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| --- | --- |
| **Arduino**  **Mechanical Testing Protocol** | **ID: MTD-1** |

**Prototyping Protocol: – Arduino Micropump Prototype**

**Date Written –** 04/04/2020

**Date Revised –** 04/06/2020

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**Protocol Description – Arduino/Micropump Mechanical Testing**

A microfluidic pump prototype was tested using Arduino INO software for user interface (UI) inputs of flow rate and tubing diameters. File type “micropumpUI.ino” was uploaded to the processor (see in PP-1).

The prototype includes an on/off switch, push button, LED light, stepper motor. The testing was assessed visually and video recorded for verification.

Table 1 below lists the tools and equipment used to perform the mechanical prototype testing.

**Table 1. Tools and Equipment**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **#** | **Tool** | **Name / # if applicable** | **Location** | **Purpose** |
| TE1 | Computer | NA | Design Lab | User Interface |
| TE2 | 3D Printer | Flashforge Creator Pro | Design Lab | Create pump assembly |

Table 2 below provides the list of materials used in addition to tools and equipment.

**Table 2. Materials**

|  |  |  |
| --- | --- | --- |
| **ID** | **Material** | **Purpose** |
| PM16 | (Polylactic Acid (PLA) 1.75mm Hatchbox, Black) | Pump assembly |

Table 3 below provides all machine settings used, and corresponds to table 1.

Table 3 below describes the test settings used to gather recorded values.

**Table 3. Test Settings**

|  |  |  |
| --- | --- | --- |
| **#** | **Test Type** | **Setting** |
| TE1 | Arduino UI Default setting | 2 microliters/minute |
| TE2 | Arduino UI Variable Flow Rate/Tubing diameter | 5 microliters/minute |
| TE3 | LED light test | On |
| TE4 | Arduino code uploaded to microcontroller | Compiled |
| TE5 | On/Off switch and push button functional | On to off |

Table 4 lists all recorded values, and corresponds to the verification matrix (DI/O) found on DCW-1.

**Table 4. Recorded Value**

|  |  |  |  |
| --- | --- | --- | --- |
| **#** | **Task** | **Expected Values** | **Actual (Pass/Fail)** |
| TE1 | Arduino UI Default setting | 2 microliters/minute | Pass |
| TE2 | Arduino UI Default setting | 5 microliters/minute | Pending |
| TE3 | LED light test | Blinking, On | Pass |
| TE4 | Arduino code uploaded to microcontroller | Compilation and upload to arduino | Pass |
| TE5 | On/Off switch and push button functional | On to off | Pass |