Bill of Materials

Must be adjusted according to concept.

Item	Part Description	Supplier	Part #	# Needed	Price Per	Unit	Total Price	Part
	System 1							
1	Loctite Epoxy Adhesive #99393, High-Strength, 1 Ounce Syringe	McMaster	7556A35	1	$5.95	each	$5.95	Adhesive
2	Polyester (PET) Sheet 1/2" Thick, 12" X 12"	McMaster	8597K53	1	$59.29	each	$59.29	Static Chamber
3	Flexible Rubber Grommet MS 35489-77, AN 931-B11-16, 11/16" ID, 1-5/16" OD	McMaster	9307K68	1	$8.22	each	$8.22	Nebulizer Insertion
4	Expandable Grommet ID 5/32" to 13/16" for a 1" Dia Panel Hole, Black	McMaster	4946A2	1	$8.95	each	$8.95	Probe System Insertion
5	3/8" Wide X 26 Yards Long, 1/8" Thick Butyl-Coated PVC Foam Sealing Tape	McMaster	75875A661	1	$12.38	each	$12.38	Air Tight Seal for Static Chamber
6	Draw Latch 304SS, Nonlocking, 7/8" Latch Distance	McMaster	1889A43	2	$5.91	each	$11.82	Static Chamber Lid
	System 2 Concept (Inner Glass Tube)							
1	3/4" x 6" x 6" Polyester Plastic Block	McMaster	7031K21	1	$24.20	each	$24.20	Block to hold System
2	Viton Etp O-Ring AS568A	McMaster	2857T116	1	$4.40	5 pack	$4.40	Probe Insertion
3	Black UHMW Polyethylene Sheet 1/2" Thick, 12" X 12"	McMaster	4296A24	1	$21.04	each	$21.04	Black Plastic Block to custom machine
4	Borosilicate Flat Plate Glass Rectangle, 1/8" Thick, 2" Width X 1" Length	McMaster	8476K321	1	$0.98	each	$4.48	Glass Sheet for window
	System 2 Concept (window)							
1	3/4" x 6" x 6" Polyester Plastic Block	McMaster	7031K21	1	$24.20	each	$24.20	Block to hold System
2	Viton Etp O-Ring AS568A	McMaster	2857T116	1	$4.40	5 pack	$4.40	Glass Window Seal
3	1/2" Black Barbed Tee (3/8" ID)	McMaster	5463K283	1	$6.20/10	each	$6.20	Black Plastic Tee
4	Borosilicate Glass Tube .5" OD X .376" ID, 12" Length	McMaster	8729K37	1	$4.77	each	$4.77	Glass Tube to make a window
	System 3 Push/Pull Concept							
1	Clear PETG Sheet 1/8" Thick, 12" X 12"	McMaster	85815K14	1	$3.93	each	$3.93	Pressure Chamber walls
2	Clear PETG Sheet 1/4" Thick, 12" X 12"	McMaster	85815K16	3	$7.41	each	$22.23	Bases
3	Polyester (PET) Sheet 1/2" Thick, 6" X 6"	McMaster	8597K93	1	$15.92	each	$15.92	Pressure Chamber Lid/Base
4	Clear PETG Tube 2-3/4" OD, 2-1/2" ID	McMaster	9245K57	1	$6.64	per ft	$6.64	Piston
5	Aluminum Barbed Hose Fitting Adapter, 5/16" Hose ID X 1/4" NPT Male	McMaster	5357K34	2	$2.86	each	$5.72	Pressure Chamber to Piston
6	Hard Viton O-Ring AS568A Dash Number 031	McMaster	8297T141	1	$4.00	10 pack	$4.00	Piston
7	Viton Rubber Tubing Soft, 5/16" ID, 7/16" OD, 1/16" Wall, Black	McMaster	5119K44	1	$6.83	per ft	$6.83	Piston to Pressure Chamber
8	Sheet Gasket Assortment Includes 14 Sheets, 6" X 6"	McMaster	9476K12	1	$23.05	pack	$23.05	Gasket material
9	Aluminum (Alloy 6061) 1/4" Thick X 10" Width X 1' Length	McMaster	8975K115	1	$18.75	each	$18.75	piston bracket
10	Clear Cast Acrylic Cube 1" Square	McMaster	8680K26	1	$1.26	each	$1.26	system 2 to pressure chamber bracket
11	Glass-Filled PTFE Sheet 1/4" Thick, 6" X 6"	McMaster	8636K16	2	$21.81	each	$43.62	Cams
12	Draw Latch 304SS, Nonlocking, 27/32" Latch Distance	McMaster	1889A340	2	$4.51	each	$9.02	pressure chamber latches
13	Dow Corning 732 Silicone Adhesive/Sealant 10.3 Ounce Tube, Clear	McMaster	7587A51	1	$17.08	each	$17.08	Silicone sealant
14	Thrd-Form Screw Type B, Pan Head Phillips, 6-20 Thread, 3/16" Length	McMaster	90056A143	1	$6.69	100 pack	$6.69	Screws for latches.
15	Multipurpose Aluminum (Alloy 6061) 2-1/2" Diameter, 1" Long	McMaster	1610T51	1	$7.35	each	$7.35	Piston Head
16	Multipurpose Anodized Aluminum (Alloy 6061) 1/4" Diameter, 1' Length	McMaster	6750K131	1	$3.41	each	$3.41	Push rod and Piston Axle
17	Freescale Pressure Sensor - 20-250 kPa - 20mV/kPa	DigiKey	MPX4250AP	1	$12.40	each	$12.40	Absolute Pressure Sensor
18	NI USB-6008 Low-Cost Multifunction DAQ	National Instruments	779051-01	1	$169	each	$169	DAQ for sensors and motor
19	DC Geared Motor 12VDC	Automation Express	GM8724S018	1	$155.25	each	$155.25	Motor
20	12V Power Supply (40 Watt)	Watt Supply	S-40-12	1	$31.23	each	$31.23	Power Supply for motor
21	Through hole Resistor Pot (2K)	DigiKey	3345P-202-ND	2	$9.54	each	$19.08	For Op Amp Adjustment
22	Op Amp (LM324 quad Op Amp)	Radio Shack	NLM324	1	$1.69	each	$1.69	For Motor Voltage Amplification
	System 3 Spring Concept							
1	Clear PETG Sheet 1/8" Thick, 12" X 12"	McMaster	85815K14	1	$3.93	each	$3.93	Pressure Chamber walls
2	Clear PETG Sheet 1/4" Thick, 12" X 12"	McMaster	85815K16	4	$7.41	each	$29.64	Bases
3	Polyester (PET) Sheet 1/2" Thick, 6" X 6"	McMaster	8597K93	1	$15.92	each	$15.92	Pressure Chamber Lid/Base
4	Clear PETG Tube 2-3/4" OD, 2-1/2" ID	McMaster	9245K57	1	$6.64	per ft	$6.64	Piston
5	Aluminum Barbed Hose Fitting Adapter, 5/16" Hose ID X 1/4" NPT Male	McMaster	5357K34	2	$2.86	each	$5.72	Pressure Chamber to Piston
6	Hard Viton O-Ring AS568A Dash Number 031	McMaster	8297T141	1	$4.00	10 pack	$4.00	Piston
7	Viton Rubber Tubing Soft, 5/16" ID, 7/16" OD, 1/16" Wall, Black	McMaster	5119K44	1	$6.83	per ft	$6.83	Piston to Pressure Chamber
8	Sheet Gasket Assortment Includes 14 Sheets, 6" X 6"	McMaster	9476K12	1	$23.05	pack	$23.05	Gasket material
9	Aluminum (Alloy 6061) 1/4" Thick X 10" Width X 1' Length	McMaster	8975K115	1	$18.75	each	$18.75	piston bracket
10	Clear Cast Acrylic Cube 1" Square	McMaster	8680K26	1	$1.26	each	$1.26	system 2 to pressure chamber bracket
11	Glass-Filled PTFE Sheet 1/4" Thick, 6" X 6"	McMaster	8636K16	2	$21.81	each	$43.62	Cams
12	Draw Latch 304SS, Nonlocking, 27/32" Latch Distance	McMaster	1889A340	2	$4.51	each	$9.02	pressure chamber latches
13	Dow Corning 732 Silicone Adhesive/Sealant 10.3 Ounce Tube, Clear	McMaster	7587A51	1	$17.08	each	$17.08	Silicone sealant
14	Thrd-Form Screw Type B, Pan Head Phillips, 6-20 Thread, 3/16" Length	McMaster	90056A143	1	$6.69	100 pack	$6.69	Screws for latches.
15	Multipurpose Aluminum (Alloy 6061) 2-1/2" Diameter, 1" Long	McMaster	1610T51	1	$7.35	each	$7.35	Piston Head
16	Multipurpose Anodized Aluminum (Alloy 6061) 1/4" Diameter, 1' Length	McMaster	6750K131	1	$3.41	each	$3.41	Push rod and Piston Axle
17	Multipurpose Anodized Aluminum (Alloy 6061) 1/8" Diameter, 1' Length	McMaster	6750K111	2	$1.76	each	$3.52	Piston Guides
18	Compression Spring 12in length, OD 0.375in…	Grainger	1NBW9	1	$4.69	3 pack	$4.69	Cam return
19	Steel Extension Spring 6" Length, 47/64" OD, .062" Wire	McMaster	9654K276	2	$6.50	each	$13.00	Cam return
20	Nylon Eyebolt, 6-32 Thread, 1/4" Eye ID, 3/4" Shank, 5/8" L Thread	McMaster	9686T71	1	$5.67	25 pack	$5.67	Spring Retention
21	Freescale Pressure Sensor - 20-250 kPa - 20mV/kPa	DigiKey	MPX4250AP	1	$12.40	each	$12.40	Absolute Pressure Sensor
22	NI USB-6008 Low-Cost Multifunction DAQ	National Instruments	779051-01	1	$169	each	$169	DAQ for sensors and motor
23	DC Geared Motor 12VDC	Automation Express	GM8724S018	1	$155.25	each	$155.25	Motor
24	12V Power Supply (40 Watt)	Watt Supply	S-40-12	1	$31.23	each	$31.23	Power Supply for motor
25	Through hole Resistor Pot (2K)	DigiKey	3345P-202-ND	2	$9.54	each	$19.08	For Op Amp Adjustment
26	Op Amp (LM324 quad Op Amp)	Radio Shack	NLM324	1	$1.69	each	$1.69	For Motor Voltage Amplification

*Not Included: Nebulizer, Flow meter, Temperature control

Bill of Materials

Must be adjusted according to concept.

Item	Part Description	Supplier	Part #	# Needed	Price Per	Unit	Total Price	Part
	System 1							
1	Loctite Epoxy Adhesive #99393, High-Strength, 1 Ounce Syringe	McMaster	7556A35	1	$5.95	each	$5.95	Adhesive
2	Polyester (PET) Sheet 1/2" Thick, 12" X 12"	McMaster	8597K53	1	$59.29	each	$59.29	Static Chamber
3	Flexible Rubber Grommet MS 35489-77, AN 931-B11-16, 11/16" ID, 1-5/16" OD	McMaster	9307K68	1	$8.22	each	$8.22	Nebulizer Insertion
4	Expandable Grommet ID 5/32" to 13/16" for a 1" Dia Panel Hole, Black	McMaster	4946A2	1	$8.95	each	$8.95	Probe System Insertion
5	3/8" Wide X 26 Yards Long, 1/8" Thick Butyl-Coated PVC Foam Sealing Tape	McMaster	75875A661	1	$12.38	each	$12.38	Air Tight Seal for Static Chamber
6	Draw Latch 304SS, Nonlocking, 7/8" Latch Distance	McMaster	1889A43	2	$5.91	each	$11.82	Static Chamber Lid
	System 2 Concept (window)							
1	3/4" x 6" x 6" Polyester Plastic Block	McMaster	7031K21	1	$24.20	each	$24.20	Block to hold System
2	Viton Etp O-Ring AS568A	McMaster	2857T116	1	$4.40	5 pack	$4.40	Glass Window Seal
3	1/2" Black Barbed Tee (3/8" ID)	McMaster	5463K283	1	$6.20/10	each	$6.20	Black Plastic Tee
4	Borosilicate Glass Tube .5" OD X .376" ID, 12" Length	McMaster	8729K37	1	$4.77	each	$4.77	Glass Tube to make a window
	System 3 Push/Pull Concept							
1	Clear PETG Sheet 1/8" Thick, 12" X 12"	McMaster	85815K14	1	$3.93	each	$3.93	Pressure Chamber walls
2	Clear PETG Sheet 1/4" Thick, 12" X 12"	McMaster	85815K16	3	$7.41	each	$22.23	Bases
3	Polyester (PET) Sheet 1/2" Thick, 6" X 6"	McMaster	8597K93	1	$15.92	each	$15.92	Pressure Chamber Lid/Base
4	Clear PETG Tube 2-3/4" OD, 2-1/2" ID	McMaster	9245K57	1	$6.64	per ft	$6.64	Piston
5	Aluminum Barbed Hose Fitting Adapter, 5/16" Hose ID X 1/4" NPT Male	McMaster	5357K34	2	$2.86	each	$5.72	Pressure Chamber to Piston
6	Hard Viton O-Ring AS568A Dash Number 031	McMaster	8297T141	1	$4.00	10 pack	$4.00	Piston
7	Viton Rubber Tubing Soft, 5/16" ID, 7/16" OD, 1/16" Wall, Black	McMaster	5119K44	1	$6.83	per ft	$6.83	Piston to Pressure Chamber
8	Sheet Gasket Assortment Includes 14 Sheets, 6" X 6"	McMaster	9476K12	1	$23.05	pack	$23.05	Gasket material
9	Aluminum (Alloy 6061) 1/4" Thick X 10" Width X 1' Length	McMaster	8975K115	1	$18.75	each	$18.75	piston bracket
10	Clear Cast Acrylic Cube 1" Square	McMaster	8680K26	1	$1.26	each	$1.26	system 2 to pressure chamber bracket
11	Glass-Filled PTFE Sheet 1/4" Thick, 6" X 6"	McMaster	8636K16	2	$21.81	each	$43.62	Cams
12	Draw Latch 304SS, Nonlocking, 27/32" Latch Distance	McMaster	1889A340	2	$4.51	each	$9.02	pressure chamber latches
13	Dow Corning 732 Silicone Adhesive/Sealant 10.3 Ounce Tube, Clear	McMaster	7587A51	1	$17.08	each	$17.08	Silicone sealant
14	Thrd-Form Screw Type B, Pan Head Phillips, 6-20 Thread, 3/16" Length	McMaster	90056A143	1	$6.69	100 pack	$6.69	Screws for latches.
15	Multipurpose Aluminum (Alloy 6061) 2-1/2" Diameter, 1" Long	McMaster	1610T51	1	$7.35	each	$7.35	Piston Head
16	Multipurpose Anodized Aluminum (Alloy 6061) 1/4" Diameter, 1' Length	McMaster	6750K131	1	$3.41	each	$3.41	Push rod and Piston Axle
17	Freescale Pressure Sensor - 20-250 kPa - 20mV/kPa	DigiKey	MPX4250AP	1	$12.40	each	$12.40	Absolute Pressure Sensor
18	NI USB-6008 Low-Cost Multifunction DAQ	National Instruments	779051-01	1	$169	each	$169	DAQ for sensors and motor
19	DC Geared Motor 12VDC	Automation Express	GM8724S018	1	$155.25	each	$155.25	Motor
20	12V Power Supply (40 Watt)	Watt Supply	S-40-12	1	$31.23	each	$31.23	Power Supply for motor
21	Through hole Resistor Pot (2K)	DigiKey	3345P-202-ND	2	$9.54	each	$19.08	For Op Amp Adjustment
22	Op Amp (LM324 quad Op Amp)	Radio Shack	NLM324	1	$1.69	each	$1.69	For Motor Voltage Amplification

Total Cost	**$730.33**
McMaster	$341.68
Grainger	$0.00
DigiKey	$31.48
WattSupply	$31.23
NI	$169
Automation Express	$155.25
Radio Shack	$1.69

Bill of Materials

Must be adjusted according to concept.

Item	Part Description	Supplier	Part #	# Needed	Price Per	Unit	Total Price	Part
	System 1							
1	Loctite Epoxy Adhesive #99393, High-Strength, 1 Ounce Syringe	McMaster	7556A35	1	$5.95	each	$5.95	Adhesive
2	Polyester (PET) Sheet 1/2" Thick, 12" X 12"	McMaster	8597K53	1	$59.29	each	$59.29	Static Chamber
3	Flexible Rubber Grommet MS 35489-77, AN 931-B11-16, 11/16" ID, 1-5/16" OD	McMaster	9307K68	1	$8.22	each	$8.22	Nebulizer Insertion
4	Expandable Grommet ID 5/32" to 13/16" for a 1" Dia Panel Hole, Black	McMaster	4946A2	1	$8.95	each	$8.95	Probe System Insertion
5	3/8" Wide X 26 Yards Long, 1/8" Thick Butyl-Coated PVC Foam Sealing Tape	McMaster	75875A661	1	$12.38	each	$12.38	Air Tight Seal for Static Chamber
6	Draw Latch 304SS, Nonlocking, 7/8" Latch Distance	McMaster	1889A43	2	$5.91	each	$11.82	Static Chamber Lid
	System 2 Concept (Custom Milled block)							
1	3/4" x 6" x 6" Polyester Plastic Block	McMaster	7031K21	1	$24.20	each	$24.20	Block to hold System
2	Viton Etp O-Ring AS568A	McMaster	2857T116	1	$4.40	5 pack	$4.40	Probe Insertion
3	Black UHMW Polyethylene Sheet 1/2" Thick, 12" X 12"	McMaster	4296A24	1	$21.04	each	$21.04	Black Plastic Block to custom machine
4	Borosilicate Flat Plate Glass Rectangle, 1/8" Thick, 2" Width X 1" Length	McMaster	8476K321	1	$0.98	each	$4.48	Glass Sheet for window
	System 3 Push/Pull Concept							
1	Clear PETG Sheet 1/8" Thick, 12" X 12"	McMaster	85815K14	1	$3.93	each	$3.93	Pressure Chamber walls
2	Clear PETG Sheet 1/4" Thick, 12" X 12"	McMaster	85815K16	3	$7.41	each	$22.23	Bases
3	Polyester (PET) Sheet 1/2" Thick, 6" X 6"	McMaster	8597K93	1	$15.92	each	$15.92	Pressure Chamber Lid/Base
4	Clear PETG Tube 2-3/4" OD, 2-1/2" ID	McMaster	9245K57	1	$6.64	per ft	$6.64	Piston
5	Aluminum Barbed Hose Fitting Adapter, 5/16" Hose ID X 1/4" NPT Male	McMaster	5357K34	2	$2.86	each	$5.72	Pressure Chamber to Piston
6	Hard Viton O-Ring AS568A Dash Number 031	McMaster	8297T141	1	$4.00	10 pack	$4.00	Piston
7	Viton Rubber Tubing Soft, 5/16" ID, 7/16" OD, 1/16" Wall, Black	McMaster	5119K44	1	$6.83	per ft	$6.83	Piston to Pressure Chamber
8	Sheet Gasket Assortment Includes 14 Sheets, 6" X 6"	McMaster	9476K12	1	$23.05	pack	$23.05	Gasket material
9	Aluminum (Alloy 6061) 1/4" Thick X 10" Width X 1' Length	McMaster	8975K115	1	$18.75	each	$18.75	piston bracket
10	Clear Cast Acrylic Cube 1" Square	McMaster	8680K26	1	$1.26	each	$1.26	system 2 to pressure chamber bracket
11	Glass-Filled PTFE Sheet 1/4" Thick, 6" X 6"	McMaster	8636K16	2	$21.81	each	$43.62	Cams
12	Draw Latch 304SS, Nonlocking, 27/32" Latch Distance	McMaster	1889A340	2	$4.51	each	$9.02	pressure chamber latches
13	Dow Corning 732 Silicone Adhesive/Sealant 10.3 Ounce Tube, Clear	McMaster	7587A51	1	$17.08	each	$17.08	Silicone sealant
14	Thrd-Form Screw Type B, Pan Head Phillips, 6-20 Thread, 3/16" Length	McMaster	90056A143	1	$6.69	100 pack	$6.69	Screws for latches.
15	Multipurpose Aluminum (Alloy 6061) 2-1/2" Diameter, 1" Long	McMaster	1610T51	1	$7.35	each	$7.35	Piston Head
16	Multipurpose Anodized Aluminum (Alloy 6061) 1/4" Diameter, 1' Length	McMaster	6750K131	1	$3.41	each	$3.41	Push rod and Piston Axle
17	Freescale Pressure Sensor - 20-250 kPa - 20mV/kPa	DigiKey	MPX4250AP	1	$12.40	each	$12.40	Absolute Pressure Sensor
18	NI USB-6008 Low-Cost Multifunction DAQ	National Instruments	779051-01	1	$169	each	$169	DAQ for sensors and motor
19	DC Geared Motor 12VDC	Automation Express	GM8724S018	1	$155.25	each	$155.25	Motor
20	12V Power Supply (40 Watt)	Watt Supply	S-40-12	1	$31.23	each	$31.23	Power Supply for motor
21	Through hole Resistor Pot (2K)	DigiKey	3345P-202-N	2	$9.54	each	$19.08	For Op Amp Adjustment
22	Op Amp (LM324 quad Op Amp)	Radio Shack	NLM324	1	$1.69	each	$1.69	For Motor Voltage Amplification

Total Cost	**$744.88**
McMaster	$356.23
Grainger	$0.00
DigiKey	$31.48
WattSupply	$31.23
NI	$169
Automation Express	$155.25
Radio Shack	$1.69

Bill of Materials

Must be adjusted according to concept.

Item	Part Description	Supplier	Part #	# Needed	Price Per	Unit	Total Price	Part
	System 1							
1	Loctite Epoxy Adhesive #99393, High-Strength, 1 Ounce Syringe	McMaster	7556A35	1	$5.95	each	$5.95	Adhesive
2	Polyester (PET) Sheet 1/2" Thick, 12" X 12"	McMaster	8597K53	1	$59.29	each	$59.29	Static Chamber
3	Flexible Rubber Grommet MS 35489-77, AN 931-B11-16, 11/16" ID, 1-5/16" OD	McMaster	9307K68	1	$8.22	each	$8.22	Nebulizer Insertion
4	Expandable Grommet ID 5/32" to 13/16" for a 1" Dia Panel Hole, Black	McMaster	4946A2	1	$8.95	each	$8.95	Probe System Insertion
5	3/8" Wide X 26 Yards Long, 1/8" Thick Butyl-Coated PVC Foam Sealing Tape	McMaster	75875A661	1	$12.38	each	$12.38	Air Tight Seal for Static Chamber
6	Draw Latch 304SS, Nonlocking, 7/8" Latch Distance	McMaster	1889A43	2	$5.91	each	$11.82	Static Chamber Lid
	System 2 Concept (Custom Milled block)							
1	3/4" x 6" x 6" Polyester Plastic Block	McMaster	7031K21	1	$24.20	each	$24.20	Block to hold System
2	Viton Etp O-Ring AS568A	McMaster	2857T116	1	$4.40	5 pack	$4.40	Probe Insertion
3	Black UHMW Polyethylene Sheet 1/2" Thick, 12" X 12"	McMaster	4296A24	1	$21.04	each	$21.04	Black Plastic Block to custom machine
4	Borosilicate Flat Plate Glass Rectangle, 1/8" Thick, 2" Width X 1" Length	McMaster	8476K321	1	$0.98	each	$4.48	Glass Sheet for window
	System 3 Spring Concept							
1	Clear PETG Sheet 1/8" Thick, 12" X 12"	McMaster	85815K14	1	$3.93	each	$3.93	Pressure Chamber walls
2	Clear PETG Sheet 1/4" Thick, 12" X 12"	McMaster	85815K16	4	$7.41	each	$29.64	Bases
3	Polyester (PET) Sheet 1/2" Thick, 6" X 6"	McMaster	8597K93	1	$15.92	each	$15.92	Pressure Chamber Lid/Base
4	Clear PETG Tube 2-3/4" OD, 2-1/2" ID	McMaster	9245K57	1	$6.64	per ft	$6.64	Piston
5	Aluminum Barbed Hose Fitting Adapter, 5/16" Hose ID X 1/4" NPT Male	McMaster	5357K34	2	$2.86	each	$5.72	Pressure Chamber to Piston
6	Hard Viton O-Ring AS568A Dash Number 031	McMaster	8297T141	1	$4.00	10 pack	$4.00	Piston
7	Viton Rubber Tubing Soft, 5/16" ID, 7/16" OD, 1/16" Wall, Black	McMaster	5119K44	1	$6.83	per ft	$6.83	Piston to Pressure Chamber
8	Sheet Gasket Assortment Includes 14 Sheets, 6" X 6"	McMaster	9476K12	1	$23.05	pack	$23.05	Gasket material
9	Aluminum (Alloy 6061) 1/4" Thick X 10" Width X 1' Length	McMaster	8975K115	1	$18.75	each	$18.75	piston bracket
10	Clear Cast Acrylic Cube 1" Square	McMaster	8680K26	1	$1.26	each	$1.26	system 2 to pressure chamber bracket
11	Glass-Filled PTFE Sheet 1/4" Thick, 6" X 6"	McMaster	8636K16	2	$21.81	each	$43.62	Cams
12	Draw Latch 304SS, Nonlocking, 27/32" Latch Distance	McMaster	1889A340	2	$4.51	each	$9.02	pressure chamber latches
13	Dow Corning 732 Silicone Adhesive/Sealant 10.3 Ounce Tube, Clear	McMaster	7587A51	1	$17.08	each	$17.08	Silicone sealant
14	Thrd-Form Screw Type B, Pan Head Phillips, 6-20 Thread, 3/16" Length	McMaster	90056A143	1	$6.69	100 pack	$6.69	Screws for latches.
15	Multipurpose Aluminum (Alloy 6061) 2-1/2" Diameter, 1" Long	McMaster	1610T51	1	$7.35	each	$7.35	Piston Head
16	Multipurpose Anodized Aluminum (Alloy 6061) 1/4" Diameter, 1' Length	McMaster	6750K131	1	$3.41	each	$3.41	Push rod and Piston Axle
17	Multipurpose Anodized Aluminum (Alloy 6061) 1/8" Diameter, 1' Length	McMaster	6750K111	2	$1.76	each	$3.52	Piston Guides
18	Compression Spring 12in length, OD 0.375in…	Grainger	1NBW9	1	$4.69	3 pack	$4.69	Cam return
19	Steel Extension Spring 6" Length, 47/64" OD, .062" Wire	McMaster	9654K276	2	$6.50	each	$13.00	Cam return
20	Nylon Eyebolt, 6-32 Thread, 1/4" Eye ID, 3/4" Shank, 5/8" L Thread	McMaster	9686T71	1	$5.67	25 pack	$5.67	Spring Retention
21	Freescale Pressure Sensor - 20-250 kPa - 20mV/kPa	DigiKey	MPX4250AP	1	$12.40	each	$12.40	Absolute Pressure Sensor
22	NI USB-6008 Low-Cost Multifunction DAQ	National Instruments	779051-01	1	$169	each	$169	DAQ for sensors and motor
23	DC Geared Motor 12VDC	Automation Express	GM8724S01E	1	$155.25	each	$155.25	Motor
24	12V Power Supply (40 Watt)	Watt Supply	S-40-12	1	$31.23	each	$31.23	Power Supply for motor
25	Through hole Resistor Pot (2K)	DigiKey	3345P-202-N	2	$9.54	each	$19.08	For Op Amp Adjustment
26	Op Amp (LM324 quad Op Amp)	Radio Shack	NLM324	1	$1.69	each	$1.69	For Motor Voltage Amplification

Total Cost	**$779.17**
McMaster	$385.83
Grainger	$4.69
DigiKey	$31.48
WattSupply	$31.23
NI	$169
Automation Express	$155.25
Radio Shack	$1.69

Bill of Materials

Must be adjusted according to concept.

Item	Part Description	Supplier	Part #	# Needed	Price Per	Unit	Total Price	Part
	System 1							
1	Loctite Epoxy Adhesive #99393, High-Strength, 1 Ounce Syringe	McMaster	7556A35	1	$5.95	each	$5.95	Adhesive
2	Polyester (PET) Sheet 1/2" Thick, 12" X 12"	McMaster	8597K53	1	$59.29	each	$59.29	Static Chamber
3	Flexible Rubber Grommet MS 35489-77, AN 931-B11-16, 11/16" ID, 1-5/16" OD	McMaster	9307K68	1	$8.22	each	$8.22	Nebulizer Insertion
4	Expandable Grommet ID 5/32" to 13/16" for a 1" Dia Panel Hole, Black	McMaster	4946A2	1	$8.95	each	$8.95	Probe System Insertion
5	3/8" Wide X 26 Yards Long, 1/8" Thick Butyl-Coated PVC Foam Sealing Tape	McMaster	75875A661	1	$12.38	each	$12.38	Air Tight Seal for Static Chamber
6	Draw Latch 304SS, Nonlocking, 7/8" Latch Distance	McMaster	1889A43	2	$5.91	each	$11.82	Static Chamber Lid
	System 2 Concept (window)							
1	3/4" x 6" x 6" Polyester Plastic Block	McMaster	7031K21	1	$24.20	each	$24.20	Block to hold System
2	Viton Etp O-Ring AS568A	McMaster	2857T116	1	$4.40	5 pack	$4.40	Glass Window Seal
3	1/2" Black Barbed Tee (3/8" ID)	McMaster	5463K283	1	$6.20/10	each	$6.20	Black Plastic Tee
4	Borosilicate Glass Tube .5" OD X .376" ID, 12" Length	McMaster	8729K37	1	$4.77	each	$4.77	Glass Tube to make a window
	System 3 Spring Concept							
1	Clear PETG Sheet 1/8" Thick, 12" X 12"	McMaster	85815K14	1	$3.93	each	$3.93	Pressure Chamber walls
2	Clear PETG Sheet 1/4" Thick, 12" X 12"	McMaster	85815K16	4	$7.41	each	$29.64	Bases
3	Polyester (PET) Sheet 1/2" Thick, 6" X 6"	McMaster	8597K93	1	$15.92	each	$15.92	Pressure Chamber Lid/Base
4	Clear PETG Tube 2-3/4" OD, 2-1/2" ID	McMaster	9245K57	1	$6.64	per ft	$6.64	Piston
5	Aluminum Barbed Hose Fitting Adapter, 5/16" Hose ID X 1/4" NPT Male	McMaster	5357K34	2	$2.86	each	$5.72	Pressure Chamber to Piston
6	Hard Viton O-Ring AS568A Dash Number 031	McMaster	8297T141	1	$4.00	10 pack	$4.00	Piston
7	Viton Rubber Tubing Soft, 5/16" ID, 7/16" OD, 1/16" Wall, Black	McMaster	5119K44	1	$6.83	per ft	$6.83	Piston to Pressure Chamber
8	Sheet Gasket Assortment Includes 14 Sheets, 6" X 6"	McMaster	9476K12	1	$23.05	pack	$23.05	Gasket material
9	Aluminum (Alloy 6061) 1/4" Thick X 10" Width X 1' Length	McMaster	8975K115	1	$18.75	each	$18.75	piston bracket
10	Clear Cast Acrylic Cube 1" Square	McMaster	8680K26	1	$1.26	each	$1.26	system 2 to pressure chamber bracket
11	Glass-Filled PTFE Sheet 1/4" Thick, 6" X 6"	McMaster	8636K16	2	$21.81	each	$43.62	Cams
12	Draw Latch 304SS, Nonlocking, 27/32" Latch Distance	McMaster	1889A340	2	$4.51	each	$9.02	pressure chamber latches
13	Dow Corning 732 Silicone Adhesive/Sealant 10.3 Ounce Tube, Clear	McMaster	7587A51	1	$17.08	each	$17.08	Silicone sealant
14	Thrd-Form Screw Type B, Pan Head Phillips, 6-20 Thread, 3/16" Length	McMaster	90056A143	1	$6.69	100 pack	$6.69	Screws for latches.
15	Multipurpose Aluminum (Alloy 6061) 2-1/2" Diameter, 1" Long	McMaster	1610T51	1	$7.35	each	$7.35	Piston Head
16	Multipurpose Anodized Aluminum (Alloy 6061) 1/4" Diameter, 1' Length	McMaster	6750K131	1	$3.41	each	$3.41	Push rod and Piston Axle
17	Multipurpose Anodized Aluminum (Alloy 6061) 1/8" Diameter, 1' Length	McMaster	6750K111	2	$1.76	each	$3.52	Piston Guides
18	Compression Spring 12in length, OD 0.375in…	Grainger	1NBW9	1	$4.69	3 pack	$4.69	Cam return
19	Steel Extension Spring 6" Length, 47/64" OD, .062" Wire	McMaster	9654K276	2	$6.50	each	$13.00	Cam return
20	Nylon Eyebolt, 6-32 Thread, 1/4" Eye ID, 3/4" Shank, 5/8" L Thread	McMaster	9686T71	1	$5.67	25 pack	$5.67	Spring Retention
21	Freescale Pressure Sensor - 20-250 kPa - 20mV/kPa	DigiKey	MPX4250AP	1	$12.40	each	$12.40	Absolute Pressure Sensor
22	NI USB-6008 Low-Cost Multifunction DAQ	National Instruments	779051-01	1	$169	each	$169	DAQ for sensors and motor
23	DC Geared Motor 12VDC	Automation Express	GM8724S018	1	$155.25	each	$155.25	Motor
24	12V Power Supply (40 Watt)	Watt Supply	S-40-12	1	$31.23	each	$31.23	Power Supply for motor
25	Through hole Resistor Pot (2K)	DigiKey	3345P-202-NI	2	$9.54	each	$19.08	For Op Amp Adjustment
26	Op Amp (LM324 quad Op Amp)	Radio Shack	NLM324	1	$1.69	each	$1.69	For Motor Voltage Amplification

Total Cost	**$764.62**
McMaster	$371.28
Grainger	$4.69
DigiKey	$31.48
WattSupply	$31.23
NI	$169
Automation Express	$155.25
Radio Shack	$1.69