

Automation Modules

Installation and Operation Guide



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Safety

Before installing, operating, or maintaining this equipment, it is imperative that all hazards and preventive measures are fully understood. While specific hazards may vary according to location and application, take heed in the following general warnings:

 **WARNING**

Liquids associated with this instrument may be classified as carcinogenic, biohazard, flammable, or radioactive.

Should these liquids be used, it is highly recommended that this application be accomplished in an isolated environment designed for these types of materials in accordance with federal, state, and local regulatory laws, and in compliance with your company's chemical/hygiene plan in the event of a spill.

 **WARNING**

Avoid hazardous practices! If you use this instrument in any way not specified in this manual, the protection provided by the instrument may be impaired.

 **WARNING**

If you are using flammable solvents or chemicals with this system, vapor concentration levels may exceed the maximum exposure levels as recommended by OSHA Guide 1910.1000. To reduce those levels to a safe exposure, Teledyne Isco recommends that you place the system in a laboratory hood designed for the purpose of ventilation. This hood should be constructed and operated in accordance with federal state and local regulations. In the event of a solvent or chemical spill, your organization should have a plan to deal with these mishaps. In all cases, use good laboratory practices and standard safety procedures.

Hazard Severity Levels

This manual applies *Hazard Severity Levels* to the safety alerts. These three levels are described in the sample alerts below.

 **CAUTION**

Cautions identify a potential hazard, which if not avoided, may result in minor or moderate injury. This category can also warn you of unsafe practices, or conditions that may cause property damage.

 **WARNING**









Warnings identify a potentially hazardous condition, which if not avoided, could result in death or serious injury.

 **DANGER**

DANGER – limited to the most extreme situations to identify an imminent hazard, which if not avoided, will result in death or serious injury.

Hazard Symbols

The equipment and this manual use symbols used to warn of hazards. The symbols are explained in the table below.

Hazard Symbols	
Warnings and Cautions	
	The exclamation point within the triangle is a warning sign alerting you of important instructions in the instrument's technical reference manual.
	The lightning flash and arrowhead within the triangle is a warning sign alerting you of "dangerous voltage" inside the product.
Symboles de sécurité	
	Ce symbole signale l'existence d'instructions importantes relatives au produit dans ce manuel.
	Ce symbole signale la présence d'un danger d'électocution.
Warnungen und Vorsichtshinweise	
	Das Ausrufezeichen in Dreieck ist ein Warnzeichen, das Sie darauf aufmerksam macht, daß wichtige Anleitungen zu diesem Handbuch gehören.
	Der gepfeilte Blitz im Dreieck ist ein Warnzeichen, das Sie vor "gefährlichen Spannungen" im Inneren des Produkts warnt.
Advertencias y Precauciones	
	Esta señal le advierte sobre la importancia de las instrucciones del manual que acompañan a este producto.
	Esta señal alerta sobre la presencia de alto voltaje en el interior del producto.

*For Additional
Information*

Technical assistance for the Teledyne Isco Automation Modules
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Automation Modules

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Automation Modules

Section 1 Introduction

1.1 Overview

The AutoInjector Module, AutoSampler Module, and Column Selector Module allow you to increase the productivity of the CombiFlash[®] EZ Prep by automating a number of tasks involved with high-performance liquid chromatography (HPLC). These modules are controlled by Teledyne Isco's PeakTrak[®] software in order to maintain the ease-of-use you are familiar with and practically eliminate the need for training.

The three modules can be used separately or in conjunction with one another for even more automated operation.

AutoInjector Module

The AutoInjector Module performs automated, repetitive compound injections completely unattended. This allows users to automatically purify amounts of compound larger than what can be done with a single separation run. As a result of having this tedious process automated, user productivity is increased.

More information regarding the AutoInjector Module including installation, setup, and operation can be found in Section 2.

AutoSampler Module

The AutoSampler Module performs automated purifications on multiple samples. In addition, the module doubles the fraction collection capacity of the EZ Prep by adding two collection racks. For more flexibility, samples can consist of multiple injections. You can even choose between maximizing rack capacity by filling racks completely or optimizing work flow on a shared system by having each sample sent to the next rack. The racks utilize the same RFID rack swapping technology of the EZ Prep, allowing users to remove completed racks and replace them with new racks for practically unlimited fraction collection capacity.

More information regarding the AutoSampler Module including installation, setup, and operation can be found in Section 3.

Column Selector Module

The Column Selector Module allows the EZ Prep to automatically access up to four prep columns. This allows users easy access to a variety of column sizes and chemistries. It also allows users to dedicate columns to both high and low pH separations. When combined with the AutoSampler Module, each sample can be separated on the column best suited for the job.

More information regarding the Column Selector Module including installation, setup, and operation can be found in Section 4.

Automation

Section 2 *The AutoInjector Module*

2.1 AutoInjector Module Installation

Note

CombiFlash EZ Prep software must be version 3.1.0 or higher to support the automation capabilities.

Note

If the AutoInjector Module is used in conjunction with the Column Selector Module, the standard prep column mount can be removed to keep the overall system width minimized. In this case, the AutoInjector Module can be mounted on top of the Column Selector Module instead of on top of the standard prep column mount.

Installation

1. Turn off the EZPrep.
2. Remove the top cover of the EZ Prep column mount by grasping and pulling straight up.



Figure 2-1 Removing the top cover of the EZ Prep column mount

3. Remove the Luer fitting from the EZ Prep inject valve.



Figure 2-2 Removing the Luer fitting from the EZ Prep inject valve

4. Remove the waste line from the EZ Prep inject valve. Remove the check valve from this line and set it aside for later use. Discard the waste line.



Figure 2-3 Removing the waste line from the EZ Prep inject valve

5. Install the AutoInjector Module by placing it on top of the prep column mount and pressing downwards. The tab on the bottom of the AutoInjector Module will snap into the receptacle on the top of the prep column mount.



Figure 2-4 AutoInjector Module attached to the EZ Prep column mount

6. Connect the USB cable from the AutoInjector Module to the USB port on the rear of the EZ Prep. If you have a CombiFlash Rf+ PurIon™ Mass Detector attached to the EZ Prep, you will need to obtain a USB hub to connect both modules.
7. Connect the included power supply from the AutoInjector Module to a suitable power connection. Place the power supply in a location that minimizes the possibility of a chemical spill damaging the power supply.
8. Locate the supplied waste tubing and fitting package (P/N 60-5234-653).
9. Unscrew the attached plastic fitting in this fitting package until the plastic fitting is almost completely detached from the steel fitting.
10. Attach the steel fitting in this package to the EZ Prep inject valve waste port. This steel fitting should be hand tight.



Figure 2-5 Waste tubing fitting attached to the EZ Prep inject valve

11. Turn the plastic fitting until it is attached hand tight to the valve.
12. Turn the steel fitting $\frac{1}{2}$ turn tighter. If it is difficult to do so, loosen the plastic fitting slightly.
13. Remove the plastic fitting while leaving the steel fitting attached.



Figure 2-6 Waste fitting with the plastic fitting removed

14. Attach the supplied tubing from this package to the fitting just installed. Tighten the fitting finger tight.



Figure 2-7 Waste fitting with tubing attached

15. Connect the opposite end of this tubing to the left port of the AutoInjector Module.



*Figure 2-8 Connection of the waste tubing from the EZ
Prep inject valve to the left AutoInjector
Module port*

16. Connect the supplied waste line (P/N 60-5234-654) to the right port of the AutoInjector Module.



Figure 2-9 Waste line connected to the right AutoInjector Module port

17. Connect the check valve removed in Step 4 to the waste line from the AutoInjector Module. Ensure that the arrow on the check valve points away from the AutoInjector Module as shown in Figure 2-10.



Figure 2-10 Check valve connected to the waste line of the AutoInjector Module

18. Locate the supplied sample probe tubing and fitting package (P/N 60-5234-657).
19. Unscrew the attached plastic fitting in this package until the plastic fitting is almost completely detached from the steel fitting.
20. Attach the steel fitting in this package to the EZ Prep inject valve waste port. This steel fitting should be hand tight.



Figure 2-11 Sample tube fitting attached to the EZ Prep inject valve

21. Turn the plastic fitting until it is attached hand tight to the valve.
22. Turn the steel fitting $\frac{1}{2}$ turn tighter. If it is difficult to do so, loosen the plastic fitting slightly.
23. Remove the plastic fitting while leaving the steel fitting attached.



Figure 2-12 Sample probe tube fitting with the plastic fitting removed

24. Attach the supplied tubing from this package to the steel fitting by screwing the new plastic fitting into the steel fitting. Tighten the steel fitting finger tight with the wrench supplied in the package.



Figure 2-13 Sample tube fitting with sample tubing attached

25. Turn on the EZ Prep, or cycle power if the EZ Prep is already turned on.

Before using the AutoInjector Module for the first time, the EZ Prep should be configured for the proper injection loop volume.

1. Begin by going to TOOLS | CONFIG | PREP HPLC.
2. Select the loop volume field as shown in Figure 2-14.

Note

The screen shot in Figure 2-14 depicts what is shown when a Column Selector Module is installed. If the Column Selector Module is not installed, this screen may appear differently.

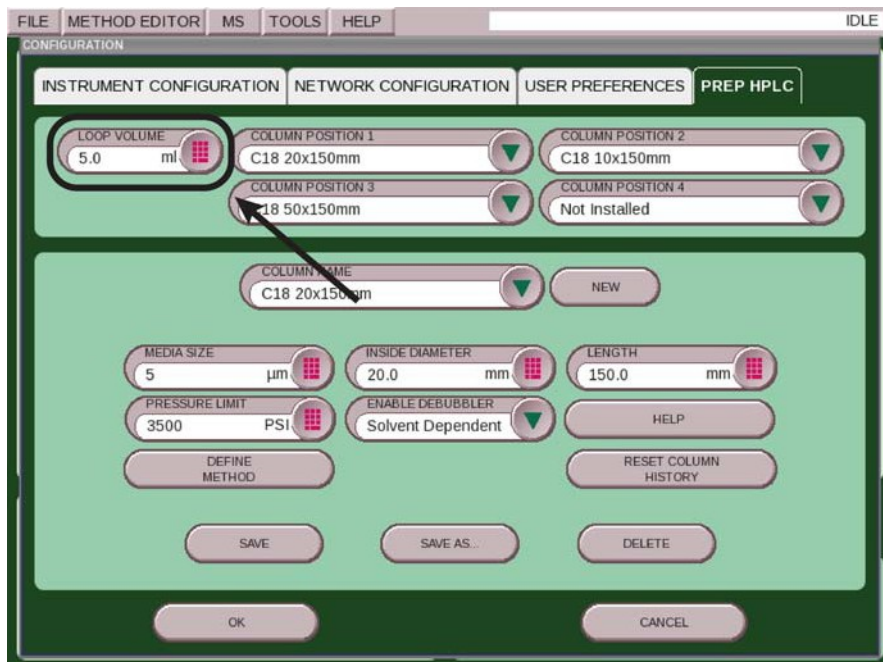


Figure 2-14 Configuring the injection loop volume

For best results, the loop should generally be 50% filled for maximum compound recovery. If the parameters entered for the individual injection exceed a 50% loop fill, a warning message will appear recommending a change in the parameters. This warning can be ignored at the discretion of the user.

2.2 AutoInjector Module Operation

2.2.1 Operation

To use the AutoInjector Module, follow the steps below:

1. Place the sample probe into your sample container.
2. Press PLAY to start a separation as you would for an individual separation.
3. If you want to automatically perform multiple injections (or perform a single injection using the AutoInjector Module), select the “Multiple Injections” drop down as shown in Figure 2-15. This is the default selection if an AutoInjector Module is present.

Note

If you want to manually inject your sample without using the AutoInjector Module, you will have to replace the sample probe fitting with the Luer injection port.

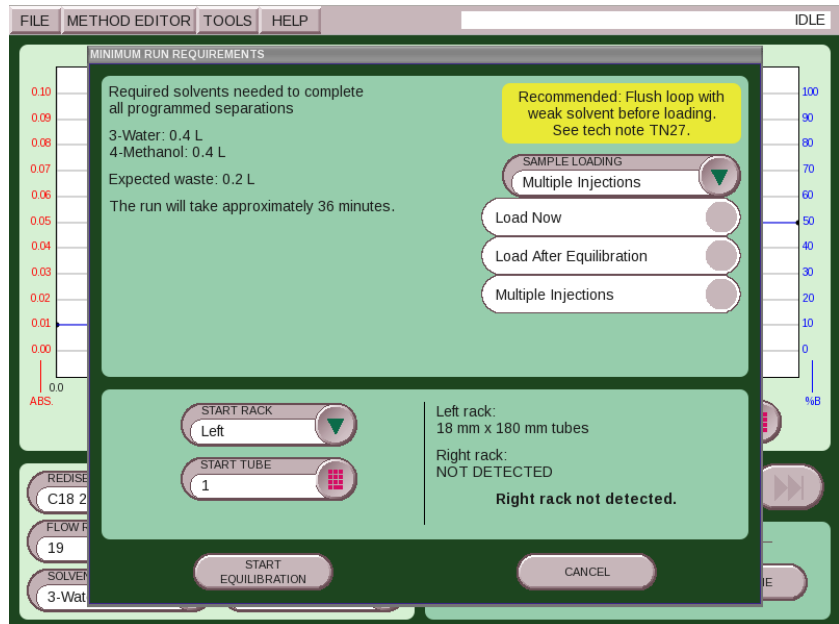


Figure 2-15 Selecting for multiple injections

4. In the dialogue box, enter the total sample volume and the number of injections as show in Figure 2-16.

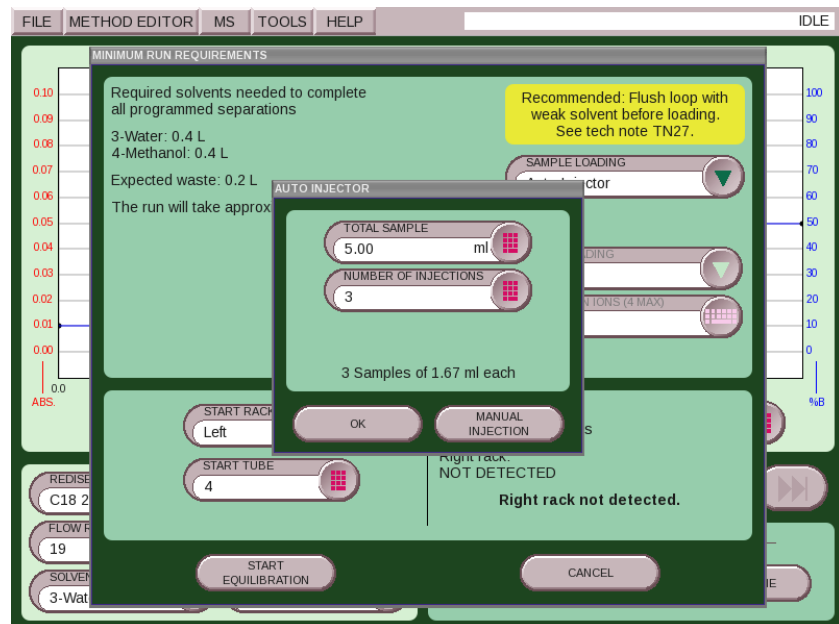


Figure 2-16 Selecting the sample volume and number of injections

PeakTrak will divide the total volume by the number of injections to determine the injection volume for each separation. If this volume exceeds 50% of the loop volume, a warning message will appear recommending a change in the parameters. This message can be ignored at the discretion of the user. PeakTrak will perform exactly as programmed. It will also compensate for the volume of tubing used for the supplied sample probe. If the sample probe is ever lost or damaged, it should be replaced by the AutoInjector Needle Assembly (P/N 60-5234-657).

During the programmed separation sequence, any changes made to the method will be included on any of the remaining injections. This includes automatic changes such as using the peak hold feature or automatic run length extension. For the most reliable operation, it may be best to disable these automatic features. Mid-separation flow rate changes will occur at the beginning of the next separation. Please be aware that changes of flow rate will not automatically affect the overall run length.

5. After the last injection is performed, a sample probe wash screen is shown prompting the user to wash the probe with a strong solvent followed by a weak solvent. Perform these duties as requested.

Note

A weak solvent is used following the usage of the strong solvent to inhibit poor separation due to excessive strong solvent in the probe tubing. It is important to perform Step 5 to ensure there is no carryover into the next separation.

6. At the completion of the sequence, the final separation results will be displayed. To easily view previous separations, press the REWIND key to return to the HOMEscreen.
7. Select File | Open to view previous separations.

If a sample had multiple injections, the run sequence will be displayed under a single name preceded by a “+” symbol. This symbol indicates there are multiple injections with the same base file name. Names are appended with “-I(#)” to signify the numerical order of the separation. See Table 2-1 for an example.

Table 2-1 Naming Scheme

Name	Description
Sample Run (user-defined; single injection run)	First injection.
Sample Run I1 (system-appended; multiple injection run)	First injection.
Sample Run I2	Second injection.
Sample Run I3	Third injection.

8. Select the file you wish to display.

- The remaining injections can be immediately viewed by pressing the left or right arrows at the lower left and right of the file viewer screen (Figure 2-17). This function can also be used to immediately view files before or after the currently viewed file even if they are not part of the same injection sequence.

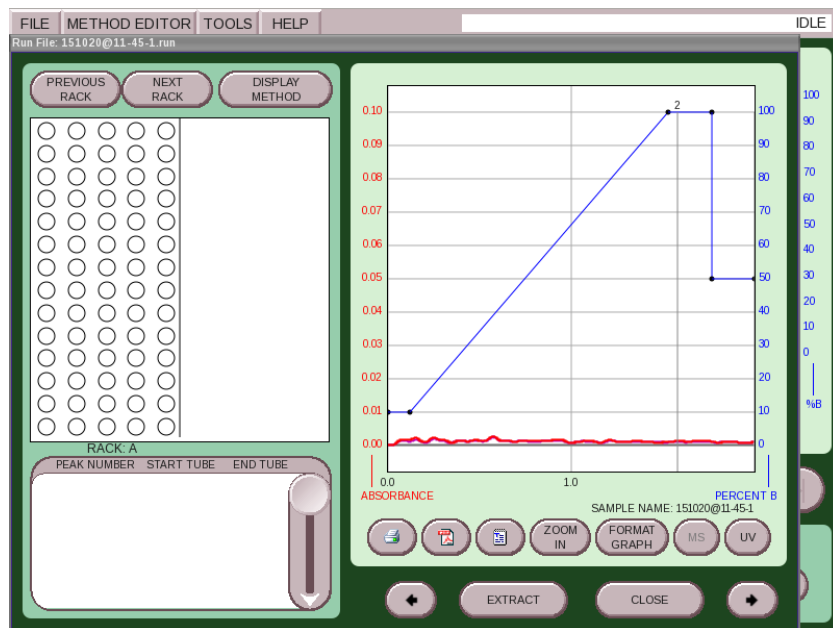


Figure 2-17 Viewing injections

2.2.2 Explanation of Operating Procedures

This section outlines the operating procedures for the AutoInjector Module.

- The user is prompted to place the sample probe into the sample container before the separation begins.
- During column equilibrium, the sample loop is first placed into the run position. This position passes the column equilibration fluid through the loop to wash out any left-over fluid from a previous separation and fills the loop with the initial gradient conditions from the current separation. This prevents any strong solvent remaining in the loop from affecting the current separation.
- Near the end of the equilibration, the inject valve moves to the sample load position.
- The AutoInjector Module aspirates enough sample to fill the loop with the programmed amount and to compensate for the volume of the sample probe.
- After the equilibration has completed, the injection valve moves to the separation position and the separation process continues.
- After the first separation has completed, the next separation begins with the equilibration as described above (from Step 2). During this process, the AutoInjector Module continues to aspirate the programmed injection volume.

7. When the sample is aspirated for the final injection of the sequence, the total volume of all the sample injections will match the programmed amount.

If the sample container held less sample than programmed, the final injection will aspirate a small amount of air. Small amounts of air will not damage the HPLC column. If the sample container held more sample than programmed, there may be some sample remaining in the probe after the final injection. For this reason, it is recommended that users program the injection sequence with about 0.5 mL more sample volume than the actual sample amount provided in the sample container. This will ensure all of your sample is processed.

If some sample remains in the sample probe, it can be recovered by loosening the sample probe fitting at the injection valve to allow the sample to drain back into the sample container.

After completion of the final injection, the system washes the sample probe to prevent sample carryover during the next separation. To perform the wash the system will prompt the user to follow the proper wash steps. The wash sequence is detailed as follows:

1. The system will prompt the user to place the probe in a strong wash solvent. This solvent should be capable of completely washing the sample from the probe.
2. 10 mL of strong solvent is aspirated through the probe to wash away any remaining sample from the probe.
3. The system will prompt the user to place the probe in a weak wash solvent.
4. 10 mL of weak solvent is aspirated through the probe to wash away any remaining strong solvent from the probe so it cannot interfere with future separations.

Automation

Section 3 The AutoSampler Module

3.1 AutoSampler Module Installation

Note

CombiFlash EZ Prep software must be version 3.1.0 or higher to support the automation capabilities.

Note

Begin your installation on a clean workspace separate from the EZ Prep. You will be prompted to place the AutoSampler Module on the right side of the EZ Prep in 3.1.2 *Establishing Fluid Connections*.

The AutoSampler Module includes an AutoInjector Module. To install the AutoSampler Module, follow the steps below:

3.1.1 Installing the AutoSampler Module

1. Carefully unpack the Z-Drive.
2. Find the Y-axis carriage on the arm of the AutoSampler Module. The Z-Drive will be attached to this carriage.

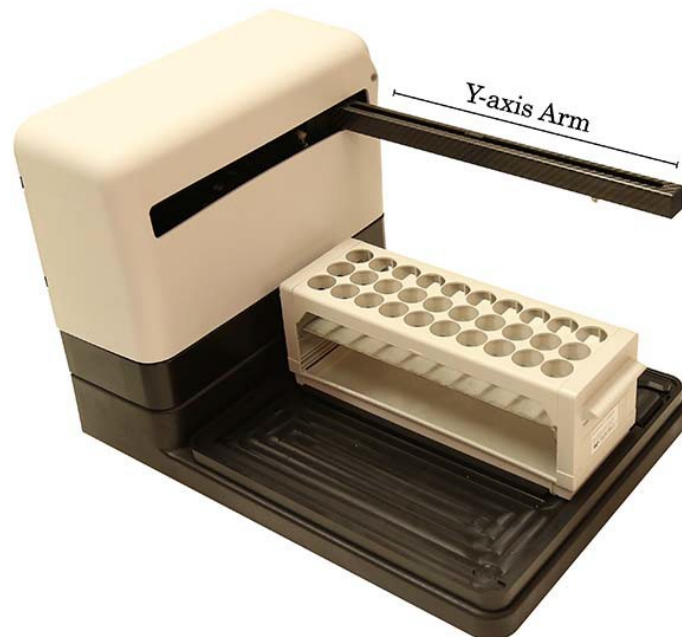


Figure 3-1 Column Selector Module Y-axis arm

3. Slide the Z-Drive onto the arm until the two holes align with the matching holes in the Y-axis carriage.



Figure 3-2 Z-Drive mounted on the Y-axis carriage

4. Secure the Z-Drive to the carriage using the two plastic thumbscrews. Tighten the thumbscrews with your fingers.



Figure 3-3 Z-Drive secured to the Y-axis carriage

5. Insert the two loosened probe clamps into the Z-axis slider.



Figure 3-4 Probe clamps inserted into the Z-axis slider

6. Insert the probe into the hole in the top of the Z-axis slider and through the holes of the loosened probe clamps.



Figure 3-5 Probe inserted into the Z-axis slider

7. Move the Z-Drive to the topmost position on the Z-axis by turning the Z-Drive drum fully clockwise as shown in Figure 3-6.

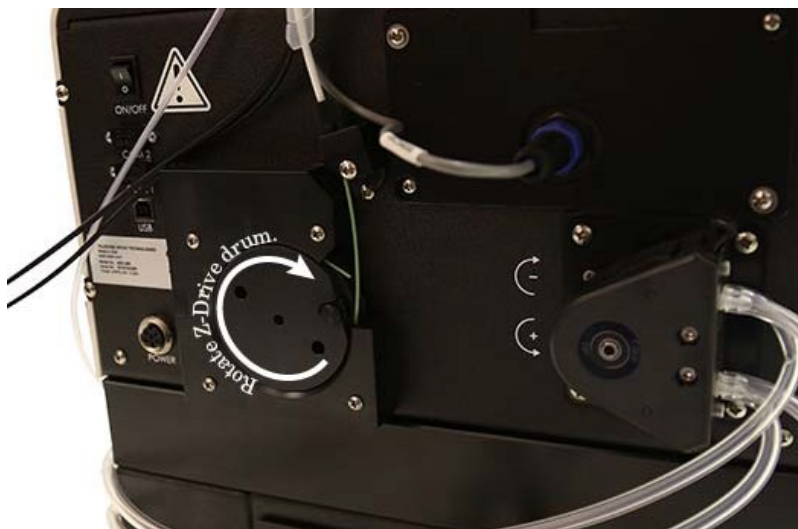


Figure 3-6 Z-Drive rotation

8. Guide the probe down until it stops, and then finger tighten the probe clamps.
9. Rotate the Z-Drive rotor back and forth to ensure that the Z-Drive moves up and down freely.

Note

If the rotor does not move freely, check that the other cables are not interfering with the movement of the green probe cable.

10. Mount the rinse station by placing it into the receptacle located on the right-rear portion of the AutoSampler Module bed.



Figure 3-7 AutoSampler Module rinse station



Figure 3-8 AutoSampler Module wash station with tubing attached

11. Route the bottom section of tubing (labeled “3”) from the rinse station to the matching fitting (labeled “3”) at the bottom of the AutoSampler Module’s peristaltic pump. Be sure to select the fitting furthest from the back of the module. When installing the tubing, be careful to push straight onto the fitting. The tubing has a fluoropolymer inner lining that can be damaged resulting in reduced chemical resistance.



Figure 3-9 Routing the bottom section of wash station tubing

12. Route the top section of tubing (labeled “2”) from the rinse station to the matching fitting (labeled “2”) at the top of the AutoSampler Module’s peristaltic pump. Be sure to select the fitting closest to the back of the module.



Figure 3-10 Routing the top section of wash station tubing

13. The two remaining sections of tubing are used to connect the wash pump to the wash fluid. In addition, about 3 m of fluoropolymer tubing is supplied to route to the wash fluid supply and waste container. These sections of tubing will need to be assembled as depicted in Figure 3-11.

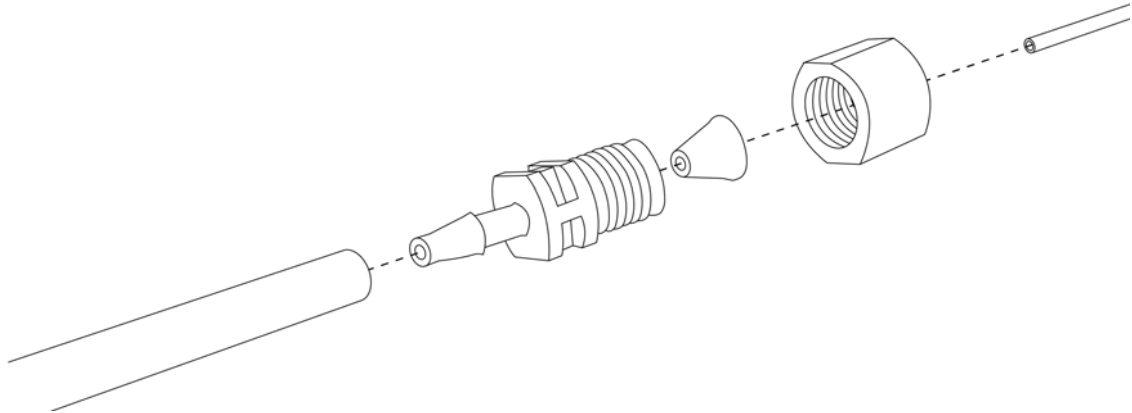


Figure 3-11 Sample input tubing section assembly

14. Attach the assembled wash solution input tubing sections to the remaining fittings on the peristaltic pump. These tubing sections are labeled “1” and “4”, and are attached to the respectively labeled fittings. The free ends will be inserted into the wash solution container.

Note

Alternatively to Step 14, the free end of the tubing section labeled “1” can be placed into a wash solution container, while the tubing section labeled “4” can be connected to a waste container if the user does not wish to reuse the wash solution. Weights are provided to retain these tubes in the supply container. Tees are also included to allow these lines to be secured inside the B solvent supply to simplify tubing routing.

Note

The smaller piece of tubing from Step 13 is resistant to chemical attack, but the larger piece is not. When inserting the tubing into the wash solution, be sure only the smaller piece of tubing is resting inside the solution.

Mounting the AutoInjector Module

15. Install the AutoInjector Module onto the AutoSampler Module by removing the right side mounting screws on the AutoSampler Module back panel.

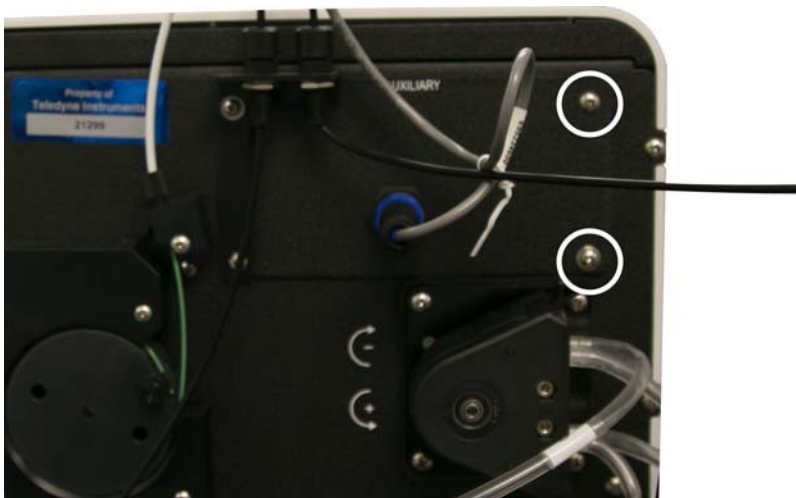


Figure 3-12 AutoSampler Module back panel with AutoInjector Module mounting screws removed

16. Place the AutoInjector Module on top of the AutoSampler Module and fasten them together with the mounting screws removed in Step 15.



Figure 3-13 AutoInjector Module fastened to the AutoSampler Module

17. Connect the USB-A cable attached to the AutoInjector Module to one of the USB-A ports located on the back of the AutoSampler Module.



Figure 3-14 AutoSampler Module USB-A connection

18. Connect a power cable from the rear panel of the AutoSampler Module to the AutoInjector Module. The power cables are already attached to the AutoSampler Module (shown coiled and tied in Figure 3-14).
19. Connect the short provided USB cable from the USB-B port on upper left portion of the back panel of the AutoSampler module to one of the USB-A ports on the back of the module.



Figure 3-15 AutoSampler Module USB-B connection



*Figure 3-16 AutoSampler Module USB-A connection
(center)*

20. Locate the AutoSampler Module's power supply bracket as show in Figure 3-17.



*Figure 3-17 AutoSampler Module power supply bracket
shown removed from the AutoSampler Module*

21. Remove the two bottom screws from the AutoSampler Module's rotor.



Figure 3-18 AutoSampler Module rotor before removing the bottom screws

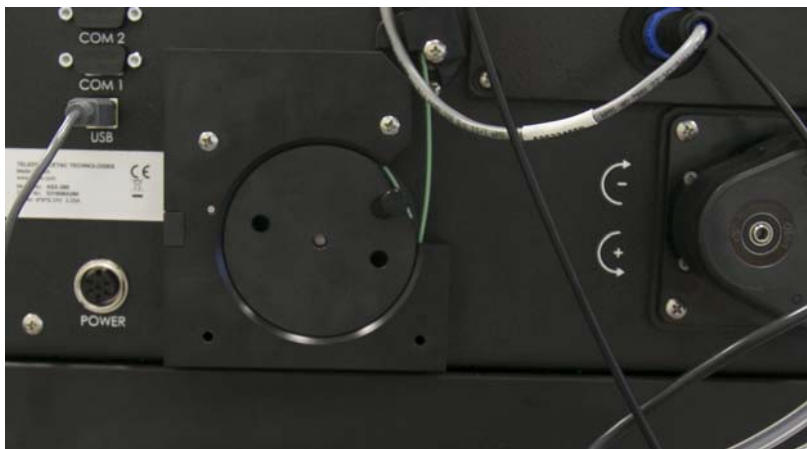


Figure 3-19 AutoSampler Module rotor before after the bottom screws

22. Place the power supply bracket so the two holes in the bracket align with the two lower holes on the AutoSampler Module's rotor. Secure the bracket with the screws provided with the power supply bracket.



Figure 3-20 Power supply bracket secured to the AutoSampler Module

23. Slide the power supply into the bracket.



Figure 3-21 Inserting the power supply into the power supply bracket

24. Plug the power supply into the power port immediately above the power supply, and then connect the power supply to a suitable power source.



Figure 3-22 AutoSampler Module with power connection made

25. Connect the long provided USB cable from the USB-A port on the back of the EZ Prep to the USB-B port on the lower portion of the back panel on the AutoSampler Module.



Figure 3-23 EZ Prep USB-A connection



Figure 3-24 AutoSampler Module USB-B connection

26. Connect one of the 24 V power cables from the AutoSampler Module to the AutoInjector Module

✓ Note

The AutoSampler Module features two 24 V power cables. One is used to provide power to the AutoInjector Module. The other can be used to power the Column Selector Module (if applicable).

3.1.2 Establishing Fluid Connections

To establish the necessary connections, follow the steps below:

1. Place the AutoSampler Module on the right side of the EZ Prep.
2. Disconnect the tubing at the back of the EZ Prep from the port labeled DIVERTER VALVE WASTE.



Figure 3-25 Diverter Valve Waste port with no connection

3. Connect the shorter length of tubing from the AutoSampler Module to the port labeled DIVERTER VALVE WASTE at the back of the EZ Prep.



Figure 3-26 Diverter Valve Waste port with AutoSampler Module tubing connection

4. Route the longer length of tubing from the AutoSampler to waste. This can be done by connecting the tube to an existing waste line with the supplied tee or by placing it into a waste container using a weight (P/N209-016-351).
5. Remove the Luer fitting from the EZ Prep inject valve.

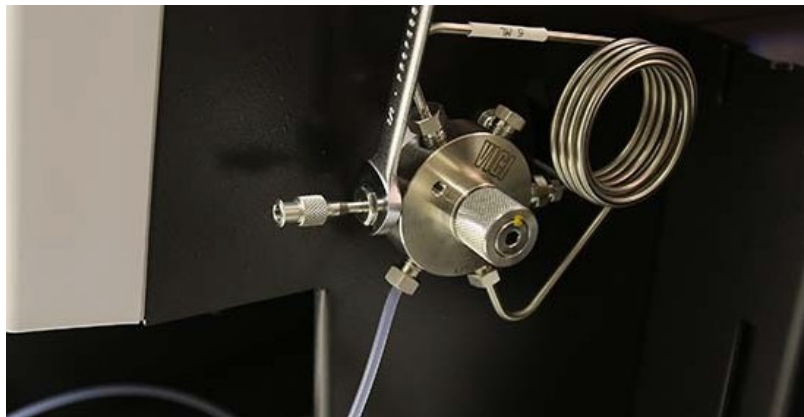


Figure 3-27 Removing the default EZ Prep injector port

6. Locate the supplied sample probe tubing and fitting adapter package.
7. Unscrew the attached plastic fitting in this fitting package until the plastic fitting is almost completely detached from the steel fitting.
8. Attach the steel fitting in this package to the EZ Prep inject valve waste port. This steel fitting should be hand tight.



Figure 3-28 Sample probe tube fitting connected to the EZ Prep inject valve

9. Turn the plastic fitting until it is attached hand tight to the valve.
10. Turn the steel fitting $\frac{1}{2}$ turn tighter. If it is difficult to do so, loosen the plastic fitting slightly.
11. Remove the plastic fitting while leaving the steel fitting attached.



Figure 3-29 Sample probe tube fitting with the plastic fitting removed

12. Attach the supplied sample probe tubing from this package to the steel fitting by screwing the new plastic fitting into the steel fitting. Tighten the steel fitting finger tight with the wrench supplied in the package.



Figure 3-30 Sample probe tube fitting with sample probe tubing attached

13. Secure the probe tubing to the side of the EZ Prep by removing the housing screw, fitting the tubing bracket to the screw, and replacing the screw.



Figure 3-31 Sample probe tubing secured to the EZ Prep

Note

The tubing bracket should be affixed to the EZ Prep so that the probe tubing threads vertically through the bracket. This ensures that the probe tubing will not be obstructed by other end of the probe attachment.

14. Locate the supplied waste tubing and fitting package (P/N 60-5234-653).
15. Unscrew the attached plastic fitting in this fitting package until the plastic fitting is almost completely detached from the steel fitting.

16. Attach the steel fitting in this package to the EZ Prep inject valve waste port. This steel fitting should be hand tight.



Figure 3-32 Waste tubing fitting attached to the EZ Prep inject valve

17. Turn the plastic fitting until it is attached hand tight to the valve.
18. Turn the steel fitting $\frac{1}{2}$ turn tighter. If it is difficult to do so, loosen the plastic fitting slightly.
19. Remove the plastic fitting while leaving the steel fitting attached.



Figure 3-33 Waste fitting with the plastic fitting removed

20. Attach the supplied tubing from this package to the fitting just installed. Tighten the fitting finger tight.



Figure 3-34 Waste fitting with tubing attached

21. Connect the opposite end of this tubing to the left port of the AutoInjector Module.



Figure 3-35 Connection of the waste tubing from the EZ Prep inject valve to the left AutoInjector Module port

22. Connect the supplied waste line (P/N 60-5234-654) to the right port of the AutoInjector Module.

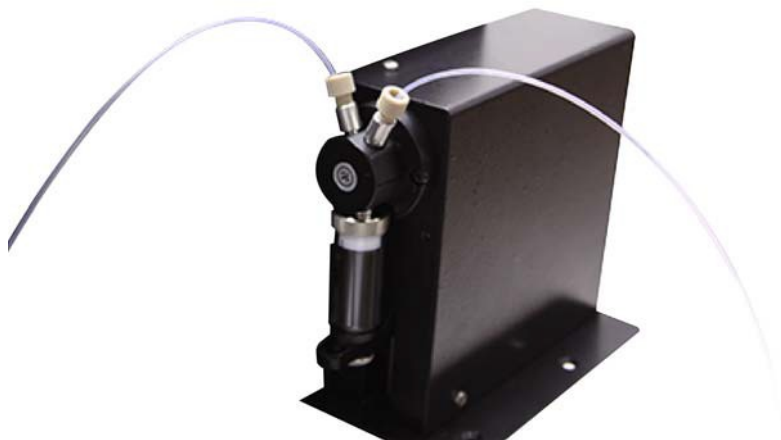


Figure 3-36 Waste line connected to the right AutoInjector Module port

23. Connect the check valve removed previously to the waste line from the AutoInjector Module. Ensure that the arrow on the check valve points away from the AutoInjector Module as shown in Figure 3-37.



Figure 3-37 Check valve connected to the waste line of the AutoInjector Module

3.2 AutoSampler Module Operation

3.2.1 Power Cycling

Before the AutoSampler Module can be used with the Combi-Flash EZ Prep, the EZ Prep must auto-sense the AutoSampler Module. This process takes place during the power up sequence of the EZ Prep. Be sure to power up the AutoSampler Module *before* powering up the EZ Prep. If you have not done this, cycle the power on the EZ Prep by turning the EZ Prep off, waiting ten seconds, and turning the EZ Prep on again.

3.2.2 Fraction Collection Capacity

The AutoSampler Module increases the fraction collection capacity of the CombiFlash EZ Prep by two racks. The RFID capabilities of these additional racks are supported in the same way as the racks for the EZ Prep. When a rack is full, the system will automatically advance to the next available rack. If a rack is replaced with a fresh rack, this will be sensed by the system software and the new rack will be made available for use. The sample racks also have RFID tags which allow for the recognition of vial locations.

Note

The sample rack cannot be swapped during a separation sequence.

3.2.3 Configuration

Before using the AutoSampler Module for the first time, the EZ Prep should be configured for the proper injection loop volume.

1. Begin by going to TOOLS | CONFIG | PREP HPLC.
2. Select the loop volume field as shown in Figure 3-38.

Note

The screen shot in Figure 3-38 depicts what is shown when a Column Selector Module is installed. If the Column Selector Module is not installed, this screen may appear differently.

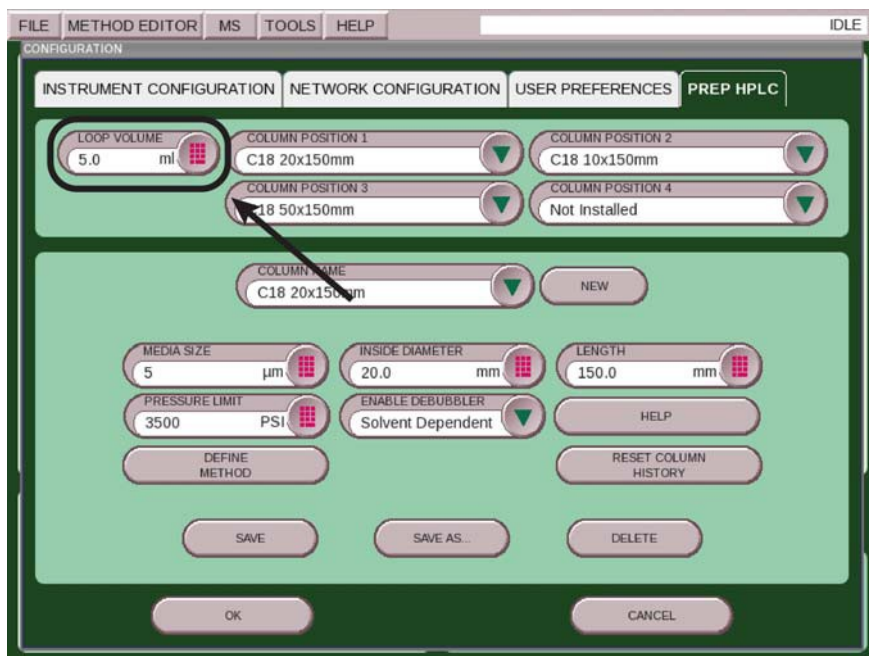


Figure 3-38 Configuring the injection loop volume

The system software assumes the loop should only be 50% filled for maximum compound recovery. If the parameters entered for the individual injection exceed a 50% loop fill, a warning message will appear recommending a change in the parameters. This advice can be ignored at the discretion of the user.

3.2.4 Setup for Operation

If you have installed the system to recirculate wash fluid, check that the container holds sufficient clean wash fluid for the planned separations.

In addition, there is a holder for an 18 mm test tube located beside the wash station. Fluid in this tube is used to displace air in the probe before loading a sample. Removing the air from the probe improves the volumetric accuracy of the sample loading. This fluid is separated from the injected sample by a small air gap (around 0.05 mL) to minimize the effect of this fluid on compound solubility. Filling this tube with a typical starting gradient composition minimizes any effect of trace amounts of this fluid in the injected volume.

3.2.5 Operation

To begin a separation sequence with the AutoSampler Module, you will need to create a sample queue. After the AutoSampler Module has been installed and the EZ Prep is in the PREP HPLC mode, the software will display two tabs at the bottom of the screen. Accessing the RUN tab will result in a screen and operation much like the standard EZ Prep (without an installed AutoSampler Module). Pressing PLAY will display the RUN REQUIREMENTS screen. On this screen, you can perform a manual injection by removing the Luer fitting from the inject loop, or you can perform multiple injections on a single sample from the AutoSampler Module without creating a queue. Selecting the QUEUE screen will allow you to set up a separation sequence.

 Note

If you are performing a manual injection, the Luer fitting or a needle port must be reinstalled on the injection valve.

Follow the instructions below for further information on operating the AutoSampler Module:

1. Install a sample vial rack before opening the QUEUE tab. This will allow the software to limit sample programming to the positions available for sample vials.
2. Open the QUEUE tab.

For an explanation of the available columns on this screen, see Table 3-1.

Table 3-1 Queue Tab Columns

Column	Description
=	Allows the user to remove a single row of an existing queue, clear all rows of the queue, or RUN NEXT.
Sample Name	Allows the user to name each sample. Naming is optional. If left blank, the sample is named based on the date and time the separation was started.
Column (drop down menu)	<p>If a Column Selector Module is installed, this menu allows you to select a separation device and associated method for use.</p> <p>If a Column Selector Module is not installed, this menu allows you to select different methods that may be associated with the configured and installed separation device.</p>
Method	<p>Once a column has been selected, or if there is only one column defined on the system, the default method created for that column is automatically loaded. To change this method, touch the method name and a list of methods associated with the column will appear. These methods will be listed in the order they were created. Alternatively, select CUSTOMIZE CURRENT METHOD or BROWSE to populate this field.</p> <p>Select CUSTOMIZE CURRENT METHOD to create a modified version of the method for use in the current queue. To use this modified method, exit the method editor and select SAVE when prompted. A new method named "Temporary 1" will be created. This method will be used for the current sample and will be discarded after the sample is complete. All method parameters are saved with each separation. If you would like to save the modified method for later use, select SAVE AS as you exit the method editor and create a unique name for the new method.</p>
Sample Position	This field indicates where the sample for this separation is located. If the sample size is too large for a single vial, create a second position in the queue and access the second vial.
Sample Volume	Used in conjunction with the NUMBER OF INJECTIONS column to determine the size of each injection.

Table 3-1 Queue Tab Columns	
Number of Injections	Used in conjunction with the SAMPLE VOLUMES column to determine the size of each injection.
Start Tube	Allows the user to optimize rack usage by sharing the racks for multiple samples or placing each sample's result into individual racks to support multiple users.

- Once the queue is complete, select the RUN tab and press the PLAY button. Alternatively, you can select the “=” menu on the first unfinished run and select the RUN option.
- While a separation is in process, the QUEUE screen can be accessed to add samples to the queue. Samples that have been completed cannot be edited. They can be viewed, however, by touching the file name corresponding the that run.

Note

The number of rows in the queue is limited to 28. Additional samples can be added by deleting completed rows from the queue. If there are more rows than can be displayed on screen, up and down arrows are displayed at the top and bottom of the screen which allow access to hidden rows.

- Once the entire queue has completed, the RESULT screen is displayed with the last separation. To easily view previous separations, select the separation on the QUEUE screen or select FILE | OPEN to view previous separations.

If a sample had multiple injections, the run sequence will be displayed within the FILE | OPEN dialogue under a single name preceded by a “+” symbol. This symbol indicates there are multiple injections with the same base file name. Names are appended with “-I(#)” to signify the numerical order of the separation. See Table 3-2 for an example.

Name	Description
Sample Run (user-defined; single injection run)	First injection.
Sample Run I1 (system-appended; multiple injection run)	First injection.
Sample Run I2	Second injection.
Sample Run I3	Third injection.

3.2.6 Explanation of Operating Procedures

This section outlines the operating procedures for the AutoSampler Module.

 Note

The below sequence of operation is valid for software version 3.1.26 only.

1. During column equilibrium, the sample loop is first placed into the run position. This position passes the column equilibration fluid through the loop to wash out any left-over fluid from a previous separation and fills the loop with the initial gradient conditions from the current separation. This prevents any strong solvent remaining in the loop from affecting the current separation.
2. The sample probe is placed into the solvent container beside the wash station to displace the air in the sample probe.
3. About 1.5 mL of the solvent is pulled from the small tube beside the wash station and into the probe to minimize the injection of air into the column and to eliminate injection volume errors due to air in the probe. A rinse fluid that will not cause a negative impact on the chromatographic processes should be selected. In many cases, a solvent that is similar to the initial conditions for the gradient is adequate. For injections larger than 0.5 mL, most of this fluid will be diverted to waste and not injected.
4. When the sample probe is dipped in the sample or solvent, some of the liquid sticks to the outside of the probe when it is raised. Therefore, the probe is moved up and down over the sample tube to prevent the contamination of other samples or collection tubes.
5. The sample probe is raised and a small amount of air (0.05 mL) is drawn into the sample probe to minimize the mixing of the rinse solvent and the sample. This also minimizes the potential of the sample coming out of solution.
6. The sample probe is moved to the sample container.
7. A portion of the programmed injection amount is aspirated into the sample probe displacing most of the rinse solvent in the sample probe. This compensates for the volume of the sample probe. Since the loop is still in the separation position, the rinse solvent is sent to waste.
8. The loop is switched to the load position.
9. The programmed injection volume is aspirated into the sample loop. Once the programmed amount of sample is aspirated into the probe, the probe is lifted and a small amount of air is drawn into the sample probe. This allows the entire sample to be aspirated into the loop without leaving any sample in the probe.

10. Once again, the probe is moved up and down over the sample tube to prevent the contamination of other samples or collection tubes as described in Step 4.
11. The sample is now loaded and the separation will begin.
12. Before the next injection, the probe will be dipped into the wash station to rinse the exterior of the probe in order to minimize contamination of the rinse station fluid.
13. The next injection will proceed as described above (from Step 6).

After the completion of the final injection of a sample, system washes the probe with the following sequence:

14. The inject valve will be moved to bypass to prevent contamination of the loop during the cleaning process.
15. Air is drawn into the probe to eliminate any remaining solvent in the probe.
16. The probe is placed into the wash station. The wash station pump with flush wash fluid over the exterior of the probe while 10 mL of wash fluid is drawn into the probe to wash the interior flow path. The probe syringe pump will use half strokes to improve the rinsing of any tiny amounts of compound that may be present due to the wash process.
17. Once again, the probe is moved up and down over the sample tube to prevent the contamination of other samples or collection tubes as described in Step 4
18. Air is drawn into the probe to eliminate the strong wash solvent from the sample flow path.

Automation

Section 4 The Column Selector Module

4.1 Column Selector Module Installation

Note

CombiFlash EZ Prep software must be version 3.1.0 or higher to support the automation capabilities.

The Column Selector Module can be laid flat horizontally or stood on an edge vertically for installation. If you are installing the Column Selector Module horizontally, it is recommended that you install the columns prior to continuing with the Column Selector Module installation. If you are installing the module vertically, install the columns after installing the module.

4.1.1 Installing the Column Selector Module

Removing the housing from the EZ Prep

To install the Column Selector Module vertically, please follow the steps below.

1. Remove the screw connected to the housing from inside of the EZ Prep using a #2 Phillips screwdriver.

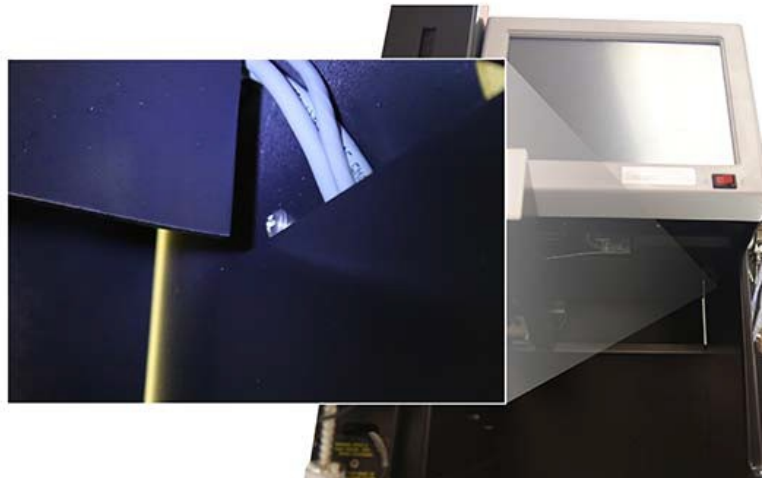


Figure 4-1 Location of the EZ Prep inner screw

2. Use a 1/4" nut driver to remove the nut from the bottom section of the housing.



Figure 4-2 Removing the bottom section housing nut

3. Use a 5/16" wrench to remove the nut located inside the EZ Prep column housing.

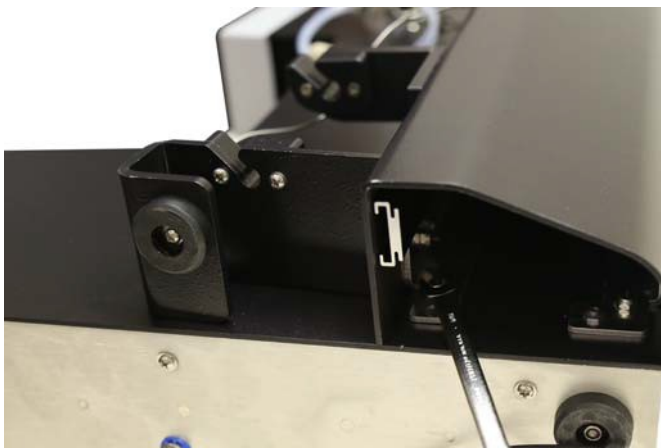


Figure 4-3 Removing the EZ Prep housing column inner nut

4. Use a screwdriver to remove the two screws from the back of the housing. The housing will come free from the EZ Prep at this time with little effort.
5. Remove the mounting rail from the right side of the EZ Prep by removing the two nuts from the mounting rail using a 5/16" wrench.

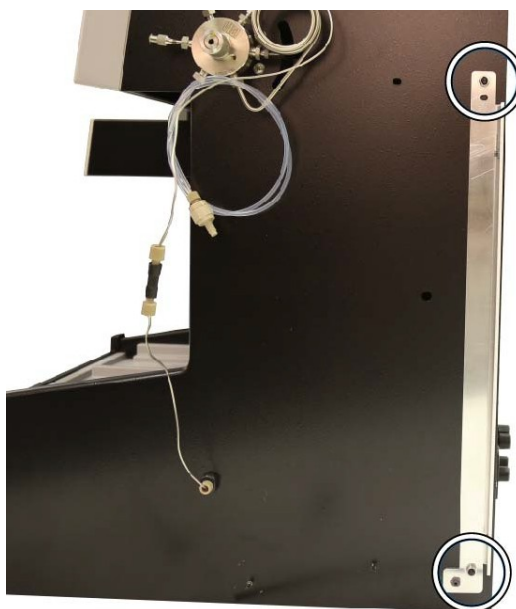


Figure 4-4 Location of the two EZ Prep mounting rail securing nuts

Mounting the Column Selector Module

1. Remove the three thumbscrews from the housing of the Column Selector Module by hand.



Figure 4-5 Location of the three Column Selector Module housing thumbscrews

2. Separate the housing of the Column Selector Module using little effort.

3. When the Column Selector Module is set vertically alongside the EZ Prep, you will find two screws on the top of the module. Remove these two screws with a screwdriver.



Figure 4-6 Two screws on top of the Column Selector Modules

4. Remove the cover plate and set it aside.
5. Insert the mounting rail attachment into the designated slot located on top of the Column Selector Module, and secure it to the module with the attached screw.



Figure 4-7 Column Selector Module with mounting rail attachment configured

6. Replace the cover plate and screw it into place.
7. Connect the Column Selector Module mounting rail attachment to the EZ Prep using the provided thumbscrew.



Figure 4-8 Location of the Column Selector Module mounting rail attachment thumbscrew

8. Use the provided thumbscrew and washer to attach the Column Selector to the EZ Prep at the bottom of the module.



Figure 4-9 Location of the Column Selector Module lower attachment thumbscrew

4.1.2 Establishing Column Selector Module Connections

1. Connect the Column Selector Module to the EZ Prep using the provided USB-to-RS232 cable.

Note

If you are also using an AutoSampler Module, you will need to first connect the Column Selector Module to the AutoSampler Module with the supplied USB cable. Then, connect the AutoSampler Module to the EZ Prep.



Figure 4-10 Connected USB-to-RS232 cable

2. Remove the stainless steel tubing which connects the EZ Prep inject valve to the column inlet.
3. Connect one end of the provided stainless steel tubing to the EZ Prep inject valve.
4. Connect the other end of the provided stainless steel tubing to the inlet port located on the back of the Column Selector Module.



Figure 4-11 Column Selector Module inlet port

5. Cut a piece of the provided green PEEK tubing which is long enough to reach from the outlet port of the Column Selector Module to the outlet port of the EZ Prep.
6. Connect the outlet port from the Column Selector Module outlet port to the outlet port on the EZ Prep using the provided tubing and hardware.

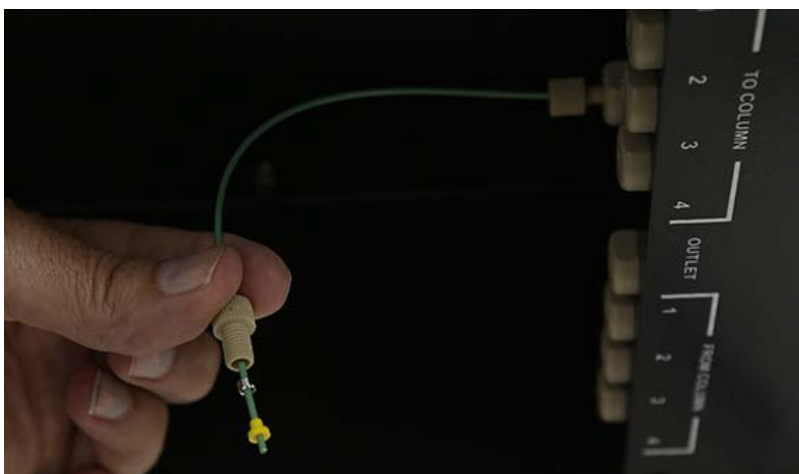


Figure 4-12 Proper outlet port tubing configuration



Figure 4-13 Connected Column Selector Module outlet port tubing

Note

For instructions on assembling the tubing connections, please see the instruction sheet included with the hardware.

The Column Selector Module has multiple channels for retaining the column mounting clamps. To change the channels, simply unscrew the retainer at the end of the track, slide the column mounting clamp off the track, and slide it in place wherever required.

7. Place the columns into a clamp suitable for the column size.
8. Using the provided tubing and a tubing cutter, connect the column input port to the “TO COLUMN” port on the Column Selector Module. If a guard column is used, it can be plumbed directly before the individual column.
9. Connect the column output port to the “FROM COLUMN” port on the Column Selector Module.

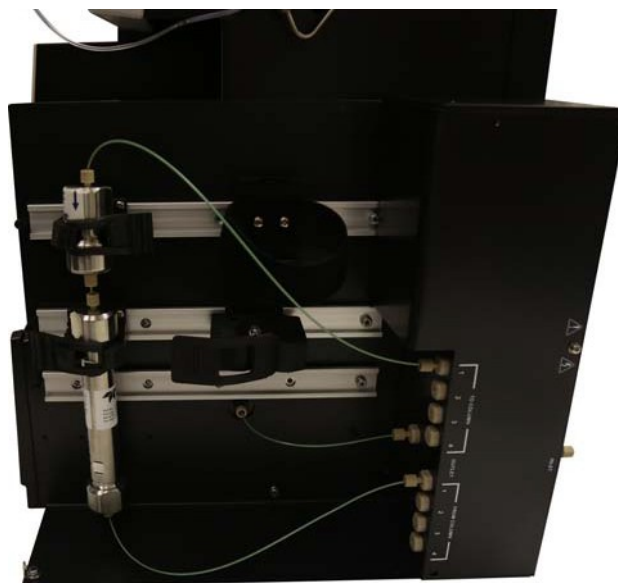


Figure 4-14 Proper column connections on the Column Selector Module

Note

Record the position of the columns as you will need this information during your initial configuration. After the configuration is complete, the columns will be selected by name rather than by how they are connected.

10. If desired, secure the housing of the Column Selector Module back onto the module using the thumbscrews removed in Step 1 of *Removing the housing from the EZ Prep*.
11. Connect the power supply from the Column Selector Module to a power source.

4.1.3 Mounting the AutoInjector Module to the Column Selector Module

The Column Selector Module can be used in conjunction with the AutoInjector Module. Begin by installing the Column Selector Module, and then install the AutoInjector Module using the steps below:

1. Remove the cover plate from the top of the Column Selector Module by removing the two screws.
2. Attach the AutoInjector Module to the top of the Column Selector Module using the two screws supplied with the module.



Figure 4-15 Column Selector Module with attached AutoInjector Module

3. Remove the Luer fitting from the EZ Prep inject valve.



Figure 4-16 Removing the Luer fitting from the EZ Prep inject valve

4. Remove the waste line from the EZ Prep inject valve. Remove the check valve from this line and set it aside for later use. Discard the waste line.



Figure 4-17 Removing the waste line from the EZ Prep inject valve

Note

If you have an AutoSampler Module or a CombiFlash Rf+ Purlon™ Mass Detector attached to the EZ Prep, you will need to obtain a USB hub to connect both modules.

5. Locate the supplied waste tubing and fitting package (P/N 60-5234-653).
6. Unscrew the attached plastic fitting in this fitting package until the plastic fitting is almost completely detached from the steel fitting.
7. Attach the steel fitting in this package to the EZ Prep inject valve waste port. This steel fitting should be hand tight.



Figure 4-18 Waste tubing fitting attached to the EZ Prep inject valve

8. Turn the plastic fitting until it is attached hand tight to the valve.
9. Turn the steel fitting $\frac{1}{2}$ turn tighter. If it is difficult to do so, loosen the plastic fitting slightly.
10. Remove the plastic fitting while leaving the steel fitting attached.



Figure 4-19 Waste fitting with the plastic fitting removed

11. Attach the supplied tubing from this package to the steel fitting by screwing the new plastic fitting into the steel fitting. Tighten the steel fitting finger tight with the wrench supplied in the package.



Figure 4-20 Waste fitting with tubing attached

12. Connect the opposite end of this tubing to the left port of the AutoInjector Module.



Figure 4-21 Connection of the waste tubing from the EZ
Prep inject valve to the left AutoInjector
Module port

13. Connect the supplied waste line (P/N 60-5234-654) to the right port of the AutoInjector Module.



Figure 4-22 Waste line connected to the right AutoInjector Module port

14. Connect the check valve removed in Step 4 to the waste line from the AutoInjector Module. Ensure that the arrow on the check valve points away from the AutoInjector Module as shown in Figure 4-23.



Figure 4-23 Check valve connected to the waste line of the AutoInjector Module

15. Locate the supplied sample probe tubing and fitting package (P/N 60-5234-657).
16. Unscrew the attached plastic fitting in this fitting package until the plastic fitting is almost completely detached from the steel fitting.
17. Attach the steel fitting in this package to the EZ Prep inject valve waste port. This steel fitting should be hand tight.



Figure 4-24 Sample tube fitting attached to the EZ Prep inject valve

18. Turn the plastic fitting until it is attached hand tight to the valve.
19. Turn the steel fitting $\frac{1}{2}$ turn tighter.
20. Remove the plastic fitting while leaving the steel fitting attached.



Figure 4-25 Sample tube fitting with the plastic fitting removed

21. Attach the supplied tubing from this package to the secured fitting by screwing the new plastic fitting into the secured fitting. Tighten the fitting finger tight with the wrench supplied in the package.



Figure 4-26 Sample tube fitting with sample tubing attached

4.1.4 Establishing AutoInjector Module Connections

The AutoInjector Module comes with an attached USB-A cable. Connect this cable to an open USB port on the back of the EZ Prep.

Note

You will need a USB hub to connect the Column Selector Module and the AutoInjector Module.

Y-type Power Supply

When using the Column Selector Module in conjunction with the AutoInjector Module, you will be supplied with a Y-type power supply. This power supply is used to power both of the modules from a single power source. Plug one end of the power cable into the Column Selector Module, and plug the other end into the AutoInjector Module. Then, plug the power cord into a suitable power supply.

4.2 Installing the Column Selector Module with the AutoSampler Module

Using the Column Selector Module in conjunction with the AutoSampler Module does not affect the installation process for either module. Please install each module in accordance with the instructions given in that module's section.

Note

The USB cable for the Column Selector Module will be connected to the USB hub at the rear of the AutoSampler Module.

Note

Power to the Column Selector Module will be provided by one of the 24 V power cables at the rear of the AutoSampler Module.

4.3 Column Selector Module Operation

4.3.1 Setup

Before using the Column Selector Module for the first time, the CombiFlash EZ Prep must be configured to identify the column in each position. Once the columns have been installed in the Column Selector Module, go to FILE | CONFIG | PREP HPLC. Then, define the parameters of each column so a default method can be created for the column. To create a new column definition, follow the steps below:

1. Select NEW and enter a name in the COLUMN NAME field.
2. Enter the media size, column inside diameter, and length. If the default pressure limit of 3,500 is excessive, enter a new pressure limit as well.

These parameters are automatically entered into the RUN NOTE for each separation. The inside diameter is used to suggest a flow rate with a similar velocity to a 4.6 mm HPLC operating at 1 mL/min. This flow rate may be overridden at this time to decrease the time required for a separation. The column length along with the diameter is used to estimate a column's volume and suggest a default gradient duration. This parameter can also be overridden to decrease run time.

3. The debubbler automatically operates if one of the names of the solvents contains the words "water", "H2O", "wasser", "eau", or "agua". The ENABLE DEBUBBLER field allows the user to enable the debubbler without having one of these words present.
4. To set other method parameters as default for the column being defined, or to create a new method with custom parameters, use the DEFINE METHODS button.
5. Once the column definition is set, press the SAVE button.
6. To identify the column in each position, select the drop down menu in upper portion of the screen and choose a previously defined column. This allows you to select a column position by selecting the column name in the REDISEP drop down or the AutoSampler Module queue screen.



Figure 4-27 Configuring the Prep HPLC tab

Automation

Appendix A Specifications

A.1 AutoInjector Module Specifications

Dimensions	5.0 x 1.9 x 6.3 inches 12.7 x 4.8 x 16.0 cm
Weight	4 lb 1.8 kg
Temperature	20 - 40 °C
Maximum Humidity	95% relative humidity
Input Voltage	100 - 240 VAC; 50/60 Hz
Amps	2
Disconnect Device	Line cord
Electrical Safety	per EN 61010-1
Pollution Degree	2
Installation	Category II
Maximum Altitude	2,000 m
Sample Size	0.1 mL minimum

A.2 AutoSampler Module Specifications

Dimensions	18.9 x 14.0 x 19.3 inches 48.0 x 35.6 x 49.0 cm
Weight	31 lbs 14.1 kg
Temperature	20 - 40 °C
Maximum Humidity	95% relative humidity
Input Voltage	100 - 240 VAC; 50/60 Hz
Amps	2
Disconnect Device	Line cord
Electrical Safety	per EN 61010-1
Pollution Degree	2
Installation	Category II
Maximum Altitude	2,000 m
Sample Size	0.1 mL minimum

**A.3 Column Selector
Module Specifications**

Dimensions (vertical setup)	14.5 x 4.6 x 16.1 inches 36.8 x 11.7 x 40.9 cm
Dimensions (horizontal setup)	4.6 x 14.5 x 16.1 inches 11.7 x 36.8 x 40.9 cm
Weight	12.9 lb 5.9 kg
Temperature	20 - 40 °C
Maximum Humidity	95% relative humidity
Input Voltage	100 - 240 VAC; 50/60 Hz
Amps	2
Disconnect Device	Line cord
Electrical Safety	per EN 61010-1
Pollution Degree	2
Installation	Category II
Maximum Altitude	2,000 m

DECLARATION OF CONFORMITY



Application of Council Directive: 2014/30/EC -The EMC Directive
2014/35/EC – The Low Voltage Directive

Manufacturer's Name: Teledyne Isco
 Manufacturer's Address: 4700 Superior, Lincoln, Nebraska 68504 USA
 Mailing Address: P.O. Box 82531, Lincoln, NE 68501
 Phone: +1 (402) 464-0231
 FAX: +1 (402) 465-3799

Equipment Type/Environment: Laboratory Equipment for Light Industrial/Commercial Environments
 Trade Name/Model No: CombiFlash Automation Modules (includes AutoInjector, AutoSampler, and Column Select Module)

Year of Issue: 2016

Standards to which Conformity is Declared: EN 55011:2009/A1:2010 EMC Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use
 EN 61326-1:2013 EMC Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use
 EN 61010-1:2010 Safety requirements for electrical equipment for measurement, control, and laboratory use -- Part 1: General requirements
 EN 61000-3-2:2014 Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)
 EN 61000-3-3:2013 Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A

Standard	Description	Severity Applied	Performance Criteria
IEC61000-4-2	Electrostatic Discharge	Level 2 - 4kV contact discharge Level 3 - 8kV air discharge	A
IEC61000-4-3	Radiated RF Immunity	80 MHz to 1GHz, 3V/m 1.4 to 2.0GHz, 3V/m, 2.0 to 2.7GHz 1 V/m, 80% AM at 1 kHz Level 2	A
IEC61000-4-4	Electrical Fast Transient (EFT) on Mains and I/O	Level 2 - 1kV on AC lines	A
IEC61000-4-5	Surge on AC Lines	Level 2 - 1kV Line Common Mode Level 2 - 0.5kV Differential Mode	A
IEC61000-4-6	Conducted RF Immunity on Mains and I/O	150 kHz to 80 mHz Level 2 – 3V rms, 80% Modulated at 1 kHz	A
IEC61000-4-11	Voltage Dips	0% during 1 cycle and full cycle 70% at 25 cycles	A
IEC61000-4-11	Voltage Dips	0% for 5 seconds	C
CISPR11/ EN 55011:2009 /A1:2010	RF Emissions Radiated, below 1GHz and Conducted, AC Mains	Group 1, Class A Industrial, Scientific, and Medical Equipment	PASS

The undersigned, hereby declare that the design of the equipment specified above conforms to the above Directive(s) and Standards as of July 7, 2016.

USA Representative

Edward J. Carter
Director of Engineering



60-5232-423
Rev. 0

名称及产品中有害物质的名称和数量

Name and amount of Hazardous Substances or Elements in the product

捷 Component Name	Hazardous Substances or Elements					
	耗 (Pb)	琇 (Hg)	柘 (Cd)	鉻 (Cr(VI))	梁勤啾 (PBB)	梁啾啾 (PBDE)
瞭悉竺歌 LCD Display (none on RF4X)	O	O	O	O	O	O
兔忙换 Circuit boards	X	O	O	O	O	O
坐兔 Wiring	O	O	O	O	X	O
捷口冕 Internal Cables	O	O	O	O	X	O
纜纜兔 Line Cord	O	O	O	O	X	O
屨打趙抗 Stepper Motor	X	O	O	O	X	O
獵獵縵 Deuterium lamp	O	O	X	O	O	O
梛→ Valve Body	O	O	O	O	X	O

名称及产品中有害物质的名称和数量

O: 此产品的任何均匀片段的有害物质浓度均低于其适用的标准限制。

O: Represent the concentration of the hazardous substance in this component's any homogeneous pieces is lower than the ST/ standard limitation.

X: 此产品的任何均匀片段的有害物质浓度均高于其适用的标准限制的2倍。

(←“X”表示有害物质浓度高于其适用的标准限制的2倍。)

X: Represent the concentration of the hazardous substance in this component's at least one homogeneous piece is higher than the ST/ standard limitation.

(Manufacturer may give technical reasons to the “X”marks)

环境友好使用期限(EFUP)

The Environmentally Friendly Use Period (EFUP) was determined through experience.

生产日期(2007年)及月份(“A”为1月,“B”为2月,以此类推)

生产日期

The date of Manufacture is in code within the serial number. The first three numbers are the year of manufacture (207 is year 2007) followed by a letter for the month. "A" is January, "B" is February and so on.

Teledyne Isco One Year Limited Factory Service Warranty*

This warranty exclusively covers Teledyne Isco instruments, providing a one-year limited warranty covering parts and labor.

Any instrument that fails during the warranty period due to faulty parts or workmanship will be repaired at the factory at no charge to the customer. Teledyne Isco's exclusive liability is limited to repair or replacement of defective instruments. Teledyne Isco is not liable for consequential damages.

Teledyne Isco will pay surface transportation charges both ways within the 48 contiguous United States if the instrument proves to be defective within 30 days of shipment. Throughout the remainder of the warranty period, the customer will pay to return the instrument to Teledyne Isco and Teledyne Isco will pay surface transportation to return the repaired instrument to the customer. Teledyne Isco will not pay air freight or customer's packing and crating charges. This warranty does not cover loss, damage, or defects resulting from transportation between the customer's facility and the repair facility.

The warranty for any instrument is the one in effect on date of shipment. The warranty period begins on the shipping date, unless Teledyne Isco agrees in writing to a different date.

Excluded from this warranty are normal wear; expendable items such as desiccant, pH sensors, charts, ribbon, lamps, tubing, and glassware; fittings and wetted parts of valves; check valves, pistons, piston seals, wash seals, cylinders, pulse damper diaphragms, inlet lines and filter elements; and damage due to corrosion, misuse, accident, or lack of proper LQVWDOODWLRQ RU maintenance. This warranty does not cover products not sold under the Teledyne Isco trademark or for which any other warranty is specifically stated.

No item may be returned for warranty service without a return authorization number (RMA) issued by Teledyne Isco.

This warranty is expressly in lieu of all other warranties and obligations and Teledyne Isco specifically disclaims any warranty of merchantability or fitness for a particular purpose.

The warrantor is Teledyne Isco, 4700 Superior, Lincoln, NE 68504, U.S.A.

***This warranty applies to the USA and countries where Teledyne Isco does not have an authorized dealer. Customers in countries outside the USA, where Teledyne Isco has an authorized dealer, should contact their Teledyne Isco dealer for warranty service.**

Problems can often be diagnosed and corrected without returning the instrument to the factory. Before returning any instrument for repair, please contact the Teledyne Isco Service Department for instructions and to obtain a return material authorization number (RMA).

Instruments needing factory repair should be packed carefully and shipped to the attention of the service department. Small, non-fragile items can be sent by insured parcel post. **PLEASE WRITE THE RMA NUMBER ON THE OUTSIDE OF THE SHIPPING CONTAINER** and enclose a note explaining the problem.

Shipping Address: Teledyne Isco - Attention Repair Service
4700 Superior Street
Lincoln, NE 68504 USA

Mailing Address: Teledyne Isco
PO Box 82531
Lincoln, NE 68501 USA

Phone: Repair service: (800) 775-2965 (lab instruments)
(866) 298-6174 (samplers & flow meters)
Sales & General Information: (800) 228-4373 (USA & Canada)

Fax: (402) 465-3001

Email: IscoService@teledyne.com



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