

# Standard Operating Procedure (SOP) for Dragonfly

## 1. PURPOSE:

This SOP outlines the correct usage, maintenance, and shutdown procedures for the Dragonfly dispensing system from SPT Labtech to ensure safe and consistent operation.

## 2. SCOPE:

This SOP applies to all authorized personnel operating the Dragonfly system within the laboratory.

## 3. RESPONSIBILITIES:

- Only trained personnel are permitted to operate the Dragonfly system.
- Operators must adhere strictly to this SOP.
- Maintenance and troubleshooting issues should be reported to the designated laboratory manager.

## 4. EQUIPMENT AND MATERIALS NEEDED:

- Dragonfly system (SPT Labtech)
- Computer with Dragonfly software installed (laptop)
- Microplates (as per experimental requirements)
- Reagents (Prepared in NUSBF but Arnaud/Johan or commercial)
- Personal Protective Equipment (PPE): Lab coat, gloves, and safety glasses

## 5. SAFETY PRECAUTIONS:

- Always wear appropriate personal protective equipment (PPE).
- Ensure the workspace around the Dragonfly system is clean and free of obstructions.
- Handle reagents and samples in accordance with their respective Safety Data Sheets (SDS).

## 6. STARTUP PROCEDURE:

## 6.1. Power on the System

- Inspect the Dragonfly system to ensure it is clean and free of debris.
- Turn on the main power switch on the Dragonfly unit (in front bottom left).
- Wake the laptop.

## 7. OPERATION PROCEDURE:

### 7.1. Set Up the Design (if required)

- Start the Dragonfly Designer software.
- In the design tab, open an existing protocol or create a new one.
- In the left top quadrant add your stock solutions (name, concentrations and pH).
- In the bottom left quadrant select the dispensing patterns.
- In the top right quadrant select the gradient concentration boundaries, the directions horizontal or vertical or select constant.
- In the bottom right quadrant examine that the design is correct.
- To save the design, make a folder with your first name.
- **At this stage you can save the design if you want to be able to re-use it to modify.**
- Click export.
- Choose the volume usually 85 ul and "Calculate Optimization."
- Export the protocol for use with DragonFly software.
- You can also export with alternative formats such as PDF for your own records.
- Close the designer software.

### 7.2. Execute the Protocol (DragonFly)

- Turn on the DragonFly on if not already (otherwise the software goes in simulation mode).
- Start the Dragonfly software (the robot must initialize).
- Open the previously DragonFly .csv file exported from Designer.
- Check if any volume of stock solution is above 4 ml as these will need to be split in 2 or more syringes.
- Select the correct plate type SD-2 is the standard MRC 2-wells crystallization plate.
- Adjust the reservoir volume (usually 85 ul).
- Select "use a mask" only if using viscous solutions such as PEG 20k.
- Navigate to the Setup tab.
- Assemble the syringes and pistons and gently clip them into the required positions on the Dragonfly (a small green square should appear next to the syringe name in the software).
- Remove the metal reservoir frame and place the plastic trays in the appropriate positions.
- Fill the plastic troughs with the required amount of reagent (add ~10% extra volume to account for dead volumes). Do not make air bubbles.
- Slide the reservoir tray back in position.
- Click "Aspirate" to allow the robot to aspirate the solutions into the syringes.
- Check for bubbles in the syringes; if present, click "Purge" and repeat the aspiration process after correcting for missing liquid volume if necessary.

- Place the microplates on the pedestal ensuring they are clean and appropriately labeled.
- Navigate to the run tab and click "Run" to start the dispensing process.
- Click "Remove" in the Dragonfly software.
- Remove and disassemble the syringes, trays, and Mixer pin array, placing them in the large black plastic tray.
- Close the DragonFly software.
- Turn-off the DragonFly.
- Wash all components with DI water at the sink.
- Leave the components to air dry on the stand.

### **7.3. Mix the Plate (MixerOne)**

- Start the MX One Mixer software.
- Place the appropriate frame on the deck (e.g., MRC-2 well should be the default).
- Place the microplate on the deck.
- Attach the 96-pin hedgehog to the Mixer.
- Select the appropriate plate type in the software and run the 2-minute mixing protocol.
- Remove the plate after mixing is complete.