Nanoject III

Programmable Nanoliter Injector

INSTRUCTION MANUAL • 3-000-207

DRUMMOND SCIENTIFIC COMPANY

MADE IN USA

LABORATORY EQUIPMENT
E21997

Rules for Safe Operation

- For indoor use only.
- Never operate unit in an explosive atmosphere.
- Do not operate unit with a damaged cord.
- Use power source only in a standard electrical outlet.
- Do not handle power source with wet hands.
- Do not put unit or power source in water or other liquid.
- When servicing, use only identical Drummond replacement parts.
- Save these instructions.

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired. Always use the power source that is supplied with the unit.

Connections to Power Source:

Check the power source to see that the line voltage corresponds to the voltage indicated on the mains adapter.

If the mains adapter source and the line voltage are not compatible, the electrical components of the Nanoject III may be damaged or destroyed.

Before each use, confirm that the mains adapter cable is not damaged, worn or severely buckled and there are no breaks in the insulating surface. If any damage is noted, do not use the Nanoject III until the damaged mains is replaced.

Connecting to power outlet: The control box has a power source transformer attached to the box. Plug this into your outlet using the correct adapter supplied. There is an "on/off" switch on the side of the control box which turns on the control box once the injector head is attached. To turn off, use the switch to turn off. If you want to disconnect the power from the unit, merely unplug the transformer from the wall outlet.

Power/Current Rating: AC 100~V, 50-60 Hz, 38VA DC9V 2A
Input: 100-240~V, 50-60 Hz, 0.6A
Output: 9V 2A

Specifications for Usage

This unit is intended to be used to inject nanoliter quantities of sample.

This equipment is for indoor use only.
Temperature Range 10°C–35°C, Maximum Humidity 60%

FAILURE TO USE THE EQUIPMENT IN ACCORDANCE WITH INSTRUCTIONS OR MODIFYING THE EQUIPMENT WILL VOID WARRANTIES.

CAUTION: CAREFULLY READ THROUGH THIS ENTIRE MANUAL BEFORE USING YOUR NEW NANOJECT III. PAY CLOSE ATTENTION TO THE RULES FOR SAFE OPERATION WARNINGS AND CAUTIONS.

Quick Start Guide

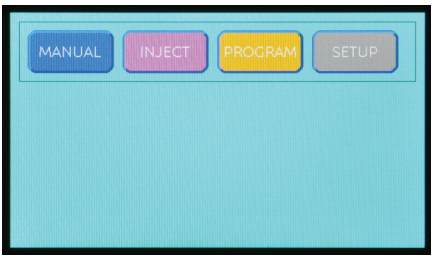
1) Carefully insert either end of the cable into the plug on the top of the injector head. Plug the opposite end of the cable into the “HEAD” port on the right side of the control box.

2) If using the footswitch, insert the footswitch cable into the “FOOTSWITCH” port on the right hand side of the control box.

3) Plug in the control box into a standard electrical outlet using the appropriate adapter head on the power supply.

4) Turn on unit with the on/off switch located on the left hand side of the control box.

5) Initially the Drummond logo will be displayed on the screen and then the operational mode screen will appear with the following icons:



Select the manual mode by pressing the [**MANUAL**] icon.

Note: During this brief startup phase, the injector head will automatically drive the plunger to its fully retracted position (“home”) and the control box will emit an audible beep upon completion.

6) Install a micropipet onto the injector plunger by first loosening the black collet slightly. Backfill your micropipet with a suitable lightweight mineral oil (or any other non-compressible liquid), and slide it onto the wire plunger until it seats firmly, then tighten the collet. It works best if the wire plunger is extended slightly so you can see what you are doing.

NOTE: THE MICROPIPET MUST BE FILLED COMPLETELY WITH SOME TYPE OF BACKFILLING SOLUTION. THE UNIT WILL NOT INJECT ACCURATELY WITH AIR INSIDE THE MICROPIPET–THIS INCLUDES AIR BUBBLES ALSO.

Once the micropipet is backfilled with oil and secured, press the [**EMPTY**] icon down until the plunger is fully extended (approximately 23 mm beyond the end of the black collet). A single beep will be heard when the plunger is fully extended. (This will force the backfilling solution to the tip of the micropipet and any excess will be expelled).

7) Front-fill the micropipet with your sample by placing the micropipet tip into your sample and pressing the [**FILL**] icon. You may want to fill at a slow speed or fill by alternately pressing the [**FILL**] icon for a few seconds and then the [**STOP**] icon to allow the sample to equilibrate before pressing the [**FILL**] again. This is dependent on the tip size and the viscosity of your sample.

Note: The plunger will continue to extend or retract until you press the [**STOP**] icon, or a fully extended or fully retracted position is reached.

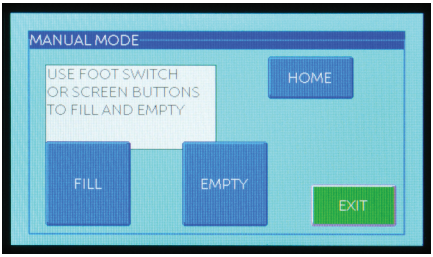
8) To inject the sample, return to the operational mode screen by pressing the [**EXIT**] icon, then select inject mode by pressing the [**INJECT**] icon. Set the desired injection volume (**NL**) and rate using the respective [**+**] and [**-**] icons. Press the [**INJECT**] icon to inject your sample.

Note: Multiple injections can be performed by simply pressing the [**INJECT**] icon again and again.

Operational Modes

[MANUAL] Mode

This mode will enable the user to manually fill and empty the micropipet. Pressing the [**FILL**] icon will retract the wire plunger, while pressing the [**EMPTY**] icon will cause the wire plunger to extend. When the [**HOME**] icon is pressed, the wire plunger will fully retract to the "home" position and should be flush with the end of the black collet.

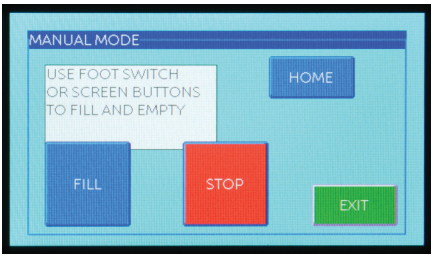


If the [**FILL**] or [**EMPTY**] icon has been pressed and you desire to stop the action, simply press the same icon position (now labeled [**STOP**]) a second time.

Note: The [**HOME**] and [**EXIT**] icons are disabled while the wire plunger is in motion.

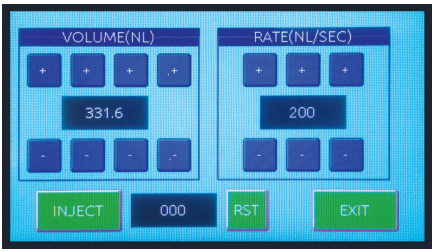
Note: The speed of the fill and empty movement can be regulated in the [**SETUP**] mode and is independent of the injection rate.

Press the [**EXIT**] icon to exit back to the operational mode screen.



[INJECT] Mode

This mode is used to do single manual injections. It enables the user to program an injection volume (0.6 – 999.9nL) and an injection rate (nL/sec) using the respective [**+**] and [**-**] icons. Press the [**INJECT**] icon to inject the desired volume at the rate selected.



To the right of the inject icon, you will see a counter box. This will count the number of injections. You can change volume and/or rate and the counter will continue to count. If you change screens, the counter will zero out. You will also see an [RST] icon that when pressed, will reset the counter to zero.

Note: Multiple injections can be performed by simply pressing the [**INJECT**] icon again and again. The injection rate is independent of the empty rate as programmed in the [**SETUP**] mode.

Press the [**DONE**] icon to exit back to the operational mode screen.

[PROGRAM] Mode

This mode enables the user to program multiple injection cycle recipes. To program a new recipe, press the [**NEW**] icon. A screen displaying the sample injection volume (nL) and an injection rate (nL/sec) will appear. As before, adjust these individual values by using the respective [+] and [-] icons.

Pressing the [**NEXT**] icon brings up a screen displaying the number of injection cycles. Again, use the [**+**] and [**-**] icons to select the value desired.

Pressing the [**BACK**] icon always returns you to the previously displayed screen.

Pressing the [**NEXT**] icon once again brings up the screen displaying the interval (secs) between injection cycles. Use the [**+**] and [**-**] icons to set the desired time.

Pressing the [**NEXT**] icon a final time allows you to view the entire program recipe values in the following format:

VOL (NL) . . . . .volume of injection

RATE . . . . . .rate of injection

CYCLES . . . . .number of cycles this volume will be injected

TIME (SEC) . . .time interval between each injection

Note: The program recipes are automatically saved and labelled in sequential order. You can step through the stored recipes by pressing the [**<**] and [**>**] icons. Should you desire to delete a recipe, simply press the [**DEL**] icon, and the displayed recipe will be deleted.

Pressing the [**RUN**] icon will initiate the currently displayed program recipe.

After pressing the [**RUN**] icon, a [**PAUSE**] icon appears and enables the user to interrupt the program at any time, and then resume the program where it was interrupted by pressing the [**RUN**] icon again.

To initiate a single cycle of the displayed recipe, simply press the [**TEST**] icon once.

Below the [**RUN**] icon is a box displaying the number of injection cycles remaining in the entire program recipe. It will count down toward (0) as the multiple injection cycle progresses. Below this “counter” box is a display of the percentage of the program recipe remaining. It will count down toward (0%) as the multiple injection cycle progresses.

Press the [**EXIT**] icon to exit back to the operational mode screen.

[SETUP] Mode

This mode will enable the user to program and store the manual fill and empty rates. As before, use the [+] and [-] icons to select the desired independent values for both the FILL SPEED (NL/SEC) and the EMPTY SPEED (NL/SEC).

Note: As mentioned earlier, the fill and empty speeds on this screen have no effect on the injection rate.

Press the [**HOME**] icon to manually fully retract the plunger to the "home" position.

Press the [**EXIT**] icon to exit back to the operational mode screen.

Notes

The Nanoject III does not use any O-rings to secure the micropipet. We have incorporated a small chuck and a silicon receiver for the glass micropipet. The micropipet should slide easily onto the wire, provided the collet has been loosened enough.

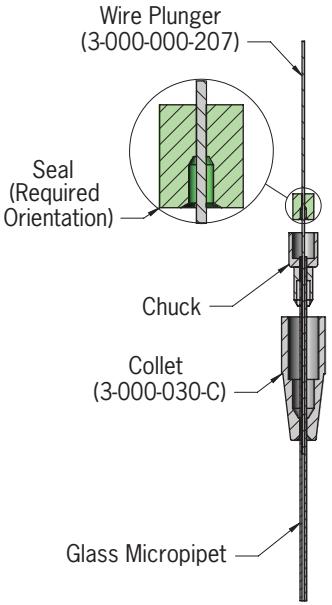
When storing the injector, do not tighten the collet. Leave it slightly loosened.

Cleaning Instructions: To clean the Nanoject III, simply wipe the control box down with a moist cloth. The injector head can also be cleaned with a moist cloth; unscrew the collet and wipe off the excess oil with a clean Kimwipe or soft cloth. The wire plunger may be wiped down with alcohol.

Orientation of the collet components is critical to the proper operation of this unit. You will see the collet contains a black "chuck" and a green "seal". This seal has a small opening and a large opening. The small opening or hole slides over the wire plunger while the large opening or hole receives the back end of the pulled micropipet and must face the tip of the micropipet. Failure to orient this piece properly will cause an improper seal and will not enable the Nanoject III to inject properly.

When placing the backfilled micropipet on to the wire plunger and through the chuck, do not force the micropipet, merely push it onto the plunger until it bottoms out in the green seal.

Then tighten the collet to secure the pipet.



Questions, Comments, Suggestions or Service:

CALL OUR HOTLINE AT 1-800-523-7480

Power Source supplied with four interchangeable adapter plugs for use in the U.S., UK, Europe, and Australia

Specifications

Part Number	3-000-207
Power Source	100/240 volt, 50/60 Hz
Total Sample Volume	4.2 µL
Fill / Empty Volume Speed	10 nL - 200 nL/sec
Injection Volume Range	0.6 nL - 999.9 nL
Injection Rate	1 nL - 200 nL/sec
Plunger Travel	23 mm
Glass Micropipet Dimensions	OD 0.045″ (1.14 mm) ID 0.021″ (0.53 mm)

Control Box Dimensions

Weight: .43 kg
Length: 14 cm
Width: 13.5 cm
Thickness: 4 cm

3-000-207 kit contains the following items:

Control box & power source 3-000-037
Injector head 3-000-030-B
Injector head cable 3-000-031
100 pcs., 3.5″ glass capillaries 3-000-203-G/X
100 pcs., 7″ glass capillaries 3-000-203-G/XL
Backfilling needle 3-000-027
Universal adapter 3-000-024-A

Accessories not included in kit:

Replacement collet kit 3-000-030-K
(1 collet, 1 chuck, 1 seal, 1 wire plunger, 1 Allen wrench)
Replacement collet only 3-000-030-C
Replacement silicon seal (3 pk) 3-000-030-S
Replacement wire plunger 3-000-000-207
(Note: Not the same as the Nanoject II plunger)
Support base 3-000-025-SB
Micromanipulator, right hand 3-000-024-R
Micromanipulator, left hand 3-000-024-L
Footswitch 3-000-032
(remote capability for fill, empty and inject functions)

Questions: Please contact Chuck Locke at **800-523-7480** or **clocke@drummondsci.com** if you need any assistance.

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