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)

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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.

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