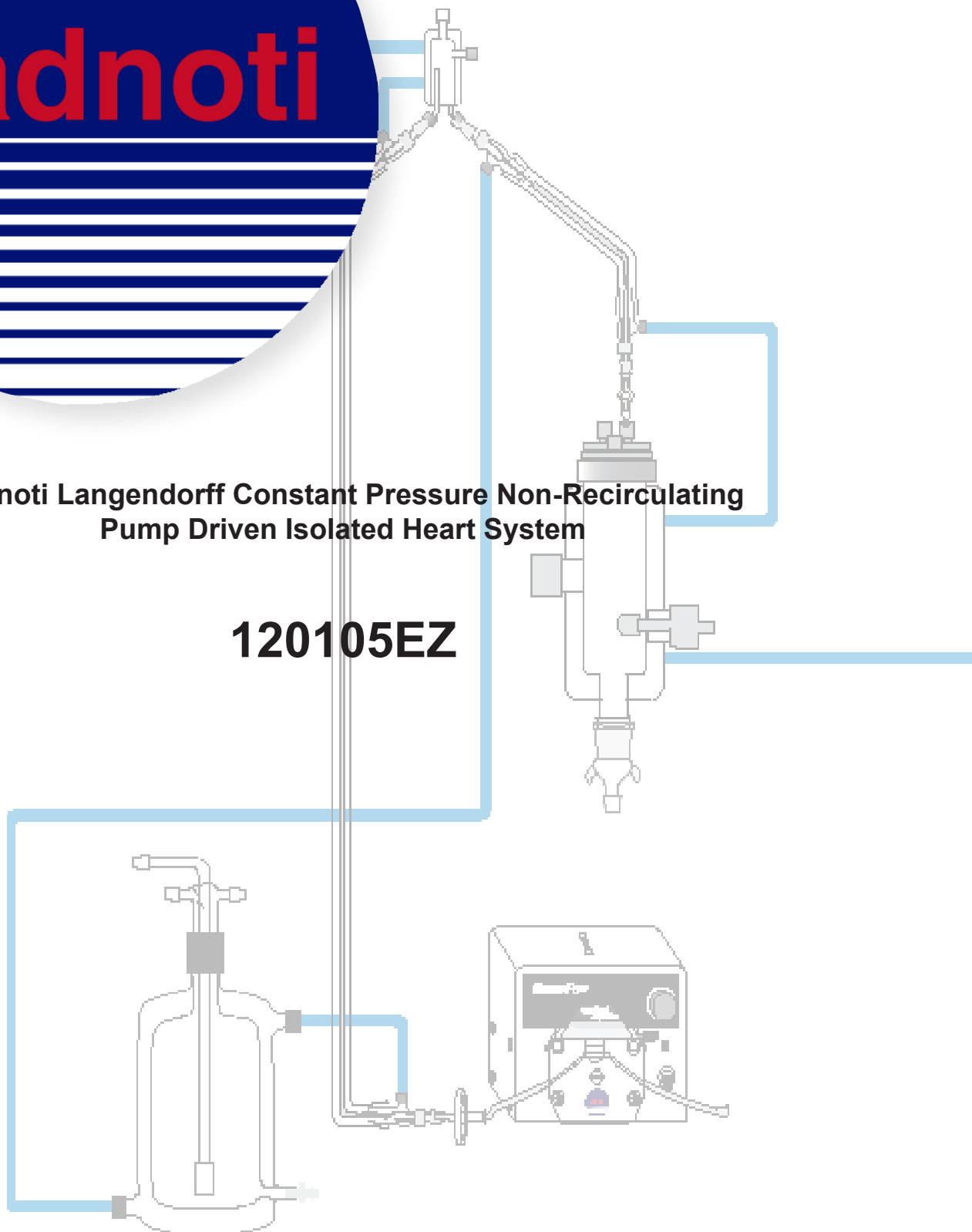


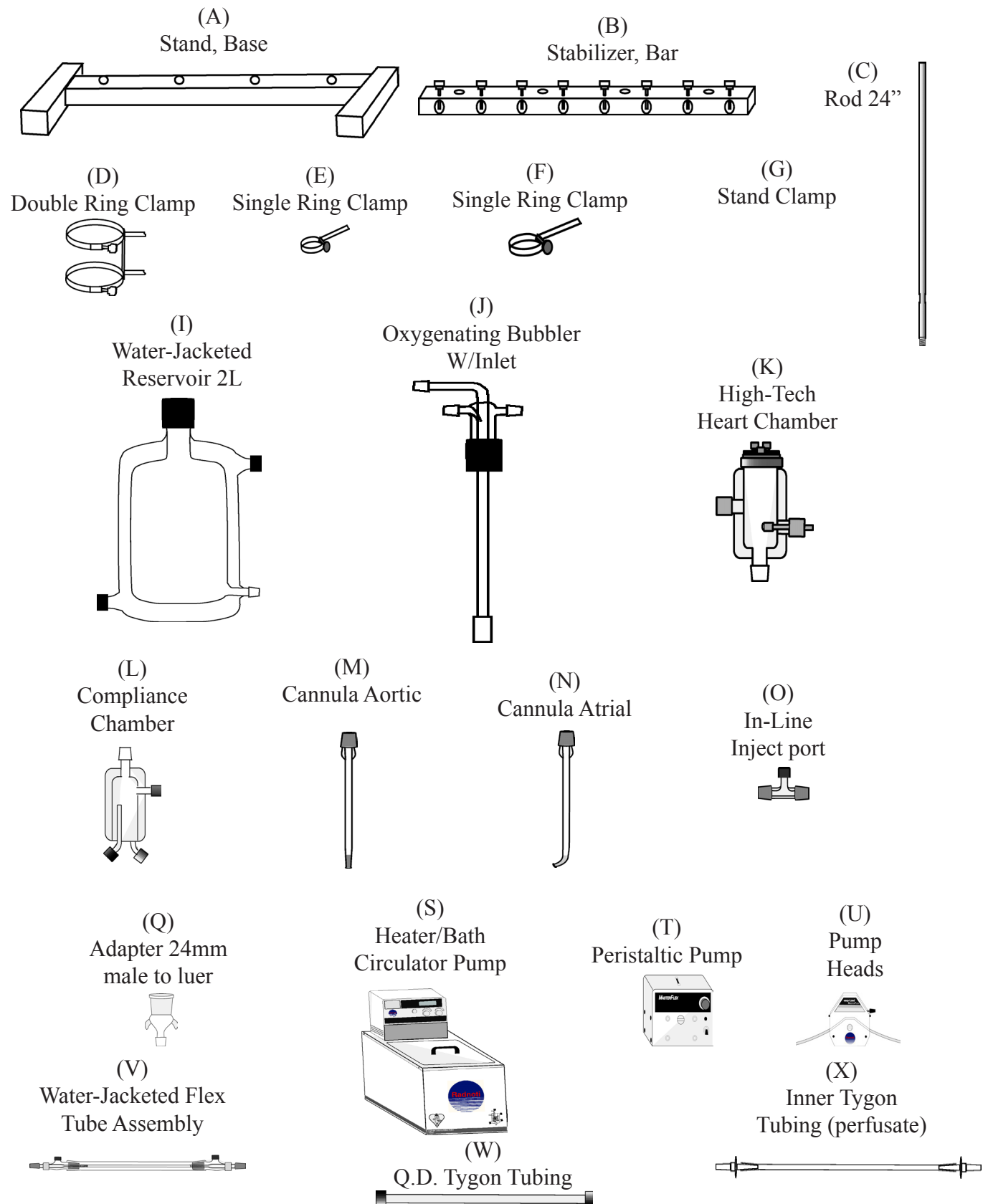


**Radnoti Langendorff Constant Pressure Non-Recirculating
Pump Driven Isolated Heart System**

120105EZ



	Description	Qty	Part #
A	Base only, for 4-bar stand	1	159950-B4
B	Stabilizer Bar only, for 4-Bar stand	2	159950-C4
C	Rod 24" Long Stainless Steel	5	159950-24
D	Double Ring Clamp for Reservoir	1	120141-2
E	Single Ring Clamp (Bubble Trap)	1	120149-RC
F	Single Ring Clamp (Hi-Tech Heart Chamber)	1	159593-Q
G	Stand Clamps (Large)	2	159952-10
H	Stand Clamps (Medium)	3	159952-11
I	Water-Jacketed Reservoir (2 Liter)	1	120142-2
J	Oxygenating Bubbler for 2 Liter W/inlet Port	1	140143-2
K	High-Tech Heart Chamber (Small)	1	140150
L	Bubble Trap (Compliance) Q.D. Ports	1	130149
M	Cannula Aortic (set of 5 for small HTHC)	1	140153-OST
N	Cannula Atrial (set of 5 for small HTHC)	1	140154-OST
O	In-Line Injection Port	1	120151
P	Filling Funnel	1	120140-A
Q	Adapter 24mm Male to Luer	1	140132
R	Heater/Bath Circulator Pump	1	170051
S	Peristaltic Pump	1	170100A
T	Easy Load Pump Head	1	170110
U	Water-Jacketed Flex Tube Assembly		
	36"	1	130155-36
	72"	1	130155-72
V	Q.D. Tygon Tubing (Water-Jacketed)		
	10"	1	120159-10
	20"	1	120159-20
	35"	2	120159-35
	60"	2	120159-60
W	Inner Tubing (Perfusate,gas)		
	30"	1	120157-30
	50"	1	120157-50
X	Silicone Tubing (Drain, overflow)		
	30"	1	
	50"	1	



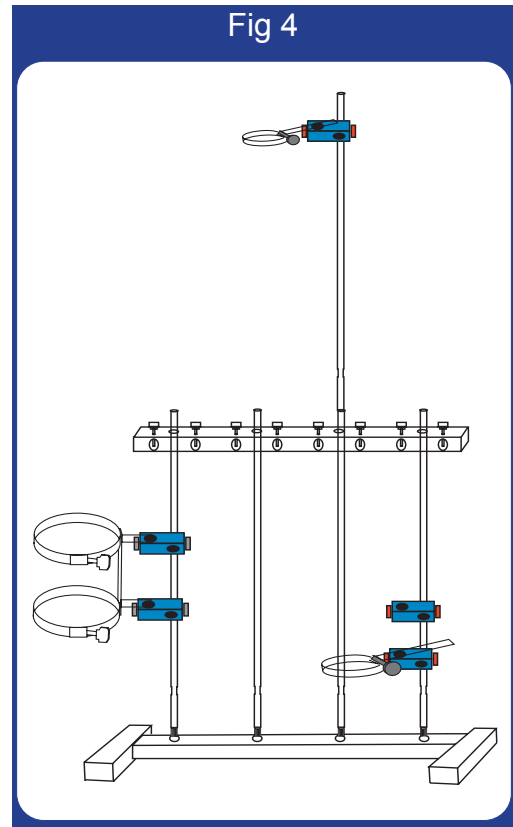
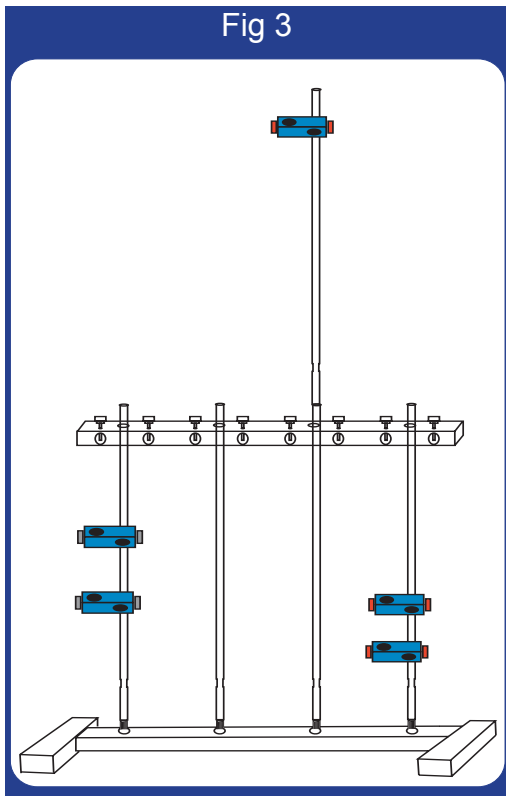
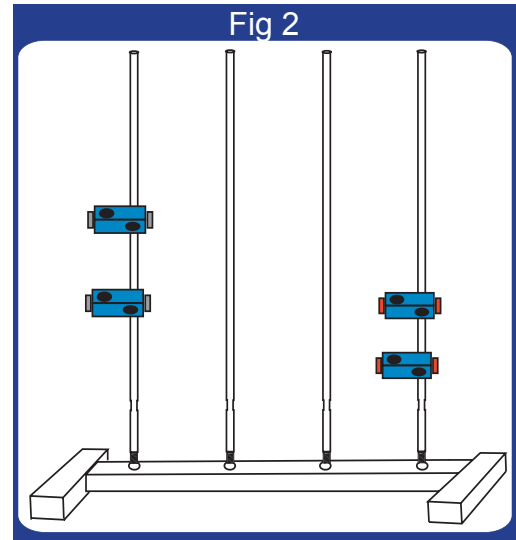
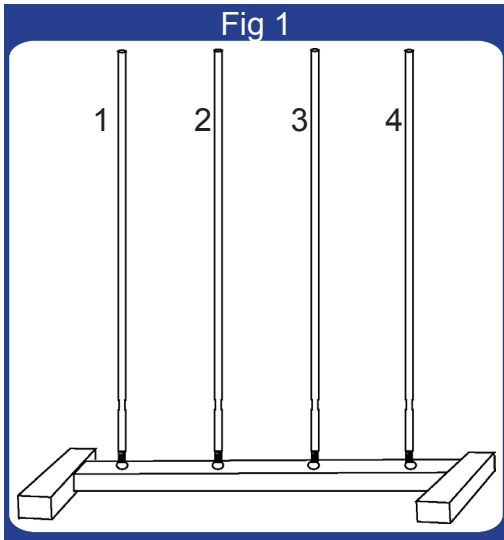
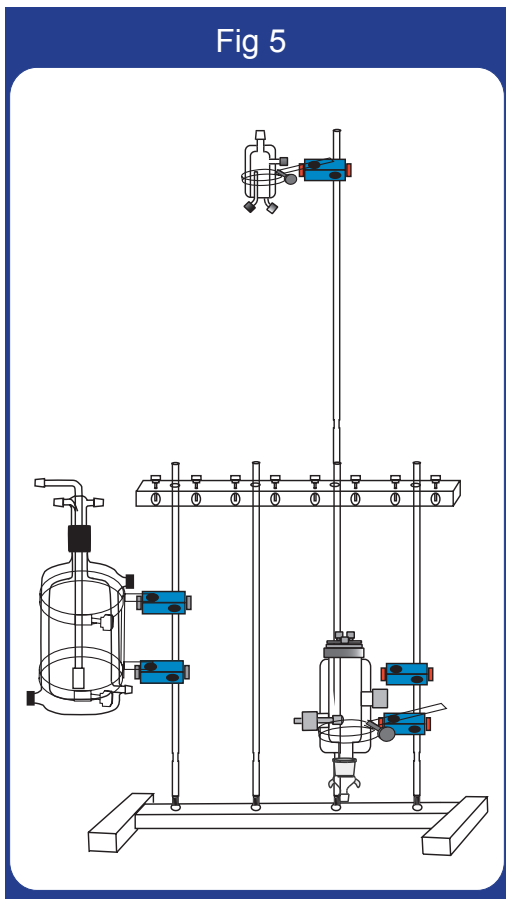


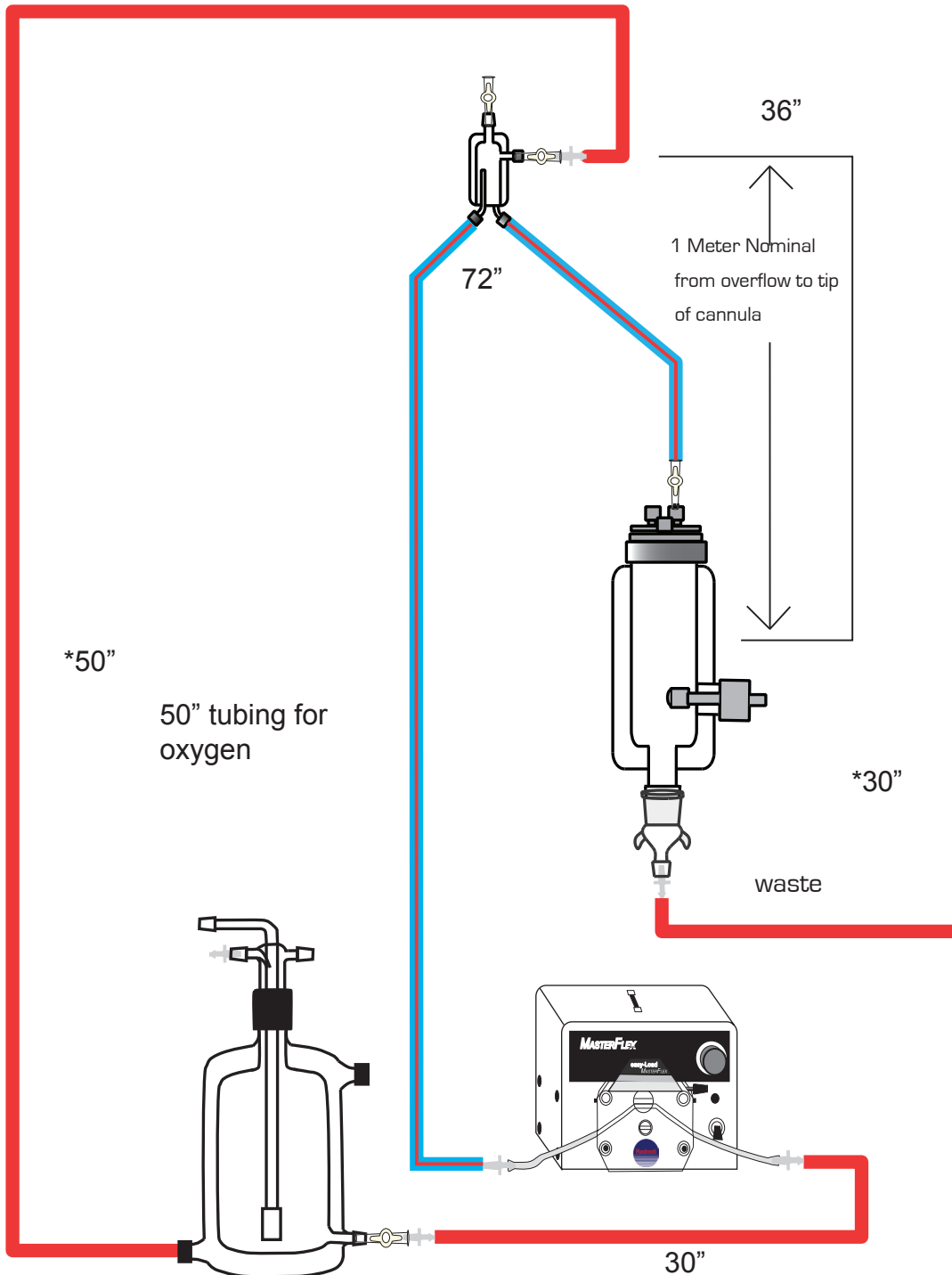
Fig 5



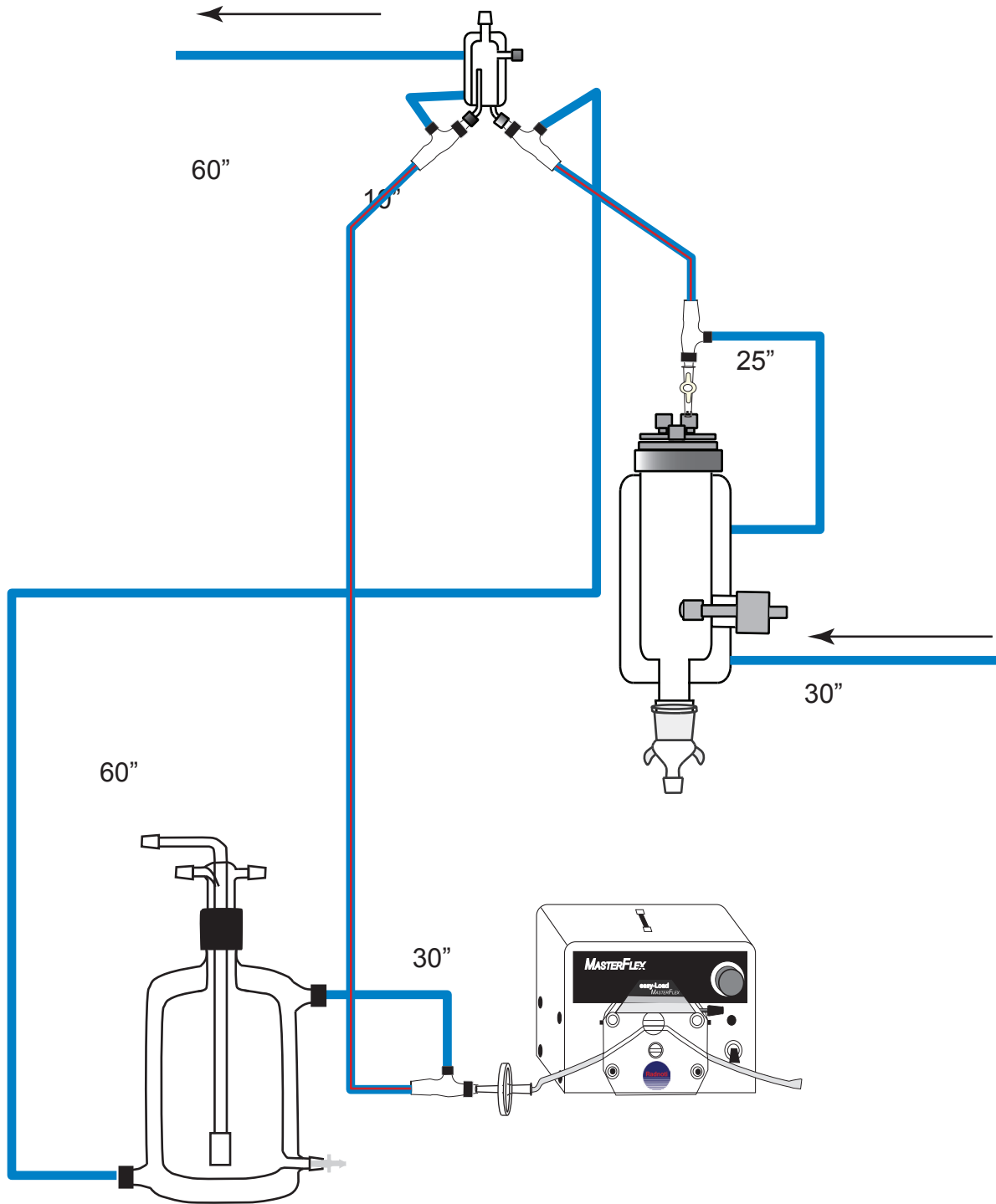
Warning: *When placing the glass components in ring clamps, please be careful not to over tighten clamps.*

Perfusion Connection

* Silicone tubing
Slip over luer or stopcock



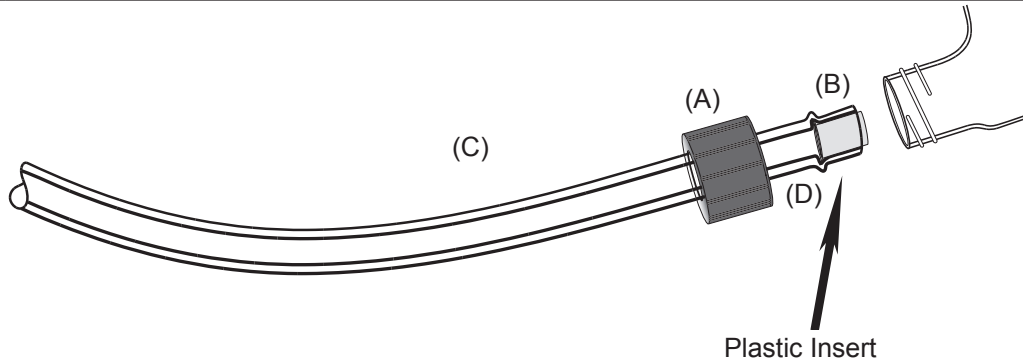
Water-Jacket Tubing Connection Chart



RADNOTI 'QUICK DISCONNECT" INSTRUCTIONS

For Reference only

A	Slide Cap-With hole onto the water line. (Tygon tubing #120159)
B	Push the plastic sleeve insert into the end of the Tygon tubing with the flared end first. (Catalog #120160)
C	Be sure to use 5/16 x 3/16 inch Tygon tubing. (Catalog #120159)
D	<u>MOISTEN TIP OF TYGON TUBING</u> before insertion into the threaded glass.
	CAUTION: To avoid breakage, do not over tighten the screw cap.



Replacement Part List:

Catalog No.	Description
120160	Plastic sleeve insert, 25/Pkg
120159	Tygon tubing 5/16 x 3/16 ID, 50 ft/min
160196	Drilled cap for W/J.Q.D.

General Preparation Instructions

Prior to starting, the experimental protocol should be designed and solutions and agents prepared.

Turn on the water recirculating pump, set temperature (normally 37° C) and allow the system to come to temperature, which normally takes 15-30 minutes.

After turning on the water pump, switch on the computer and boot the data acquisition and analysis package, if present.

The perfusate reservoir(s) stopcocks should be closed, then the perfusate added to the reservoir(s) to a level a few centimeters below the shoulder of the internal reservoir bottle(s). This headspace allows aeration without spillage of perfusate.

After making sure that gas can leave the reservoir through an open port, the perfusate in the reservoir can be aerated with the selected gas mixture, using a multiple stage gas regulator. The bubbles from the aerator should form a continuous stream, but not violently agitate the perfusate. Nominal gas flows will be in the range of 0.25-2 liters/minute, depending on reservoir size.

Unscrew the lid of the heart chamber, release the clamp holding the lid onto the support bar, slide the lid upward and leave enough room to mount the heart and then retighten the lid's clamp onto the support bar.

Testing and calibration of sensors (pressure, force, flow, ion selective electrodes, ECG, etc) should be performed at this time. The left ventricular balloon should be tested for leakage and catheters, stopcocks and fittings primed with fluid.

Instruments and surgical supplies should be laid out and ties prepared to mount the heart, secure the balloon catheter, etc. A beaker of chilled perfusate with heparin can be placed on ice to transport the donor heart.

Specific instructions for the 120105EZ Radnoti Langendorff Constant Pressure Non-Recirculating Pump Driven Isolated Heart System.

Principles of the system

The Radnoti 120105EZ system provides a constant perfusate pressure delivery to the isolated heart through the use of a peristaltic pump that delivers an **excess** amount of perfusate to the elevated bubble trap located at the selected pressure head above the heart. Pump flows are selected to deliver more flow than the maximum required by the particular cardiac preparation (normally 50-100% excess of expected flow, to allow for variations in coronary flow of preparations). Pump tubing selection, which determines the pump flow range, should be made so that the selected pump speed used to deliver excess flow will be in the **midrange** of the pump speed controller. This permits increases in pump speed to increase coronary flow if necessary and reduces the chance of large pressure variations (surging) that may occur at very low pump speeds. Once set for a given preparation and pressure, the flow should not have to be adjusted unless experimental conditions change significantly. The excess perfusate leaves the bubble trap via the compliance side port and is returned to the perfusate reservoir via the perfusate return port (see perfusate connection chart), so there is no perfusate loss. The aortic cannula should be selected to be the largest diameter to easily slide into the aorta of the heart. The selection of a small diameter aortic cannula could restrict coronary flow and thereby reduce cardiac performance. To calculate pressure head, measure the distance in mm from side port to the tip of the aortic cannula (when the heart is mounted and the chamber lid secured). The conversion to mm Hg is 1mm Hg=13.6 mm water.

Flow selection and troubleshooting. If you are unsure of the correct flow setting you can check literature references or run a test preparation. Depending on heart weight, perfusion pressure, perfusate, temperature, preload and other factors, normal coronary flow ranges for adult hearts are approximately 1-2 ml/min for mouse, 10-20ml/min for rat and 30-60 ml/min for rabbit (60 mm Hg and 37^o C). **For our over-flow system these coronary flows should be multiplied by 1.5-2 to set pump delivery flow.**

Normally, tubing selection and pump speed are not critical factors, as long as there is excess fluid delivery at a reasonable pump speed. If the pump flow is too low, the bubble trap fluid level declines below the side port and outflow to the reservoir stops; at this point increase the pump speed to compensate and restart outflow. If you have selected a tubing diameter that is very large and/or are pumping **very** large amounts of fluid, the fluid level will rise upward to the top output of the bubble trap. If this occurs reduce pump speed and/or choose a smaller diameter tubing.

Mounting and perfusing the heart

After the system has come to temperature and all preparations have been made, open the reservoir stopcock and adjust the valves (see chart).

Turn the pump on and the perfusate will be pumped through the line, into the bubble trap and out of the aortic cannula.

Close the aortic stopcock (see chart). This will cause the perfusate to back up and fill the bubble trap, then empty out the side port.

Select the appropriate pump speed and make sure that the overflow line is delivering the perfusate back into the reservoir.

After checking for any leaks or other problems, turn the pump off. Verify that there is no air in the perfusate lines and that the bubble trap is filled.

Prepare the donor animal, anesthetize and heparinize it and then remove the heart. Depending upon your experimental conditions, the heart may be transferred to a beaker of chilled perfusate for transport to the heart system.





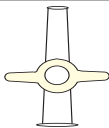

The aorta should be cut just below the aortic branches, heart slid onto the cannula, secured with clamp or suture, the pump turned on and the aortic stopcock opened (see chart).

Once perfusion starts, the heart should begin to beat and eject fluid. The heart can then be cleaned of excess tissue and instrumented with ECG or pacing electrodes, balloon or other pressure catheters, etc.

After the heart is instrumented, the lid and heart should be lowered onto the chamber and the lid screwed shut to maintain temperature and control fluid output.

120105EZ

Radnoti Langendorff Constant Pressure Non-Recirculating Pump Driven

Valve #	1	2	3	4
Set Valves				
Turn Pump On				
Closing Aortic Cannula				
Turn Pump Off				
Prepare Heart				
Turn Pump On				
Mount Heart				
Opening Aortic Cannula				

Quick Reference Chart

Valves are marked as red numbers

