SpectraMax®

Injector Cartridge

With SmartInject™ Technology

Quick Start Guide

MOLECULAR DEVICES

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SpectraMax Injector Cartridge

The SpectraMax® Injector Cartridge adds injector capability to the SpectraMax i3x Instrument. You can use the injectors and optics in the Injector Cartridge for luminescence reads from the top of the sample, or use the injectors in the cartridge along with the built-in Monochromator in the SpectraMax i3x Instrument for fluorescence intensity reads from the bottom of the sample. To do a read with injection, you must first install the Injector Cartridge in the detection cartridge drawer.

For installation instructions, see Installing the Injector Cartridge on page 3.

You can create protocols that use the Injector Cartridge in the SoftMax Pro Software. For information on creating protocols, see "Creating a Protocol" in the SoftMax Pro Software application help or user guide.

Applications of Injectors

Injectors in a microplate reader are used to automatically deliver a specified volume of a reagent to the wells of a microplate. They are generally used when delivery of the reagent initiates a reaction that occurs rapidly and results in a luminescent or fluorescent signal that must be detected quickly.

The SpectraMax i3x Instrument with the Injector Cartridge installed can be set up to inject and read well by well to reduce signal loss.

Common inject-and-read assays include luciferase reporter assays and calcium flux assays.

The Injector Cartridge is DLReady™ certified by Promega for the Dual-Luciferase Reporter (DLR™) assay system.

Using the Injector Cartridge

Before using the Injector Cartridge or doing maintenance operations, make sure that you are familiar with the safety information in the SpectraMax i3x Instrument user guide that is installed with the software.

For information on controlling the Injector Cartridge with the software, see the SoftMax Pro Software application help or user guide.

The following procedures describe the hardware-based usage of the Injector Cartridge.

- Installing the Injector Cartridge on page 3
- Inserting the Waste Plate and the Strip Wells on page 5
- Inserting the Bottles on page 6
- Priming the Injector Tubing on page 8
- Clearing the Injector Tubing on page 9
- Disabling Bubble Detection on page 10
- Removing the Injector Cartridge on page 10

For maintenance procedures and specifications, see the Injector Cartridge chapter in the SpectraMax i3x Instrument user guide.

Installing the Injector Cartridge

The installed Injector Cartridge is automatically detected by the SoftMax Pro Software. When detected, the cartridge appears in the SoftMax Pro Software **Settings** dialog enabling the read modes that can be used with the installed Injector Cartridge. The Injector Cartridge must be installed in the instrument to enable it for data acquisition in the SoftMax Pro Software.

There are three slots available for most detection cartridges in the detection cartridge drawer, plus the rear-most slot number 3 that is dedicated for the Injector Cartridge. The Injector Cartridge is installed in the two rear-most slots (3 and 4) in the detection cartridge drawer.

Note: When using the software in offline mode, all detection cartridges are available in the **Settings** dialog, including the Injector Cartridge. You can define non-injector luminescence reads that use the Injector Cartridge in the **Standard View** or **Acquisition View** the of the **Settings** dialog. However, to define reads with injectors, you must use the **Acquisition View**. See the SoftMax Pro Software application help or user guide.

To install the Injector Cartridge:

CAUTION! To prevent damage to the installed detection cartridges and the instrument, do not manually slide the detection cartridge drawer in or out when the instrument is powered on or when one or more detection cartridges are installed in the drawer.

1. Remove the bottles from the bottle holder to prevent spillage during the installation.
2. On the touch screen on the front panel of the instrument, touch the **INJECT** button to open the detection cartridge drawer and view the Injector screen.
3. Locate cartridge slots 3 and 4 in the rear of the detection cartridge drawer for installing the Injector Cartridge.

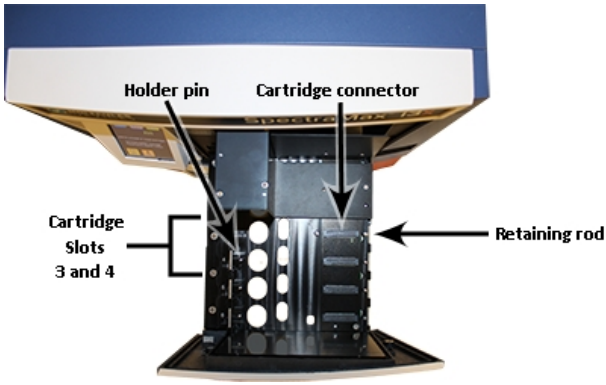

Figure 1-1: Cartridge Slots 3 and 4 for the Injector Cartridge

4. With the bottle holder toward the instrument, position the small hole and the connector pins on the bottom of the cartridge over the holder pin and connector of cartridge slots 3 and 4.

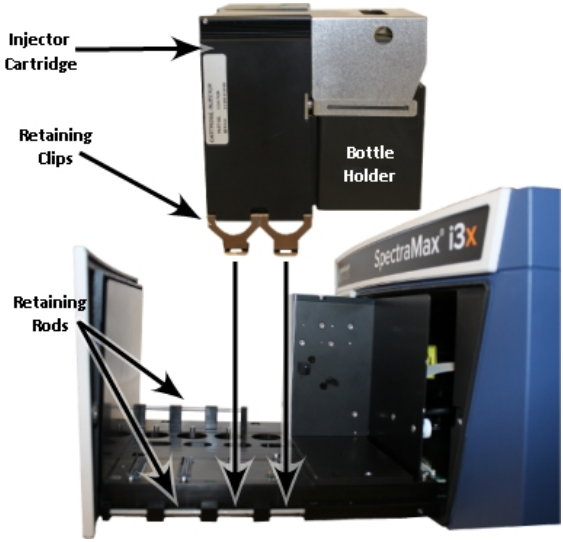

Figure 1-2: Installing the Injector Cartridge

5. Gently but firmly push the cartridge onto the holder pin and connector so that the cartridge is fully seated in cartridge slots 3 and 4.
6. Push the two retaining clips on the right side of the cartridge so that they fasten securely to the retaining rod.
7. Push the retaining clip on the left side of the cartridge so that it fastens securely to the retaining rod.
8. When prompted by the messages on the touch screen, insert the waste plate and the strip wells. See Inserting the Waste Plate and the Strip Wells on page 5.
   If you are preparing for an experiment, you can fill the bottles and prime the injectors before closing the detection cartridge drawer. See the following topics:
   - Inserting the Bottles on page 6
   - Priming the Injector Tubing on page 8
9. Make sure that the top cover is fully closed over the bottle holder so that there is enough clearance between the top of the cartridge and the top of the drawer opening before closing the drawer.
10. Touch the detection cartridge drawer **OPEN/CLOSE** button to close the detection cartridge drawer.

11. Remove the waste plate from the microplate drawer.
    Molecular Devices recommends that the strip wells remain in the microplate drawer whenever the Injector Cartridge is installed in the instrument.
12. Touch the **PLATE** button to close the microplate drawer.

13. Start the SoftMax Pro Software and connect to the instrument.
    If the software is running and connected to the instrument, go to the **Operations** tab in the ribbon and click **Refresh** to let the software detect the installed detection cartridges.

Inserting the Waste Plate and the Strip Wells

The waste plate provided with the Injector Cartridge captures excess liquid during priming, rinsing, and washing operations. The strip wells are used during the quick-prime of the injectors when starting a read with injectors.

Note: Make sure that the waste plate and strip wells are empty before you install them.

During the installation of the Injector Cartridge, the microplate drawer opens and messages on the touch screen prompt you to insert the waste plate and the strip wells. If the Injector Cartridge is already installed, then touch the **INJECT** button on the touch screen to open the microplate drawer.

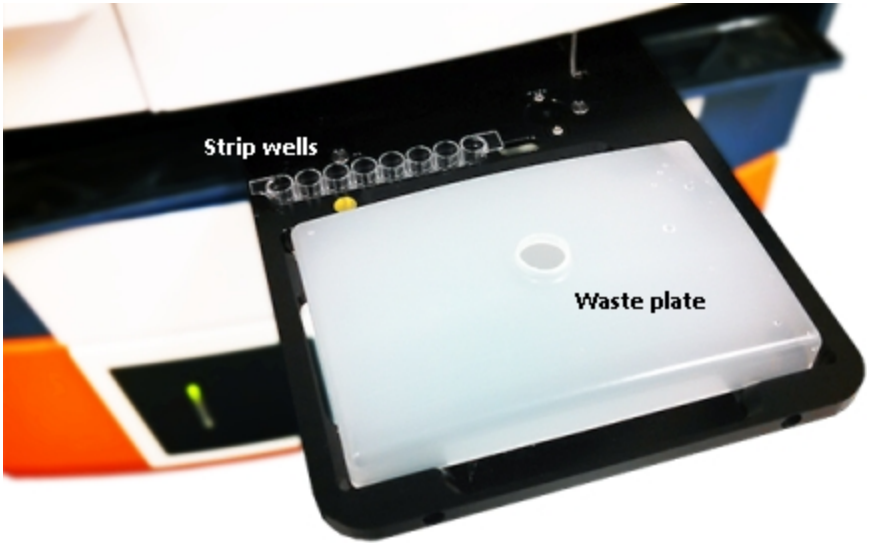

Figure 1-3: Waste Plate and Strip Wells

- Install the empty waste plate in the same location as a microplate.
- Install the empty strip wells in the smaller slot next to the microplate.

When you are ready to run an experiment, replace the waste plate with your prepared microplate. The empty strip wells must remain in the microplate drawer, since they are used during the 10 µL quick-prime of the injectors when starting a read with injectors.

Molecular Devices recommends that the strip wells remain in the microplate drawer whenever the Injector Cartridge is installed in the instrument. The waste plate should be removed before closing the microplate drawer.

Inserting the Bottles

The bottle holder on the Injector Cartridge holds two bottles that correspond with the two injectors. Fill the bottles with enough reagent for your experiment plus at least 2 mL to account for the prime operation and the quick-prime operation before the plate is read, and for the dead volume in the bottle and the tubing. Place the bottles in the positions that correspond with the injectors defined in your protocol.

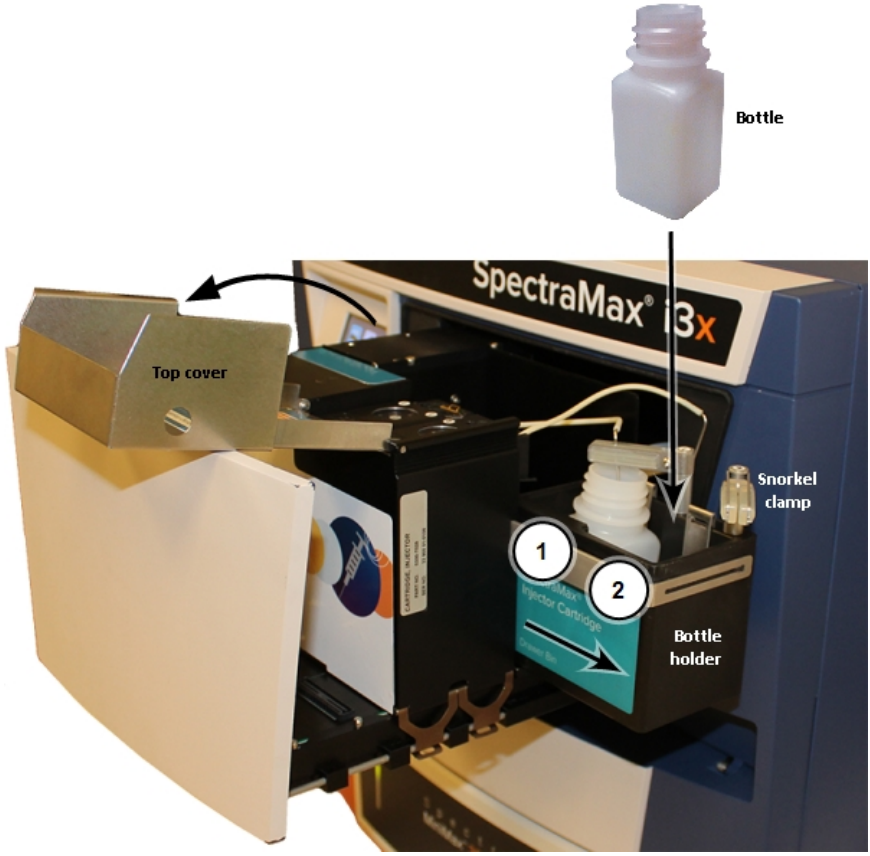

Figure 1-4: Inserting a Bottle

Bottles can be inserted with the Injector Cartridge on a workbench or after the cartridge has been installed in the instrument. This procedure describes inserting the bottles with the cartridge installed in the instrument.

1. With the detection cartridge drawer open, lift the top cover of the Injector Cartridge and swing the cover to its fully opened position.
2. Slide the bottle holder away from the cartridge body.

3. Slide the snorkel tube out of the open side of the snorkel clamp, and then slide it upward out of the bottle, if present.

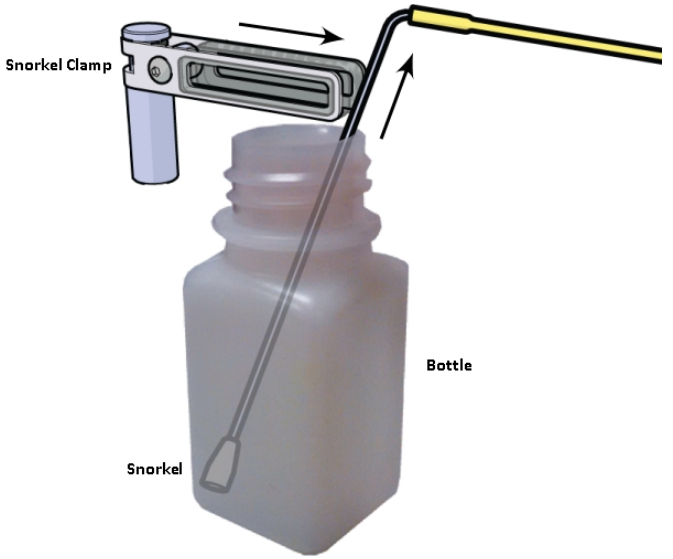

Figure 1-5: Removing the Snorkel

4. Twist the snorkel clamp to clear the position where the bottle is to be placed.
5. Remove the old bottle, if present, and then slide the new bottle into its position until the bottom of the bottle rests on the bottom of the bottle holder.
6. Twist the snorkel clamp back into position over the bottle.
7. Slide the snorkel all the way down into the bottle, and then slide the snorkel tube into the open end of the snorkel clamp.
   The bottle holder is slightly tilted toward one corner. To extract the maximum amount of liquid from the bottle, place the end of the snorkel in the lowest point that is located in the corner of the bottle closest to the closed end of the snorkel clamp.

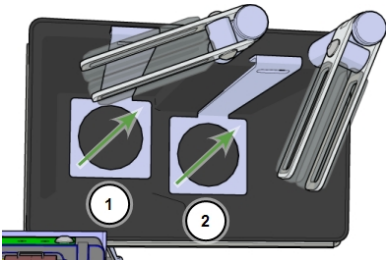

Figure 1-6: Lowest Points of the Bottle Holder

8. If required, insert a second bottle into the other position of the bottle holder and insert its snorkel.
9. Slide the bottle holder back into place on the cartridge body.
10. Swing the top cover to its fully closed position.

Priming the Injector Tubing

Before running a read with injectors, prime the injector tubing with the reagent that you are using for your experiment.

To view the Injector screen, touch the **INJECT** button in the Home screen. If the Injector Cartridge has not been installed, a message appears on the touch screen prompting you to install the cartridge.

Figure 1-7: Injector Screen on the Touch Screen

The Injector screen gives you options to prime each injector tubing separately.

To prime the injector tubing:

1. Insert the empty waste plate and the empty strip wells on the microplate drawer. See Inserting the Waste Plate and the Strip Wells on page 5.
2. Fill the bottles with enough reagent for your experiment plus at least 2 mL to account for the prime operation and the quick-prime operation before the plate is read, and for the dead volume in the bottle and the tubing. Place the bottles in the positions that correspond with the injectors defined in your protocol. See Inserting the Bottles on page 6.
3. Touch the **PRIME** button for the injector tubing with a filled bottle.
   If you are using both bottles in your experiment, then touch the other **PRIME** button after the first priming operation completes.
4. After the prime operation completes, touch the **HOME** button.
5. Make sure that the top cover of the Injector Cartridge is fully closed over the bottle holder.
6. In the Home screen, touch the **OPEN/CLOSE** button to close the detection cartridge drawer.
7. Remove the waste plate from the microplate drawer and replace it with your prepared microplate.
8. Touch the **PLATE** button to close the microplate drawer.
9. Use the SoftMax Pro Software to run your experiment. See the SoftMax Pro Software application help or user guide.

Clearing the Injector Tubing

After you finish using the injectors, clear the reagent from the injector tubing. The system uses a “reverse prime” to aspirate the reagent in the tubing and return it to the bottle. This can save valuable reagents from going to waste. The reverse prime operation recovers nearly all of the 250 µL of reagent in the tubing, leaving behind less than 10 µL. To maximize reagent recovery, run the reverse prime a second time.

You should also clear the injector tubing before removing the Injector Cartridge from the instrument. See Removing the Injector Cartridge on page 10.

To view the Injector screen, touch the **INJECT** button in the Home screen.

Figure 1-8: Injector Screen on the Touch Screen

The Injector screen gives you options to clear each injector tubing separately.

1. Remove the microplate from the microplate drawer, if applicable.
2. Insert the empty waste plate on the microplate drawer. See Inserting the Waste Plate and the Strip Wells on page 5.
3. Touch the **REVERSE** button for the injector that has reagent in its tubing.
   If both injectors contain reagent, then touch the other **REVERSE** button after the first clearing operation completes.

After the injector tubes have been cleared, you can remove the bottles from the cartridge, or remove the cartridge from the instrument.

Note: To ensure optimal operation of the Injector Cartridge, it is important to rinse the injector tubing after every use, and to periodically wash the tubing. See the Injector Cartridge chapter in the SpectraMax i3x Instrument user guide.

Disabling Bubble Detection

The Injector Cartridge has built-in detection for bubbles in the injector tubing to help maintain injection accuracy during your assays. The bubble sensor on the injector tubing detects breaks in the flow of conductive liquid within the tubing. It cannot detect breaks in non-conductive liquids, such as distilled water or ethanol.

For some solutions, you might want to disable bubble detection, if the solution is somewhat gaseous.

CAUTION! Disabling bubble detection can cause sputtering at the tip that can contaminate the optics and samples inside of the microplate chamber if the solution runs dry in the bottle or labware.

Molecular Devices recommends that you keep bubble detection enabled unless your assay requires it to be disabled.

- To disable bubble detection, touch the **BUBBLE ON** button on the Home screen of the touch screen.
- To enable bubble detection after it has been disabled, touch the **BUBBLE OFF** button.

Table 1-1: Bubble Detection Buttons on the Touch Screen

Button	Description
	When this button appears on the Home screen, bubble detection is enabled. To disable bubble detection, touch this button.
	When this button appears on the Home screen, bubble detection is disabled. To enable bubble detection, touch this button.

Removing the Injector Cartridge

It is not necessary to remove the Injector Cartridge when it is not in use. However, you can remove the Injector Cartridge to make room for other detection cartridges, to do maintenance operations, or when the instrument is being packed for shipping. After the Injector Cartridge is removed, store the cartridge in its box in a dry, dust-free, controlled environment.

CAUTION! During a prime, rinse, or wash operation, and during a microplate read, the nozzle containing the injector tips and the optics lowers to 0.5 mm above the opening of the waste plate or the top of the microplate for injecting the reagent and for detecting the luminescence signal. To prevent damage to the Injector Cartridge, do not remove the cartridge when the nozzle is extended. To make sure that the nozzle is safely inside the cartridge, always return to the Home screen on the touch screen before starting this procedure.

Before removing the Injector Cartridge, clear the injector tubing of all liquid. See Clearing the Injector Tubing on page 9.

To remove the Injector Cartridge:

CAUTION! To prevent damage to the installed detection cartridges and the instrument, do not manually slide the detection cartridge drawer in or out when the instrument is powered on or when one or more detection cartridges are installed in the drawer.

1. From the Home screen on the touch screen on the front panel of the instrument, touch the detection cartridge drawer **OPEN/CLOSE** button. To prevent damage to the Injector Cartridge, always return to the Home screen on the touch screen before starting this procedure.
2. If you have not previously cleared the injector lines, touch the **REVERSE 1** and **REVERSE 2** buttons on the touch screen. See Clearing the Injector Tubing on page 9.
3. Remove the bottles from the bottle holder to prevent spillage during the removal of the cartridge.
4. Place the end of a slot-head screwdriver in the slot on the retaining clip and use it as a lever to unfasten all the retaining clips on both sides of the Injector Cartridge.

Figure 1-9: Unfastening a Retaining Clip

5. Lift the Injector Cartridge straight up off of the connector and holder pins on the detection cartridge slot.
6. When not in use, store the Injector Cartridge in its original box.
7. Remove or install other detection cartridges, if desired.
8. Touch the detection cartridge drawer **OPEN/CLOSE** button to close the detection cartridge drawer.
9. Touch the **PLATE** button to open the microplate drawer.
10. Remove the waste plate and the strip wells from the microplate drawer, if present.
11. Touch the **PLATE** button to close the microplate drawer.

For more information about the Injector Cartridge visit:
http://www.moleculardevices.com/injectors/help

For research use only. Not for use in diagnostic procedures.

Patents: http://www.moleculardevices.com/productpatents

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