# Micropumps

## Mechanical Testing Protocol – 20 Pts

## ID: MTP-1

**Due Date: 4/6/2020 11:59 PM, Canvas Upload**

**Testing Protocol: – (Micropump Testing MTP-1)**

**Date Written –** 4/4/2020

**Date Revised –** 4/6/2020

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**Testing Protocol Description – (Peristaltic Micropump Testing Protocol)**

This is the testing protocol for an Arduino controlled peristaltic micropump used to pump media through a bioreactor in an incubator. The Arduino will be taking in user inputs to calculate the motor speed. If there is no valid input, the motor will be set to default speed.

**Tools and Equipment**

| # | Tool | Name / # if applicable | Location | Purpose |
|---|---|---|---|---|
| TE1 | Programming Software | Arduino | Computer file | An Arduino code that can takes in user interface to calculate motor speed and execute the pump |
| TE2 | Stepper Motor | NEMA 17 | GulfCoast Robotics | A motor used to rotate the pump |
| TE3 | Stepper Motor Driver | A4988 | GulfCoast Robotics | Drive the stepper motor. Allow for control with simple directions and direction inputs. |
| TE4 | 12V Power Supply | inShareplus 12V LED Strip Power Supply | Amazon | Provides enough power to drive the stepper motor to turn |
| TE5 | 220 µF Electrolytic Capacitor | | Guitar Pedal Parts | Stores electrical energy. |

# 3D Printing – Mechanical Testing Protocol

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## Materials

| ID | Material | Purpose |
|---|---|---|
| MAT1 | 2-mm tubing | To connect to the system and allow for fluids to flow |
| MAT2 | Pushbutton | Start/stop the motor when pushed |
| MAT3 | LED | Indicate if the pump is turned on by flashing |
| MAT4 | PCB | Electrically connect components |
| MAT5 | Nuts, Bolts & Washers | To assemble the pump. |

## Machine Settings

| # | Volumetric Flow Rate (mL/ms) | Tubing Diameter (cm) | Description |
|---|---|---|---|
| 1 | 0.5 | 0.3 | Default setting |
| 2 | 0.8 | 0.5 | Higher testing motor speed |
| 3 | 0.3 | 0.3 | Slower testing motor speed |

## Values to be Recorded

| | Values | Description |
|---|---|---|
| 1 | Volumetric Flow Rate (mL/ms) | User input |
| 2 | Tubing Diameter (cm) | User input |
| 3 | Stepper Delay Value (sec/step) | Calculated value from the flow rate and tubing geometry that sets the speed for the motor |