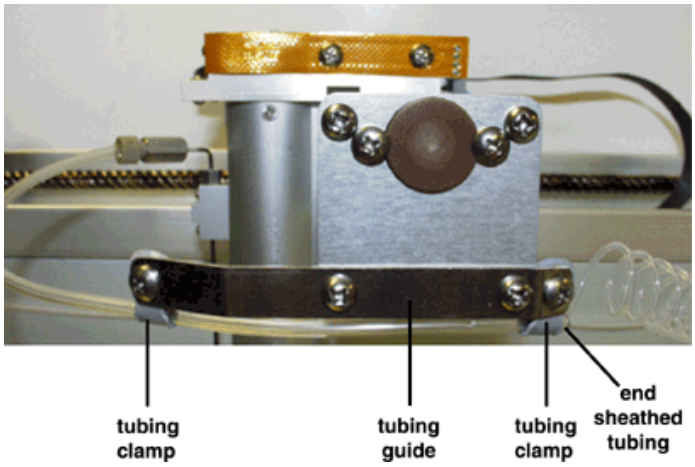
Replacing Transfer Tubing (1 mL)

1 Remove the cover by removing the six screws on the back panel and the two screws on the side panels of the instrument.

2 Disconnect the transfer tubing from the syringe pump valve.

3 Detach the tubing from the three tubing clips on the left inside panel of the instrument.

4 Using a Phillips screwdriver, unscrew the tubing clamps from the tubing guide connected to the X-arm (see picture below).



5 Detach the tubing from the tubing clamps.

6 Disconnect the tubing from the probe.

7 When replacing the transfer tubing it is best to first move the probe to the rinse station and then lower it to the bottom of its stroke. To do this, click on Control-Manual Control in the 235 Autoinjector Software and then select the Probe Bottom radio button.

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8 Connect the new transfer tubing (part number 499430402) to the probe using the transfer tubing nut (see page 4-20).

9 Attach the tubing clamps to the tubing and screw them back into the tubing guide using the Phillips screwdriver. The flat side of the clamps should face the inside of the instrument. The sheathed tubing should end after the last clamp and before the coiled tubing (refer to the picture on page 4-21). Minor adjustments may be needed to tighten the slack to prevent the tubing from obstructing the arm movement.

10 Attach the sheathed tubing to the three tubing clips on the left, inside panel of the instrument.

11 Connect the other end of the transfer tubing to the syringe pump valve.

12 Click on *Prime Syringe and Rinse Probe* (Control-Manual Control) in the 235 Autoinjector Software to ensure that there are no leaks and to rinse and fill the tubing.

13 Replace the cover.

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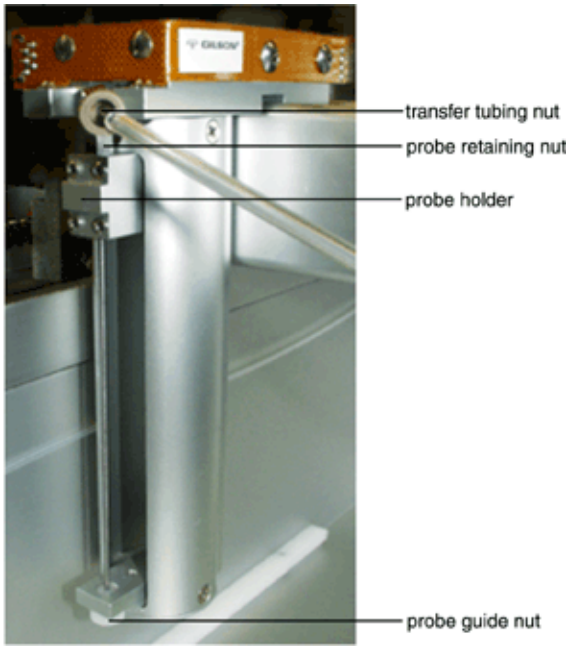
Checking Position Alignment

The 235 Setup utility (Adjust XY tab) allows you to make minor adjustments to the X and Y axis offsets for the autoinjector. This may be necessary if the probe is not properly aligned with the injection port or if it is not accessing the sample vessels correctly.

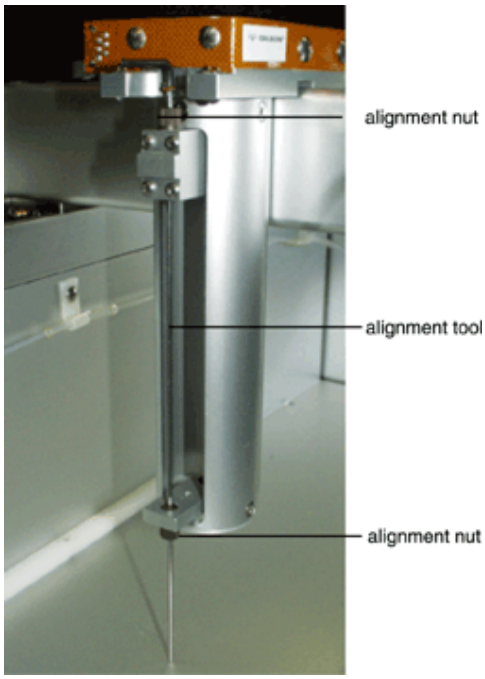
To determine if the autoinjector's probe needs to be adjusted in the X or Y direction you will need to remove the probe and install the alignment probe assembly that comes with the Operational Qualification kit (part number 244971). The following instructions will guide you through this procedure:

1 Remove the probe as described on page 4-20.

2 Remove the probe guide nut at the bottom of the Z-arm by turning it clockwise.

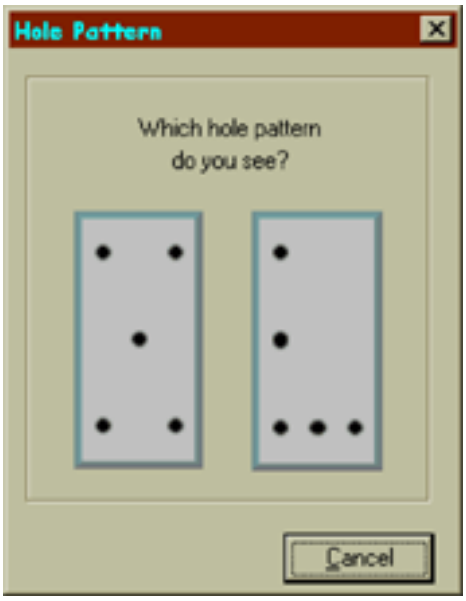


3 Install the alignment tool by tightening (clockwise) one of the alignment nuts into the top of the probe holder. Tighten (counterclockwise) the other alignment nut to the probe guide at the bottom of the Z-arm. Install the alignment tool by passing it through the probe holder and both alignment nuts.



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4 In the 235 Setup utility (Adjust XY tab), click on *Start*. Choose the 5 alignment hole pattern that is on the bottom plate of your 235 or 235P Autoinjector by clicking on the appropriate pattern in the dialog box (shown below). The autoinjector will then home itself. After homing is complete, click on *Go to Point 1*.



5 Push the alignment tool down to the bottom plate surface. If aligned correctly, the alignment probe will move smoothly through the alignment hole. If the tool is not aligned over the alignment hole, use the on-screen arrow buttons to move the probe in the appropriate X or Y direction.

6 After alignment is done click on *Go to point 2*. Repeat the above procedure. Continue through all five targets, repeating the above procedure for each.

7 After all five targets have been aligned click on *Done* and then *Update* to store the new offsets.

8 Replace the alignment tool with the probe.

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Transporting the Autoinjector

When moving the autoinjector to another location or when sending it back to the factory, reinstall the armlock (see ***Section 2***) and always lift the autoinjector from the base.

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Troubleshooting 5

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Error Messages

If a problem occurs while running the autoinjector, the red error indicator light on the front panel will light and the autoinjector will stop. Check the Error Handling tab in the 235 Setup utility for a display of the current error. Possible error messages are listed on the next few pages.

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Error	*Description*	*Solution*
10	Door Opened	Check that the door is tightly closed; press the STOP/ HOMEkey
11	Undefined syringe size	Run 235 Setup utility (Syringe tab) to correct the problem.
12	Pump not found	Contact the Gilson Customer Service Department.
13	Invalid syringe speed	This can be caused by an incorrect syringe size setting. Run 235 Setup utility (Syringe tab) to check that the correct syringe size was entered. If you do not know the size of the syringe installed, check the container the syringe was shipped in for size information. Or, the requested aspirate or dispense speed is too fast for the installed syringe. Refer to the table listing the maximum flow rates on page 3-24 and then change the speed accordingly in program controlling the autoinjector.
14	Invalid syringe volume	Requested aspirate or dispense volume is too large for syringe installed. Modify the syringe aspirate and dispense volumes in the program controlling the autoinjector. An incorrect syringe size setting can also cause improper volumes to be aspirated or dispensed during operation or can cause an error to occur. Run 235 Setup utility (Syringe tab) to check that the correct syringe size was entered.
15	NV-RAM checksum not match	• Send the buffered ~9 GSIOC command to reset the NV-RAM and initialize to the default value. Run the 235 Setup Utility (Home Phase and Adjust XY tab). • Replace the main board
16	Safety Contact In	Run 235 Setup utility (Error Handling tab). Compare Input Contact Error setting with output contact error setting from external device connected to Input Contact D on the back of the autoinjector. Modify if necessary. Release contact; press STOP/ HOME key on the autoinjector.

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20	Door Opened/ Buffered Command sent	Close door; press STOP/ HOME key
24	X-target position less than X-minimum range	Send the immediate Q command using the GSIOC Utility Program to read the travel range. Correct the error in the program controlling the autoinjector.
25	X-target position bigger than X-maximum range	Send the immediate Q command using the GSIOC Utility Program to read the travel range. Correct the error in the program controlling the autoinjector.
26	Y-target position less than Y-minimum range	Send the immediate Q command using the GSIOC Utility Program to read the travel range. Correct the error in the program controlling the autoinjector.
27	Y-target position bigger than Y-maximum range	Send the immediate Q command using the GSIOC Utility Program to read the travel range. Correct the error in the program controlling the autoinjector.
28	Z-target position less than Z-minimum range	Send the immediate Q command using the GSIOC Utility Program to read the travel range. Correct the error in the program controlling the autoinjector.
29	Z-target position bigger than Z-maximum range	Send the immediate Q command using the GSIOC Utility Program to read the travel range. Correct the error in the program controlling the autoinjector.
30	X-home sensor error	• Remove the cover and check for obstructions. • Check that the sensor is installed and intact.
31	Y-home sensor error	• Remove the cover and check for obstructions. • Check that the sensor is installed and intact.
32	Missing probe	• Check that the probe is installed. • Check that the probe is not bent. • Check that the probe is aligned.

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34	X-home phase not match	Run 235 Setup utility (Home Phase) to correct the problem.
35	Y-home phase not match	Run 235 Setup utility (Home Phase) to correct the problem.
36	X and Y home phase not match	Run 235 Setup utility (Home Phase) to correct the problem.
37	Missing X home sensor	Check that the sensor cable is plugged in the connector board.
38	Missing Y home sensor	Check that the sensor cable is plugged in the connector board.
40	Gilson M402 bad syringe pump valve position	This is caused by the valve stem not turning properly or the encoder not registering properly. Try operating without a valve. If that fails, you will probably need a new module. If that works check the valve assembly for smooth operation. If necessary, replace valve.
41	Gilson M402 syringe pump valve time out	Try operating without a valve. If that fails, you will probably need a new module. If that works check the valve assembly for smooth operation. If necessary, replace valve.
42	Gilson M402 valve undefined command	Try operating without a valve. If that fails, you will probably need a new module. If that works check the valve assembly for smooth operation. If necessary, replace valve.
43	Gilson M402 valve communication error	Try operating without a valve. If that fails, you will probably need a new module. If that works check the valve assembly for smooth operation. If necessary, replace valve.
44	Gilson M402 valve unit busy	Try operating without a valve. If that fails, you will probably need a new module. If that works check the valve assembly for smooth operation. If necessary, replace valve.

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45	Gilson M402 syringe overload	• Slow down flow rate indicated for aspirate and dispense commands in the program controlling the autoinjector • Use less viscous liquid • Use larger ID transfer tubing
46	Gilson M402 syringe missing	Try operating without a valve. If that fails, you will probably need a new module. If that works check the valve assembly for smooth operation. If necessary, replace valve.
47	Gilson M402 syringe undefined command	Try operating without a valve. If that fails, you will probably need a new module. If that works check the valve assembly for smooth operation. If necessary, replace valve.
48	Gilson M402 syringe communication error	Replace the syringe pump.
49	Gilson M402 syringe busy	Contact the Gilson Customer Service Department.
50	No injection valve installed	• Check the connections from the injection valve to the connector board. • Reseat the main board. • Replace the valve.
51	Inject position detection error	Replace the valve.
52	Load position detection error	Replace the valve.

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Mechanical

Probe no longer finding tube center

- Probe may be bent. Straighten or replace the probe
- Incorrect tray file defined. Review and if necessary change the tray file using the Tray Editor
- Autoinjector may be misaligned. Perform the position alignment procedures, described on page 4-23

Liquid bubbling from the injection port as sample is loaded into the loop

- Remove the injection port/ seal from the valve using the 5/ 64" Allen wrench (part number 4310782)
- Check to see if the PEEK injection port/ seal is plugged. If the injection port/ seal is plugged, use a thin wire to clean out the hole at the bottom
- Check the injection port for wear. Replace if necessary
- Check to see if the probe is aligned in the injection port/ seal (refer to **Checking Position Alignment** on page 4-23 for details)
- Replace the injection port/ seal (refer to ***Section 4, Maintenance*** for instructions)
- Reduce the sample dispense flow rate when loading the loop. If this helps, the injection port has begun to wear. Replace the injection port.
- Check to see if the sample loop is plugged. Remove the loop and insert a thin wire to clean out any debris. The loop can also be sonicated to clean it.
- If the problem persists, contact the Gilson Customer Service Department

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Liquid bubbling from waste port or injection port when the valve is in the INJECT position

- Replace injection valve's rotor seal (refer to ***Section 4, Maintenance*** or the instructions supplied with the replacement injection port/ seal)

Liquid bubbling from the syringe pump overflow port or the injection port/seal when rinsing the injection port

- Check to see if the PEEK injection port/ seal is plugged or worn (follow instructions on previous page)
- Replace the injection port/ seal if necessary
- Check the probe and transfer tubing for blockages
  - Remove the probe from the probe holder and disconnect the transfer tubing; run a cleaning wire through the probe to remove any particles
  - Pump a cleaning solution through the transfer tubing and probe to remove any particles
  - If necessary, replace the transfer tubing or the probe

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Electrical

Input contact functions not operating

- Make sure connections into terminal block connector are secure
- Make sure terminal block connector is secure in input/ output port
- Check connections for proper pin assignments
- Be sure pins from external devices are assigned correctly
- Check polarity of input. Inputs should be a contact closure. If not, it must be TTL level (logic 0 activates)
- Confirm that source supplying input signal to the autoinjector is working

Output contact functions not operating

- Make sure connections into terminal block connector are secure and that the terminal block connector is secure in the input/ output port
- Check connections for proper pin assignments
- Output from the autoinjector should be compatible with device to which it is interfaced. Outputs are contact closures
- Check the contact assignment in the software

Unit not operational

- Make sure power is turned on
- Check AC power cord connections
- Try different AC outlet
- Check fuse(s); replace if necessary
- Check all autoinjector connections and make sure that the unit is plugged in

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Tubing and Syringe Pump

Instrument will not aspirate reagent

- Make certain all fittings are tight
- Check valve fitting threads on the syringe pump. Replace if damaged.
- If transfer tubing is kinked or blocked, replace defective tubing (refer to **Replacing Transfer Tubing** on page 4-29 for details).
- Reduce aspirate flow rate
- Check probe for blockages (refer to page 5-8 for details)

No fluid being dispensed

- Make sure the syringe is tight within the valve fitting.
- If transfer tubing is kinked or blocked, replace defective tubing (refer to **Replacing Transfer Tubing** on page 4-21 for details).
- Replace the syringe pump valve if damaged. Turn the power to the autoinjector off and then on to re-initialize (refer to **Replacing the Valve** on page 4-12 for details).

Reagent being pulled back into reservoir

- Replace the syringe pump valve if damaged. Turn the power off and then on to the autoinjector to re-initialize (refer to **Replacing the Valve** on page 4-12 for details).

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Air gap breaks up

- If the air gap breaks up when aspirating a liquid, check to see that the inner diameter of the transfer tubing is appropriate for the application and air gap volume.
- Reduce aspiration and dispense flow rates.
- Increase volume of air gap.
- Clean or replace any dirty transfer tubing.

Syringe bubbles

- Make sure that all tubing fittings are tight and air-free.
- Make sure the syringe is tightened onto the valve.
- Clean the syringe if dirty. Refer to page 4-2.
- If any of the syringe pump valve fittings are damaged, replace the valve (refer to **Replacing the Valve** on page 4-12 for details).
- Degas liquids used as reservoir solvent
- Reduce aspiration speed

Fluid leak

- Replace any worn piston seals on the syringe piston. Instructions are supplied with replacement seals.
- Clean syringe pump valve. Refer to page 4-9.
- Allow reagents to warm to room temperature before using.

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Incorrect aspirating and dispensing

- Check for leaks on all fittings and tubing leading to the probe.
- Tighten or replace fittings on inlet and transfer tubing as needed.
- Replace the syringe pump valve if damaged. Turn the power to the autoinjector off and then on to re-initialize.
- Ensure that the correct syringe capacity is selected on the Syringe tab in the 235 Setup utility.

Syringe stalls

- If the syringe on the syringe pump stalls, there may be a blockage in the tubing or valve. Inspect all tubing and the valve.
- If the syringe stalls due to an accelerated aspirate or dispense flow rate, reduce the rate in the program controlling the autoinjector.

Poor accuracy

- Worn piston seals and tubing fittings and accelerated flow rate can cause the autoinjector to perform with poor volumetric accuracy and precision. Inspect seals and tubing and replace if necessary. If the aspirate and dispense flow rates are too fast, slow down the rates as appropriate.
- A worn injection port and/ or a partial plug in the probe, port, valve, or loop can cause poor accuracy and precision. Check all systematically to identify the source and clear the plug or replace the part if necessary.

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Repair and Return Policies

Before calling us

Gilson Customer Service personnel will be able to serve you more efficiently if you prepare the following information:

- the serial number (located inside the lower door) of your 235 or 235P Autoinjector
- the installation procedure you used
- list of symptoms
- list of operating procedures and conditions you were using when the problem arose
- list of other devices connected to the autoinjector and a description of those connections
- list of other electrical connections in the room

Warranty repair

Units covered under warranty will be repaired and returned to you at no charge. If you have any questions about applicability, please contact the Gilson Customer Service Department or your authorized representative.

Non-warranty repair

Contact your local Gilson representative or the Gilson Customer Service Department to discuss service options and make arrangements to return the instrument, if necessary.

Rebuilt exchange

For some units, rebuilt exchange components are available. Contact the Gilson Customer Service Department for details.

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Return procedure

In the United States, contact the Gilson Customer Service Department to obtain authorization before returning any Gilson equipment. To return a piece of equipment:

- Carefully pack the unit to prevent damage in transit. Check with Gilson regarding proper method of shipment. No responsibility is assumed by Gilson for damage caused by improperly packaged instruments. Indicate the authorization on the carton and on the packing slip

- Always insure for the replacement value of the unit

- Include a description of symptoms, your name, address, phone number, and purchase order to cover repair costs, return and shipping charges, if your institution requires it. Ship to:

  Gilson, Inc.
  Attention: Customer Service
  (indicate the authorization here)
  3000 W. Beltline Highway
  Middleton, WI 53562-0027

Outside the United States, contact your Gilson representative for return procedures.

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Replacement Parts and Accessories A

Racks and Accessories

24014050	Code 350 Rack, aluminum, for shallow-well microplates (96-well Evergreen, Falcon, Nunc, Corning, Greiner, Costar, and Beckman styles* or 384-well Nunc and Grenier styles*)
24014051	Code 351 Rack, aluminum, for deep-well microplates (Evergreen, Falcon, Nunc, Corning, Greiner, Costar, and Beckman styles*)
24014054	Code 354 Rack, aluminum, for Peltier heating and cooling (235P only) of shallow-well, flat-bottom microplates (96-well Evergreen and Falcon styles*)
24014055	Code 355 Rack, aluminum, for Peltier heating and cooling (235P only) of shallow-well microplates (96-well Nalge, Nunc, and Dynex or 384-well Nalge and Nunc styles only)
24014103	Rack cover for Code 350, 351 and 354, and 355 racks, aluminum
24014053	Code 353 Rack, aluminum, for 0.7 mL vials
24014115	Rack cover for Code 353 rack, aluminum
24014056	Code 356 Rack, aluminum, for 2 mL vials

*These lists of manufacturers are not all-inclusive. Gilson has tested some styles of microplates by these manufacturers and found them compatible with the 235/ 235P Autoinjector Racks. Microplates by other manufacturers have not been tested, but may work. Custom rack options are available by contacting the Gilson Customer Service Department.

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Stainless Steel Sample Loops

4967123227	1 µL internal sample loop/ stator face assembly
49677520	5 µL sample loop, stainless steel
49677521	10 µL sample loop, stainless steel
49677522	20 µL sample loop, stainless steel; standard accessory
49677523	50 µL sample loop, stainless steel
49677524	100 µL sample loop, stainless steel
49677525	200 µL sample loop, stainless steel
49677526	500 µL sample loop, stainless steel
49677527	1 mL sample loop, stainless steel
49677528	2 mL sample loop, stainless steel
49677529	5 mL sample loop, stainless steel

Titanium Sample Loops

49677521T	10 µL sample loop, titanium
49677522T	20 µL sample loop, titanium
49677523T	50 µL sample loop, titanium
49677524T	100 µL sample loop, titanium
49677525T	200 µL sample loop, titanium
49677526T	500 µL sample loop, titanium
49677527T	1 mL sample loop, titanium
49677528T	2 mL sample loop, titanium
49677529T	5 mL sample loop, titanium

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Syringes and Transfer Tubing

25025341	100 µL syringe
25025342	250 µL syringe
25025347	500 µL syringe
25025343	1 mL syringe
25025344	5 mL syringe
25025345	10 mL syringe
499430402	1.1 mL coiled FEP tubing, 0.8 mm ID
499430403	5 mL coiled FEP tubing, 1.5 mm ID
499430404	10.5 mL coiled FEP tubing, 2.0 mm ID

Cables and Connectors

36083121	Serial cable, IBM PS/ 2-type, 25-to-25 pin
36083122	Serial cable, IBM AT-type, 9-pin female to 25-pin male
36083123	Serial cable adapter, 9-pin female to 25-pin male
638308513	Terminal block connector, 8-pin
638310513	Terminal block connector, 10-pin
709910206	2-conductor interconnect wire, 6', for making contact connections
36078143	Shielded GSIOC cable, 30"
6730254007	2.5 Amp, T-2.5 slow-blow fuse
36078155	Package of five interconnect wires (2-conductors x 6 ft.) plus identification markers

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Miscellaneous

2401711	Conical tip, stainless steel probe for the 235/ 235P Autoinjector
2401712	Angled tip, stainless steel probe for septum piercing. Includes mounting hardware. For use with the SP 235/ 235P Autoinjector.
25051109	Tee injection port kit; 0.028" through-hole. Includes injection port with drain, rinse injection port, and silicone tubing 1/ 4" ID.
2707273	Injection port seal, 0.7 mm, package of 5
4310782	5/ 64" Allen wrench; for removal and installation of the PEEK injection port/ seal
496775027	Stator face assembly for external loop on Rheodyne RV700-120 valve; order external loop separately
4967123227	Stator face assembly for internal loop on Rheodyne RV700-120 valve; incorporates 1 µL internal loop
496775055	Rotor seal for RV700-120 valve; internal or external sample loop
4340254	1/ 4" angled open-end wrench
4311402	9/ 64" Allen wrench
4311092	7/ 64" Allen wrench
49656055	Rheodyne 6000-055; package of 5. RheFlex short fitting set (5 nuts, 5 ferrules)
49951059	PEEK tubing; 5 ft. x 0.010" ID; 0.062" (1/ 16") OD

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Accessories and Replacement Parts

23077310	Waste bottle with lid and male quick-connect fitting
470343706	Tygon tubing for connection between rinse station and waste bottle
23077332	Quick-connect fitting to connect Tygon tubing to waste bottle
4011161241	Shipping Screw (armlock) for the 235 Autoinjector
3645357	PTFE inlet tubing (650 x 3 x 2 mm) with 20 µm stainless steel filter for syringe pump. Standard accessory
49948391	PTFE inlet tubing (1000 x 3 x 2 mm)
F1410153	Coupling for 1/ 4"-28 fittings; PVDF
F4420577	FEP waste tubing, 200 x 4 x 3 mm, for syringe pump vent connection

SP 235/SP 235P Accessories and Replacement Parts

4967001201	Stator ring for RV700 valve **SP 235/SP 235P only**
4967001001	SSL Stator for RV700 valve **SP 235/SP 235P only**

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Specifications Methods B

This appendix contains information on the methods used to obtain the volumetric precision, the accuracy specifications, and the carryover specification listed on page 1-6.

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Precision Methods/Data

System Configuration

Gilson 306 Pump
- 5 SC pump head

Gilson 305 Pump
- 5 SC pump head

Gilson 811C Dynamic Mixer
- 1.5 mL mixing chamber

Gilson 805 Manometric Module

Gilson 151 UV/ Vis Detector
- 5 mm, 12 µL analytical flow cell
- 270 nm
- 4 second peak width
- 0.05 sensitivity

235 Autoinjector
- 100 µL syringe
- 1.1 mL transfer tubing
- 20 µL loop
- sampling from 1 mL deep well microplate in Code 351 rack

Hewlett Packard Column
- Zorbax SB-C18
- 150 x 4.6 mm ID, 5 µm
- Serial No. USCM005453

UniPoint™ System Software

Mobile Phase

30% acetonitrile: 70% trifluoroacetic acid 0.05% (isocratic)
0.7 mL/ min.

Rinse Solvent

degassed 30% Acetonitrile: 70% Water

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Total Loop Injection

Sample

0.1 mg/ mL caffeine in water

Injections

5 injections of 0.1 mg/ mL caffeine in water

Injection method

1 Aspirate 3 µL air gap, 0.3 mL/ min.
2 Move to sample location
3 Aspirate 80 µL sample (loop filling coefficient=4) + 5 µL (injection flush volume), 0.3 mL/ min.
4 Aspirate 3 µL air gap, 0.3 mL/ min.
5 Move arm to outside rinse station and dip the probe
6 Move arm to injection port
7 Turn valve to load
8 Dispense 80 µL sample volume + 3 µL, 0.3 mL/ min.
9 Turn valve to inject
10 Home syringe
11 Rinse injection port 5 times with 100 µL, 3.0 mL/ min.
12 Move arm to outside rinse station
13 Home syringe
14 Rinse outside probe 5 times with 100 µL, 3.0 mL/ min.

Precision Data

CV

<0.5% with 100 µL syringe and total loop filling method as described above

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Centered Loop Injection

Sample

Five calculated concentrations of caffeine solution in 100% water

Injections

Five injections of:

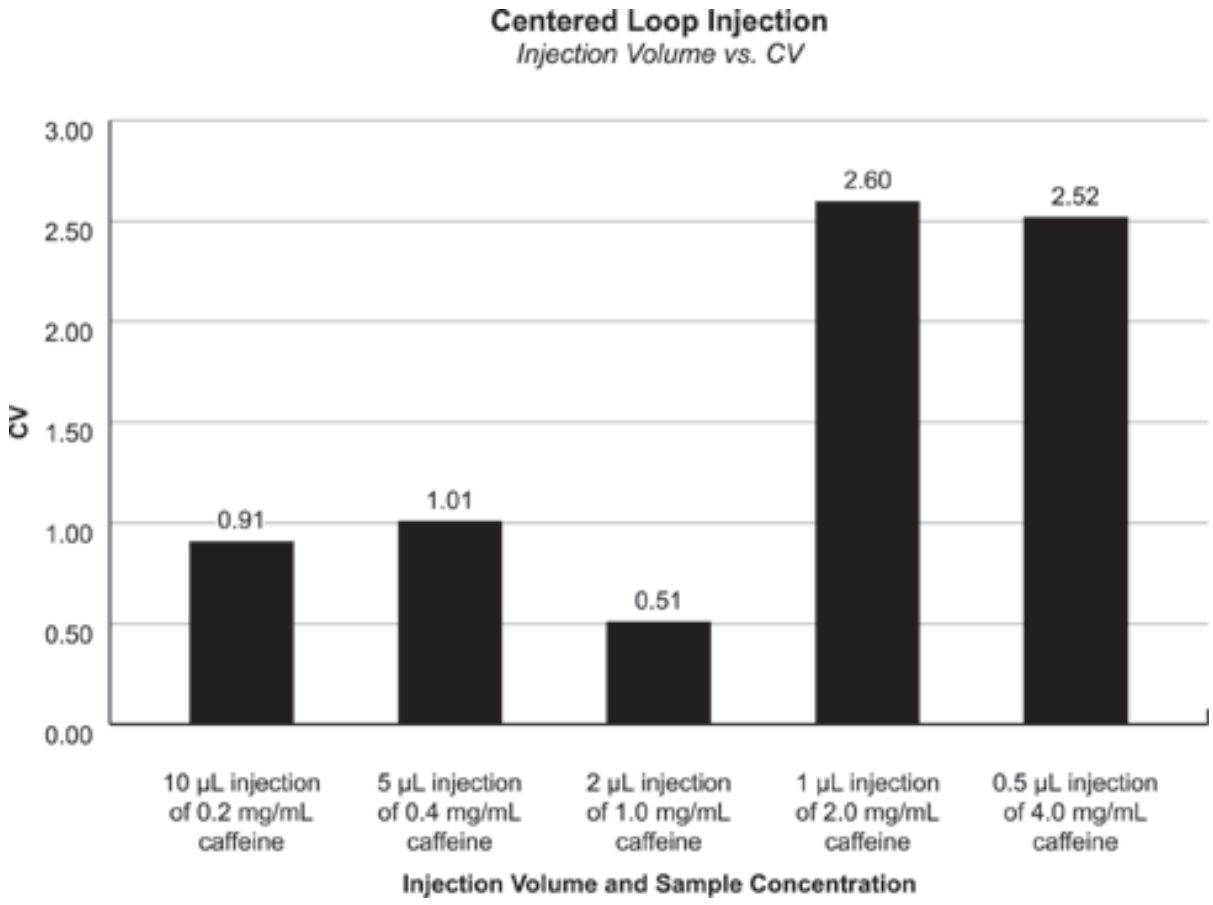
10 µL of 0.2 mg/ mL caffeine
5 µL of 0.4 mg/ mL caffeine
2 µL of 1.0 mg/ mL caffeine
1 µL of 2.0 mg/ mL caffeine
0.5 µL of 4.0 mg/ mL caffeine

Injection method

1 Aspirate 3 µL air gap, 0.3 mL/ min.
2 Move to sample location
3 Aspirate inject volume, 0.1 mL/ min.
4 Aspirate 3 µL air gap, 0.3 mL/ min.
5 Aspirate from reservoir push volume, 0.3 mL/ min.
6 Move arm to outside rinse station and dip the probe
7 Move arm to injection port
8 Turn valve to load
9 Dispense inject volume + push volume + 6 µL, 0.1 mL/ min.
10 Turn valve to inject
11 Home syringe
12 Rinse injection port 5 times with 100 µL, 3.0 mL/ min.
13 Move arm to outside rinse station
14 Home syringe
15 Rinse outside probe 5 times with 100 µL, 3.0 mL/ min.

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Precision Data



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Partial Loop Injection

Sample

Five calculated concentrations of caffeine solution in 100% water

Injections

Five injections of:

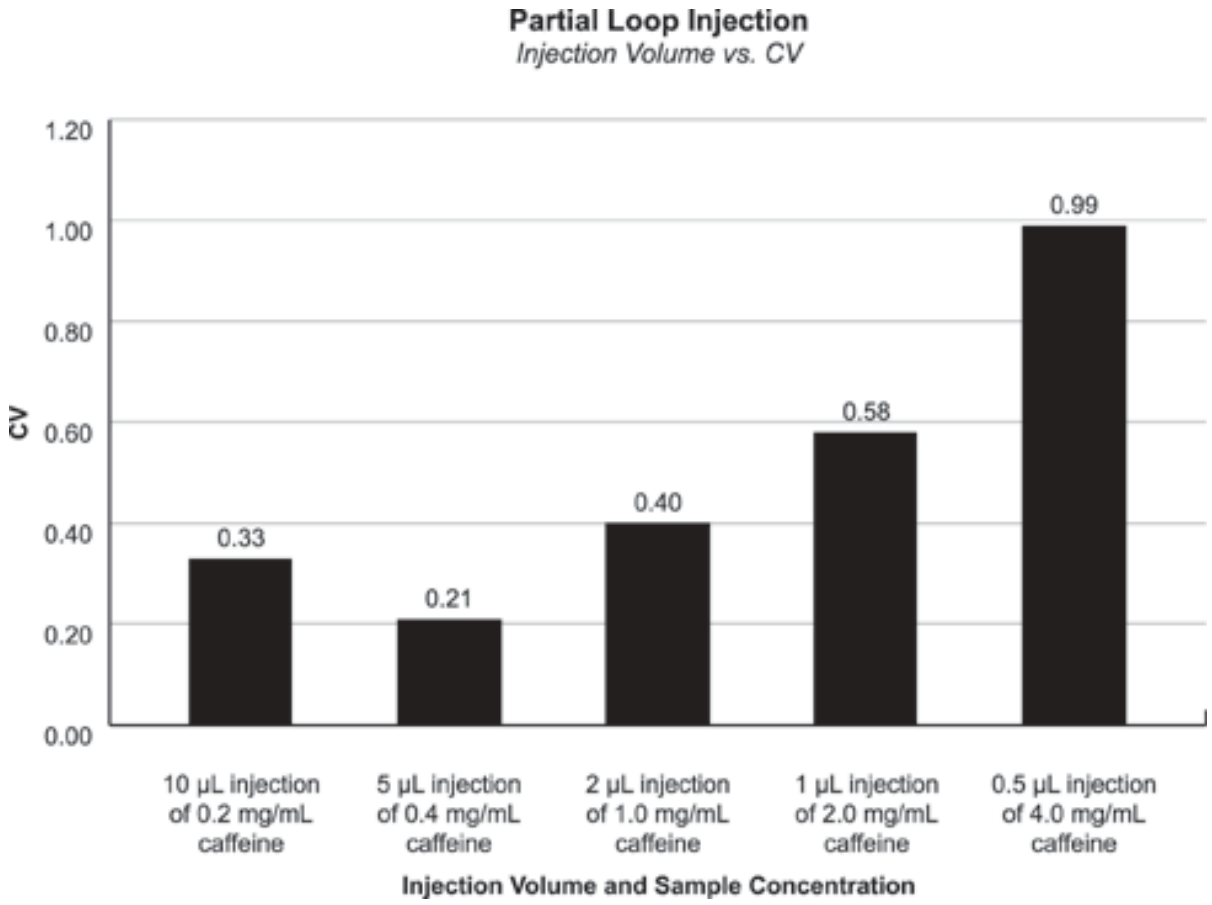
10 µL of 0.2 mg/ mL caffeine
5 µL of 0.4 mg/ mL caffeine
2 µL of 1.0 mg/ mL caffeine
1 µL of 2.0 mg/ mL caffeine
0.5 µL of 4.0 mg/ mL caffeine

Injection method

1 Aspirate 6 µL air gap, 0.3 mL/ min.
2 Move to sample location
3 Aspirate inject volume +15 µL, 0.3 mL/ min.
4 Aspirate 6 µL air gap, 0.3 mL/ min.
5 Move arm to outside rinse station and dip the probe
6 Move arm to injection port
7 Turn valve to inject
8 Dispense 15 µL, 0.3 mL/ min.
9 Turn valve to load
10 Dispense inject volume, 0.3 mL/ min.
11 Turn valve to inject
12 Home syringe
13 Rinse injection port 5 times with 100 µL, 3.0 mL/ min.
14 Move arm to outside rinse station
15 Home syringe
16 Rinse outside probe 5 times with 100 µL, 3.0 mL/ min.

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Precision Data



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Carryover Methods/Data

System Configuration

Gilson 306 Pump
- 5 SC pump head

Gilson 305 Pump
- 5 SC pump head

Gilson 811C Dynamic Mixer
- 1.5 mL mixing chamber

Gilson 805 Manometric Module

Jasco FP-920 Intelligent Fluorescence Detector
- PMT Gain: 100
- excitation filter: 254 nm
- emission filter: 400 nm
- attentuation: 16

235 Autoinjector
- 100 µL syringe
- 1.1 mL transfer tubing
- 20 µL loop
- sampling from Code 353 Rack with 0.7 mL glass, conical vials and metal crimp top caps with septa

Hewlett Packard Column
- Zorbax SB-C18
- 150 x 4.6 mm ID, 5 µm
- Serial No. USCM005453

UniPoint™ System Software

Mobile Phase

100% methanol
0.7 mL/ min.

Rinse Solvent

100% methanol
- 500 µL injection port rinse
- 500 µL outside probe rinse

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Partial Loop Injection

Injections

1 Two system blanks
2 Two 20 µL injections of 100% methanol
3 One 10 µL injection of 1.5277 µg/ mL anthracene in 100% methanol followed by three 10 µL injections of 100% methanol repeated three times
4 One 5 µL injection of 1.5277 µg/ mL anthracene in 100% methanol followed by four 5 µL injections of 100% methanol repeated three times
5 Three 2 µL injections of 1.5277 µg/ mL anthracene in 100% methanol followed by four 2 µL injections of 100% methanol

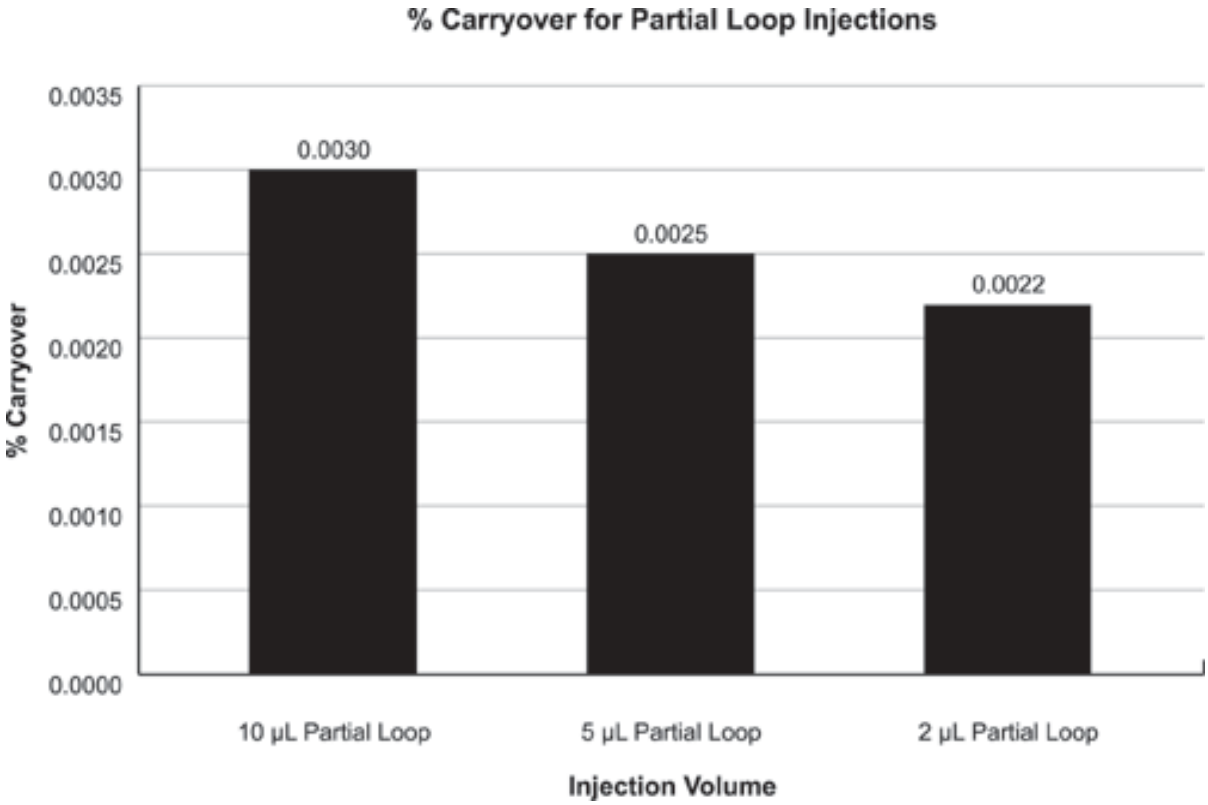
Injection method

1 Aspirate 6 µL air gap, 0.3 mL/ min.
2 Move to sample location
3 Aspirate inject volume +15 µL, 0.3 mL/ min.
4 Aspirate 6 µL air gap, 0.3 mL/ min.
5 Move arm to outside rinse station and dip the probe
6 Move arm to injection port
7 Turn valve to inject
8 Dispense 15 µL, 0.3 mL/ min.
9 Turn valve to load
10 Dispense inject volume, 0.3 mL/ min.
11 Turn valve to inject
12 Home syringe
13 Rinse injection port 5 times with 100 µL, 3.0 mL/ min.
14 Move arm to outside rinse station
15 Dip probe in rinse station.
16 Home syringe

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Carryover Data

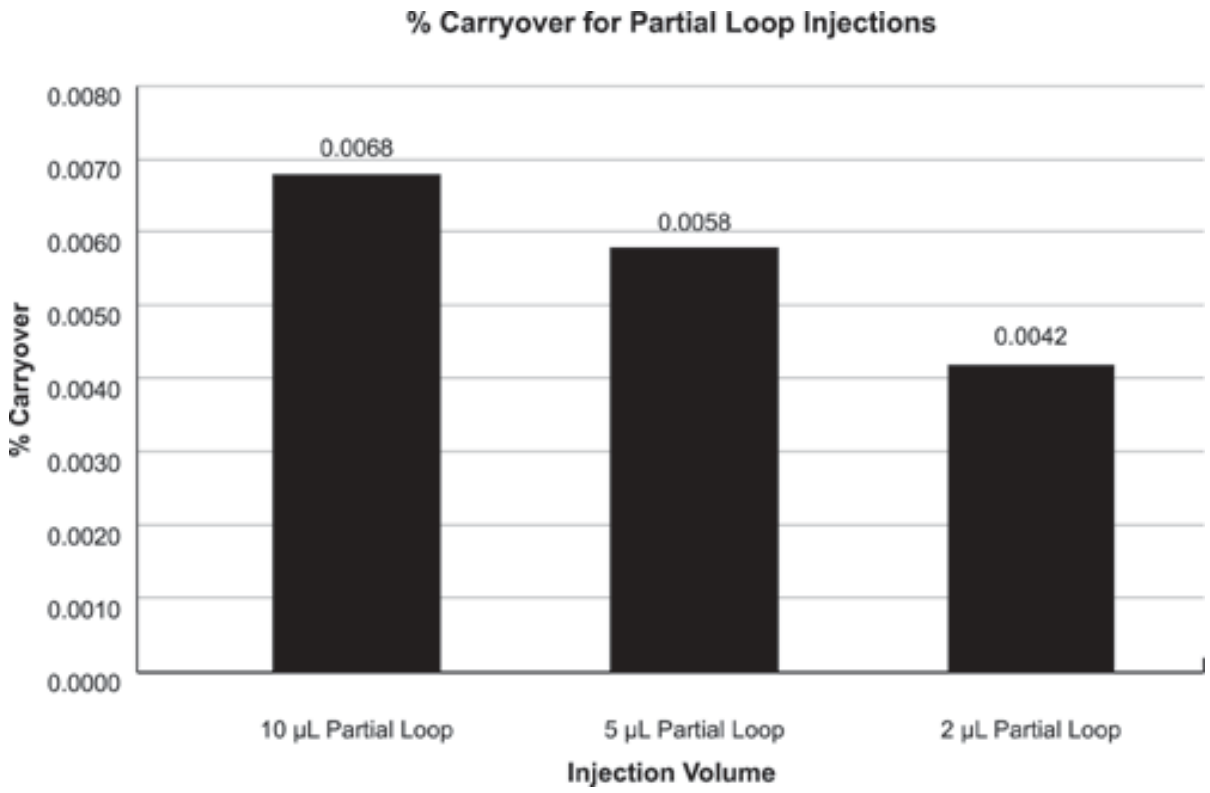
<0.0035% in the first blank injection with the rinse volumes listed in this method.



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Carryover Data for 235 Septum Piercing Option

<0.0070% in the first blank injection with the rinse volumes listed in this method.



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GSIOC Commands C

The Gilson Serial Input Output Channel (GSIOC) is an asynchronous serial communications interface that enhances the power of your Gilson equipment.

The GSIOC incorporates an EIA RS-485 interface and allows up to 32 slave devices to be controlled from a single master in a multi-drop configuration.

Each slave device is identified by a unique number which must be known to the device and to the controller. The default ID code of the 235 Autoinjector is 20.

To control the 235 Autoinjector you will need the following:

- a personal computer with Microsoft Windows 98 or NT and any Gilson control software or 706 Device Driver Software installed
- an unused RS-232 communication port

From the computer, you:

- specify the 235 Autoinjector as the device you want to control
- issue commands that set operating parameters, control operation, or request information from that device

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GSIOC Commands

There are two kinds of commands that you can send over the GSIOC:

- **Buffered commands** send instructions to the autoinjector. These commands are executed one at a time.

- **Immediate commands** request status information from the autoinjector. These commands are executed immediately, temporarily interrupting other commands in progress.

GSIOC Command List

In the command list on the following pages, the GSIOC command must be entered in the proper upper or lower case format. If a buffered command requires additional information, you'll see *italicized* text next to the command. The description of the command identifies what you need to enter in place of the italicized parameter. Also note that if a parameter is optional, it appears within brackets, [ ].

I - Immediate
B - Buffered

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Command	*Type*	*Description*
%	I	Request module identification. Response format: 235Va.bc where Va.bc is the firmware version.
$	I	Master reset. Returns $ and resets the machine in its power-up state.
@	I	Reads non-volatile memory at current address. Response format: AA=xxxx where AA is address(0..19, 100..119) and xxxx is the word data for address 0 to 19 and the floating data for address 100 to 119. Current address is incremented as a side effect.
@AA=vv	B	Set the value at NV-RAM address. AA is address, 0 to 19 for word type data and 100 to 119 for floating type data. vv is data.
~n	B	Set to special mode. ~1: XYZ test. ~2: Pump test. ~9: Reset NV-RAM and initialize to default value.
9	I	Reads contact input event FIFO. Whenever the status of a contact input changes, the state of all four contacts and the time since the last buffered 9 command are stored in the event FIFO. If there is an event in the FIFO queue, the command returns 'Xttttt', where X describes the state of the four contact inputs and ttttt is the time in 10mS units since the last buffered 9 command in hexidecimal. If the queue is empty, a "|000000" (a pipe character + zeros) is returned. ('1' = Closed '0' = Opened) X = A B C D X = A B C D @ = 0 0 0 0 H = 0 0 0 1 A = 1 0 0 0 I = 1 0 0 1 B = 0 1 0 0 J = 0 1 0 1 C = 1 1 0 0 K = 1 1 0 1 D = 0 0 1 0 L = 0 0 1 1 E = 1 0 1 0 M = 1 0 1 1 F = 0 1 1 0 O = 0 1 1 1 G = 1 1 1 0 P = 1 1 1 1

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9	B	Clears the contact event FIFO and resets the contact input event timer.
A	I	Reads X & Y Motor home phases. Response Format: xx/ yy where xx is X-motor phase and yy is Y-motor phase.
D	I	Reads syringe pump status. Response format: 'vxxxxx.xx' where v is valve position. v is 'R' for Reservoir and 'N' for Probe. Xxxx.xx is current volume [mL] in syringe.
Ddxxxxx.xx[,ss]	B	Syringe pump command. d indicates valve position 'N' for Needle, 'R' for Reservoir. Vvv.vv is a signed decimal volume in µL. The optional ss field is syringe speed in units of [ML/ MIN].
d	B	Home Syringe pump. Sends the piston to the upper position with the valve in Needle position.
E	I	Reads Error number. 00 indicates normal operation.
Exyz	B	Sets XYZ Motor enable. xyz are X-motor, Y-motor and Z-motor. '0' for disable. '1' for enable.
F	I	Reads maximum syringe flow rate in units of [ML/ MIN].
H	B	Initiates home sequence. Homes to X = 0, Y= 0, Z = Top of travel. Injection valve moves to INJECT position. Syringe pump moves to the top of its stroke. Syringe pump valve moves to the probe position.
I	I	Reads contact inputs and front key. Response Format: cccc where cccc are input A, B, C and D. '1' is for closed '0' is opened for contact input.

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J	I	Reads relay output status. Response Format: ccccp where cccc is relay output 1, 2, 3, and 4. p is for AUX external +12V power. '1' is for connected, '0' is for disconnect. AUX power is ON after 235 power up.
Jcccc[p]	B	Sets relay output contacts and +12V external power. cccc is relay 1, 2, 3, and 4. p is +12V AUX power. '1' for connected, '0' for disconnected. 'X' for no change.
jc[ttt]	B	Pulses a relay output. c is a relay 1 to 4. ttt is the pulse duration time in units of 0.1 sec. Default ttt is 1.
M	I	Reads XYZ Motor, Pump, and Injection valve status Response Format: xyzpv where xyzpv are X, Y, Z-Motor, Pump, and Injection valve. 'U' for Unpowered, 'P' for Powered, 'R' for Running, 'E' for Error.
Q	I	Reads XYZ travel range. Response format: axis=min/ max where axis is 'X' or 'Y' or 'Z'. Min is minimum position and max is maximum position. The first reading returns X travel range, next reading returns Y travel range, and so on.
q	I	Reads X, Y, needle, Door sensor and Start/ Stop button status. Response Format: XYZDS where X is X-arm stop sensor, Y is Y-arm sensor, Z is probe sensor, D is front door sensor and S is start/ stop button.
S	I	Reads next pending command in the synchronization FIFO buffer. Returns '|' if buffer is empty.

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Smm	B	Sends a synchronized command. Mm is any valid buffered command that will execute when the instrument is quiescent. Up to 8 commands can be stored in the FIFO.
V	I	Reads Injection valve status. Returns one character. L ... Load position I ... Inject position M ... Moving E ... Error
Vs	B	Turn Injection valve to a position VI for valve to Inject position. VL for valve to Load position
W	I	Reads virtual display.
Wss..s	B	Writes to virtual display. Up to 28 characters
x y z	I	Motor status. Response format: 'U' for Unpowered, 'P' for parked, 'R' for running, 'E' for error.
X	I	Reads X and Y positions in units of 0.1 mm. Response format: xxxx/ yyyy where xxxx is X position and yyyy is Y position.
Y	I	Reads Y position in units of 0.1 mm. Response format: yyyy where yyyy is Y position.
Z	I	Reads Z position in units of 0.1 mm. Response format: zzzz where zzzz is Z position.
Xxxxx[/ yyyy]	B	Sets new X and Y positions. xxxx and yyyy are new positions in units of 0.1 mm. Y position is optional.
Yyyyy	B	Sets new Y position. yyyy is new position in units of 0.1 mm.
Zzzzz	B	Sets new Z position. zzzz is new position in units of 0.1 mm.

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System Variables and Methods D

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System Variables

Variable Name	*Min.*	*Default*	*Max.*	*Description*
Mode_Sample	-	Simple	-	Sample Preparation Mode
Mode_Loop	-	Total	-	Loop Filling Mode
Mode_SynchPort	False	True	True	Wait at injection port for synchronization? (Or wait above sample?)
Mode_Coord	-	Time	-	Coordination Mode
Mode_CoordTime	0	5	10,000	Coordination Time (min.)
Con_Loop	0	20	5,000	Injection Loop Volume (µL)
Con_Flush	0	15	5,000	Injection Flush Volume (µL)
Con_Tray	-	untitled	-	Tray File Path/Name
Con_Zoff	-10	1	10	Probe Z Offset (mm)
Con_GSIOC	20	20	29	GSIOC Unit ID
Con_PeltierOn	False	False	True	Is the Peltier to be on at start?
Con_PeltierOff	False	False	True	Is the Peltier to be turned off at end?
Con_LoopCo	1	4	10	Loop Filling Coefficient
Adv_CalTube	0	1.5	100	Injection Port Dead Volume (µL)
Adv_ValveLoadRate	0.1	0.3	100	Injection Valve Loading Flow Rate (mL/min.)
Adv_ValveRinseRate	0.1	3	100	Injection Valve Rinsing Flow Rate (mL/min.)
Adv_PulseTime	0.1	2	10	Contact Pulse Duration (sec.)
Adv_DoDip	False	True	True	Do a pre-injection dip in rinse station?
Vol_InsideR	1	0	10,000	Inside Probe Rinse Volume (µL)
Vol_OutsideR	1	500	10,000	Outside Probe Rinse Volume (µL)
Vol_InjectR	1	500	10,000	Injection Valve Rinse Volume (µL)
Vol_AirGap	0.1	3	100	Air Gap Volume (µL)
Vol_AirRate	0.1	0.3	100	Air Gap Flow Rate (mL/min.)
Vol_VialRate	0.1	0.3	100	Vial Aspirate/Dispense Flow Rate (mL/min.)
Vol_PrimeRate	0.1	3	100	Priming Flow Rate (mL/min.)
Vol_MixRate	0.1	2	100	Mixing Aspirate Flow Rate (mL/min.)
Vol_MixRate2	0.1	2	100	Mixing Dispense Flow Rate (mL/min.)
Vol_DiluteRate	0.1	3	100	Diluent Aspirate Flow Rate (mL/min.)
Vol_RinseRate	0.1	2	100	Probe Rinse Flow Rate (mL/min.)
Dil_DiluteFactor	1	2	100	Dilution Ratio (1 part in X)
Dil_MixCount	1	5	100	Mixing Cycle Count
Meth_FirstSamp	1	1	10,000	Zone Index of First Sample
Meth_LastSamp	1	1	10,000	Zone Index of Last Sample
Meth_InjPerSamp	1	1	500	Injections Per Sample
Meth_InjectVol	0.1	10	100	Volume Per Injection
Meth_SampPerStd	1	1	100	Samples Per Standard Set
Meth_Standards	0	1	100	Number of Standards in Set
Meth_InjPerStd	1	1	500	Injections per Standard
Meth_IntStdPerInject	0.1	5	100	Internal Standard Per Injection

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Process Descriptions

Simple Injection

1) Initialize hardware
2) For each sample (Meth_FirstSamp..Meth_LastSamp)
   a) If a Priority is pending
      i) For each injection (1..Meth_InjPerSamp)
         (1) Do a simple inject of that priority sample
         (2) Cleanup for that priority sample
   b) For each injection (1..Meth_InjPerSamp)
      i) Do a simple inject of that sample
      ii) Cleanup for that sample

Simple Injection with Dilution

1) Initialize hardware
2) For each sample (Meth_FirstSamp..Meth_LastSamp)
   a) If a Priority is pending
      i) Prepare a diluted priority sample in the next clean Process well.
      ii) Mix diluted samples
      iii) For each injection (1..Meth_InjPerSamp)
         (1) Do a simple inject of that diluted priority sample
         (2) Cleanup for that priority sample
   b) Prepare diluted sample in next clean Process well.
   c) Mix diluted samples
   d) For each injection (1..Meth_InjPerSamp)
      i) Do a simple inject of that diluted sample
      ii) Cleanup for that sample

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External Standard

To do one set of external standards

1) For each standard (1..Meth_Standards),
   a) For each injection (1..Meth_InjPerStd),
      i) Do a simple inject of that standard
      ii) Cleanup for that standard

1) Initialize hardware
2) Do one set of external standards
3) For each sample (Meth_FirstSamp..Meth_LastSamp)
   a) If last calibration was Meth_SampsPerStd ago, do one set of external standards
   b) If a Priority sample is pending
      i) For each injection (1..Meth_InjPerSamp)
         (1) Do a simple inject of that priority sample
         (2) Cleanup for that priority sample
   c) For each injection (1..Meth_InjPerSamp)
      i) Do a simple inject of that sample
      ii) Cleanup for that sample
4) Do one set of external standards.

External Standard with Dilution

To do one set of diluted external standards

1) For each standard (1..Meth_Standards),
   a) Dilute standard to next clean process well
   b) Mix diluted standard
   c) For each injection (1..Meth_InjPerStd),
      i) Do a simple inject of that diluted standard
      ii) Cleanup for that diluted standard

1) Initialize hardware
2) Do one set of diluted external standards
3) For each sample (Meth_FirstSamp..Meth_LastSamp)
   a) If last calibration was Meth_SampsPerStd ago, do one set of external standards
   b) If a Priority sample is pending
      i) Dilute priority sample to next clean process well
      ii) Mix diluted priority sample
      iii) For each injection (1..Meth_InjPerSamp)
         (1) Do a simple inject of that diluted priority sample
         (2) Cleanup for that diluted priority sample
   c) Dilute sample to next clean process well
   d) Mix diluted sample
   e) For each injection (1..Meth_InjPerSamp)
      i) Do a simple inject of that sample
      ii) Cleanup for that sample
4) Do one set of diluted external standards.

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Internal Standard

To do a spike of a priority sample, sample, or calibrator

1) The total volume to transfer is the amount of liquid required to put 2mm of liquid in the bottom of the process vial, plus enough to support the required number of injections. The composition of this liquid must be the same as a sample volume of Meth_InjectVol containing Meth_IntStdPerInj of internal standard, the rest being raw sample.
   Needed sample per injection =
   if **total loop**: (Con_Loop * Meth_LoopCo) + Con_Flush
   if **partial loop**: Meth_InjectVol + Con_Flush
   if **centered loop**: Meth_InjectVol
   Total volume (µL) = (2mm* Pi*Rmm^2)+(Meth_InjPerSamp*needed sample per injection)
   Fraction of total volume from internal standard = Meth_IntStdPerInj / Meth_InjectVol
   Fraction of total volume from raw sample = 1 – (Meth_IntStdPerInj / Meth_InjectVol)
   Transfer internal standard plus raw sample from source to the next process well
2) Mix contents of process well Dil_MixCount times
3) Cleanup for that spike

To do one set of spiked external standards

1) For each standard (1..Meth_Standards),
   a) Spike that standard to the next clean process well.
   b) For each injection (1..Meth_InjPerStd),
      i) Do a simple inject of that process well
      ii) Cleanup for that injection

2) Initialize hardware
3) Do one set of spiked external standards
4) For each sample (Meth_FirstSamp..Meth_LastSamp)
   a) If last calibration was Meth_SampPerStd ago, do one set of spiked external standards
   b) If a Priority sample is pending
      i) Spike the priority sample to the next clean process well
      ii) For each injection (1..Meth_InjPerSamp)
         (1) Do a simple inject of that process well
         (2) Cleanup for that priority sample
   c) Spike that sample to the next process well
   d) For each injection (1..Meth_InjPerSamp)
      i) Do a simple inject of that process well
      ii) Cleanup for that sample
5) Do one set of spiked external standards.

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Internal Standard with Dilution

To do a spike of a priority sample, sample, or calibrator and dilute it

1) The total volume to transfer is the amount of liquid required to put 2mm of liquid in the bottom of the process vial, plus enough to support the required number of injections. The composition of this liquid must be the same as a sample composed of
   Meth_IntStdPerInj of internal standard
   Meth_InjectVol – Meth_IntStdPerInj of sample, priority sample, or calibrator.
   Meth_InjectVol * (Dil_DiluteConcen – 1) of diluent

   Needed sample per injection =
   if **total loop**: (Con_Loop * Meth_LoopCo) + Con_Flush
   if **partial loop**: Meth_InjectVol + Con_Flush
   if **centered loop**: Meth_InjectVol

   Total volume (µL) = (2mm*Pi*Rmm^2)+(Meth_InjPerSamp*needed sample per injection)
   Fraction from internal standard = Meth_IntStdPerInj/ (Meth_InjectVol*Dil_DiluteConcen)
   Fraction from raw sample = (Meth_InjectVol–Meth_IntStdPerInj)/ (Meth_InjectVol* Dil_DiluteConcen)
   Fraction from diluent = (Meth_InjectVol*(Dil_DiluteConcen–1))/ (Meth_InjectVol* Dil_DiluteConcen)
   Transfer internal standard plus raw sample plus diluent from source to the next process well
2) Mix contents of process well Dil_MixCount times (mix volume = 1mm volume)
3) Cleanup for that spike

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To do one set of spiked external standards with dilution

1) For each standard (1..Meth_Standards),
   a) Spike that standard with diluent to the next clean process well.
   b) For each injection (1..Meth_InjPerStd),
      i) Do a simple inject of that process well
      ii) Cleanup for that injection
1) Initialize hardware
2) Do one set of spiked external standards with dilution
3) For each sample (Meth_FirstSamp..Meth_LastSamp)
   a) If last calibration was Meth_SampPerStd ago, do one set of spiked external standards with dilution
   b) If a Priority sample is pending
      i) Spike the priority sample and dilute to the next clean process well
      ii) For each injection (1..Meth_InjPerSamp)
         (1) Do a simple inject of that process well
         (2) Cleanup for that priority sample
   c) Spike that sample and dilute to the next process well
   d) For each injection (1..Meth_InjPerSamp)
      i) Do a simple inject of that process well
      ii) Cleanup for that sample
4) Do one set of spiked external standards with dilution.

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Sub-Process Descriptions

Simple Inject of Zone:N

1) Go to Zone: N in XY
2) Aspirate Vol_AirGap at Vol_AirRate
3) If not Synchronize in Port and GSIOC coordination then write 'Ready' on display
4) If **centered loop:** aspirate diluent (Adv_CalTube+(Con_Loop/ 2)–(Meth_InjectVol/ 2)) at Vol_DiluteRate
5) If Synchronize at Sample
   a) if **time coordination:** wait for coordination time to finish
   b) if **contact coordination:** wait for input contact to close
   c) if **GSIOC coordination:** wait for virtual display to be 'Go'
6) Go to Con_Zoff from bottom of Zone: N tube in Z
7) Pickup sample into probe
   a) if **total loop**: Aspirate sample ((Con_Loop*Meth_LoopCo)+Con_Flush) at Vol_VialRate
   b) if **partial loop**: Aspirate sample (Meth_InjectVol + Con_Flush) at Vol_VialRate
   c) if **centered loop**: Aspirate sample (Meth_InjectVol) at Vol_VialRate
8) Delay 2 seconds
9) Go to top of travel in Z
10) Aspirate Vol_AirGap at Vol_AirRate
11) if **doing dip**: Go to Rinse:1 in XY
12) if **doing dip**: Go to Rinse:1 bottom in Z
13) if **doing dip**: Go to top of travel in Z
14) Go to Inject:1 in XY
15) Go to bottom of Inject:1 in Z
16) Special prepare for valve loading
   a) If **partial loop:** dispense Con_Flush at Adv_ValveLoadRate
   b) If **GSIOC coordination**: write 'Ready' into virtual display.
17) If Synchronize in Port
   a) if **time coordination:** wait for coordination time to finish
   b) if **contact coordination:** wait for input contact to close
   c) if **GSIOC coordination:** wait for virtual display to be 'Go'
18) Turn injection valve to loop load, and close output 2.
19) Load Loop
   a) if **total loop:** dispense ((Con_Loop*Meth_LoopCo)+Con_Flush) at Adv_ValveLoadRate
   b) if **partial loop**: dispense Meth_InjectVol at Adv_ValveLoadRate
   c) if **centered loop:** dispense (Vol_AirGap+(Meth_InjectVol/ 2)+Adv_CalTube+(Con_Loop/ 2)) at Adv_ValveLoadRate
20) Wait 1.2 seconds to equilibrate
21) Synchronize
   a) if **time coordination:** go ahead with injection
   b) if **contact coordination:** wait for input contact to open
   c) if **GSIOC coordination:** write 'Done' to virtual display

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22) Turn injection valve to inject, and open output 2.
23) If syringe not empty, dispense any held volume.
24) Aspirate diluent Vol_InjectR at Vol_DiluteRate
    (note: repeat these two steps as needed to make up Vol_InjectR)
25) Dispense (holding) at Adv_ValveRinseRate
26) Delay 2 seconds.
27) Go to top of travel in Z
28) Standard Cleanup Process

Volumes totals for simple inject

Total loop

Step	Aspirate or Dispense	Holding
2	+Vol_AirGap	Vol_AirGap
5	+((Con_Loop*Meth_LoopCo)+Con_Flush)	Vol_AirGap+(Con_Loop*Meth_LoopCo)+ Con_Flush
13	-((Con_Loop*Meth_LoopCo)+Con_Flush)	Vol_AirGap
16	+Vol_InjectR	Vol_AirGap+Vol_InjectR
17	-(Vol_InjectR+Vol_AirGap)	0

Partial loop

Step	Aspirate or Dispense	Holding
2	+Vol_AirGap	Vol_AirGap
5	+(Meth_InjectVol+Con_Flush)	Vol_AirGap+Meth_InjectVol+Con_Flush
10	-Con_Flush	Vol_AirGap+Meth_InjectVol
13	-Meth_InjectVol	Vol_AirGap
16	+Vol_InjectR	Vol_AirGap+Vol_InjectR
17	-(Vol_InjectR+Vol_AirGap)	0

Centered loop

Step	Aspirate or Dispense	Holding
2	+Vol_AirGap	Vol_AirGap
4	+Adv_CalTube+(Con_Loop/2)- (Meth_InjectVol/2)	Vol_AirGap+Adv_CalTube+(Con_Loop/2)- (Meth_InjectVol/2)
5	+Meth_InjectVol	Vol_AirGap+Adv_CalTube+(Con_Loop/2) +(Meth_InjectVol/2)
7	+Vol_AirGap	(Vol_AirGap*2)+(Adv_CalTube+ (Con_Loop/2)+(Meth_InjectVol/2)
13	-Vol_AirGap-(Meth_InjectVol/2)- Adv_CalTube-(Con_Loop/2)	Vol_AirGap
16	+Vol_InjectR	Vol_AirGap+Vol_InjectR
17	-Vol_InjectR+Vol_AirGap	0

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Standard Mix

1) Go to Con_Zoff from bottom of process well
2) Aspirate (Pi*Rmm^2)+(Meth_SampInj*SampVol) at Vol_MixRate
3) Dispense (Pi*Rmm^2)+(Meth_SampInj*SampVol) at Vol_MixRate
   (note: repeat these two prior steps Dil_MixCount times)
4) Go to top of travel in Z

Standard Cleanup

1) If Vol_InsideR > 0
   a) Go to Rinse: 2 in XY (rinse dump site)
   b) Go down to top of rinse site.
   c) If holding, dispense holding.
   d) Aspirate diluent Vol_InsideR at Vol_DiluteRate
   e) Dispense Vol_InsideR at Vol_RinseRate
   f) Go to top of travel in Z.
2) Go to Rinse: 1 in XY (pocket rinse)
3) Go to Rinse: 1 bottom in Z
4) Aspirate diluent Vol_OutsideR at Vol_DiluteRate
   (Note: repeat these two steps if needed to get Vol_OutsideR)
5) Dispense Vol_OutsideR at Vol_RinseRate
6) Go to top of travel in Z

Volume totals for standard cleanup

1)	–Holding	0
2)	+Vol_InsideR	Vol_InsideR
3)	–Vol_InsideR	0
4)	+Vol_OutsideR	Vol_OutsideR
5)	–Vol_OutsideR	0

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Internal Standard plus Sample to Process Well

1) Go to internal standard well in XY
2) Aspirate Vol_AirGap
3) Go down to Con_Zoff from bottom of internal standard well
4) Aspirate internal standard at Vol_VialRate
   a) if **total loop**: Aspirate (Meth_IntStdPerInj/ Meth_InjectVol)*((2mm*Pi*Rmm^2)+(Meth_InjPerSamp*((Con_Loop*Meth_LoopCo)+Con_Flush)))
   b) if **partial loop**: Aspirate (Meth_IntStdPerInj/ Meth_InjectVol)*((2mm*Pi*Rmm^2)+(Meth_InjPerSamp*(Meth_InjectVol+Con_Flush)))
   c) if **centered loop**: Aspirate (Meth_IntStdPerInj/ Meth_InjectVol)*((2mm*Pi*Rmm^2)+(Meth_InjPerSamp*Meth_InjectVol))
5) Go to top of travel in Z
6) Go to Source well
7) Aspirate Vol_AirGap at Vol_AirRate
8) Go to Con_Zoff from bottom of source well
9) Aspirate raw sample at Vol_VialRate
   a) if **total loop**: Aspirate (1–(Meth_IntStdPerInj/ Meth_InjectVol))*((2mm*Pi*Rmm^2)+(Meth_InjPerSamp*((Con_Loop*Meth_LoopCo)+Con_Flush)))
   b) if **partial loop**: Aspirate (1–Meth_IntStdPerInj/ Meth_InjectVol))*((2mm*Pi*Rmm^2)+(Meth_InjPerSamp*(Meth_InjectVol+Con_Flush)))
   c) if **centered loop**: Aspirate (1–Meth_IntStdPerInj/ Meth_InjectVol))*((2mm*Pi* Rmm^2)+(Meth_InjPerSamp*Meth_InjectVol))
10) Go to top
11) Go to next clean process well
12) Move down to top edge of process well
13) Dispense raw sample plus internal standard and air gaps.
   a) if **total loop**: (2mm*Pi*Rmm^2)+(Meth_InjPerSamp*((Con_Loop*Meth_LoopCo)+Con_Flush))+(2*Vol_AirGap)
   b) if **partial loop**: (2mm*Pi*Rmm^2)+(Meth_InjPerSamp*(Meth_InjectVol+ Con_Flush))+(2*Vol_AirGap)
   c) if **centered loop**: (2mm*Pi*Rmm^2)+(Meth_InjPerSamp*Meth_InjectVol)+(2*Vol_AirGap)

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Diluent plus Sample to Process Well

1) Aspirate diluent at Vol_DiluteRate
   a) if **total loop**: Aspirate ((Dil_DiluteConcen–1)/ Dil_DiluteConcen)*((2mm*Pi*Rmm^2)+(Meth_InjPerSamp*((Con_Loop*Meth_LoopCo)+Con_Flush)))
   b) if **partial loop**: Aspirate ((Dil_DiluteConcen–1)/ Dil_DiluteConcen)*((2mm*Pi*Rmm^2)+(Meth_InjPerSamp*(Meth_InjectVol+Con_Flush)))
   c) if **centered loop**: Aspirate ((Dil_DiluteConcen–1)/ Dil_DiluteConcen)*((2mm*Pi*Rmm^2)+(Meth_InjPerSamp*Meth_InjectVol))
2) Go to Source well
3) Aspirate Vol_AirGap at Vol_AirRate
4) Go to Con_Zoff from bottom of source well
5) Aspirate raw sample at Vol_VialRate
   a) if **total loop**: Aspirate (1/ Dil_DiluteConcen)*((2mm*Pi*Rmm^2)+(Meth_InjPerSamp*((Con_Loop*Meth_LoopCo)+Con_Flush)))
   b) if **partial loop**: Aspirate (1/ Dil_DiluteConcen)*((2mm*Pi*Rmm^2)+(Meth_InjPerSamp*(Meth_InjectVol+Con_Flush)))
   c) if **centered loop**: Aspirate (1/ Dil_DiluteConcen)*((2mm*Pi*Rmm^2)+(Meth_InjPerSamp*Meth_InjectVol))
6) Go to top
7) Go to next clean process well
8) Move down to top of tube.
9) Dispense raw sample plus diluent and air gap.
   a) if **total loop**: (2mm*Pi*Rmm^2)+(Meth_InjPerSamp*((Con_Loop*Meth_LoopCo)+Con_Flush))+Vol_AirGap
   b) if **partial loop**: (2mm*Pi*Rmm^2)+(Meth_InjPerSamp*(Meth_InjectVol+ Con_Flush))+Vol_AirGap
   c) if centered loop: (2mm*Pi*Rmm2)+(Meth_InjPerSamp*Meth_InjectVol)+Vol_AirGap

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Internal Standard, Diluent, and Sample to Process Well

1) Go to internal standard well in XY
2) Aspirate Vol_AirGap
3) Go down to Con_Zoff from bottom of internal standard well
4) Aspirate internal standard at Vol_VialRate
   a) if **total loop**: Aspirate (Meth_IntStdPerInj/ Meth_InjectVol)*((2mm*Pi*Rmm^2)+(Meth_InjPerSamp*((Con_Loop*Meth_LoopCo)+Con_Flush)))
   b) if **partial loop**: Aspirate (Meth_IntStdPerInj/ Meth_InjectVol)*((2mm*Pi*Rmm^2)+(Meth_InjPerSamp*(Meth_InjectVol+Con_Flush)))
   c) if **centered loop**: Aspirate (Meth_IntStdPerInj/ Meth_InjectVol)*((2mm*Pi*Rmm^2)+(Meth_InjPerSamp*Meth_InjectVol))
5) Go to top of travel in Z
6) Go to Source well
7) Aspirate Vol_AirGap at Vol_AirRate
8) Go to Con_Zoff from bottom of source well
9) Aspirate raw sample at Vol_VialRate
   a) if **total loop**: Aspirate (1–(Meth_IntStdPerInj/ Meth_InjectVol))*((2mm*Pi*Rmm^2)+(Meth_InjPerSamp*((Con_Loop*Meth_LoopCo)+Con_Flush)))
   b) if **partial loop**: Aspirate (1–Meth_IntStdPerInj/ Meth_InjectVol))*((2mm*Pi*Rmm^2)+(Meth_InjPerSamp*(Meth_InjectVol+Con_Flush)))
   c) if **centered loop**: Aspirate (1–Meth_IntStdPerInj/ Meth_InjectVol))*((2mm*Pi*Rmm^2)+(Meth_InjPerSamp*Meth_InjectVol))
10) Go to top
11) Go to next clean process well
12) Go down to top of process well.
13) Dispense raw sample plus internal standard and air gaps.
   a) if **total loop**: (2mm*Pi*Rmm^2)+(Meth_InjPerSamp*((Con_Loop*Meth_LoopCo)+Con_Flush))+(2*Vol_AirGap)
   b) if **partial loop**: (2mm*Pi*Rmm^2)+(Meth_InjPerSamp*((Meth_InjectVol+Con_Flush))+(2*Vol_AirGap)
   c) if **centered loop**: (2mm*Pi*Rmm^2)+(Meth_InjPerSamp*Meth_InjectVol)+(2*Vol_AirGap)
14) Aspirate diluent at Vol_VialRate
   a) if **total loop**: Aspirate ((Dil_DiluteConcen–1)/ Dil_DiluteConcen)*((2mm*Pi* Rmm^2)+(Meth_InjPerSamp*((Con_Loop*Meth_LoopCo)+Con_Flush)))
   b) if **partial loop**: Aspirate ((Dil_DiluteConcen–1)/ Dil_DiluteConcen)*((2mm*Pi*Rmm^2)+(Meth_InjPerSamp*(Meth_InjectVol+Con_Flush)))
   c) if **centered loop**: Aspirate ((Dil_DiluteConcen–1)/ Dil_DiluteConcen)*((2mm*Pi* Rmm^2)+(Meth_InjPerSamp*Meth_InjectVol))
15) Dispense diluent at Vol_VialRate
   a) if **total loop**: Dispense ((Dil_DiluteConcen–1)/ Dil_DiluteConcen)*((2mm*Pi*Rmm^2)+(Meth_InjPerSamp*((Con_Loop*Meth_LoopCo)+Con_Flush)))
   b) if **partial loop**: Dispense ((Dil_DiluteConcen–1)/ Dil_DiluteConcen)*((2mm*Pi*Rmm^2)+(Meth_InjPerSamp*(Meth_InjectVol+Con_Flush)))
   c) if **centered loop**: Dispense ((Dil_DiluteConcen–1)/ Dil_DiluteConcen)*((2mm*Pi* Rmm^2)+(Meth_InjPerSamp*Meth_InjectVol)

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Baud Rate E

As a default, the baud rate is set to 19200, indicating that the 235/ 235P Autoinjector is a master device and the baud rate is being clocked internally.

The following baud rate selections are available if the 235/ 235P Autoinjector is being controlled by non-Gilson applications:

- External
- 19200
- 9600
- 4800

Note: External is the appropriate setting if the autoinjector will be controlled by Gilson Software via GSIOC.

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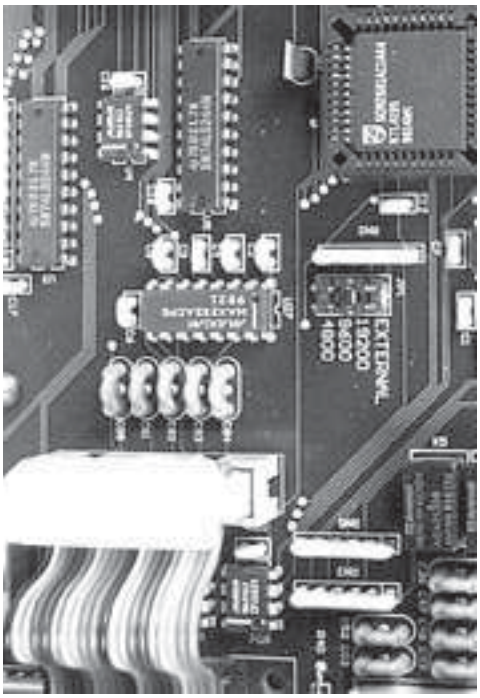
Baud Rate

To change the baud rate:

1 Turn off power to the autoinjector.

2 Remove the four screws securing the circuit board in the rear panel of the autoinjector.

3 Pull the circuit board out of the rear panel using the pull handle provided.



4 Locate **JP1** in the bottom center of the rear-panel electronics board.

5 Reposition the jumper to connect the pins for the baud rate that you want to use.

6 Replace the circuit board in the rear panel.

7 Replace the four screws that secure the circuit board in the rear panel of the autoinjector.

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Tray Editor F

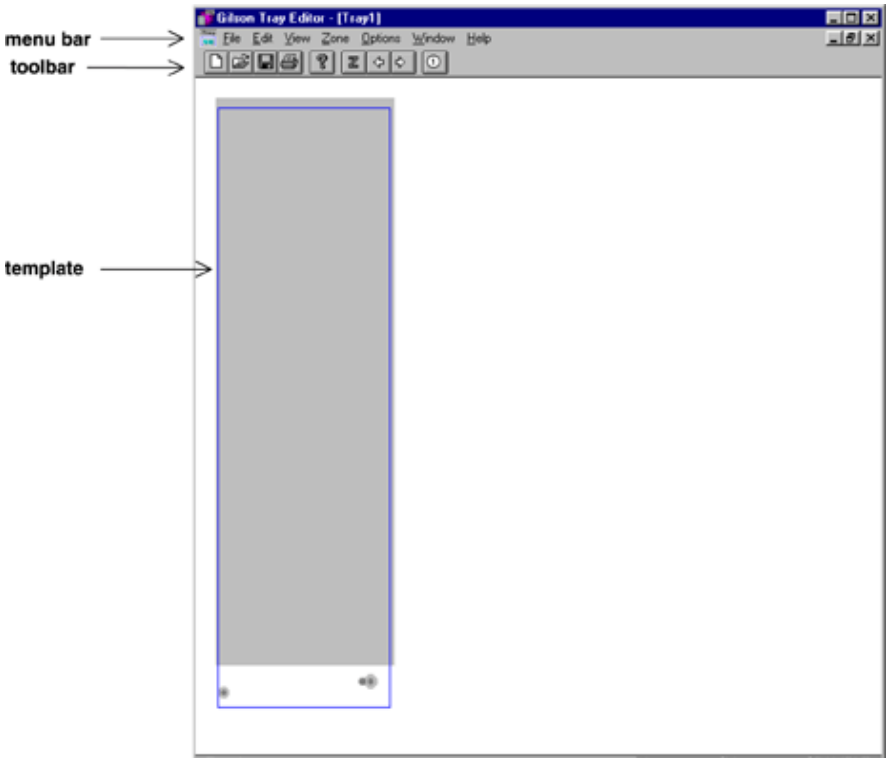
This section will provide additional information about using the Tray Editor Software supplied with the 235 Autoinjector Software. You'll use the Tray Editor to create a tray file that contains rack, zone, and vessel information. You can then use this information in your autoinjector control program to access vessels. Setting up a tray file consists of the following:

- Choosing the template for the autoinjector's work area.
- Placing rack information into the appropriate location on the template.
- Assigning a zone and a number to each location to be accessed by the probe.

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Tray Editor Window

Following is an example Tray Editor window.



Menu Bar

Choose Tray Editor functions from the drop-down menus found beneath the seven items on the menu bar.

Menu	*Description*
File	Create, open, save or print files; exit Tray Editor.
Edit	Add or remove racks and tubes.
View	Change size of graphic; remove toolbar and status bar.
Zone	Select a zone
Options	Change tube numbering.
Window	Rearrange windows or icons, or activate a window.
Help	Learn about the Tray Editor.

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Template

A graphical representation of autoinjector's work area. It illustrates the rack and tubes, rinse station, transfer ports (if applicable), and injection port, etc.

Toolbar

The tool bar consists of several icons that represent various functions of the Tray Editor. The table below describes each of the tools, from left to right.



To activate the tool, just click on its icon.

Tool	*Description*
New	Creates a tray file
Open	Browses for existing tray file
Save	Stores tray file to disk
Print	Generates a printout of the active tray file
About	Displays current software version and copyright information
Zones	Displays the currently available zone names
Left and Right Arrows	Activates each zone in turn. The name of the active zone appears in the status bar located at the bottom of the window.
Tube Numbering	Identifies how blocks of tubes are to be numbered.

The tool bar can be turned on and off from the View menu.

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Status Bar

The status bar shows the following information, from left to right:



	Description
message	Shows operational status of Tray Editor or a help message if a menu command is being highlighted.
X Location	Shows the X axis position, in millimeters, of the mouse pointer.
Y Location	Shows the Y axis position, in millimeters, of the mouse pointer.
zone indicator	Shows the name of the currently selected zone. If no zone is active, then *No Zone Selected* appears.

The status bar can be turned on and off from the View menu.

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Creating a Tray File

The following sections take you through creating a tray file. You will learn to do the following:

- Select rack files
- Assign zone name and numbers to locations on the autoinjector's work area
- Save the tray file

Defining Rack Information

You will need to identify the racks installed on and, if applicable, the microplates being used in the autoinjector.

Rack files

Unless their destination was changed at installation, rack files are located at C:\GILSON\TRAY\RACKS. The rack file name identifies the rack code and has the extension .GRK, for example CODE_350.GRK.

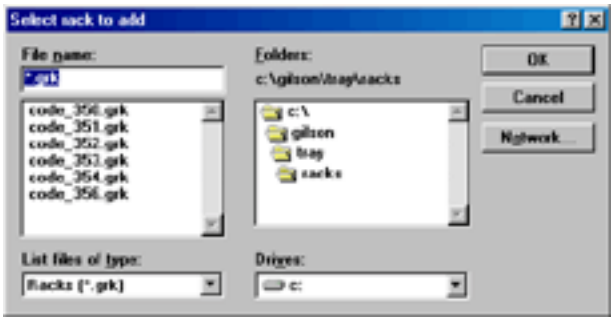
Identifying rack information

To identify information for pre-determined rack locations, follow the procedures below.

1 Click on the rack in the template. A red outline will appear whenever a rack position is selected. Then choose Add Rack from the Edit menu.

Or, double click on the rack position in the template.

The Select Rack to Add dialog box appears. The File Name list box should display valid rack files for the selected position.

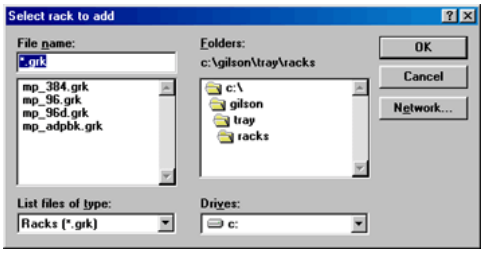


2 In the File Name box, type or select the file you want to open.

3 Click on OK. The template now displays tube locations that can be accessed for the selected rack.

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Identifying microplate information



1 Click on a quadrant of the rack in the template. A red outline will appear whenever a microplate position is selected. Then choose Add Rack from the Edit menu.

   Or, double click on the microplate position in the template.

   The Select Rack to Add dialog box appears. The File Name list box should display rack files for the selected position.

2 In the File Name box, type or select the file you want to open.

3 Click on OK. The template now displays tube locations that can be accessed for the selected rack.

Deleting a rack or a microplate

Choose Undo Last Add from the Edit menu. Be aware that this command is only available immediately after a rack has been opened. Once another action is performed, this command is dimmed.

You can also delete a rack or a microplate by double-clicking outside of a tube. You then see a message box asking you to verify the deletion.

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Assigning Zone and Number to Tubes

You can select vessels on the work area and assign them the default zone names.

Numbering vessels establishes identification information for each one. The autoinjector program can then refer to a specific vessel by zone name and number.

When adding vessels to and removing them from a zone, note the following:

- Tubes can be numbered individually, across single rows or columns, or in blocks.

Numbering tubes individually

Tubes can be numbered one at a time without an apparent pattern. To number tubes individually:

1 Select a zone from the Zone menu.

2 Click on each tube in the order that you want them numbered in the zone. To remove a tube from a zone, click on the tube again. Higher numbered tubes will be renumbered to maintain the sequence.

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Numbering tubes in a single column or row

Tubes can be numbered sequentially across a column or row. The numbering order is determined by the direction they are sectioned. For example, tubes that are selected from left to right display numbers in ascending order from left to right.

To number tubes in column or row:

1 Select a zone from the Zone menu.

2 Position the mouse pointer just outside the first tube you want to assign to the zone.

3 While holding down the left-mouse button, drag the mouse in the direction you want the tubes numbered.

4 When all of the tubes have been selected in the single row or column, release the mouse button.

In the template, tubes can be numbered from left to right, right to left, top to bottom, or bottom to top.

Reselecting tubes removes them from the zone.

Note: If you select multiple rows or columns, the Tray Editor thinks you're selecting a block of tubes and will use the default numbering pattern. This pattern is set using the Tube Numbering command in the Options menu.

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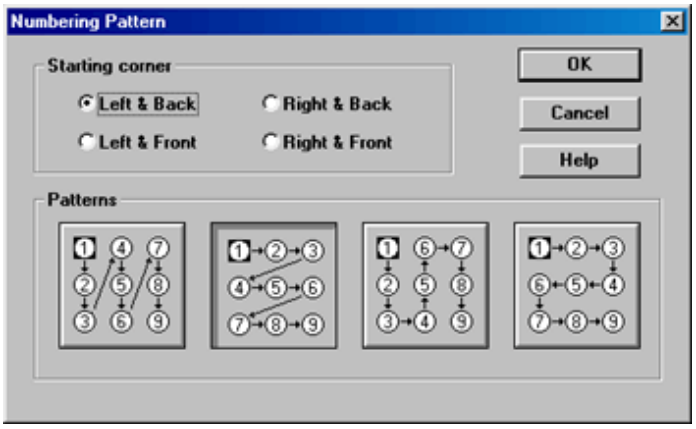
Numbering blocks of tubes

Tubes can be numbered in a selected pattern across multiple columns and rows. The numbering order is determined by the pattern selected in the Numbering Pattern dialog box, described below.

To number blocks of tubes:

1 Select a zone from the Zone menu.

2 Choose Tube Numbering from the Options menu. The Numbering Pattern dialog box appears.



3 Select where numbering begins and the pattern to be used.

By selecting each of the Starting corner option buttons and then looking at the pattern diagrams, you can see how the numbering of tubes is affected. There are 16 different numbering patterns available.

Note: The numbering patterns shown in the dialog box are representative and can be expanded to include as many tubes as needed.

4 Click on OK to close the dialog box and return to the Tray Editor window so you can select tubes.

5 Point the mouse just outside of one of the corner tubes to be assigned to the zone.

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6 Holding down the left mouse button, drag the mouse until all of the tubes have been selected.

Note: When you are numbering a block of tubes, the direction they are selected does not affect the pattern.

7 Repeat the above to assign numbers to additional blocks of tubes. Remember to change the zone and tube numbering scheme if necessary before selecting the tubes.

Changing tube numbers

You can change the numbers assigned to tubes in a zone as described below.

1 Choose a zone name from the Zone menu to select and highlight all of the tubes that are attached to that zone.

2 Select a tube or group of tubes that you want to renumber. This action removes the tubes from the current zone and removes the numbers as well. Gray filled circles appear for the tubes.

Remaining tubes in that zone will adjust their numbering so that no numbers are skipped.

3 Select the tubes again in the pattern that you want them numbered.

Removing tubes from a zone

1 Choose No Zone Selected from the Zone menu.

2 Then click on each tube or select a group of tubes by clicking and dragging to draw a box around the tubes you want removed.

Remaining tubes in the zone are renumbered so that no numbers are skipped. The tubes removed from the zone are displayed as gray-filled circles.

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Viewing Techniques

Determining tube status

The appearance of a tube determines its current status.

Gray-filled - The tube doesn't belong to a zone and is consequently not numbered. Clicking on the tube assigns it to the currently selected zone. If the No Zone Selected option is active; the state of the tube remains the same.

Blue-filled, numbered - The tube is in the currently selected zone.

Clicking on the tube:
- Reverts the tube to an ungrouped and unnumbered state. A gray-filled circle results.
- Causes remaining tubes in the zone to adjust their numbering so that no number is skipped.

Lettered - The tube is assigned to a zone that's represented by the letter. Clicking on the tube activates its zone so you can see the tube number assigned to the tube plus any other tubes in the zone. The name of the zone will then be shown in the status bar.

Scrolling through zones

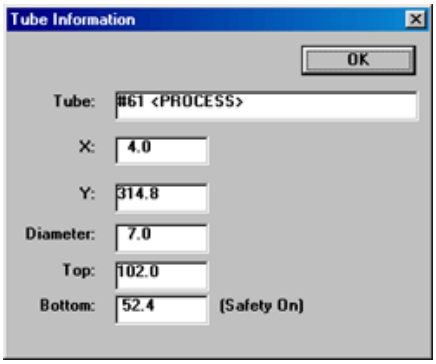
Do any of the following to scroll through zones and see what tubes have been assigned to each one:

- In the tool bar, click on the left or right arrow to move through the assigned zones, activating each in turn.

- Or, choose the name of the zone from the Zone menu. Repeat for each additional zone.

- Or, using the keyboard, press the 1-letter short-cut key assigned to the zone.

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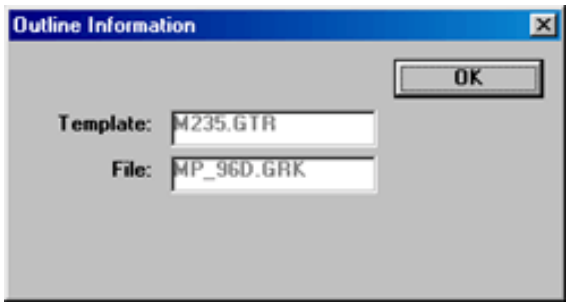


Getting tube information

Pressing the SHIFT key while simultaneously clicking on a tube will display a box showing the tube's zone and number assignment, X and Y coordinates, and physical dimensions.

Getting template and rack information

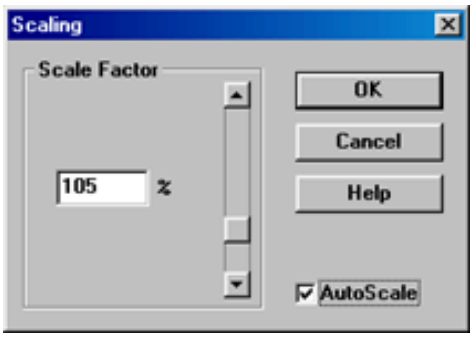
Pressing the SHIFT key while simultaneously clicking outside a tube will display a box showing the name of the associated template and rack file.



Enlarging/reducing size of the template

You can zoom in and out on the information displayed in the template by changing the size. To do this, choose Scaling from the View menu. The Scaling dialog box appears.

Some considerations when using the Scaling dialog box are:



- Maximum scale factor is 400% and the minimum scale factor is 25%
- Choose the Auto Scale check box to display the entire instrument bed in the opened window. Note that the manually setting scale factor turns off this option.
- You can indicate the scale factor directly by highlighting the current scale factor in the text box and typing the new number or by using the scroll bar to select the factor.

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Saving the Tray File

To save the tray file, click on  on the Tray Editor tool bar. If the file has not been named, you see the Save As dialog which allows you to name the file.

When you save the tray file, the software removes any zone names that have not been assigned to tubes.

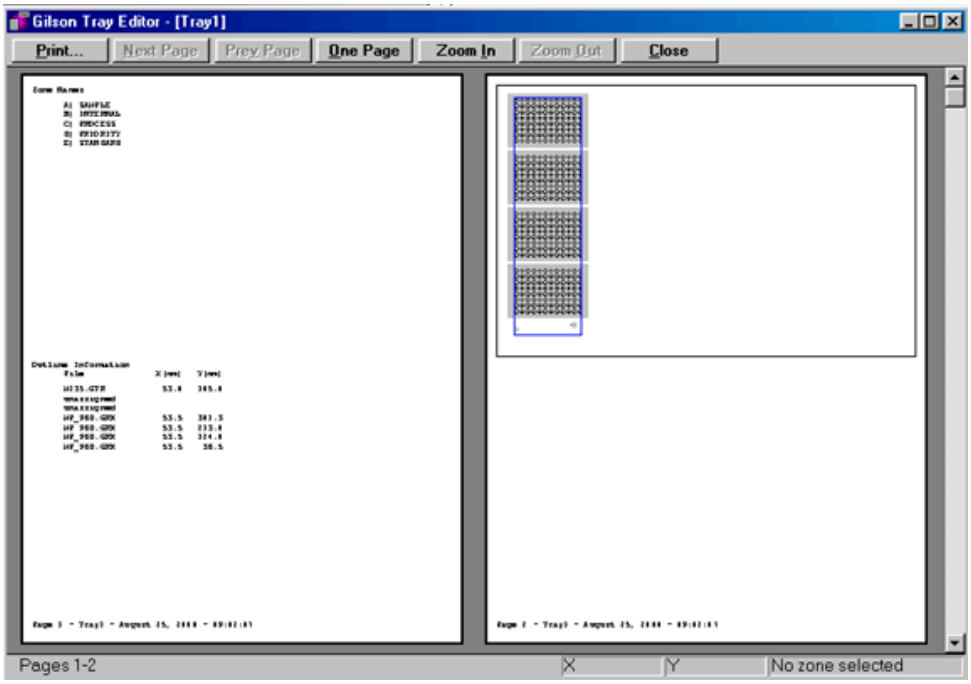
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Printing the Tray File

Previewing what's printed

To see what's printed for a tray file:

1 Choose Print Preview from the File menu. The Print Preview window appears.



2 Use the command buttons at the top of the window to move between pages, manipulate what you see on screen, and send the pages to the printer.

Note: Tray diagrams will often print better if landscape orientation has been selected.

The first page lists the zones. This information is helpful when accessing tube in your autoinjector program.

The second page is the tray diagram.

Both pages identify the page number, the date and time, and the name of the tray file.

3 Choose Close to return to the Tray Editor window.

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Quitting the Tray Editor

To quit the program, choose Exit from the File menu. You'll return to the Configuration window of the 235 Autoinjector Software.

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GSIOC Configuration Utility G

The GSIOC Configuration Utility enables you to modify COM (serial communications) port, IRQ (interrupt request), and baud rate information. You need to use this utility if you connect the autoinjector to a different COM port after installing the 235 Autoinjector Software. Or, you can use this utility if incorrect information appears in the GSIOC Utility window.

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1 Locate the GSIOC Configuration Utility (GSCONFIG.EXE) using Windows Explorer or the shortcut at Start - Programs - Gilson Applications - Utilities - GSIOC Configuration Utility. During 235 Autoinjector Software installation, this utility was stored to C:\GILSON\UTIL unless the installation path was changed.

2 Start the utility. The Gsioc Configuration window appears.



3 In the Port box, indicate the computer's serial communications (COM) port to which the Gilson interface instrument (such as the autoinjector or 506C System Interface) is connected.

4 If necessary, indicate an interrupt request value in the Irq box.

An interrupt request is a signal to a computer's microprocessor that it should stop doing whatever it is currently doing and pay attention to the cause of the interrupt. After the microprocessor has "serviced" the interrupt, it goes back to doing whatever it was doing before the interrupt occurred. For a Gilson instrument, an interrupt request occurs when a character arrives from the instrument or when the instrument disconnects.

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The customary interrupt request number assignments for COM ports are as follows:

Port	IRQ
1	4
2	3
3	4
4	3

5 Click *19200* or *9600* to select the baud. The baud is the rate of data transmission between the computer and the Gilson instrument.

6 Click *OK* to save the changes. A message box appears indicating that the computer must be restarted before any changes become effective.

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GSIOC Utility H

The GSIOC Utility enables you to check communication between your computer and a Gilson instrument. For communication to occur, the Gilson instrument must be connected via an RS-232 connection to the computer or connected via a GSIOC connection to a Gilson interface instrument that is connected to the computer.

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Starting the GSIOC Utility

1 Locate the GSIOC Utility (GSUTIL32.EXE) using Windows Explorer or the shortcut at Start - Programs - Gilson Applications - Utilities - GSIOC Utility. During 235 Autoinjector Software installation, this utility was stored to C:\GILSON\UTIL unless the installation path was changed.

2 Start the utility. The GSIOC Utility window appears.



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Using the GSIOC Utility

Reviewing the Port, IRQ, and Baud Information

In the GSIOC Utility window, review the COM port, IRQ, and baud information. If any information is incorrect or missing, close the GSIOC Utility and use the GSIOC Configuration Utility to update the information. Refer to ***Appendix G***.

Listing GSIOC Instruments

Using the GSIOC Utility, you can determine the instruments currently connected to the computer.

1 Click on Scan!

The Unit ID box displays the current GSIOC instruments and their Unit IDs.

If all Gilson instruments are not listed, ensure that the proper RS-232 or GSIOC connection exist between the computer and Gilson instruments.

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Sending Commands

Using the GSIOC Utility, you can send commands to Gilson instruments. Each instrument has a set of commands that it understands. A complete list of GSIOC commands for any instrument is given in its *user's guide*.

1 Type or select the unit ID assigned to the instrument in the Unit ID box. If you don't know the Unit ID, click on Scan! to reveal a list box with the GSIOC instruments and their Unit IDs.

2 In the Command box, type the command string.

Commands consist of strings of no more than 40 characters that specify an instruction to the specified instrument.

3 Click on the appropriate command button to select a command type according to the function of the desired command. The command is issued when you select the command type.

Buffered commands send instructions to an instrument. These commands are executed one at a time.

Immediate commands request status information from a instrument. These commands are executed immediately, temporarily interrupting other commands in progress.

4 Monitor the instrument's response to your command in the Response area of the box. The response to a successfully completed buffered command is a period (.). Immediate status responses also appear in this area. Refer to the *user's guide* for the Gilson instrument for a description of the valid responses to immediate commands.

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