

## Start-up: “Dispensing by Volume”

**Equipment:** You will need the following items to get started:

<b>SciLog P/N</b>	<b>Description</b>	<b>Quantity</b>
400-480 or 490	10 or 20 liter ADS Carboy	1 pc
Or	Appropriate Solution Reservoir	1 pc
100-1682	LabTec CP-200 w/1082 Head	1 pc
400-420	Stand and Clamps	1 set
400-124	Silicone #24 Tubing “Masterflex”	25 ft (1 pkg)
400-491A	Dispensing Tips	1 pkg
Or		
400-450	Sartobran 300 Filter & Bell (needs a larger clamp)	1 pkg

### Hardware Setup:

1. Unpack all the components, visually identify and inspect for damage.
2. At the dispensing station, place the ADS carboy (ADS = Automated Dispensing Station) to the far left, the LabTec to its right and the stand and clamps to the right of the LabTec. Position the dispensing tip over the appropriately sized container.
3. Plug in and power up the LabTec.
4. Cut approximately 10 feet of the #24 tubing and install the dispensing tip or filter on one end. Mount that end of the tubing in the clamp stand and position it so that it is just above the container. Fasten the tubing to the upright of the clamp stand with a cable tie or twist tie to stabilize it.
5. Route the tubing to the LabTec, open the head by rotating the lever 180 degrees counter clockwise, and place the tubing over the upper set of rollers. Confirm that the tubing is under the centering springs and close the head by rotating the lever back to its original position.
6. Route the remaining tubing to the ADS carboy and attach it to the appropriate connector.

**NOTE:** If you purchased the LabTec with your aliquot sizes preprogrammed by SciLog, the calibrations have been done for you. There will be a sticker on the unit explaining which Exec (1-5) program has been assigned to the aliquots, and you may proceed directly to dispensing. If a Factory Reset, under Setup: Pump, has been done, and/or the pump shows “PUMP NOT CALIBRATED” when you try to execute the program, a Master Calibration for that program will need to be done.

## Calibration:

1. Each pump head/pump tubing combination requires a Master Calibration. This needs to be done only once for each head/tubing combination, as any future fine adjustment (e.g. to accommodate pump tube wear) can be accomplished by using the Re-Cal feature accessible directly from the “**RE-CAL**” key on the front panel of the LabTec.
2. The LabTec utilizes a number of factory installed Master Calibrations. The EDIT, EXEC and CAL sub modes are labeled according to the Masterflex tubing size used in the calibration. For example, “**EDIT 17**” and “**EXEC 17**” means that tubing size #17 was used in the calibration, and you can skip directly to the “**RE-CAL**” instructions which follow shortly. The following tubing sizes have factory installed master calibrations: #16, 25, 17, and 18. These sizes are thin-walled tubing. **SciLog recommends using thick-walled tubing, sizes #15, 24 and 35. For #15 tubing use “EXEC 25”, for #24 use “EXEC 17” and for #35 use “EXEC 18”.** If you wish to do your own Master Calibration, or are using a piston or magnetic gear pump head, refer to Section 4.0, “Volume: Master Calibration, Edit” of the LabTec Manual. The LabTec is capable of storing up to six custom master calibrations (e.g. CAL, EXEC, EDIT 1 – 6).
3. The **RE-CAL** feature is accessible from the front panel of the LabTec using the “**RE-CAL**” button located in the lower right-hand corner of the panel. To do this accurately, it is important that you have a balance available to dispense the aliquots onto that has a readability of 0.01 gm. This feature is active when the following type of display is shown:

<b>VOLUME SET: 10.00 ml</b> <b>Press RUN when Ready</b>
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4. After checking to be sure that the system is primed, Press the **RUN** key and dispense 10.00 ml into the container on the scale. Record the weight, and do this for a minimum of 3 aliquots, and determine the average (AV) aliquot weight. For example, assume you obtained the following values:

Trial 1	10.25 gm
Trial 2	10.30 gm
Trial 3	10.20 gm
<b>AV = Average Value</b>	<b>10.25 gm</b>

5. Press the “**RE-CAL**” key on the front panel of the LabTec, and the following display will appear:

<b>DV = 10.00</b>		<b>AV = 10.00</b>
<b>Incr.</b>	<b>Decr.</b>	<b>Select</b>
<b>A</b>	<b>B</b>	<b>C</b>

6. Only the **AV** parameter can be changed in this display, use the “**A**” and “**B**” keys to adjust the value. In the above example, you would increase the AV value to 10.25. Press the “**C**” key to Select and the stored calibration curve will be updated. You may wish to repeat the RE-CAL in order to check the improved dispensing accuracy.

## Program Editing and Execution:

1. At this point, you need to consider the parameters of the dispensing that you are going to do. The following is a list of the various parameters available, and their defaults. Adjust these parameters based on the volume that you are dispensing. Consult Section 3.0, Pages B7 & B8 of the LabTec Manual to edit your volume dispensing parameters.

**DISPENSE VOLUME:** Defines the volume to be dispensed in milliliters. (The default Volume for Edit/Exec 1-6=10.00 ml, for Edit/Exec 16=5.00 ml, for Edit/Exec 17=10.00 ml, for Edit/Exec 18=80.00 ml, and for Edit/Exec 25=40.00 ml)

**SNIFFLE:** The sniffle function consists of a brief pump reversal at the end of the dispensing cycle to suck in the droplet that typically hangs at the end of the dispensing tip. It also will relieve the pressure on a filter if you are using one so that it does not drip. (The default Sniffle = 0.3)

**SLOW FACTOR:** Defines the solution volume that is dispensed slowly at the end of the dispensing cycle. This should be set between 1-5 ml depending the volume being dispensed and the tubing size to avoid overshooting the target volume. For example, if your using #15 tubing, and the target volume is 100 ml, a slow factor of 1 or 2 ml will work fine. The default Slow Factor = 1.00 ml. This may be adjusted if necessary.

**PUMP DIRECTION:** Defines the rotation of the pump head, this parameter can be changed from clock-wise (CW) to counter clock-wise (CCW). (Default = CW)

**PUMP RATE:** Defines the relative pump speed (0% to 100%) with which the solution is being dispensed. The default Pump Rate = 100%. This may be adjusted as needed, Slower pump rates may be desirable to increase accuracy and minimize back-splashing.

**TIME DELAY:** Defines the time interval, in seconds, between dispensing cycles. (Default = 00.01)

**COUNT:** Defines how often the dispensing cycle will be repeated. For example, when COUNT = 10, then the selected Dispense Volume will be dispensed 10 times. (Default = 1)

1. For this example, the tubing will be MasterFlex #24, and a dispense volume of 100.00 ml. From the Mode Select screen, use “A” or “B” to go up or down to the “Volume” mode, and Press “C” to select it. The Volume mode will give you the following display.

- VOLUME DISPENSE -		
Exec	Edit	Cal
A	B	C

2. Press “B” to enter the Edit Menu, and use “A” or “B” to scroll to “EDIT 17” for thick walled #24 MasterFlex tubing.

- EDIT 17 -		
Up	Down	Select
A	B	C

3. Press "C" to select EDIT 17, and "C" again to select "DISP VOLUME. Use the "A" or "B" keys to increase or decrease the selected volume to 100.00 ml. Then press "C" to select.

DISP VOLUME:		100.00
Inc	Decr	Select
A	B	C

4. Next, use the "A" and "B" keys again to scroll to "SLOW FACTOR" and press "C" to select. Use the "A" key to increase this based on your tubing size. For this example, increase it to 2.00 ml, and press "C" to select.

SLOW FACTOR:		2.00
Inc	Decr	Select
A	B	C

5. All other parameters will be left at their defaults. Press the exit key to return to the "Volume" screen and Press the "Exec" key, this will show the Exec program that matches the Edit program you were just in. Continuing with this example, press "C" to select, and the LabTec will show the following display:

VOLUME SET: 100.00ml	
Press RUN when Ready	

Press the "RUN" key, and the LabTec will dispense 100.00 ml, and show the following screen:

DV=100.00ml	FINISH
CV= 100ml	ID=001

Where DV=Dispensed Volume, CV=Cumulative Volume, and ID=Sample # for the volume dispensed, will increment by one for each occurrence. The display will then alternate between this screen and the one before it. Continue pressing the run key until you have finished the needed number of aliquots.

## Documentation:

The LabTec will output data to a printer or a PC at periodic intervals for archival purposes. The following is an example of that data, and an explanation of the abbreviations used.

LabTec: EXEC 17: VOLUME SET=100.00; COUNT= 1; RATE=100.0%; DATE\_\_\_\_\_

ID= 1;	DV= 100.02;	CV= 100;	ST=FINISH;
ID= 2;	DV= 100.00;	CV= 200;	ST=FINISH;
ID= 3;	DV= 100.09;	CV= 300;	ST=FINISH;
ID= 4;	DV= 100.07;	CV= 400;	ST=FINISH;
ID= 5'	DV= 55.00;	CV= 455;	ST= STOP;

ID=Sample #, DV=Dispensed Volume, CV=Cumulative Volume, ST=STATUS

NOTE: The LabTec will print at the end of each dispense, and immediately if the STOP key is pressed during a run.

The following chart shows tubing dimensions and the available flow rates based on tubing, pump head and motor size choices:

MasterFlex Tubing	13	14	16	25	17	18	15	24	35
Tubing ID*: in	0.030	0.060	0.125	0.190	0.250	0.310	0.190	0.250	0.310
Tubing OD*: in	0.157	0.189	0.251	0.314	0.376	0.439	0.376	0.439	0.500
Tubing Wall*: in	0.063	0.063	0.063	0.063	0.063	0.063	0.093	0.093	0.093
Pump Rate Range*:	ml/min	ml/min	ml/min	ml/min	ml/min	ml/min	ml/min	ml/min	ml/min
<b>CP-8 8RPM</b>	0.03 - 0.45	0.10 - 1.63	0.43-6.38	0.9 - 12.6	1.14 - 18.3	1.7 - 24.3	0.45 - 13	0.65 - 20	0.8 - 32
<b>CP-120 160RPM</b>	0.5 - 10	1.7 - 35.2	6.3 - 129	12.5 - 283	18.5 - 405	24.7 - 554	9 - 260	13 - 435	16 - 650
<b>CP-200 600RPM</b>	2 - 34	8.6- 132	29 - 533	49 - 974	70 - 1048	103 - 1515	59-993	85-1348	111 - 2258
* Nominal Values									
<b>Pump Head Model:</b>	<b>TANDEM 1081</b>						<b>TANDEM 1082</b>		

**CAUTION:** The following may affect your accuracy, and should be considered:

- 1) SciLog suggests you use #15 or 24 tubing, and move the portion inside the pump 3-4 inches toward the discharge side of the pump periodically to avoid excessive wear. As the tubing becomes worn, you will want to run the RE-CAL feature again. #35 tubing will allow you to pump at higher flow rates, but a larger slow factor should be implemented.
- 2) Sniffle Factor. This is a parameter that can be adjusted to minimize the drips that occur after dispensing, thereby eliminating overruns. These procedures suggest an initial factor of 0.3. If you are using a filter, this may need to be increased as the filter becomes plugged.
- 3) Slow Factor and Pump Rate. These parameters can be optimized further depending upon your specific application. The Slow Factor should be set to 1 or 2 ml for most tubing, and up to as much as 5 ml if you are using large diameter tubing. Decreasing the Pump Rate will help if the default of 100% is causing too much backsplash that can't be eliminated in some other manner, or if the dispense volume is small.

SciLog recommends a factory cleaning, testing and recalibration be done to your Smart Pump at least once a year, to maintain the accuracy of the unit and reduce your downtime. SciLog also has loaner units available you can rent if you need to keep production running while SciLog is performing maintenance on your pump. Call us at 800-955-1993 for an RGA and arrange for a loaner if needed. If you have a large number of units, call us, and we can design a preventative maintenance program specifically for your company.