| Frederick National Laboratory for Cancer Research<br>*sponsored by the National Cancer Institute* | Vaccine, Immunity and Cancer Directorate<br>Standard Operating Procedure | |
|---|---|---|
| **SOP Title:** Use and Maintenance of Incubator Shakers | | |
| **Document ID: 26008** | Version | 2.0 |
| **Page 1 of 25** | Supersedes | New |
| **Effective Date: 17Sep21** | | |

| **Written by:** | | |
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| Printed Name: | Title: | Signature/Date: |
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| **Approved by:** | | |
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| **QA Approved by:** | | |
| Printed Name: | Title: | Signature/Date: |
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## 1. PURPOSE

1.1. The purpose of this procedure is to describe the general use and maintenance of the Innova and Forma Scientific Incubator Shakers.

## 2. SCOPE

2.1. This procedure applies to all Incubator Shakers.

## 3. REFERENCES

3.1. Innova 43 Incubator Shaker User Manual

3.2. Forma Scientific Orbital Shaker Model 4535 User Manual

3.3. 10007: Non-Routine Equipment Maintenance

3.4. 10009: General Record Review

3.5. 26016: Operation, Use and Maintenance of the Water Purification Systems

3.6. 15000: Waste Disposal at the Advanced Technology Research Facility

## 4. RESPONSIBILITIES

4.1. The Research Associate, hereafter referred to as Analyst, is responsible for reviewing and following this procedure, and documenting performance of equipment maintenance.

4.2. The Scientific Manager or designee is responsible for training personnel in this procedure and reviewing associated documentation.

4.3. The Quality Assurance Specialist is responsible for quality oversight and approval of this procedure.

4.4. Trained personnel perform equipment maintenance record review per “10009: General Record Review.”

## 5. DEFINITIONS

5.1. As Needed Maintenance – maintenance that is performed outside of routine maintenance but is not performed in response to equipment malfunction.

5.2. HRS- Hours

5.3. Routine Maintenance – maintenance that is performed at planned intervals to identify and prevent problems before they result in equipment failure.

5.4. RCF - Relative Centrifugal Force (g-force); Centrifuge display reads x g

5.5. RPM – Revolutions Per Minute

5.6. TOC – Total Oxidizable Carbon

5.7. Water, Type II – Pure/Analytical Grade, used for standard applications (Resistivity >1 MΩ-cm and TOC ≤ 50 ppb)

## 6. REAGENTS, CHEMICALS, AND EQUIPMENT

6.1. Bleach, Concentrated (FNLCR Warehouse, Cat # 68100251 or equivalent)

6.2. Primary Disinfectant (Cavicide, FNLCR Warehouse, Cat # 79300360 or equivalent)

6.3. Incubator Shaker

6.4. HEPA Filter (Thermo Scientific, Cat # 760164 or equivalent)

6.5. PCC-54 Detergent Concentrate (Fisher, Cat # PI72288 or equivalent)

6.6. Secondary Disinfectant (Ster-ahol, VWR, Cat # 14003-358 or equivalent)

6.7. Water, Type II

6.8. Wipe, Low-Lint, Wypalls (Warehouse, Cat # 79300335 or equivalent)

## 7. HEALTH AND SAFETY CONSIDERATIONS

7.1. Proper safety precautions should be taken while working in a laboratory setting. This includes, but is not limited to, proper protective equipment such as lab coats, safety glasses, closed-toe shoes, and non-latex gloves.

7.2. Refer to the respective Safety Data Sheet (SDS) when working with any chemicals.

7.3. Refer to “15000: Waste Disposal at the Advanced Technology Research Facility,” “EHS-WM-1: Disposal and Minimization of Chemical Waste,” and “EHS-WM-2: Biological Waste Handling and Disposal” for waste disposal processes.

7.4. When performing Quarterly Maintenance on Incubator Shaker, turn instrument off and disconnect the power cord from power supply.

7.5. Incubator Shaker should not be run without a platform installed.

7.6. Once a run has started, look through the viewfinder Window to verify all flasks and test tube racks are firmly seated while the microprocessor Speed Control brings the platform up to speed, which could take about 1 minute.

7.7. Incubator Shaker should not be used with flammable substances or used to grow organisms that produce flammable by-products.

7.8. Locate Incubator Shaker on a firm, level surface, free of dust and dirt, with at least 4 inches of space between the unit and other equipment/walls to allow for proper air flow.

7.9. Incubator Shaker must be connected to a grounded, dedicated circuit.

7.10. Air circulating fans will only operate during a run when the lid is closed.

7.11. Do not operate the Orbital Shaker at maximum RPM without a load.

## 8. OPERATION

8.1. Operational Overview

8.1.1. Incubator Shaker should be allowed to reach the proper temperature prior to beginning an incubation.

8.1.2. Incubator Shaker can run at temperatures between 5°C above ambient and up to 60°C.

8.1.3. The Spill Pan/Water Reservoir should be filled with Type II Water when humidity is required.

8.1.4. Refer to User Manual for directions on how to Run, Create, Edit, Troubleshoot, and Turn Off a program.

8.1.5. See Attachment 1: Control Panel/Operating Controls for Innova

8.1.6. See Attachment 2: Control Panel/Operating Controls for Forma

8.1.7. Ensure load is balanced on platform when running.

8.2. Innova

8.2.1. Start Up Incubator Shaker

8.2.1.1. The Incubator Shaker can be operated in four ways:

- **Continuous Mode** will run at a set speed and temperature, until Analyst stops the instrument.
- **Timed Mode** will run at a set speed, time, and temperature for a period of up to 99.9 hours, after which Incubator Shaker will shut off.
- **Programmable Controller**, the Incubator Shaker can be set for multiple temperatures and speeds over an extended period of time.
- Using a **Computer**, the Incubator Shaker can be controlled over a computer interface.

8.2.1.2. Close Incubator Shaker Lid.

8.2.1.3. Turn Power Switch on. An audible alarm will sound.

8.2.1.4. Turn Control Knob to turn alarm off.

8.2.2. Setting Temperature

8.2.2.1. Turn Control Knob until temperature set-point is highlighted; Temp in °C. Click Control Knob in and temperature value will begin to flash.

8.2.2.2. Rotate Control Knob to set temperature in 0.1°C increments.

8.2.2.3. Click Control Knob in to save setpoint.

8.2.3. Setting Speed/RPM

8.2.3.1. Turn Control Knob until speed set-point is highlighted; speed in RPM. Click Control Knob in and speed value will begin to flash.

8.2.3.2. Rotate Control Knob to set speed in 1 RPM increments.

8.2.3.3. Click Control Knob in to save setpoint.

8.2.4. Setting Time

8.2.4.1. Turn Control Knob until time setpoint is highlighted; time in HRS. Click Control Knob in and hours value will begin to flash.

8.2.4.2. Rotate Control Knob to set time in 1-minute (0.01HRS) increments.

8.2.4.3. Click Control Knob in to save setpoint.

8.2.5. Setting Humidity

8.2.5.1. Turn Control Knob until Percent Relative Humidity set-point is highlighted; %RH. Click Control Knob in and % value will begin to flash.

8.2.5.2. Rotate Control Knob to set percentage in 1% increments.

8.2.5.3. Click Control Knob in to save setpoint.

8.2.6. Start Incubator Shaker

8.2.6.1. If running a Program, go to Program screen, highlight Program using Control Knob, and select Run.

8.2.6.2. If Time (HRS) has been set to 0:00, Incubator Shaker will operate continuously until either Lid is opened or Start/Stop Button is pushed. (See Attachment 3.)

8.2.6.3. If using manually inputted settings, push Start/Stop Button.

8.2.7. Alarms

8.2.7.1. A visual and/or audible alarm will sound to alert Analyst of the following conditions:

- End of a timed run.
- Deviations from speed set point.
- Deviations from temperature set point.
- Power failure.
- Lid open.

**Note**: Refer to Attachment 6: Alarm Descriptions for more details on proper response to alarms.

8.2.8. Running Programs

**Note:** To view or change Incubator Shaker settings, refer to summary screen. The summary screen will display the actual and set points for speed, the chamber temperature, elapsed time if using a program, and humidity if in use.

**Note:** Use the ***PROG*** screen to program steps for Incubator Shaker. The resident software for Incubator Shaker can store up to 4 programs, each having as many as 15 steps. Each step can be programmed in 1-minute increments.

8.2.9. To enter programming mode, use Control Knob to select ***PROG*** screen. In ***PROG*** screen: ***Run*** a program, create a ***New*** program, ***Edit*** a program, or turn ***Off*** a program.

8.2.10. To create new program, perform the following steps:

8.2.10.1. Use Control Knob to highlight the mode of Program 1, then click Control Knob in. The selected field will begin to flash.

8.2.10.2. Turn Control Knob until field shows ***New***.

8.2.10.3. Click Control Knob in to select this mode.

8.2.10.4. The screen for Program 1 - Step - 01 will open.

8.2.10.5. Turn Control Knob to highlight time setting, then click Control Knob in. The field will flash.

8.2.10.6. Turn Control Knob until the desired running duration for this step (00:01 min – 99:59 h) appears.

8.2.10.7. Click Control Knob in to save setting.

8.2.10.8. Turn Control Knob to highlight °C temperature setting, then click Control Knob in. The field will flash.

8.2.10.9. Turn Control Knob to set temperature desired for the time period set.

8.2.10.10. When desired value appears, click Control Knob in to save setting.

8.2.10.11. Turn Control Knob to highlight rpm setting, then click Control Knob in. The field will flash.

8.2.10.12. Turn Control Knob to select shaking speed for the time period set.

8.2.10.13. Click Control Knob in to save setting.

8.2.10.14. Continue to program as many as 15 total steps in program by repeating Steps 8.2.10.1 – 8.2.10.13.

8.2.11. Use ***Run*** mode to turn a specific program on. Only 1 program can run at a time. When mode changed to ***Run***, screen will show ***Run*** icon, (see Attachment 4)

8.3. Forma

8.3.1. Start Up Orbital Shaker

8.3.1.1. Turn on Orbital Shaker using Power Switch.

8.3.1.2. Instrument is ready to run using factory settings once a Time Value has been entered.

8.3.2. Setting Temperature

8.3.2.1. Press the Button beneath the temperature set-point; Temp in °C. The temperature value will begin to flash.

8.3.2.2. Press the Up or Down Arrows to set the new temperature in 0.1°C increments. Hold either Arrow to scroll.

8.3.2.3. Press the Temperature Button again to return to the Operating Screen.

8.3.3. Setting Speed/RPM

8.3.3.1. Press the Button beneath the Speed set-point; RPM. The RPM value will begin to flash.

8.3.3.2. Press the Up or Down Arrows to set the new speed in 1 RPM increments. Hold either Arrow to scroll.

8.3.3.3. Press the Speed Button again to return to the Operating Screen.

8.3.4. Setting Time

**Note:** Forma Orbital Shaker has two Time parameters: Hold and Countdown. Hold is the total amount of time cumulatively that the Incubator Shaker operates once the Start Button is selected. Countdown is the remaining time for a specific operating cycle.

8.3.5. Press the Button beneath the Time set-point; Time.

**Note:** If the Orbital Shaker is being powered on Hold Time will begin to flash; 00:00H.

8.3.5.1. Press either Arrow to access the Countdown Time setpoint. The Preset Time set-point will begin to flash.

8.3.5.2. Press the Up or Down Arrows to set the desired operating time in five-minute increments. Hold either Arrow to scroll.

8.3.6. Start Orbital Shaker

8.3.6.1. Once all parameters have been set, return to Operating Screen and press the Start Button.

8.3.6.2. Once Countdown is complete the Incubator Shaker will automatically shut off.

## 9. MAINTENANCE

9.1. As Needed Maintenance

**Note:** Document As Needed Maintenance in its respective section on form "26008-01: Maintenance of the Incubator Shaker."

9.1.1. Spills

**Note:** Incubator Shaker is equipped with Spill Pan/Water Reservoir to cover Drive Mechanism.

**Note:** Clean all nominal spills immediately using Cavicide per "15000: Waste Disposal at the Advanced Technology Research Facility."

9.1.1.1. If spill is large (contents of a 1 L flask) and spread throughout spill pan of the Orbital Shaker, soak the spill with 10% bleach solution for 30 minutes, then drain.

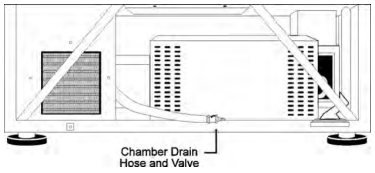
9.1.1.2. If large spill occurred during Incubator Shaker run, then stop the unit, power the instrument down, and allow 15 minutes for any particles to settle before opening lid. Soak the spill with 10% bleach solution for 30 minutes, then drain.

9.1.1.3. Spill Pan can be drained through Quick-Connect Valve at front left of unit under Humidity Tray. See Steps 9.1.2.2.

9.1.1.4. Forma Only

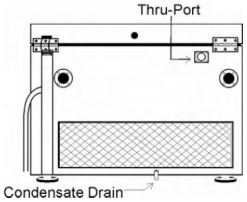
- There are two Drains for cleaning spills: an internal chamber drain and a condensate drain on the back.
- Chamber Drain is a clear vinyl hose with plastic shutoff valve located inside front Panel of Orbital Shaker.
- Gently pull off Grille and the 6 push-in Retainers holding it in place.
- Remove the 6 Phillips Screws, 3 on top and 3 on bottom, to remove the Cabinet Panel within.

Image 1. Schematic of Chamber Drain and Location




- Condensate Drain is for removing any water that may collect in Orbital Shaker's air ductwork.

Image 2: Condensate Drain




9.1.2. Humidity Maintenance

**Note:** If Incubator Shaker is equipped with factory installed Humidity Sensor, Analyst may choose to use Spill Pan as a Type II Water Reservoir. This reduces evaporation and raises humidity levels in the chamber while having humidity levels monitored by Incubator Shaker's Humidity Sensor. Spill Pan may also be used without Humidity Sensor attached.

**Note**: At a 37°C set point, the chamber loses approximately 500 mL/hr from Pan. At a 25°C set point, and placed in a 25°C room, the chamber achieves a relative humidity equilibrium that is approximately 15% above ambient humidity.

9.1.2.1. Fill Spill Pan/Water Reservoir

- Open Lid and temporarily remove Platform.
- Ensure Drain Valve is closed.
- Slowly fill Spill Pan/Water Reservoir with no more than 3 L of Type II Water.
- Replace Platform.

9.1.2.2. To drain Spill Pan/Water Reservoir

**Note:** The Spill Pan/Water Reservoir Drain is located on the front left side of the Incubator Shaker, under the Humidity Tray.

- Attach Quick-Connect Drain Fitting to Drain Valve.
- Open Drain Valve.
- Direct Drain Fitting to a waist container and allow the water to gravity drain.
- When Reservoir is empty, detach Drain Fitting, and close Drain Valve.

9.2. Quarterly Maintenance

9.2.1. Wipe down entire internal unit with Cavicide, let sit for at least 3 minutes, then wipe with a clean low-lint wipe.

9.2.2. Spray wipe with Ster-ahol, then wipe with a clean low-lint wipe.

9.2.3. If a Fill Pan is being used

9.2.3.1. Empty Fill Pan (Step 9.1.2.2)

9.2.3.2. Spray Fill Pan with Cavicide and let sit for at least 3 minutes prior to being wiped with a clean low-lint wipe.

9.2.3.3. Spray wipe with Ster-ahol, then wipe with a clean low-lint wipe.

9.2.3.4. Refill Fill Pan (Step 9.1.2.1) as needed.

9.2.4. Spray the outside surfaces, Window and Lid, with Cavicide, let sit for at least 3 minutes, then wipe with a clean low-lint wipe.

9.2.5. Spray wipe with Ster-ahol, then wipe outside surfaces with a clean low-lint wipe.

9.2.6. Document maintenance on “26008-01: Maintenance of the Incubator Shaker.”

9.2.7. Air Filter Cleaning - Forma Only

9.2.7.1. Turn Orbital Shaker off and disconnect Electric Cord from outlet.

9.2.7.2. Clean Air Filter

**Note:** The Air Filter (9.5” x 23.6”) is located behind the Grille on the front of the Cabinet.

Image 3. Air Filter

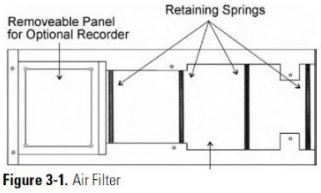



**Figure 3-1.** Air Filter

9.2.7.3. The Grille is held in place by six press-in type Retainers and is easily removed by grasping it by the edges and pulling the Grille off.

9.2.7.4. The Air Filter is held in place by four Retaining Springs (see Image 3) and is easily removed.

9.2.7.5. Wash Filter material using Type II Water and a mild detergent.

9.2.7.6. Dry Filter by pressing between paper towels.

9.2.7.7. Install Filter back into Grille once dry and replace Retaining Springs and Retainers.

9.2.7.1. Record maintenance on 26008-01.

9.3. Annual Calibration

9.3.1. Facilities, Maintenance, and Engineering (FME) or a contracted vendor will calibrate Incubator Shaker every year as required, for routine use.

9.3.2. Incubator Shaker should be re-calibrated if moved more than 10 feet or as determined by Scientific Manager.

9.3.3. Incubator Shakers are assessed for recalibration after repair, damage, or if physical, or electronic changes occur that could impact the operation, range, accuracy, or tolerance of the equipment. This is determined by the Scientific Manager or designee.

9.4. Biennial Maintenance - Forma Only

9.4.1. Change the HEPA Filter every two years.

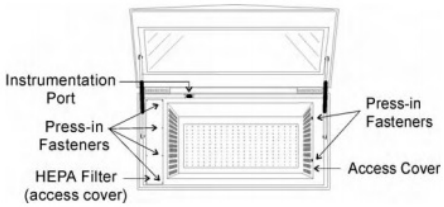
**Note:** The HEPA Filter is located on the left side inside the Orbital Shaker incubation chamber.

9.4.1.1. Open Orbital Shaker Lid.

9.4.1.2. Pull up the four, black Press-in Fasteners located inside Orbital Shaker Incubation Chamber on left side.

9.4.1.3. Slide Access Cover up and off exposing HEPA Filter.

**Image 4:** Changing the HEPA Filter:



9.4.2. Remove HEPA Filter and dispose into a red bagged biohazard waste box.

9.4.2.1. Install new HEPA Filter.

9.4.2.2. Replace Access Cover and Press-in Fasteners.

9.4.3. Document maintenance on Biennial Maintenance section of 26008-01.

9.5. Non-Routine Maintenance

9.5.1. In the case that the Incubator Shaker is not operating correctly, transition processes being performed to another unit (when applicable), post a sign stating the equipment is out of service and initiate non-routine maintenance documentation per “10007: Non-Routine Equipment Maintenance.”

9.5.2. Document the nature of any failures or malfunctions, how and when it was discovered, and the personnel involved on “10007-01: Non-Routine Equipment Maintenance Form.”

9.5.3. Initiate a service request and complete the non-routine maintenance process following 10007.

## 10. SETTINGS

10.1. Relative Humidity: 20% - 80% (If applicable to Incubator Shaker)

10.2. Ambient Temperature: 10°C – 35°C

10.3. Operating Temperature: Between 5°C above ambient and up to 60°C

10.4. RPM: 25 RPM – 400 RPM

10.5. Out of Range Events

10.5.1. There is a visible and audible warning indication when:

10.5.1.1. Speed deviates more than 5 rpm from high or low setpoints

10.5.1.2. Temperature deviates more than ±1°C from high or low setpoints

10.5.2. If Incubator Shaker goes into alarm, acknowledge alarm by emailing the laboratory personnel. If the instrument maintains a temperature out of range for more than 2 hours, then transfer biological contents to another unit. Initiate non-routine maintenance per section 9.4.

## 11. ATTACHMENTS

11.1. Attachment 1: Control Panel/Operating Controls for Innova

11.2. Attachment 2: Control Panel/Operating Controls for Forma

11.3. Attachment 3: Display Operation for Innova

11.4. Attachment 4: Display Icons for Innova

11.5. Attachment 5: Troubleshooting Guide

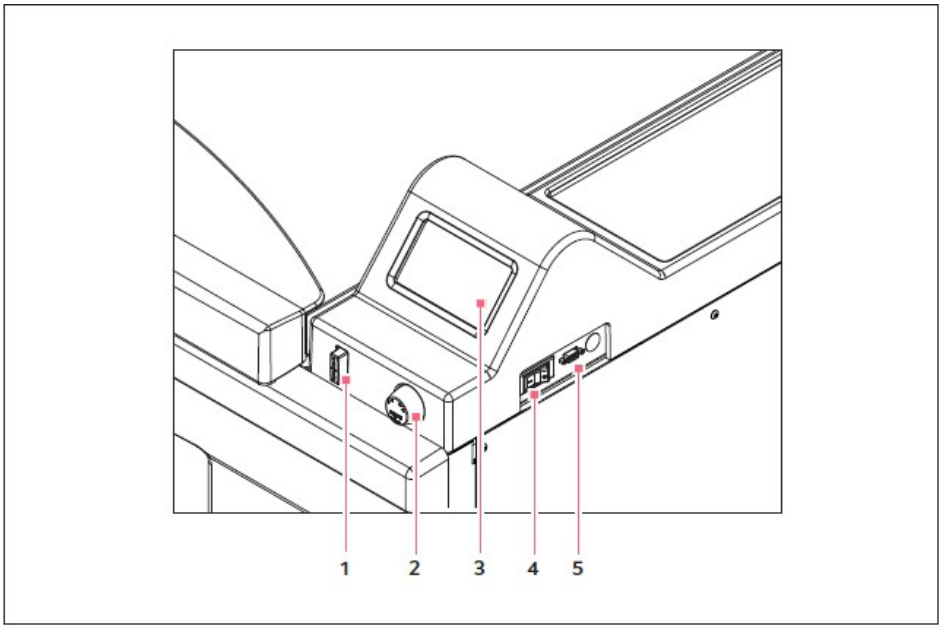
11.6. Attachment 6: Alarm Descriptions

11.7. Attachment 7: 26008-01: Maintenance of the Incubator Shaker Form

## 12. REVISION HISTORY

| Revision Start Date | Version # | Changes | Reasons |
|---|---|---|---|
| 20Sep17 | New | Create new SOP for the use and maintenance of the Innova 43 Incubator. | New SOP. |
| 14Nov20 | 2.0 | 1. Update nomenclature language of References<br>2. added additional guidance and images for use from the User Manual<br>3. Maintenance updated to included: As Needed, Non-Routine<br>4. Separated out each and included more information specific to each type of Incubator Shaker | 1. Reflects new nomenclature<br>2. Clarity and ease of use<br>3. GDP compliance, new form creation, and clarity<br>4. Clarify Innova verses Forma models |
| | | | |

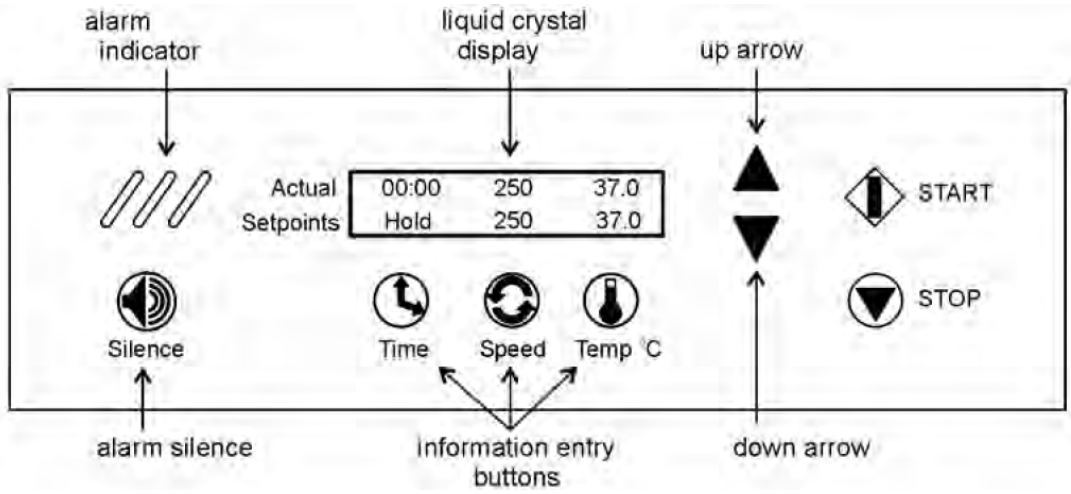
## Attachment 1: Control Panel/Operating Controls for Innova




1 **START/STOP switch (for shaking)**
2 **Control knob**
3 **Display**
4 **Power switch**
5 **RS-232 port**

| | |
|---|---|
| **START/STOP switch** | • Used to start or stop the drive<br>• Activates timer when timed run is desired<br>• If the unit is stopped and restarted, the timer automatically returns to the beginning of a run |
| **Control knob** | • Used to change screens<br>• Used to select operating conditions<br>• Used to change operating conditions |
| **RS-232 port** | • Read out parameter values<br>• Controls operational functions using computer applications<br>• Used to connect to BioCommand SFI |
| **Power switch** | • Circuit breaker<br>• Turns power on and off to the 43/43R Shaker |

**Attachment 2: Control Panel/Operating Controls for Forma**



**Attachment 3: Display Operation for Innova**

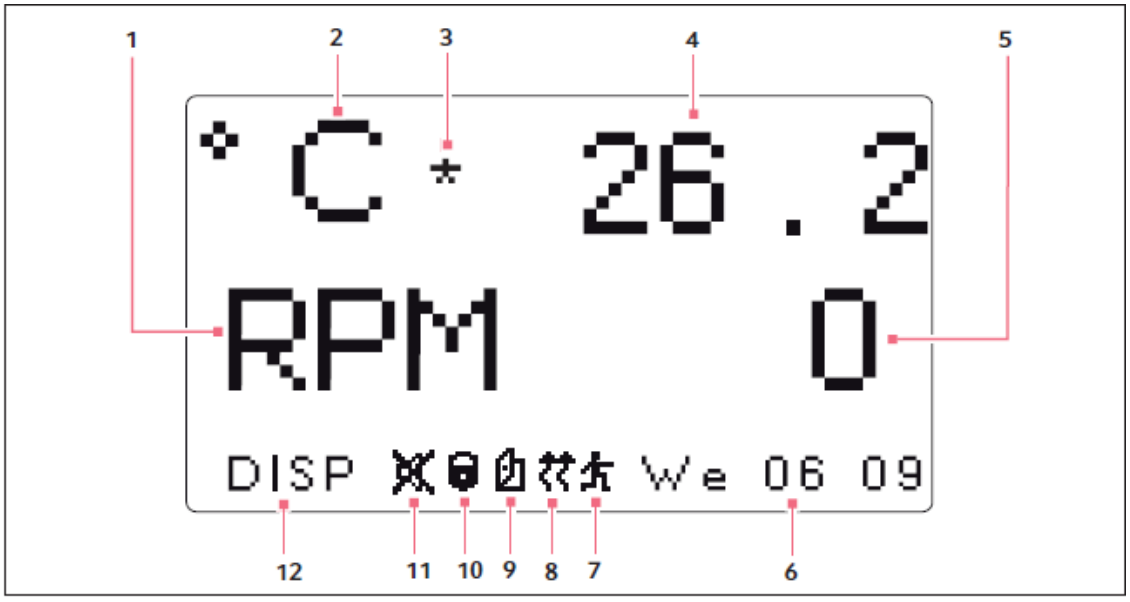



Fig. 5-1: Display screen

1 **Speed**
Parameter

2 **Temperature**
Parameter

3 **Temperature offset**
Icon appears to the right of °C if the temperature offset feature is being used

4 **Temperature**
Temperature parameter value

5 **Speed**
Speed parameter value

6 **Day and 24-hour time**

7 **Program running**
Icon appears when user-defined program is running

8 **Heater on**
Icon appears when heater is on

9 **Lid open**
Icon appears when lid is open

10 **Parameters locked**
Icon appears when the possibility to make manual or programmed parameter changes is disabled (locked), controlled by settings in the *SET* screen

11 **Audible alarms muted**
Icon appears when audible alarms are muted

12 **Screen name**

**Attachment 4: Display Icons for Innova**

| Icon | Explanation | Location |
|---|---|---|
|  | • Appears when audible alarms are muted | • Bottom of screen<br>• Visible in any screen except Program subscreens |
|  | • Appears when the possibility to make manual or programmed parameter changes has been disabled (locked)<br>• Controlled by settings on the *SET* screen | • Bottom of screen<br>• Visible in any screen except Program subscreens |
|  | • Appears when the shaker lid is open | • Bottom of screen<br>• Visible in any screen except Program subscreens |
|  | • Appears when the heater is on | • Bottom of screen<br>• Visible in any screen except Program subscreens |
|  | • Appears when a user-defined program is running | • Bottom of screen<br>• Visible in any screen except Program subscreens |
|  | • Appears to the right of °C if the temperature offset feature is being used | • To the right of °C<br>• Visible whenever the temperature is on screen |

**Attachment 5: Troubleshooting Guide**

| Symptom | Cause | Solution |
|---|---|---|
| Shaker does not run | • Power cord is not plugged in | ▸ Plug in power cord to working mains/power outlet |
| | • Lid is ajar | ▸ Ensure lid is closed firmly |
| | • Defective main board<br>• On/Off switch is broken<br>• Lid switch is broken<br>• Defective display board<br>• Jammed shaking mechanism<br>• Defective motor<br>• Drive belt out of alignment or worn | ▸ Call for service |
| | • Shaking speed has been set to 0 by program running or by computer interface | ▸ Reset shaking speed (see *Changing setpoint values in the summary screen on p. 39)* |
| | • Improperly installed fuse | ▸ Remove and reinstall fuse |
| Shaker runs slowly and/or there is no speed indication | • Improperly installed fuse<br>• Fuse is burned out | ▸ Remove and reinstall fuse |
| | • Incorrect speed calibration | ▸ Recalibrate shaking speed (see *Calibrating speed on p. 44)* |
| | • Defective main board<br>• Defective motor<br>• Drive belt out of alignment or worn | ▸ Call for service |

| Symptom | Cause | Solution |
|---|---|---|
| Shaker does not run at set speed | • Shaker is running in Program mode (look for Run icon in display)<br>• Shaker speed has been changed by RS-232 command or computer interface | ▸ Check display |
| | • Shaker is overloaded and/or you are using baffled flasks | ▸ Remove some contents and balance load |
| | • Defective motor<br>• Drive belt out of alignment or worn | ▸ Call for service |
| | • Speed not calibrated correctly | ▸ Check speed calibration (see *Calibrating speed on p. 44)* |
| Excessive operating noise | • Load out of balance | ▸ Unload all contents and reload |
| | • Loose components in platform, subplatform, and/or drive assembly | ▸ Call for service |
| Shaker does not reach set temperature | • Shaker is running in Program mode (look for Run icon in display)<br>• Shaker speed has been changed by RS-232 command/ computer interface<br>• Line voltage is too low | ▸ Check display |
| | • Heater fuse blown<br>• Compressor fuse blown | ▸ Replace fuse |
| | • Compressor over-pressure switch activated<br>• Defective heater<br>• Defective refrigeration system<br>• Defective heater<br>• Defective refrigeration system | ▸ Call for service |
| | • Ambient temperature too high or too low | ▸ Adjust the room temperature |
| | • Lid is not completely closed (even though Open Lid icon may not appear on display) | ▸ Open and reclose it firmly |
| | • Frequency on line voltage is set incorrectly | ▸ Reset line voltage frequency |
| | • Incorrect temperature indication | ▸ See *Incorrect temperature indication* section of this table |

| Symptom | Cause | Solution |
|---|---|---|
| Incorrect temperature indication | • Temperature Offset has been programmed | ▸ Look for Offset icon in display |
| | • Defective RTD assembly<br>• Defective main board<br>• Defective humidity probe or broken contact | ▸ Call for service |
| Incorrect relative humidity % | • Defective humidity probe<br>• Broken contact | ▸ Call for service |
| Photosynthetic GRO lamp does not work | • Shaker is running in Program mode (look for Run icon in display), and program calls for GRO lamp to be off<br>• GRO lamp mode has been changed by RS-232 command/ computer interface | ▸ Check display |
| | • Bulb is burned out<br>• Fuse is burned out | ▸ Replace |
| | | ▸ Check switch settings<br>▸ Check cable connections<br>▸ Check ballast voltage |
| UV germicidal lamp does not work | • Shaker is running in Program mode (look for Run icon in display), and program calls for UV lamp to be off<br>• UV lamp mode has been changed by RS-232 command/ computer interface | ▸ Check display |
| | • UV lamp is burned out<br>• Fuse is burned out | ▸ Replace |
| | | ▸ Check switch settings<br>▸ Check cable connections<br>▸ Check ballast voltage |

## Attachment 6: Alarm Descriptions

| Indication | Description |
|---|---|
| TEMP | • Indicates that the temperature has deviated more than ±1 °C from setpoint after achieving control temperature range.<br>• After lid is opened, alarm will be disabled for 5 min while chamber recovers to setpoint. |
| RPM | • Indicates that the speed has deviated more than ±5 rpm from setpoint after achieving operating speed setpoint.<br>• After lid is opened, alarm will be disabled for 5 min while chamber recovers to setpoint. |
| POWER | • Indicates that the unit is powering up (both at normal power-up and after power interruption); will flash until the control knob is moved. |
| HRS | • Indicates when timed run is completed. |

## Attachment 7: 26008-01: Maintenance of the Incubator Shaker Form

Frederick National Laboratory for Cancer Research
sponsored by the National Cancer Institute

Vaccine, Immunity and Cancer Directorate
Standard Operating Procedure Form

| | | | |
|---|---|---|---|
| **Form Title:** Maintenance of Incubator Shaker Form | | | |
| **Document ID: 26008-01** | | Version: | DRAFT |
| Associated SOP: 26008 | | Effective Date: | 17Sep21 |
| Supersedes Version: | Draft | **Page 1 of 2** | |

| | | | |
|---|---|---|---|
| Maintenance Year: | | Equipment ID: | HSL_ |

Quarterly Maintenance

| Quarter: | Q1 | Q2 | Q3 | Q4 |
|---|---|---|---|---|
| Primary Disinfectant Lot Number: | | | | |
| Primary Disinfectant Exp Date: | | | | |
| Secondary Disinfectant Lot Number: | | | | |
| Secondary Disinfectant Exp Date: | | | | |
| Performed By/Date: | | | | |
| Reviewed By/Date: | | | | |

Biennial Maintenance (Forma Only)
☐N/A

| | |
|---|---|
| Maintenance Due Date: | |
| Performed By/Date: | |
| Reviewed By/Date: | |

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| Frederick National Laboratory for Cancer Research sponsored by the National Cancer Institute | | Vaccine, Immunity and Cancer Directorate Standard Operating Procedure Form | |
|---|---|---|---|
| **Form Title:** Maintenance of Incubator Shaker Form | | | |
| **Document ID: 26008-01** | | Version: | DRAFT |
| Associated SOP: 26008 | | Effective Date: | 17Sep21 |
| Supersedes Version: | Draft | **Page 2 of 2** | |

As Needed Maintenance: ☐N/A

| Date | Activity Performed | Recorded by/date | Reviewed by/date |
|---|---|---|---|
| | | | |
| ☐N/A | | | |
| ☐N/A | | | |

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