

LabTec

Smart Dispenser

Operating Manual

SciLog Inc.

SciLog Manual, Software and Applications Copyrighted

Rev. D 11/04



WARRANTY POLICY, PRODUCT RETURNS, ACCEPTABLE USE, AND OTHER RESTRICTIONS

1. WARRANTY AND RETURNS POLICY:

SCIOLOG, INC. EXPRESSLY WARRANTS THE EQUIPMENT MANUFACTURED BY IT ONLY AS SET FORTH HEREIN. SCIOLOG, INC. MAKES NO OTHER WARRANTIES, EITHER EXPRESS OR IMPLIED (INCLUDING WITHOUT LIMITATION WARRANTIES AS TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE). IN ADDITION, THE FOLLOWING SHALL CONSTITUTE THE SOLE AND EXCLUSIVE REMEDIES OF BUYER FOR ANY BREACH BY SCIOLOG, INC. OF ITS WARRANTY HEREUNDER.

A. PRODUCT WARRANTY – SciLog, Inc. warrants products it manufactures against defects in materials and workmanship for one (1) year from the date of shipment from SciLog, Inc. in normal use and service. If any products fail to conform to this warranty within the first ninety (90) days of the warranty period, SciLog, Inc. will, at its option, repair or replace such goods returned. If any products fail to conform to this warranty for the remainder of the warranty period, SciLog, Inc. shall furnish necessary replacement parts free of charge.

B. PARTS WARRANTY - SciLog, Inc. warrants service parts against defects in materials and workmanship for ninety (90) days from the date of shipment from SciLog, Inc. in normal use and service. If any service parts fail to conform to this warranty, SciLog, Inc. shall furnish necessary replacement parts free of charge.

C. WARRANTY LIMITATIONS - These warranties are subject to the following conditions:

1. Upon discovery of such non-conformity, SciLog, Inc. will be given prompt written notice with a detailed explanation of the alleged deficiencies.

2. The product or part must be properly installed, operated and maintained in accordance with SciLog, Inc. specifications.

3. The product or part must not be operated above rated load capacity or subject to accident, alteration, misuse, or abuse.

4. The product must not have been repaired or serviced by anyone other than SciLog, Inc. or one of its authorized dealers.

5. SciLog, Inc. shall have a reasonable time to repair or replace the effective product.

6. The buyer is responsible for shipping the product to SciLog, Inc. SciLog, Inc. is responsible for shipping the product back to the buyer.

D. RETURN POLICY - Any item may be returned within thirty (30) days from the date of shipment from SciLog, Inc. If the box is unopened (the original factory seal is intact), SciLog, Inc. will refund the full credit to the buyer. If the box is opened (the original factory seal is not intact), SciLog, Inc. will refund the full credit less a \$75 inspection fee and repair labor/parts/materials cost (if applicable) to the buyer. No returns will be accepted after thirty (30) days from the date of shipment from SciLog, Inc. The buyer is responsible for shipping the product to SciLog, Inc.

2. INTELLECTUAL PROPERTY

The sale and delivery of the SciLog, Inc.'s equipment and/or software to Buyer shall in no way transfer to Buyer any right of ownership in any patents, copyrights, trademarks, technologies, designs, specifications, drawings, or other intellectual property incorporated into the equipment and/or software.

3. DISCLAIMER OF DAMAGES

IN NO EVENT SHALL SCIOLOG, INC. BE LIABLE FOR ANY TYPE OF SPECIAL CONSEQUENTIAL, INDIRECT, INCIDENTAL OR PENAL DAMAGES, WHETHER SUCH DAMAGES ARISE OUT OF OR ARE A RESULT OF BREACH OF CONTRACT, WARRANTY, TORT (INCLUDING NEGLIGENCE), STRICT LIABILITY OR OTHERWISE. Such damages shall include but not be limited to loss of profits or revenues, loss of use of the equipment or associated equipment, cost of substitute equipment, facilities, down time costs, increased construction costs or claims of Buyer's customers or contractors for such damages. Buyer agrees that in the event of a transfer, assignment, or lease of the equipment sold hereunder Buyer shall secure for the SciLog, Inc. the protection afforded to it in this paragraph.

4. LIMITATION OF LIABILITY

The SciLog, Inc. shall not be liable for any loss, claim, expense or damage caused by, contributed to or arising out of the acts or omissions of Buyer or third parties, whether negligent or otherwise. In no event shall the SciLog, Inc.'s liability for any cause of action whatsoever exceed the cost of the item giving rise to the claim, whether based in contract, warranty, indemnity, or tort (including negligence). Any suit arising hereunder must be commenced within one (1) year from the date in which the cause of action accrues. Except as provided in Article 3, the SciLog, Inc. shall not indemnify any party.

5. NO RESPONSIBILITY FOR GRATUITOUS INFORMATION OR ASSISTANCE

If SciLog, Inc. provides Buyer with assistance or advice which concerns any parts, products, service supplied hereunder or any system or equipment in which any such part, product or service may be installed and which is not required pursuant hereto, the furnishing of such assistance or advice shall not subject SciLog, Inc. to any liability, whether based in contract warranty, tort (including negligence) or otherwise.

6. INTERNATIONAL SALES EXPORT

Buyer EXPRESSLY agrees and verifies that the purchased product(s) will not be transferred or exported to third parties or foreign nationals and that Buyer is the final end-user of the product. Export or transfer of any SciLog product without the EXPRESS written authorization of the SciLog, Inc. is strictly prohibited and may violate US trade laws and regulations, thereby subjecting the Buyer to civil and criminal liability.

7. REVISIONS TO THIS POLICY

From time to time the Company may revise the terms of this Agreement. Company will make its best efforts to inform customers of these revisions. The most current revision of these terms may be accessed over the internet by accessing the webpage located at: <http://www.scilog.com/warranty>

REGISTER YOUR PRODUCT(S) WITH SCIOLOG, INC. IMMEDIATELY AT:

<http://www.scilog.com/register>



Phone: 608-824-0500 Fax: 608-824-0509
8845 South Greenview Drive, Suite 4
Middleton, Wisconsin 53562 USA

LabTec Maintenance

A factory cleaning, testing and recalibration should be performed to your LabTec at least once a year.

Fill Out this Form & Fax it to SciLog at FAX: 608-824-0509.

1. SciLog will send you a **loaner pump for one week** if you request it. **\$300/week**
This price includes the cost of next day shipping & insurance to send a loaner to you.
2. Use the packing material from the loaner & send your pump to:
SciLog Inc.
8845 S. Greenview Dr.
Middleton, WI, 53562
3. **SciLog will disassemble, clean and lubricate the pump head, change the seals if appropriate, test, recalibrate and generate a Performance Validation for your LabTec.** If your pump needs a new motor or pump head, then we will contact you & get your approval before replacing them. A new motor is \$350; a new piston head is \$645; a new peristaltic Tandem head is \$235. Most of the time, cleaning and recalibration is all that is needed to insure many years of service. Price includes the cost of SciLog shipping your pump back. **\$300**
4. Once you receive your cleaned/repared LabTec, use the packing materials to repack the loaner and send it back to SciLog.
Assuming no replacement parts are required,
Total Cost, including Loaner and Shipping: \$600

Please Check all of the following that are appropriate:

Yes, I need my LabTec cleaned and recalibrated.

Yes, I need a loaner LabTec sent to me.

PO# _____ **or Credit Card#** _____
Credit Card Expiration Date _____

Send the Loaner and/or Repaired / Cleaned LabTec to:

Company: _____

Address: _____

Contact: _____

Contact Phone #: _____

Contact Fax #: _____

Contact Email: _____

Call SciLog Customer Service at 800-955-1993 with any questions.

Table of Contents

LabTec Maintenance	2
Safety Information:	6
Installation & Start-Up	7
Maintenance & Cleaning:	8
Introduction:	9
Start-up: “Automated Weighing and Dilution of Food Samples for Analysis”	11
Start-up: “Dispensing by Volume”	15
Start-up: “Dispensing by Weight”	20
Start-up: “Dispensing Organic Solvents with a J.T. Baker CYCLE-TAINER®”	24
LabTec Specifications: Summary	27
Part A: Hardware	28
1.0 Hardware Overview:	28
2.0 Front Panel: Data Entry & Display	31
3.0 Back Panel: Interface Options	32
3.1 Printer Port:	32
3.2 Balance Port:	32
3.3 I/O Port:	32
4.0 TANDEM™ Dual Channel Peristaltic Pump Head:	33
4.1 TANDEM Pump Head Installation:	34
4.2 Peristaltic Pump Tubing / Rate Selection:	34
4.3 Pump Tube Installation:	35
4.4 Pump Tube Replacement:	35
4.5 TANDEM™ Dual Channel Peristaltic Pump: Parts Identification	36
4.6 TANDEM™ Parts List:	37
5.0 Magnetic Gear Pump Head: Model 201	38
6.0 FMI Pump Heads: General Information	39
6.1 FMI Pump Heads: Construction / Motors / Pump Rates	39
6.2 FMI Pump Heads: Installation	40
6.3 FMI Pump Heads: Stroke Volume Adjustment	41
6.4 FMI Pump Heads: Connectors and Tubing Selection	41
6.5 FMI Pump Heads: Cleaning	41
6.6 FMI Pump Head: Chemical Compatibility	42
6.7 FMI Pump Heads: Viscosity Effects	42
Part B: Software	44
1.0 Software Overview: Main menu	44
2.0 Weight Ratio: Weight Ratio Dispensing; Edit	46
3.0 Volume: Dispensing By Volume, Edit	49
4.0 Volume: Factory Calibration	52
5.0 Volume: Re-calibration, use of the Re-Cal key	52
6.0 Weight: Dispensing by Weight, Edit	54
7.0 Setup: Edit	57
7.10 Setup: Scale	59
7.30 LabTec Print-out Format:	65

8.0 Manual:	66
9.0 Serial	66
9.1 PC HyperTerminal Settings:	67
9.2 LabTec Serial Port 1 ASCII Protocol:	68
9.3 Remote Volume and Weight Dispensing Via Serial Port 2	69
10.0 SciDoc LabTec Documentation Software	70
Part C: LabTec Dispensing Applications	75
1.0 Weight Ratio Dispensing: General Information	75
2.0 Weight Ratio Dispensing: How To Get Started	77
2.1 Weight Ratio Dispensing: Parameter Guide, TANDEM 1082	80
2.2 Weight Ratio Dispensing: Parameter Guide, Magnetic Gear Pump:.....	81
3.0 Dispensing By Volume: General Considerations:.....	82
4.0 Dispensing By Volume: How to get started.	83
4.1 Dispensing By Volume: Parameter Guide, TANDEM 1082.....	84
4.2 Dispensing By Volume: Parameter Guide, TANDEM 1081.....	85
4.3 Dispensing By Volume: Parameter Guide, Magnetic Gear Pump:	86
5.0 Dispensing By Weight: How To Get Started.....	87
5.1 Dispensing By Weight: Parameter Guide, TANDEM 1082.....	89
5.2 Dispensing By Weight: Parameter Guide, Magnetic Gear Pump:	90
6.0 Robotics Dispensing Station: How To Get Started.....	91
7.0 Care and Use of Sterilizing Filters.....	93
8.0 Troubleshooting	95
8.1 Peristaltic Pump Heads	95
8.2 Piston and Magnetic Gear Heads.....	97
8.3 SciDoc Documentation Software.....	99

Safety Information:

Be sure to read and observe the following requirements!

Before connecting the LabTec to mains, make sure that the mains voltage corresponds to the voltage rating given on back panel of the pump.

Opening the LabTec cover exposes live parts. Therefore, the cover must not be removed. If repair should be required, return the pump to the factory.

If opening of the LabTec cover is inevitable, the pump must first be disconnected from all voltage sources.

Make sure that the mains plug has been pulled out.

Repair or adjustment of an opened LabTec under voltage must be carried out only by a skilled person who is aware of the hazard involved.

Whenever it is likely that the protection has been impaired, the LabTec must be made inoperative and secured against any unintended operation. The protection is likely to be impaired if, for example:

- The LabTec shows visible damage
- The LabTec fails to perform as intended
- After prolonged storage at temperature above 70°C
- After severe transport stresses

Before re-commissioning the LabTec, a professional routine test according to EN 61010-1 must be performed.

Installation & Start-Up



Installation of the LabTec must be carried out only by trained personnel in accordance with the relevant regulations and this operations manual.

Make sure that the technical specifications and input ratings of the LabTec are observed. See “LabTec Specifications”

The LabTec must be connected to a properly grounded power supply receptacle.

The LabTec location must not block access to the power disconnect point for the power supply.

The protection provided by this equipment may be impaired, if the LabTec is used in a manner or for purposes not specified by the manufacturer, SciLog, Inc.



Start-up of the LabTec must be carried out only by trained personnel in accordance with the relevant regulations and this operations manual.

Before first start-up, a parameter setting procedure and/or a parameter review must be performed by supervisory personnel.

User selected parameters are stored in the LabTec memory and are battery backed for approximately one (1) year. After longer power outages these data can be lost.

Maintenance & Cleaning:



The LabTec pump controller is maintenance free. The pump head and associated pump tubing must be flushed with distilled water for at least 5 minutes prior to pump shutdown.



To remove dust, dirt and stains, the outer surfaces of the LabTec may be wiped using a soft, non-fluffing cloth moistened with water. If required, you may also use a mild detergent or 2-propanol.

Standards:



The LabTec meets the following generic standards:

- Safety Requirements: EN 61010-1:1993
- Electromagnetic Emission: EN 50081-1: 1992
- Immunity to Interference: EN 50082-1: 1992

Description of this Manual:

This operations manual provides following information:

- Safety Requirements
- Product Specifications
- LabTec Hardware, Part A
- LabTec Software, Part B
- LabTec Uses/Applications, Part C



WARNING:

Warning means that ignoring the given instructions may lead to malfunction or damage of the instrument or other equipment and to personal injury.



NOTE:

Note call you attention to important information. *Italics* are used to emphasize certain information.

Introduction:

The LabTec has been designed to automate batch dispensing of liquids from the low milliliter to liter range. The LabTec allows you to optimize the dispensing rate per aliquot as well as the dispensing precision & accuracy. The LabTec can be used for either sterile or non-sterile dispensing applications as well as for aqueous and non-aqueous batch dispensing by volume or weight.

Please read the following instructions carefully!

Inspections: Unpack the LabTec and accessories carefully from the carton. Cross-check the contents against your purchase order to verify that all parts are included and undamaged.

Please do the inspection now, even if the LabTec is not used immediately. Many carriers must receive damage claims within seven day of delivery. Please retain all packing material so unit may be shipped safely, if necessary.

SciLog Customer Service: If you need assistance, please call

1-800-955-1993 or 1-608-824-0500

SciLog Customer Service personnel will be able to serve you more efficiently if you have the following information:

- Serial number (back panel) and model name of the equipment.
- Installation procedure you used.
- Concise list of symptoms.
- List of operating procedures and conditions you were using when problem arose.

Warranty Repair: Units covered under warranty will be repaired and returned to you at no charge. If you have any questions about applicability, please contact SciLog.

Non-warranty Repair: For out-of-warranty repair, contact the SciLog Customer Service Department. A SciLog representative will discuss service options with you and can assist in making arrangements to return the equipment, if necessary.

Return Procedure: Before returning any SciLog equipment, contact SciLog to obtain a Return Goods Authorization (RGA) Number. To return a piece of equipment:

- Carefully pack the unit to prevent damage in transit. Check with SciLog regarding the proper method of shipment. No responsibility is assumed by SciLog for damage caused by improperly packaged instruments. Indicate the RGA Number on the carton or on the packing slip.
- Always insure for the replacement value of the unit.
- Include a description of the symptoms, your name, return address, phone number and purchase order to cover repair costs, return and shipping charges, if your institution requires it. Ship to:

SciLog Inc.
8845 S. Greenview Dr. #4
Middleton, WI 53562-2562

Limited Warranty:

Pump heads are expressly excluded from the SciLog warranty. Check with the original pump head manufacturer for their return policy.

Start-up: “Automated Weighing and Dilution of Food Samples for Bacteriological Analysis”

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

SciLog P/N	Description	Quantity
400-480 or 490	10 or 20 liter ADS Carboy	1 pc
100-1682	LabTec CP-200 w/1082 Head	1 pc
100-2100B	Ohaus Balance	1 pc
080-066	Scilog Balance interface cable	1 pc
080-059	Foot Switch	1 pc
400-420	Stand and Clamps	1 set
400-124	Silicone #24 Tubing	25 ft (1 pkg)
400-491A	Dispensing Tips	1 pkg
Or		
400-450	Sartobran 300 Filter & Bell (needs a larger clamp)	1 pkg
400-478	Bag Holder	1 pc
400-477	Stomacher Bags	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 balance with the stand and clamps to the right of the LabTec. Place the bag holder on the balance.
3. Connect the footswitch to the rear of the LabTec, secure the screws, and place the footswitch in a convenient location on the lab counter or floor.
4. Connect the interface cable between the LabTec and the balance paying close attention to the labels on the cable and those on the rear of the LabTec. (The cable may ship attached to the balance already, and if so, simply attach it to the LabTec.)
5. Plug in and power up both units.
6. Cut approximately 10 feet of the #24 silicone 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 bag holder. Fasten the tubing to the upright of the clamp stand with a cable tie or twist tie to stabilize it and route it clear of the balance.
7. 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.
8. Route the remaining tubing to the ADS carboy and attach it to the appropriate connector.

Software/Program Setup:

1. For Weight Ratio applications such as this one, the only thing that must be setup prior to editing and running the program is the scale (or balance) that is in use. If you purchased the balance from Scilog, this has already been done.
2. Refer to Part B, Section 7.10, and in particular 7.123 for the Ohaus balance listed above, and follow the listed procedures to configure the balance itself.
3. On the front panel of the LabTec, press the "Exit" key until you reach the main or "Mode Select" menu.
4. Press the "Up" or "Down" key until you reach the "Setup" mode.

Mode Select SETUP		
Up	Down	Select
A	B	C

5. Press "C" to select the Setup mode, and "A" as needed to move up to "Scale". Then press "C" to select "Scale" and again to select "Scale Manuf".

-SELECT- SCALE MANUF.		
Up	Down	Select
A	B	C

6. Use "A" or "B" to move up or down thru the list, and when "OHAUS" is shown, press "C" to select it. Then press the "Exit" key until you return again to the main or "Mode Selct" menu and you are ready to proceed to editing and running a program.

SCALE MANUF: OHAUS		
Up	Down	Select
A	B	C

Program Editing and Execution:

1. From the main menu, press "Up" or "Down" to scroll between the modes until you reach "WT RATIO", and "Select" it.
2. From this screen, you can now "Prime" the system with fluid, or enter either an "Exec" (Execute) or "Edit" mode. The LabTec will allow you to Edit, store and Execute ten different sets of dilution parameters depending on your needs.

- WEIGHT RATIO -		
Up	Down	Select
A	B	C

3. 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. We strongly suggest that you use #24 Silicone tubing and these defaults initially, and then optimize your system after a review of your results during the first few days of operation. Consult Part B, Section 2.0 of the LabTec Manual to edit your weight ratio dispensing parameters.

WGT FACTOR: Defines the weight ratio (multiplier) that is applied to the actual sample weight, as determined by the balance, to arrive at the required diluent's weight. **WGT FACTOR = 9.00** is the default, and will yield a 10-fold dilution. You may increase or decrease this to any ratio you desire. Select a **WGT FACTOR = 99.00** if you want a 100-fold dilution.

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. Select **SNIFFLE = 0.3**. (The default is 0.0)

SLOW FACTOR: Defines the diluent weight that is dispensed slowly at the end of the dispensing cycle. The default **SLOW FACTOR = 25.0** grams. 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 pup speed (0% to 100%) with which the diluent is being dispensed. The default **PUMP RATE = 80%**. This may be adjusted as needed, higher speeds are not recommended.

TIME DELAY: Not used in Weight Ratio Dispensing mode. Defines the time interval, in seconds, between dispensing cycles. (Default = **00.01**)

COUNT: Not used in Weight Ratio Dispensing mode. Defines how often the dispensing cycle will be repeated. For example, when **COUNT = 10**, then the selected **DISP. WEIGHT** will be dispensed 10 times. (Default = **1**)

4. Press "**Exec**" key, select "**Exec 1**", the LabTec will show the following display:

SCALE INITIALIZATION
Please Wait

While the message is being displayed, the LabTec checks the balance communications parameters and the following display is shown:

WGT RATIO SET: 9.00
Press RUN When Ready

Press the "**RUN**" key or alternatively press the foot switch:

Press RUN When
VESSEL IS ON BALANCE

Place the sample bag or container onto the balance and underneath the dispensing tip. Press "**RUN**" key or the foot switch . The LabTec will show the following display:

REMOVING TARE WEIGHT
Please Wait

This display is followed by:

**Press RUN When
SAMPLE IS IN VESSEL**

Place your sample into the sample bag or container, only an approximate sample weight is needed. The weight ratio will be applied to the actual sample weight as determined by the balance. Press “**RUN**” key or the foot switch, the LabTec will start dispensing and display the progress:

**SW: 10.00 G RUN
DW: 50.00 G SC 001**

SW stands for the actual **sample weight** and **DW** represents the delivered **diluent weight**. When the dispensing cycle is completed, following displays are shown.

**SW: 10.00 G FINISH
DW: 90.00 G SC 001**

**DISPENSING
Completed**

**WGT RATIO SET: 9.00
Press RUN When Ready**

Remove your filled sample bag or container and initiate the second dispensing cycle.

NOTE: If you have more than one WGT FACTOR, store one WGT FACTOR in “Edit 1”, e.g. “9.00”, while a second WGT FACTOR is stored in “Edit 2”, e.g. “99.00”. Up to ten different sets of parameters can be stored in “Edit 1” through “Edit 10”

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

- 1) SciLog suggests you use #24 tubing, and move the portion inside the pump 3-4 inches toward the discharge side of the pump periodically to avoid wearing it out. As the tubing becomes worn, your dilutions may take longer, and you may get debris in the diluent. #35 tubing will cause target weight overruns, and is considered to be too large for this application.
- 2) Sniffle Factor. This is a parameter that can be adjusted to minimize the drips that occur after the dilution, 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. Increasing the Slow Factor will help if your scale response time is long, and decreasing the Pump Rate will help if the default of 80% is causing too much backsplash that can't be eliminated in some other manner.

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.

Start-up: “Dispensing by Volume”

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

SciLog P/N	Description	Quantity
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	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 (1-10) program has been assigned to the aliquots, and you may proceed directly to dispensing. If this is not the case, or you have performed a Factory Reset, you will need to Edit the individual aliquots (Edit 1-10) as shown below.

Calibration:

- The LabTec will come configured for the installed motor and Pump head. This example will assume a 600 rpm motor and a Tandem 1082 head is installed. If you have a different head, please refer to the manual or contact SciLog for assistance. Each EDIT (1 – 10) allows the user a choice of tubing, and then accesses built-in master calibrations. In addition to adjustments to the motor speed and slow factor, fine tuning of the calibration is accomplished by using the Re-Cal feature accessible directly from the “**RE-CAL**” key on the front panel of the LabTec.
- 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 aliquot onto that has a readability of 0.1 gm or better. This feature is active when the following type of display is shown:

VOLUME SET: 10.00 ml
Press RUN when Ready

- 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
AV = Average Value	10.25 gm

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

DV = 10.00	AV = 10.00	
Incr.	Decr.	Select
A	B	C

- 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.
- This procedure is performed after all of the EDIT parameters explained below have been entered into the LabTec for that particular aliquot.

Program Editing and Execution:

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 Part B, Section 3.0, of the LabTec Manual to edit your volume dispensing parameters.

DISPENSE VOLUME: Defines the volume to be dispensed in milliliters. (The default volume is 10.0 ml.)

PUMP TUBING: This choice exists if a peristaltic head has been installed. Choices are 13, 14, 16, 25, 17, 18, (thin-walled, 1081 Head) 15, 24, 35 (thick-walled, 1082 Head). The built in master calibration for that tubing is then utilized. (Default = 13)

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 1-10 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 precision and minimize back splashing.

TIME DELAY: Defines the time interval, in seconds, between dispensing cycles. (Default = 1.0)

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 #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 1".

- EDIT 1 -		
Up	Down	Select
A	B	C

- Press "C" to select EDIT 1, 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

- Use the "B" key to scroll down to "PUMP TUBING" and press "C" to select. Use the "A" and "B" keys to choose the correct size tubing.

PUMP TUBING:		24
Inc	Decr	Select
A	B	C

- 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

- 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	P1=0.0
CV= 100ml	SC=001

Where DV=Dispensed Volume, CV=Cumulative Volume, SC=Sample Count # for the volume dispensed, will increment by one for each occurrence, and P1=Back Pressure (will be 0.0 if no Pressure Sensor is in use). The display will then alternate between this screen and the one before it.

- At this time it is appropriate to use the RE-CAL procedure mentioned the earlier Calibration section to fine tune the process. Once satisfied with the results, you can 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 the completion of each dispense for archival purposes. The following is an example of that data, and the abbreviations used.

5/27/4; 11:10; DILU2.30; Volume; Exec 1; Volume Set= 10.00ml; Count= 1; Rate=100.0%; CW, Tubing=13; Units=psi; Alarms: HP=2; Limits; HP=30.0; Slow Factor = 1.00

MT,	SC,	DV,	CV,	P1,	ST,
11:10:00	1	10.01	10.01	0.0	FINISH
11:12:00	2	10.02	20.03	0.0	FINISH
11:12:30	3	10.00	30.03	0.0	FINISH

MT=Military Time, SC=Sample #, DV=Dispensed Volume, CV=Cumulative Volume, P1=Pressure, ST=Pump Status

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

Tubing Size	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
CP-8 8RPM	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	NR
CP-120 160RPM	0.5 – 10	1.7 – 35.2	6.3 – 129	12.5 – 283	18.5 – 405	24.7 – 554	9 – 260	13 – 435	NR
CP-200 600RPM	2 – 34	8.6- 132	29 – 533	49 – 974	70 – 1048	103 – 1515	59-993	85-1348	111 – 2258
* Nominal Values									
Pump Head Model:	TANDEM 1081					TANDEM 1082			

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.

Start-up: “Dispensing by Weight”

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

SciLog P/N	Description	Quantity
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
100-2100B	Ohaus Balance w/cable	1 pc
400-420	Stand and Clamps	1 set
400-124	Silicone #24 Tubing	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 balance with the stand and clamps to the right of the LabTec. Position the dispensing tip over the appropriately sized container.
3. Connect the interface cable between the LabTec and the balance paying close attention to the labels on the cable and those on the rear of the LabTec. The “**Pump**” end of the cable is plugged into the connector on the LabTec labeled “**Balance**”. The “**Balance**” end of the cable plugs into the connector on the rear of the balance. (The cable may ship attached to the balance already, and if so, simply attach it to the LabTec.)
4. Plug in and power up both units, preferably the balance first.
5. 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.
6. 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.
7. 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, there will be a sticker on the unit explaining which Exec (1-5) program has been assigned to the aliquots. If you purchased both the LabTec and the balance from SciLog, all the settings for both units have been configured. If the display shows “Scale Error, Press any key” after trying to initialize the scale, check Setup: Scale: Scale Manuf., and confirm the proper choice for the balance you have purchased. If the scale was not purchased from SciLog, refer to the LabTec Manual, Section 7.10 or the addendum for instructions for setting up your scale.

Program Editing and Execution:

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 weight that you are dispensing. Consult Part B, Section 6.0, of the LabTec Manual to edit your weight dispensing parameters.

DISP. WEIGHT: Defines the weight to be dispensed in grams. For example, if you want to dispense 50.00 grams, use the “**Incr**” and “**Decr**” keys to scroll to 50.00 and press “**Select**”. (The default Disp. Weight =100.00gm)

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. Select Sniffle=0.3 (The default Sniffle = 0.0)

SLOW FACTOR: Defines the solution weight that is dispensed slowly at the end of the dispensing cycle to allow for stabilization of the scale. This should be 10-15% of the total weight if the aliquot is less than 50 gm. For aliquots larger than 50 gm, the default of 25 gm will usually work well. This can be adjusted based on the pump rate and the tubing size to avoid overshooting the target weight. (The default Slow Factor=25gm)

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 = 80%. 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 Weight will be dispensed 10 times. (Default = 1)

1. For this example, set a dispense weight of 200.00 gm. From the Mode Select screen, use “**A**” or “**B**” to go up or down to the “**Weight**” mode, and Press “**C**” to select it. The Weight mode will give you the following display:

- WEIGHT DISPENSE -		
Exec	Edit	Prime
A	B	C

2. Press “**C**” momentarily to prime the tubing and remove all the air from the system. Then press “**B**” to enter the Edit Menu, and “**C**” to select Edit 1.

- EDIT 1 -		
Up	Down	Select
A	B	C

3. Press “C” again to select “DISP WEIGHT”. Use the “A” key to increase the selected weight to 200.00 ml. Then press “C” to select.

WEIGHT		200.00gm
Inc	Decr	Select
A	B	C

4. Next, use the “A” and “B” keys again to scroll to “SNIFFLE” and press “C” to select. Use the “A” key to increase this to 0.3, and press “C” to select.

SNIFFLE:		0.3
Inc	Decr	Select
A	B	C

5. All other parameters will be left at their defaults. Press the “EXIT” key to return to the “Weight” 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 initialize the balance and show the following display:

WEIGHT SET:	200.00G
Press RUN when Ready	

6. Press the “RUN” key, or the Foot Switch if you are using one, and the LabTec will Tare the balance, dispense 200.00 gm, and show the following screen:

DW=199.95gm	FINISH
CW= 199.9gm	SC=001

Where **DW**=Dispensed Weight, **CW**=Cumulative Weight, and **SC**=Sample # for the weight dispensed, which 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 dispensing the needed number of aliquots.

Documentation:

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

5/27/4; 11:30; DILU2.30; Weight; Exec 1; Weight set= 25.00gm; Count= 1; Rate= 80.0%; CW; Units=psi; Alarms:HP=3; Limits; HP=30.0; Slow Factor = 25.00;

MT,	SC,	DW,	CW,	P1,	ST,
11:30:00	1	25.01	25.01	0.0	FINISH
11:31:00	2	25.02	50.03	0.0	FINISH
11:32:30	3	25.00	75.03	0.0	FINISH

MT=Military Time, SC=Sample #, DW=Dispensed Weight, CW=Cumulative Weight, P1=Pressure, ST=Status

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

Tubing Size	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
CP-8 8RPM	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	NR
CP-120 160RPM	0.5 – 10	1.7 – 35.2	6.3 – 129	12.5 – 283	18.5 – 405	24.7 – 554	9 – 260	13 – 435	NR
CP-200 600RPM	2 – 34	8.6- 132	29 – 533	49 –974	70 – 1048	103 – 1515	59-993	85-1348	111 – 2258
* Nominal Values									
Pump Head Model:	TANDEM 1081						TANDEM 1082		

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. #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 25gm for most aliquots, and adjusted up or down based on aliquot size and scale response time. Increasing it beyond 40gm will just slow down your dispense times without a corresponding increase in accuracy. Decreasing the Pump Rate will help if the default of 80% is causing too much backsplash that can't be eliminated in some other manner, or if the dispense weight is small.
- 4) When executing the "**Weight Dispense**" cycle, the pump begins at the specified pump rate. The LabTec will slow down during the last 25 gm (as defined by the "**Slow Factor**") to avoid overshooting the target weight. After dispensing 98% of the target weight, the LabTec stops momentarily. At this point, the balance will reach a steady state, and the LabTec will calculate the precise amount needed to reach the target weight. If the LabTec does not stop at the 98% of target weight point, it will have overshoot the target weight. Either increase the "**Slow Factor**", or decrease the chosen "**Pump Rate**" so that the pump performs in this manner.

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.

Start-up: “Dispensing Organic Solvents with a J.T. Baker CYCLE-TAINER[®]”

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

SciLog P/N	Description	Quantity
	Source of Compressed Nitrogen (secured to bench or wall)	1 tank
	J.T. Baker CYCLE-TAINER [®] of Solvent	1 pc
100-349DILU	LabTec MP-320 w/Model 122 Magnetic Gear Head	1 pc
400-539	Gas Regulator, SS Connectors, Valve Kit, Teflon Tubing	1 kit
080-059	Foot Switch (for remote on/off control of LabTec)	1 pc
400-420	Stand and Clamps	1 set
080-095A	Printer Kit (for documenting solvent use.)	1 kit

Hardware Setup:

1. Unpack all the components, visually identify and inspect for damage.
2. At the dispensing station, place the CYCLE-TAINER[®] on the floor, and secure it and the Nitrogen Tank to the bench or wall for safety reasons. Place the LabTec on the bench with the stand and clamps to its right. Connect and place the Printer and the Foot Switch in convenient locations.
3. Plug in and power up the LabTec and the Printer.
4. Make the connection to the Nitrogen tank as follows:
 - a. Install the gas regulator on the tank. Rotating the small handle clockwise closes the small shut-off valve, located between the regulator and the brass check valve. Position the tank and regulator so it can be read.
 - b. Connect the ¼” Teflon tubing (gas line) to the brass check valve. The other end of the tubing should **not** be connected to the quick-disconnect at this point. The tubing must be flushed with nitrogen beforehand.
 - c. Open the valve on the gas cylinder, the main gauge will read 2000psi or less depending on the status of the tank. Adjust the gas regulator to read 0.5psi (on the 0-5psi gauge) by turning the large knob on the regulator clockwise.
 - d. Open the small shut-off valve 2-4 turns. Gas will flow and flush any air from the Teflon tubing. While this is being flushed, attach the tubing to the quick-disconnect. **CAUTION:** While making this connection, be sure the quick-disconnect is free standing, and not attached to the CYCLE-TAINER[®].
 - e. If the CYCLE-TAINER[®] is pressurized, relieve the pressure with the relief valve until it is near zero. Close the relief valve on the container and attach the gas quick-disconnect to it. The pressure in the container should now be close to 0.5psi.

5. Make the fluid connection as follows:
 - f. Connect the liquid quick-disconnect to the CYCLE-TAINER[®]. The other end of the Teflon tubing is connected to the suction side of the Magnetic gear pump head located on the front of the LabTec.
 - g. Connect the remaining section of the Teflon tubing to the discharge side of the pump head. Connect the other end of the tubing to the SS check valve with the dispensing tip if not done so already, and secure it to the burette stand.
 - h. Place a container under the dispensing tip, and prime the system to remove the air from the fluid line by pressing the "PRIME" key on the front panel of the LabTec.

Program Editing and Execution:

When purchased, SciLog will calibrate and optimize your three most used dispense volumes for easy access. You will find them listed as EXEC1 through EXEC3 in the **Mode Select: VOLUME** Menu. If desired, any of the stored volumes can be changed from the front panel. (See Part B, Section 3.0 of the LabTec Manual) A single-key re-calibration feature assures high dispensing accuracy and precision. (See Part B, Section 5.0) For the following example, assume EXEC1 has been setup for 100 ml.

6. With the LabTec primed and ready to dispense, press the exit key until you reach the "**Mode Select**" screen, and use the "A" or "B" key to scroll to the **VOLUME** Mode. You will have the following display.

Mode Select	VOLUME
Up	Down
A	B

7. Press "C" to Select, and you will see the following:

-VOLUME DISPENSE-		
Exec	Edit	Cal
A	B	C

8. Press "A" to enter the Execute Screen, and use the "A" or "B" keys to Scroll to **EXEC 1**.

- EXEC 1 -		
Up	Down	Select
A	B	C

9. Press "C" to select and the LabTec will show the following display.

VOLUME SET: 100.00ml
Press RUN when Ready

10. Press the "RUN" key, or step on the Foot Switch, and the LabTec will dispense 100.00 ml, and show the following screen:

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

Where **DV**=Dispensed Volume, **CV**=Cumulative Volume, and **SC**=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 or the foot switch until you have finished the needed number of aliquots.

NOTE: If you purchased the LabTec with your aliquot sizes preprogrammed by SciLog, the calibration has been done for you. There will be a sticker on the unit explaining which Exec (1-10) program has been assigned to the aliquots, and you may proceed directly to dispensing. If a Factory Reset, under Setup: Pump, has been done, they will need to be re-assigned and calibrated. Your unit was shipped with a Performance Validation that lists the parameters that were originally used.

Documentation:

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

5/27/4; 11:10; DILU2.30; Volume; Exec 1; Volume Set= 10.00ml; Count= 1; Rate=100.0%; CW, Tubing=13; Units=psi; Alarms:HP=2; Limits; HP=30.0; Slow Factor = 1.00

MT,	SC,	DV,	CV,	P1,	ST,
11:10:00	1	10.01	10.01	0.0	FINISH
11:12:00	2	10.02	20.03	0.0	FINISH
11:12:30	3	10.00	30.03	0.0	FINISH

MT=Military Time, SC=Sample #, DV=Dispensed Volume, CV=Cumulative Volume, P1=Pressure, ST=Pump Status

LabTec Performance:

The following are typical LabTec performance results:

Dispensed Volume	Standard Deviation, SD	Relative Deviation, %	Pump Rate (% Of max.)	Slow Factor (1)	Dispense Time Per Aliquot (2)
10.00 ml	+/- 0.02	0.24%	25%	2 ml	1.5 sec.
50.00 ml	+/- 0.11	0.22%	50%	7 ml	4 sec.
100.00 ml	+/- 0.10	0.10%	80%	11 ml	5 sec.
500.00 ml	+/- 0.15	0.15%	100%	12 ml	11 sec.
1000.00 ml	+/- 0.40	0.04%	100%	12 ml	21 sec.

(1) For improved accuracy and precision, the pump slows down at the end of the dispensing cycle. The user-definable Slow Factor is expressed in terms of milliliters (ml).
 (2) The above data were generated with a LabTec MP-320 (Magnetic Gear Head, Model 122, Max. Delivery 3200 ml/min.)

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.

LabTec Specifications: Summary

Mechanical:

Dimension: 5.75" (14.6 cm) W x 8.5" (21.6 cm) H x 11"(27.9 cm) D

Weight: 14 lbs (6.4 kg).

Enclosure: Aluminum / Steel; Corrosion Resistant, Recessible Handle.

TANDEM™ Dual Channel Peristaltic Pump Head: Stainless Steel and Noryl Plastic, four (4) roller design (stainless steel). Passive pump tube retention; two stainless steel forks automatically engage pump tubing when the TANDEM pump head is closed. The **TANDEM Model 1082** (P/N:080-1082) is compatible with **thick-walled** tubing sizes 15, 24 & 35. Optionally, the **TANDEM Model 1081** (P/N: 080-1081) is available and is compatible with **thin-walled** pump tube sizes 13, 14, 16, 25, 17 & 18.

TANDEM Pump Performance: 0.03 ml/min. to 2000 ml/min. per channel, 30 psi for continuous pumping, and 40 psi for intermittent pumping dependant upon motor/head/tubing combination.

Piston and Magnetic Gear Heads are also available, as your application requires.

Electrical:

Power: 110-120 / 220-240 VAC, 60 / 50 Hz, 75 Watts; double fused, Fuse Rating: TIAL 250V (CE: IR35A, 250VAC)

Motor: Variable speed, 600 RPM max. at 30 VDC, 3.8 Amps; optically encoded, servo – controlled. 8, 160, 450 and 3400 RPM motors available upon request, head dependent.

Operating Range: 4 to 40° C, 100% Humidity.

Motor Encoder: 100 lines per motor revolution.

I/O Ports:

1. First serial port labeled “Serial Port” or “Balance”, Male DB9 connector.
2. Second serial port labeled “Printer”, Female DB9 connector.
3. Phone jack connector labeled “Foot Switch” for remote On / Off control of LabTec via foot switch.
4. DB15 labeled “ Valve”, output for control of optional Fraction Collector.
5. DB37 labeled “I/O”, preferred connection for Footswitch, input for Pressure Sensor.

Display: Two line LCD, 20 characters each, back-lit.

Data Entry: Membrane keyboard with auditory feedback.

Software:

- Main menu with the following six (6) operational modes.
- Weight Ratio Dispensing: Auto-weighing and diluting of samples with pressure monitoring.
- Volume Dispensing: Programmable batch dispensing by volume with pressure monitoring.
- Weight Dispensing: Programmable batch dispensing by weight with pressure monitoring.
- Setup: Selection of user preferences and interface options.
- Manual: Simple pump control with pressure monitoring. no alarms.
- Serial: Remote control of LabTec pump via PC using RS-232 connection.

Part A: Hardware

1.0 Hardware Overview:

The LabTec has been designed to automate batch-dispensing of liquids from the low milliliter (0.5 ml) to liter range. The LabTec allows you to optimize the dispensing rate per aliquot as well as the dispensing precision & accuracy, while monitoring pressure if a filter is in use. A High Pressure Alarm may be set to stop the pump when a user-defined value has been achieved. The LabTec can be used for either sterile or non-sterile dispensing applications as well as for aqueous and non-aqueous batch dispensing.

In automated batch dispensing, three (3) important parameters, namely, dispensing rate, precision and dispensing accuracy need to be considered. The LabTec has typical precision & accuracy levels consistently in the 0.3% to 1.0% range, however the actual precision and accuracy levels are somewhat dependent on the dispensing speed or pump rate.

In general, the higher the dispensing rate, the poorer the dispensing precision and accuracy. Conversely, the dispensing precision and accuracy generally will improve with lowering of the pumping rate.

The LabTec has a unique feature, namely the **Slow Factor**, which allows you to optimize the dispensing accuracy and precision while maximizing the dispensing rate. The Slow Factor defines the solution volume or weight that is dispensed slowly at the end of the dispensing cycle.

For example, if the Dispensed Volume is 100 ml, then Slow Factor is selected to be approximately 10% or 10ml. Thus, when initiating the dispensing cycle, the first 90ml of the batch volume will be dispensed at a high pump rate (e.g. 100%), however during the last 10ml the LabTec will rapidly slow down to avoid overshooting the target volume. The Slow Factor, as well as the LabTec pump rate is user-defined. Consult the Parameter Selection Tables (see Part C of this manual) for your optimal pump settings.

Another unique feature of the LabTec is the **Sniffle** function, which is implemented at the end of each dispensing cycle. The Sniffle function consists of a brief pump reversal after dispensing has been completed to suck in the droplet that typically hangs from the dispensing tip. The Sniffle function allows you to avoid carry-over between dispensing cycles and provides for a cleaner dispensing environment. The Sniffle function is user-definable and can be deactivated.

The LabTec has three (3) dispensing modes, namely, Weight Ratio Dispensing, Volume Dispensing and Weight Dispensing:

The **Weight Ratio Dispensing** mode automates the weighing and diluting of samples. The LabTec will tare the balance after the sample container has been placed onto the balance, the sample to be diluted is then placed into the container and the sample weight is stored and displayed by the LabTec. The LabTec, based on a user-defined sample to diluent weight ratio, then automatically dispenses the diluent.

For example, if the sample weight happens to be 10.00 grams and the user-selected weight ratio is 9.00, then the LabTec will dispense 90.00 grams of diluent to provide a 10-fold dilution by weight. Regardless of the sample weight, the desired dilution ratio will be maintained. Only an approximate sample weight needs to be placed into the sample container; careful weighing of the sample as required by volumetric dilution procedures is not necessary with the weight ratio method.

In the **Volumetric Dispensing** mode, the LabTec dispenses user-programmable batch volumes. In this operational mode, the LabTec utilizes built-in factory calibration curves. The calibration is valid for a given pump head and motor combination based on the pump tubing chosen by the user.

A **Re-Cal** feature is available from the front panel keyboard to fine-tune the built in calibration, and to compensate for pump output changes due to peristaltic pump tubing wear. Both the Slow Factor and the Sniffle functions are available in the Volumetric Dispensing mode.

In the **Weight Dispense** mode, the LabTec is connected to an electronic, top-loading balance while dispensing solution batches by weight. In this operational mode, the LabTec does not require calibration since dispensing by weight involves an already calibrated balance. Typically, dispensing by weight is somewhat slower than dispensing by volume. The main reason for this slow-down lies with the limited response speed of electronic balances. Both the Slow Factor and the Sniffle functions are available in the Weight Dispensing mode.

Sterile Dispensing: When sterile liquids need to be dispensed, two (2) pump dispensing options are available to you.

First, the LabTec (P/N: 100-1682DILU) mounted with the TANDEM peristaltic pump head is the method of choice when dispensing pre-sterilized solutions. Utilizing autoclavable, thick-walled Silicone or PharMed pump tubing (see Parts List) and SciLog's Autoclavable Diluent Sterilization (ADS) System (P/N: 400-490, 20 liter ADS System), sterility of the liquid can be readily maintained during the dispensing process. The sterilized solution comes only in contact with the sterilized pump tubing.

Second, the LabTec (P/N: 100-336DILU) mounted with a Magnetic Gear Pump Head (Model 201) can be used together with a 0.2 μm filter cartridge, for in-line filter-sterilization of solutions while dispensing. This method avoids the need for pre-sterilizing, i.e. autoclaving of solutions; a significant savings both in labor and energy. Here the Magnetic Gear pump is recommended because of the high output capacity (3.8 liters per minute).

In-line filter sterilization is recommended when large batch volumes of sterile solutions are needed, e.g. dilution of combined samples in Salmonella bacteriological testing which typically require 2-4 liters of sterile diluent per sample.

In-line filter sterilization is also recommended for large volume dispensing applications in media kitchens. Utilizing large surface area filtration devices, i.e. 0.2 μm Sartobran "P" Capsule (P/N: 400-489), 1500 to 2000 liters of media can be

dispensed with a single filter cartridge. However, the actual filtration capacity is heavily dependent on the particulate load of the solution to be filtered.

For occasional or small-volume, sterile dispensing applications, a 0.2 µm Sartobran 300 filter cartridge (P/N: 400-488) is recommended; this sterilizing filter has a filtration capacity of approximately 50 liters.

Dispensing of Non-aqueous Liquid: When dispensing non-aqueous solutions, the Magnetic Gear pump head is the preferred pump head option. However, attention must be given to material compatibility. The Magnetic Gear housing material consists of 316 stainless steel. If the dispensing solution contains particulates, a 5-micron inlet filter is recommended to protect the gears from wear and abrasion.

Pressure Monitoring and Alarms: The LabTec can monitor the backpressure in your system when a sterilizing filter is being used with a disposable pressure sensor and amplifier module. A High Pressure Alarm can be enabled to Stop Pump or Alarm Only at a user-defined value.

Remote Volume and Weight Dispensing: The LabTec can be controlled in limited fashion via the HyperTerminal Mode of your PC. Dispense Amounts and Start/Stop of dispense cycle can be entered directly in an active and configured HyperTerminal window. Other Dispense Parameters like Pump Rate, Slow Factor, Count, Time Delay, Sniffle and Slow Factor must be entered locally via the –EDIT 1- Mode of the LabTec. –EXEC 1- references the Calibration –CAL 1- for volumetric dispensing. In order for different volumes sizes to be accurately dispensed, the calibration –CAL 1- should be performed at the high value of the range and the dispense parameters (i.e. Pump Rate) should be optimized for all aliquots in the range.

2.0 Front Panel: Data Entry & Display



The front panel consists of a user interface, which includes an alphanumeric display and a membrane keypad to select operational modes and alarm settings. The display is a two line, 20 characters each, liquid crystal display (LCD). The display is backlit to allow easy viewing over a wide range of lighting conditions.

The lower line on the LCD is used to signify the function of the “soft keys” marked “A”, “B” and “C”. The “soft key” current labels are displayed in the lower line of the LCD. If you press these keys, then the function displayed above it will be performed.

The main keypad consists of eight “hard” keys whose function does not change. These keys are used for basic control and programming of the LabTec. The basic key definitions are:

RUN	Executes the selected operational mode and starts pump.
STOP	Interrupts current operational mode and stops pump.
AMOUNT	Short-cut key to “Dispensed Volume”, “Dispensed Weight” or “Weight Ratio” Edit parameter, depending on the selected operational mode.
PRIME	Pump runs at 100% speed as long as key is pressed, useful for initial priming of tubing and pump head.
COUNT	Short-cut key to “Sample Count”, i.e. number of times the selected volume/weight is to be dispensed, used when multiple batches of the same weight or volume are to be dispensed repeatedly.
DELAY	Short-cut key to “Time Delay”, defines time interval between dispensing cycles when multiple batches of the same volume / weight are to be dispensed
RE-CAL	Short-cut key to LabTec re-calibration, used in the Volume Dispensing mode, AV (<u>A</u> verage <u>V</u> olume) parameter will adjust the stored calibration value.

Two LED’s are also on the front panel, just to the left of the main keypad. These indicate the current pump status. A green light indicates the pump is in motion; the red light indicates that the pump has stopped.

3.0 Back Panel: Interface Options

The LabTec back panel provides interfacing ports for:

3.1 Printer Port:

The SciLog printer (P/N: 080-095) is connected to the LabTec via Serial Port 2 labeled “**Printer**”. You need a printer cable (P/N: 080-096) to make the connection. You may also use this port to dump the data to a PC for archival. A SciLog RS-232 cable (P/N: 080-073) is needed for this connection. (See HyperTerminal Settings)

3.2 Balance Port:

The Serial Port 1 which is either labeled as “Balance” or “Serial Port” allows you to interface with a number of different electronic balances: i.e. Mettler, Ohaus, and Sartorius top-loading balances. The balance port (Female DB9) is located below the DB37 labeled “I/O”. The following balance cables are required for interfacing with the LabTec:

Mettler: PM Balances	P/N: 080-067
PGS or PRS Balances	P/N: 080-067PGS
Viper Balances	P/N: 080-067PGS
Ohaus: “Voyager”, “Explorer” & GT, “Precision Advanced”	P/N: 080-066
Ohaus: IP Series High Capacity,	P/N: 080-067
Ohaus: Adventurer Pro	P/N: 080-067PGS
Sartorius: MC-1, EA, EB Series Balances	P/N: 080-068

In the LabTec **Setup: Scale** mode, select the balance manufacturer; the LabTec will automatically implement the correct communications parameters. **Check that the proper communications parameters are also implemented in the balance you are using (see Part B of this manual).**

3.3 I/O Port:

37 pin DB connector, interfaces with SciLog **Foot Switch** (P/N: 080-059) and allows remote Start / Stop control of the LabTec. Is also used as the interface for the optional Fraction Collector and is the location for the Pressure Amplifier used with the Disposable Pressure Sensors.

4.0 TANDEM™ Dual Channel Peristaltic Pump Head:

The TANDEM peristaltic pump head is specifically designed for use with the LabTec system. The SciLog TANDEM pump heads (models 1082 & 1081) will provide you with rugged reliability as long as common sense maintenance and good quality pump tubing are used. For most dispensing applications, you should be using the TANDEM 1082 (P/N: 080-1082) together with either #24 or #15(thick-walled) Silicone pump tubing.

Please note, for most dispensing application in the 10 ml to 500 ml range the **TANDEM 1082** together with thick-walled, #24 Silicone tubing is the most appropriate and useful pump head / tubing combination. Use #15 thick-walled Silicone pump tubing for dispensing applications in the 2.5 to 10 ml range. For dispensing applications below 2.5 ml, the **TANDEM 1081** (P/N: 080-108) together with thin-walled tube sizes (#13, 14, 16) is the most appropriate pump head / tubing combination.

The TANDEM pump head is driven by a 600 RPM, high-torque motor. The pump motor is optically encoded and servo-controlled, thus the TANDEM pump head will maintain a constant output over a wide range of dispensing conditions.

However, when the pump head requires excessive torque because of pump tube failure or “freezing” of the pump head, then the LabTec control software will recognize this condition and go into a stand-by mode, the pump motor is turned off and the following message is displayed:

CHECK YOUR PUMP HEAD
Press Any Key

Before continuing with your pumping application, remove the defective pump head / tubing and either clean or replace with a functional pump head. This feature (PumpSense™) has been implemented by SciLog to protect your pump motor and electronics.



NOTE: There is nothing wrong with the LabTec controller when you see this display. The problem lies with the pump head and /or pump tubing you are using.

When you “Press Any Key” to leave the stand-by mode, you will enter the Main Menu. After you check and replaced your pump head / tubing, you may re-initialize your application.

4.1 TANDEM Pump Head Installation:

1. Identify the front and back of the TANDEM. Two 8-32 mounting cap screws, as well as the pump shaft tang extend from the back of the TANDEM pump head.
2. Facing the front of the TANDEM, open the pump head by moving the black loading lever 180° to the left. The upper and lower pump shoe will move in opposite directions, thereby exposing the inside of the upper and lower pump shoe channels.
3. With the TANDEM pump head completely opened, locate the mounting holes for the two 8-32 cap screws inside the lower pump channel.
4. On the front panel of the LabTec, locate the mounting holes and the slotted pump head coupler.
5. Before fastening the TANDEM, align the two mounting screws and pump shaft tang of the TANDEM with the holes and slotted coupler of the LabTec front panel mounting plate.
6. Make sure the TANDEM pump shaft tang is properly seated in the mating slot of the pump head coupler, before fastening the TANDEM to the front panel of the LabTec.

4.2 Peristaltic Pump Tubing / Rate Selection:

For most sterile, liquid dispensing applications larger than 10.00 ml, the TANDEM 1082 together with thick-walled, #24 pump tubing is the most useful pump head/tube combination.

For dispensing applications in the 2.5 ml to 10 ml range, the TANDEM 1082 together with #15 thick-walled-walled pump tubing is the most useful pump head/tubing combination.

Approved Tubing Size		13	14	16	25	17	18	15	24	35
	Silicone Part #	400-113	400-114	400-116	400-125	400-117	400-118	400-115	400-124	400-135
	PharMed Part #	400-313	400-314	400-316	400-325	400-317	400-318	400-315	400-324	400-335
Your Motor	Pump Rate Range (Nominal values, +/-5%)	ml/min	ml/min	ml/min	ml/min	ml/min	ml/min	ml/min	ml/min	ml/min
<input type="checkbox"/>	CP-8 8 RPM	0.03 - 0.45	0.1 - 1.6	0.4 - 6.4	0.9 - 12.6	1.1 - 18.3	1.7 - 24.3	0.5 - 13	0.6 - 20	---
<input type="checkbox"/>	CP-120 160 RPM	0.5 - 10	1.7 - 35	6.3 - 129	12.5 - 283	18.5 - 405	24.7 - 554	9.6 - 240	14 - 412	---
<input type="checkbox"/>	CP-200 600 RPM	2 - 34	8.6 - 132	29 - 533	49 - 974	70 - 1048	103 - 1515	59-993	85-1348	111 - 2258
Pump Head Model:		TANDEM 1081						TANDEM 1082		



Note: *Thick-walled pump tubing #24 & #15 (requires TANDEM 1082 pump head) typically provides better dispensing precision & accuracy than thin-walled pump tubing.*

Differences in pump tube formulation / manufacture, as well as pump tube wear over time may cause the LabTec pump output to change. Thus for very high pump rate accuracy you may want to re-calibrate the LabTec with your particular pump tubing in place. Recalibration of the LabTec pump is very easy and straightforward, consult Part B.

4.3 Pump Tube Installation:



WARNING: Do NOT mount or dismount the TANDEM pump head while the LabTec is powered. Do NOT change pump tubing while the LabTec is powered.

1. Open the TANDEM pump head by moving the black loading lever 180° to the left. If you are going to use the upper pump channel, slip the tubing into the upper channel; this is over the pump roller cage. If the lower pump channel is used, feed the tubing through the lower channel; this is under the pump roller cage.



WARNING: When using both upper and lower pump channels simultaneously, the same type of tubing should be used in each channel.

2. Lock the tubing in place by pushing the loading lever 180° to the right. The tube retainer spring will automatically place the correct tension on the pump tubing to prevent tube “walking”.

3. With the TANDEM pump head closed, lightly pull the two ends of the tubing in opposite directions and away from the pump head. This pulling action insures that the pump tubing is taut and within the pump channel.

4.4 Pump Tube Replacement:

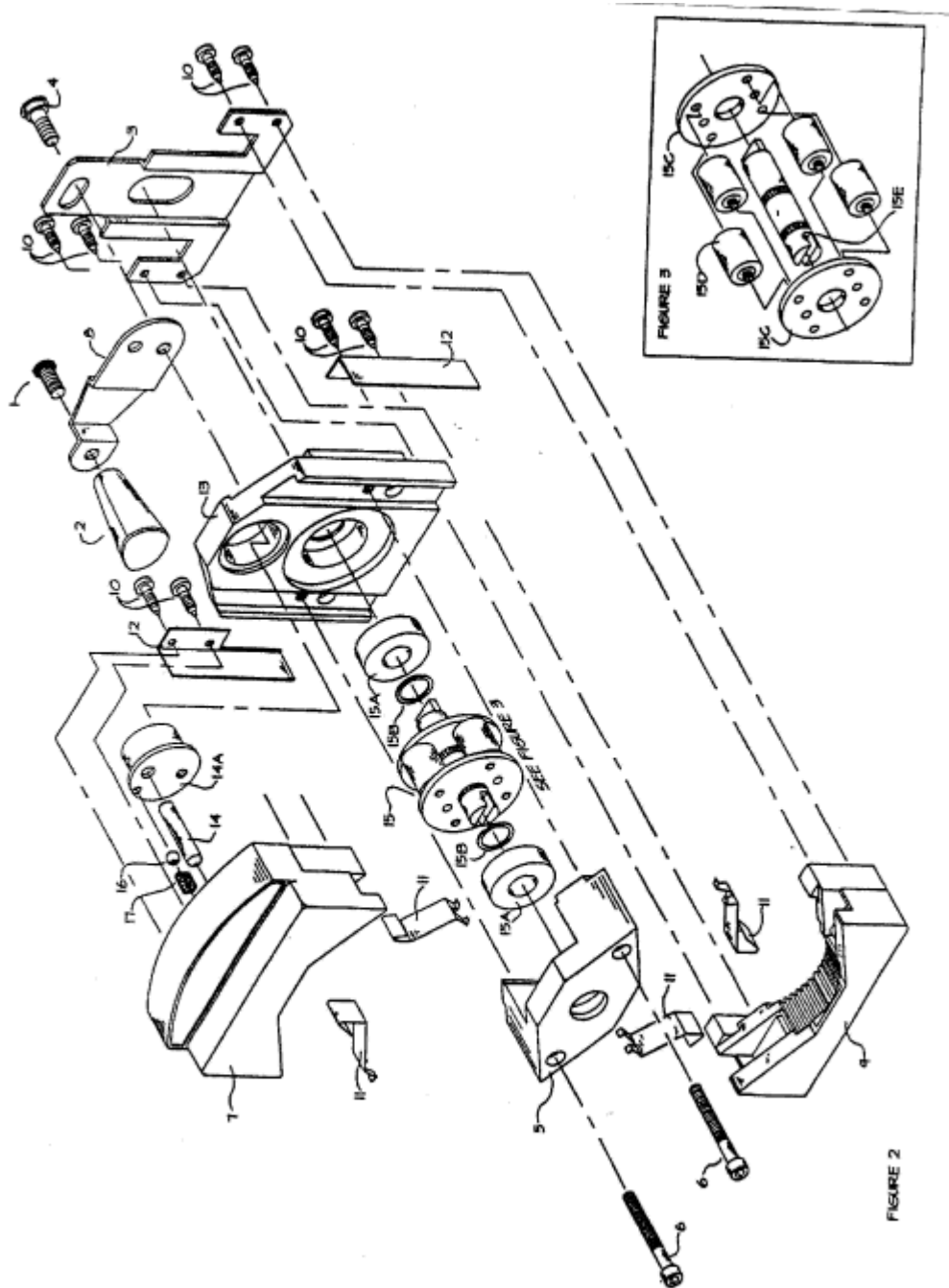
1. The pump tubing section located in the TANDEM pump head should be advanced at regular time intervals, i. E. daily, if the LabTec is heavily used.



WARNING: When advancing pump tubing, the used pump tube section must be moved to the pump discharge side, i.e. dispensing side. The used pump tube section is weakened and tends to collapse when placed on the suction side of TANDEM pump head.

2. When you advance or replace the pump tubing, *break-in the new pump tube section by letting the pump run for a few minutes before attempting RE-CAL.* The pump output will have stabilized during the break-in period, thus your calibration will be more accurate.

4.5 TANDEM™ Dual Channel Peristaltic Pump: Parts Identification



4.6 TANDEM™ Parts List:

Contact SciLog Inc (1-800- 955-1993) to order replacement parts, mention model and serial number of pump head (either TANDEM 1081 or TANDEM 1082) on which the part will be used.

Item	SciLog P/N	Description:
1	500-330	Pump Lever Stud (1)
2	500-320	Pump Lever Knob (1)
3	500-240	Plate, Lower Cam (1)
4	500-210	Cam, Lower Pump Shoe (1)
5	500-410	Bearing Block, Front (1)
6	500-411	Bearing Block Cap Screw (2)
7	500-420	Pump Shoe, Upper (1)
8	500-310	Lever, Pump (1)
9	500-430	Pump Shoe, Lower (1)
10	500-452	Pump Shoe Screw (8)
11	500-440	Tube Holding Fork (4)
12	500-451	Pump Shoe Bracket (1)
13	500-450	Pump Base (1)
14	500-220	Cam, Upper Pump Shoe (1)
14A	500-230	Cam Shaft/Cylinder (1)
15 (Fig. 3)	500-100	Assembly, Roller Housing, 1081
	500-110	Assembly, Roller Housing, 1082
16	500-250	Cam Shaft, Ball (1)
17	500-260	Cam Shaft, Spring (1)
18	500-412	Pump Body Inserts (2)

5.0 Magnetic Gear Pump Head: Model 201

The LabTec with a Magnetic Gear Pump Head is recommended for large-volume dispensing applications. When used together with a 0.2 µm Sartobran “P” Capsule, in-line filter sterilization is very cost effective for aseptic dispensing / filling applications.

The Model 201 magnetic gear pump head is an external type gear pump, which produces a pulse-less flow. The spur gears rotate and intermesh inside the pumping chamber, thereby creating a pressure differential between the inlet and outlet of the pump.



NOTE: An in-line check valve (P/N: 400-530) must be installed on the discharge side of the 201 pump head in order to avoid back-siphoning of solution between dispensing cycles and avoid losing prime by allowing the pump head to remain dry. Make sure that the dispensing tip is located above the solution reservoir level.



WARNING: The rotating gears of the 201 magnetic gear pump head generate significant shear, thus shear-sensitive solutions, i.e. enzyme or protein preps, should be dispensed with the TANDEM peristaltic pump.

Only clean fluids, without particulates or abrasives should be dispensed with the 201 magnetic gear pump head. Any particulates or abrasives will rapidly wear down the rotating gears and will decrease pumping capacity. A gear replacement kit (P/N: 080-320) is available from SciLog.



WARNING: Dispensing liquids with a viscosity greater than 1000 centipoise should be avoided. Such high viscosity can cause magnetic de-coupling. Reduce the LabTec pump speed when dispensing fluids with viscosity greater than 300 centipoise.

Magnetic de-coupling occurs when the torque limit of the driving magnet has been exceeded. Once de-coupling occurs, the driving magnet (this is the magnet fastened to the motor shaft) turns by itself while the driven magnet (inside the pump head) is motionless. Magnetic coupling automatically re-align and re-couple.



WARNING: When your dispensing task is completed, flush distilled water through the 201 pump head for approximately two (2) minutes or until the water appears clear. Do not leave your dispensing solution in the pump head overnight.

Mag 122, 120, and 040 heads are also available if you need slower flow rates, the same comments above apply.

6.0 FMI Pump Heads: General Information

The LabTec FM-420 and FM-520 pumps use rotating, reciprocating piston pump heads of various sizes. In a reciprocating pump, the rotating piston moves to and fro inside a cylinder; sucking in fluid at the inlet while compressing and releasing the fluid at the outlet. Flow rates for reciprocating pumps are varied by changing either the **frequency (motor speed)** or the **stroke length**. The FMI pump heads are excellent for precise fluid dispensing in non-sterile applications.



NOTE: *Piston pumps should not be used for pumping biological fluids or liquids containing biological cells or cellular components. Piston pumps generate high local shear in the fluid and produce strong mechanical agitation, which may destroy cells and fragment large molecular weight components, such as DNA or large protein molecules.*

6.1 FMI Pump Heads: Construction / Motors / Pump Rates

LabTec FM-420 Model: The LabTec FM-420 comes with a **450 RPM** optically encoded, servo-controlled motor and a FMI piston pump head. Materials of Construction: Pump head fittings are either made out of Kynar or Tefzel. Pump piston and body are made out of ceramic. **Exception:** RHOO pump head model has stainless steel (1/8"ID) piston. "LF" designation refers to a "Low Flow/Low Dead Volume" pump connection, utilizing 1/4 - 28 HPLC fittings. All FMI piston pump heads have a maximum pressure rating of 100psi.

Pump Head Model:	Max. RPM:	Pumping Range:
RHOO, 0 – 0.025 ml/stroke	450RPM	0.06 – 11.2 ml/min.
RHO, 0 – 0.050 ml/stroke	450RPM	0.12 – 22.5 ml/min.
RH1, 0 – 0.10 ml/stroke	450RPM	0.24 – 45.0 ml/min.



NOTE: *The cited pumping ranges are based on the following assumptions: Maximum pump rate = (Max. Stroke Volume) x (450RPM); with the stroke vernier setting at 450. Minimum pump rate = Maximum pump rate / 180; stroke vernier setting at 50 and pump motor speed at 22.5 RPM (Stalling Speed)*

LabTec FM-520 Model: The LabTec FM-520 comes with a **3400 RPM**, optically encoded, servo-controlled motor and a FMI piston pump head. Materials of Construction: Pump head fittings are either made out of Kynar or Tefzel. Pump piston and body are made out of ceramic. **Exception:** RHOO pump head model has stainless steel (1/8"ID) piston. "LF" designation refers to a "Low Flow/Low Dead Volume" pump connection, utilizing 1/4 - 28 HPLC fittings. All FMI piston pump heads have a maximum pressure rating of 100psi.

Pump Head Model:	Max. RPM:	Pumping Range:
RHOO, 0 – 0.025 ml/stroke	3400RPM	0.50 – 85.0 ml/min.
RHO, 0 – 0.050 ml/stroke	3400RPM	1.00 – 170 ml/min.
RH1, 0 – 0.10 ml/stroke	3400RPM	2.00 – 340 ml/min.



Note: *The cited pumping ranges are based on the following assumptions: Maximum pump rate = (Max. Stroke Volume) x (3400RPM); with the stroke vernier setting at 450. Minimum pump rate = Maximum pump rate / 180; stroke vernier setting at 50 and pump motor speed at 170 RPM (Stalling Speed)*

6.2 FMI Pump Heads: Installation

The following are directions to mount a FMI pump head on a LabTec controller. If you purchased the LabTec controller with a FMI pump head already mounted, you can disregard these directions. However, if you purchased your FMI pump head separately, you will need to mount the pump head. The same instructions should also be used when dismounting an old pump head, which you may want to replace with a new one:

1. Disconnect the power cable from the LabTec.
2. Remove the two screws (6-32 x 1/2") from the underside of the LabTec. These hold the motor mounting plate in place.
3. Remove the four (6-32 x 3/8") Philip screws from the faceplate at the front of the LabTec.
4. Carefully remove the pump / motor subassembly from the LabTec controller. Disconnect the motor cable (cable connecting the motor to the electronic board) before completely removing the pump / motor assembly from the LabTec controller.
5. Mate the FMI pump head shaft to the flexible pump motor coupling. Fasten the shaft to the coupling (the set screw on the coupling requires a 3/32 hex bit).
6. Fasten the FMI pump head with two screws (8-32 x 1/2") to the back of the faceplate (use a right angle ratchet wrench).
7. Reconnect the pump motor cable and carefully place the pump / motor assembly back into the LabTec controller.
8. Fasten the motor mounting plate to the underside of the LabTec with the two screws removed in Step 2.
9. Fasten the faceplate of the pump/motor assembly to the chassis with the four screws removed in Step 3.
10. Test the LabTec with the FMI pump head in place. Make fluid connections to the pump head. Do not let the pump head run dry without fluid for any prolonged period of time.

6.3 FMI Pump Heads: Stroke Volume Adjustment

The knurled Adjustment Ring (black decal with markings, not the small knurled knob) on the FMI pump head controls the stroke length and thus controls the output per pump stroke. The Adjustment Ring is factory set at “200,” however, by turning the Adjustment Ring clock-wise, the stroke length and the pump output are reduced. However, do not turn the Adjustment Ring below “50”. When turning the Adjustment Ring counter clock-wise from “50” to “450”, the maximum stroke length / volume is obtained. Do not turn the Adjustment Ring above the “450” setting. The maximum stroke volume for the RHOO pump head is 25µl, for the RHO pump head the stroke volume is 50µl while the RH1 pump head has a maximum stroke volume of 100µl.



NOTE: Each graduation on the knurled Adjustment Ring (black decal with markings) represent an adjustment of 1/450th of the maximum stroke volume: 0.055 µl for the RHOO, 0.111 µl for the RHO, 0.222 µl for the RH1 pump head.

6.4 FMI Pump Heads: Connectors and Tubing Selection

For the LabTec FM-420 and FM-520 with ¼” inlet and outlet ports, use ¼” OD Tubing. For the LabTec FM-420 with “LF” (Low Flow/Low Dead Volume) ports, use ¼-28 HPLC ferrules & nuts, 1/8”OD x 1/16 ID or 1/16 OD x 1/32 ID Teflon tubing.

6.5 FMI Pump Heads: Cleaning

Cleaning of Pump Head: Routine flushing with solvent **before** shutdown will suffice for most applications. Set the LabTec for maximum pump speed, let the pump run until solvent appears clear at discharge port. This should be for a minimum of 2 minutes. **Do not leave material in the pump head overnight. Preventive maintenance is very valuable and ensures a long operational pump life.**



NOTE: Ceramic piston / cylinder sets are sensitive to neglect and may “freeze” if allowed to dry out without adequate cleansing. Fill a loop of flexible tubing with fluid that will thin or neutralize the last fluid pumped. Then connect one end of the tube to the pump suction port, the other to the discharge port. With the loop positioned above the pump head, the ceramic surfaces and seal areas stay moist and mobile for extended idle periods.

However, if a piston freezes in the cylinder, **Do Not Force It Free!** Be gentle. Try to remove the pump head from the base assembly so the whole pump head can be soaked in a suitable solvent. If the head is not conveniently removable, the tube loop discussed in the previous paragraph may permit solvent to dissolve the “frozen” residue in reasonable time.

6.6 FMI Pump Head: Chemical Compatibility

FMI pump heads are well known for their robustness and overall chemical compatibility with many process fluids. The materials used in manufacturing FMI pump heads are inert to most chemicals, however, the following exceptions must be observed:

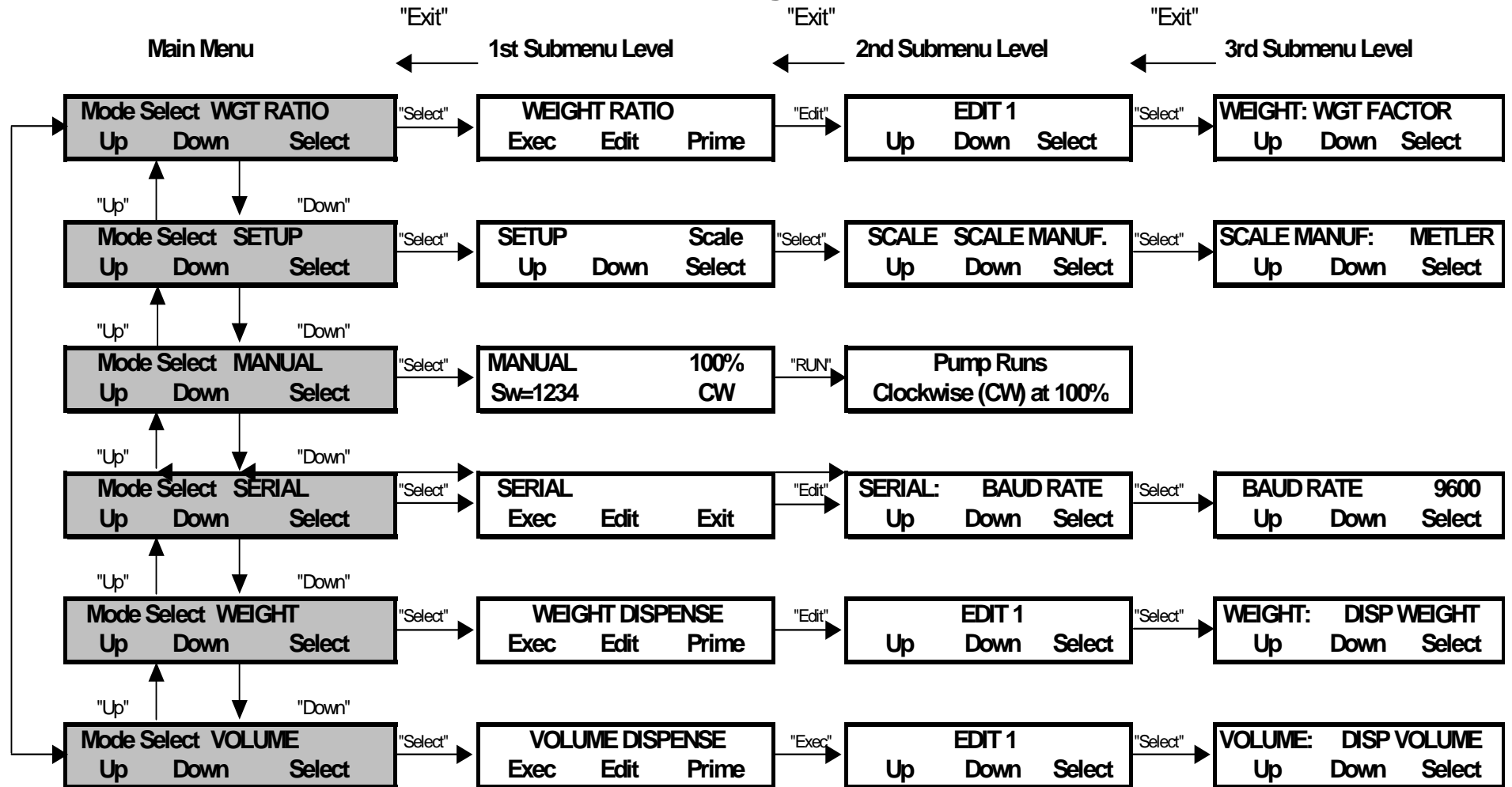
1. When pumping: *Toluene, Methyl ethyl ketone, Acetone, Methanol, Ethanol, Hexyl Alcohol, Isobutyl Alcohol or Isopropyl Alcohol*, FMI pump heads with Tefzel (ETFE) housings must be used: RH1-CTC; RHO-CTC; RHOO-CTC. the “T” in CTC designates Tefzel housing.
2. **Tefzel** has also excellent chemical resistance to most acids, bases or solvents.
3. **Tefzel** pump heads can be used in pump applications *not* exceeding 90°F and 100psi.
4. For pump applications involving fluids *above* 90°F, FMI pump heads with Kynar (PVDF) housings must be used: RH1-CKC, RHO-CKC, or RHOO-CKC, the “K” in CKC stands for Kynar.
5. **Kynar** has good chemical resistance to most fluids; however, Kynar pump heads must not be used with Acetone, Ketones or Esters.

6.7 FMI Pump Heads: Viscosity Effects

The LabTec FM-420 is capable of pumping high viscosity fluids. *When pumping high viscosity liquids, you should always use large bore tubing (1/4” OD), slow pump rates and large stroke volumes (set knurled Adjustment Ring to “400”) in order to avoid pump cavitation.*

The LabTec FM-420 together with either a RHO or RH1 pump head, can handle fluid viscosities up to 2000 cps, and fluid viscosities up to 5000 cps when the fluid reservoir and feed line connected to the pump inlet port are pressurized.

LabTec Software Configuration Overview



Part B: Software

1.0 Software Overview: Main menu

The main menu of the LabTec consists of **six (6) operational modes** as shown on the previous page. By using the “Up” and “Down” keys, you can readily scroll through the main menu. You press the “Select” key to enter a chosen operational mode, i.e. **WGT RATIO** (Weight Ratio). By pressing the “Select” key you are also entering the 1st sub mode level, which provides access to the “Exec” and “Edit” functions. In the “Edit” sub mode, you select the parameters for your dispensing application. The LabTec has three (3) dispensing modes, namely, Weight Ratio Dispensing, Volume Dispensing and Weight Dispensing:

WGT RATIO: In the Weight Ratio Dispensing mode, the LabTec is connected to an electronic, top-loading balance and allows automatic sample weighing and dilution: The LabTec will tare the balance after the sample container has been placed onto the balance, the sample to be diluted is then placed into the container and the sample weight is stored and displayed by the LabTec. The diluent is automatically dispensed by the LabTec based on a user-defined sample to diluent weight ratio. Monitoring and Alarm of backpressure is available in this mode.

VOLUME: In the Volume Dispensing mode, the LabTec dispenses user-programmable volumes. In this operational mode, the LabTec utilizes factory installed master calibration curves. These calibrations are valid for a given pump head, motor and pump tubing combination. Typically the calibration is carried at 100% pump speed although a lower pump speed setting may be advisable for smaller volumes. A **Re-Cal** feature, available from the front panel keyboard, is used to fine-tune this calibration, and to compensate for pump output changes due to peristaltic pump tube wear. Both the Slow Factor and the Sniffle functions are available in the Volumetric Dispensing mode, as well as Monitoring and Alarm of backpressure

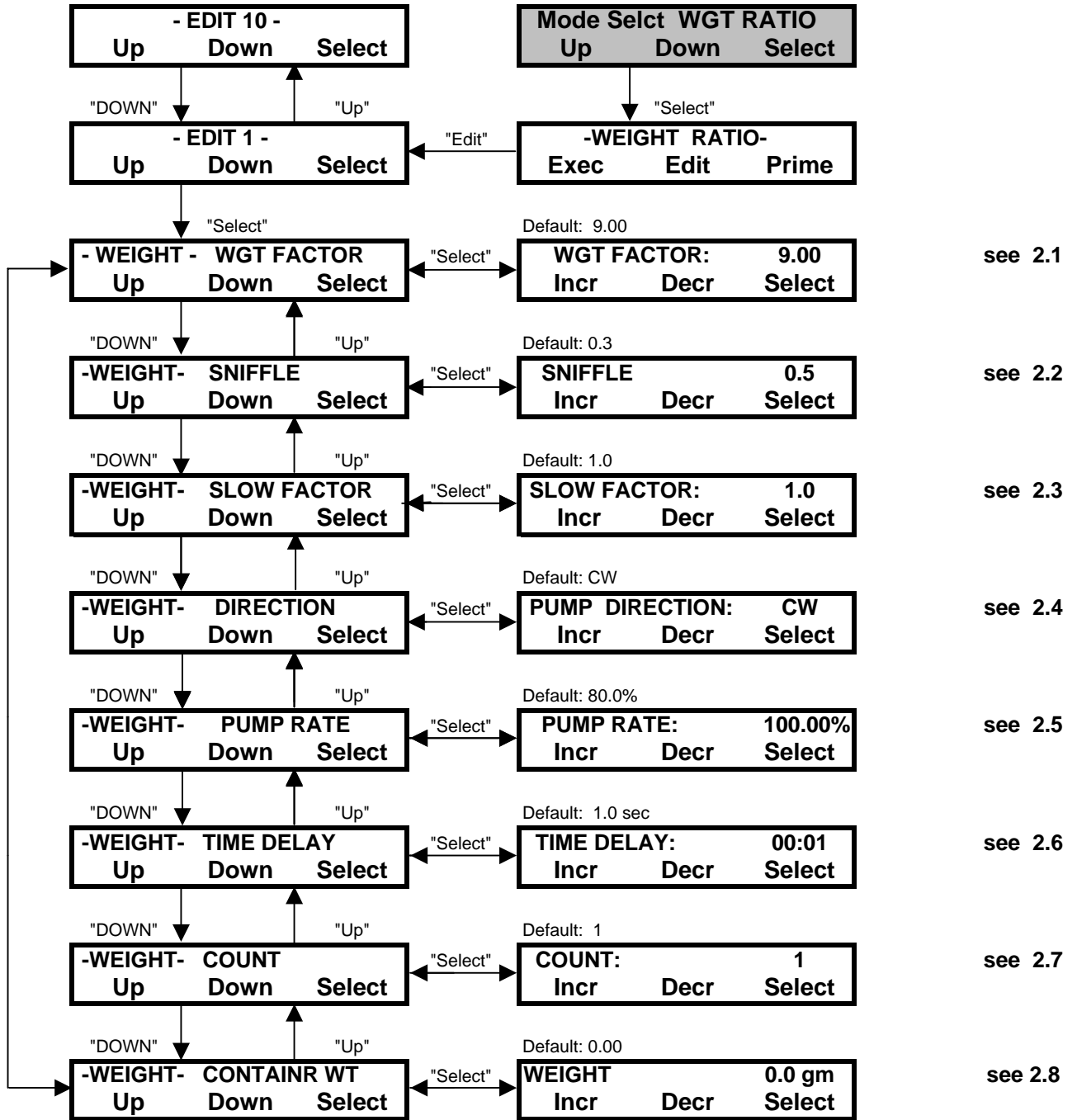
WEIGHT: In the Weight Dispensing mode, the LabTec is connected to an electronic, top-loading balance while dispensing solutions by weight. In this operational mode, the LabTec does not require calibration since dispensing by weight involves an already calibrated balance. Typically, dispensing by weight is somewhat slower than dispensing by volume. The main reason for this slow-down lies with the limited response speed of electronic balances. Both the Slow Factor and the Sniffle functions are available in the Weight Dispensing mode, as well as Monitoring and Alarm of backpressure.

SETUP: This operational mode allows you to select various user preferences and interface options. The **Setup: Scale** sub mode provides electronic balance options, i.e. balances that can be interfaced with the LabTec: Mettler, AND, Ohaus, Sartorius and Toledo balances. The **Setup: System Test** sub mode allows checkout of LabTec inputs/outputs, and requires a special set of connectors. **Setup: Printer** is used for setting up the printer communications parameters; while **Setup: Pump** allows you to set various pump user preferences. **Setup: Serial** defines the communications parameters of the **SERIAL** mode, and **Setup: Press. Sensor** allows configuration of a High Pressure Alarm, its Limit, and Zeroing of the disposable pressure sensor.

MANUAL: Allows manual pump speed control. **NOTE:** Alarm and printer parameters are not functional in the Manual mode. Monitoring and Alarm of backpressure is available in this mode.

SERIAL: Allows remote control of LabTec pump. **NOTE:** The Weight Ratio Dispensing mode is not accessible from the Serial Mode. Volume and Weight Dispensing modes are available in a limited fashion, with most parameters entered locally in Volume or Weight modes above.

2.0 Weight Ratio: Edit



2.0 Weight Ratio: Weight Ratio Dispensing; Edit

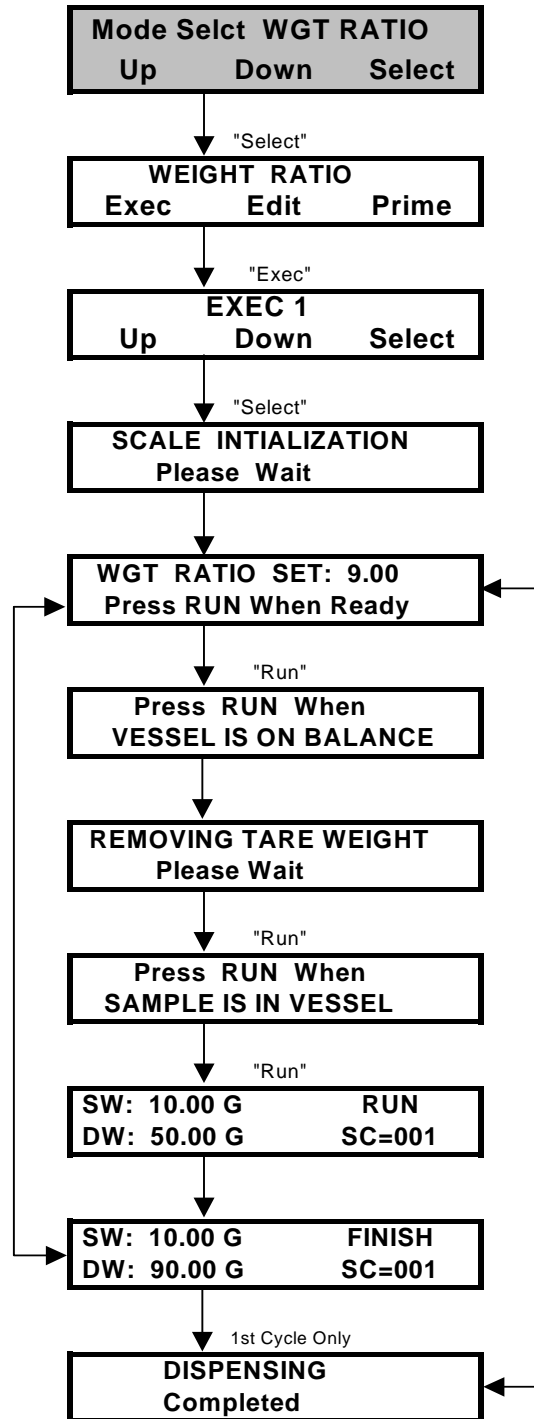
SUMMARY: In the Weight Ratio Dispensing mode, the LabTec provides automated sample weighing and sample dilution. With this operational mode, the LabTec must be connected to an electronic, top-loading balance. The **SETUP: Scale** sub mode provides electronic balance options, i.e. balances that can be interfaced with the LabTec: Mettler, Ohaus, Sartorius and Toledo balances. The selected balance is connected to Serial Port 1 labeled “Balance” or “Serial Port”. The LabTec also has provisions for printing / documenting your dispensing data. The printer (P/N: 080-095) is connected to the LabTec via Serial Port 2. Use **SETUP: Printer** for setting up the printer communications parameters. Backpressure of any filter in the system can be monitored by use of the optional pressure sensor kit, enabling the pressure alarm in **SETUP: Press Sensor**, and setting a user-defined limit.

When executing the Weight Ratio Dispensing mode, the LabTec will display “**SCALE INITIALIZATION // Please Wait**”. While this message is being displayed, the LabTec checks the balance communication. If balance communication is not possible the LabTec will display “**SCALE ERROR // Hit any key**”. Check the RS-232 cable connection as well as the communications parameters in your balance (see Section B7.1); also make sure you have selected the correct balance manufacturer in the LabTec **SETUP: Scale** sub mode.

NOTE: Use “UP” and “Down” keys to make a selection, then press “**Select**” to implement the selection

- 2.1 WGT FACTOR:** Defines the weight ratio (multiplier) that is applied to the actual sample weight, as determined by the balance, to arrive at the required diluent weight. For example, if the WGT FACTOR is set at 9.00 (default value), and the actual sample weight is 10.0 grams, then the diluent target weight is 90.0 grams resulting in a 10-fold sample dilution by weight.
- 2.2 SNIFFLE:** The SNIFFLE function consists of a brief pump reversal to suck in the droplet that typically hangs at the end of the dispensing tip.. The length of time for the pump reversal is user-selectable from 0 to 2.0 seconds. The SNIFFLE function is implemented at the end of each dispensing cycle thereby avoiding carry-over between cycles and cleaner dispensing environment.
- 2.3 SLOW FACTOR:** Defines the diluent weight that is dispensed slowly at the end of the dispensing cycle. For example, if the diluent weight is 90.0 grams, then the SLOW FACTOR is selected to be approximately 10% or 9.0 grams. When the LabTec initiates diluent dispensing, the first 81grams (90% of total) will be dispensed at a high pump rate (e.g.100%of max.), while the last 9 grams (10% of total) will be dispensed slowly to avoid overshooting the diluent target weight. The SLOW FACTOR as well as the LabTec pump rate is user-selectable.
- 2.4 PUMP DIRECTION:** Defines the rotation of the pump head; this parameter can be changed from clock-wise (CW, default) to counter clock-wise (CCW).
- 2.5 PUMP RATE:** Defines the relative pump speed (0% to 100% of max.) with which the diluent is being dispensed. Typically, this parameter is set at 80% (default), however, a slower pump speed setting is advisable if excessive back-splashing should occur.
- 2.6 TIME DELAY:** Not used in the Weight Ratio mode, should be set to 00:01 (default).
- 2.7 COUNT:** Not used in the Weight Ratio Dispensing mode, should be set to 1 (default).
- 2.8 CONTAINER WEIGHT:** Enter the weight of a standard container or bag, and it will automatically be deducted from the total weight of container and sample to arrive at the sample weight. The pump will then proceed to dispense the calculated diluent weight, skipping the “Press RUN When Sample is in Vessel” step.

2.0 Weight Ratio:
Execute



Alternate screens with
pressure sensor enabled:

SW: 10.00 G P1 = 0.0
DW: 50.00 G SC=001

SW: 10.00 G P1 = 0.0
DW: 90.00 G SC=001

3.0 Volume: Dispensing By Volume, Edit

SUMMARY: In the Volume Dispensing mode, the LabTec output must be optimized for a particular pump head / motor / tubing combination. Once optimized and calibrated, the LabTec dispenses user-programmable batch volumes with dependable precision and accuracy.

NOTE: *If you requested pre-configured aliquots from SciLog, then the LabTec was delivered to you optimized, calibrated and ready for use.*

A simple **Re-Cal** feature is available at the LabTec front panel to fine-tune your calibration, and compensate for pump output changes due to peristaltic pump tube wear. In general, the LabTec should be re-calibrated (**Re-Cal** key) at least daily, for very high accuracy dispensing applications a more frequent re-calibration schedule is advisable.

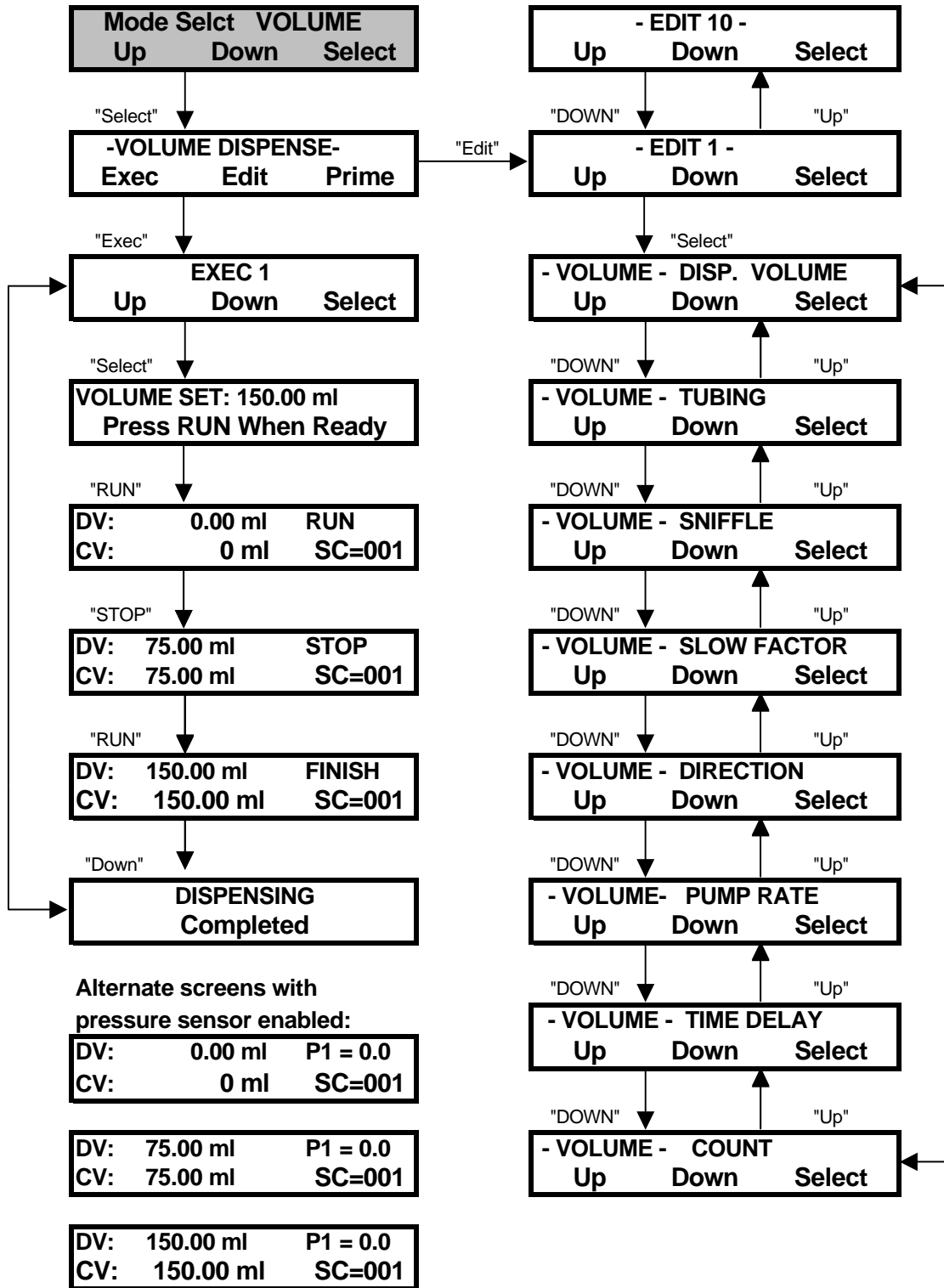
For volumetric batch dispensing, the typical precision and accuracy ranges from 0.5% to 1.0% depending somewhat on the dispensing rate (see Part C, Section 4.1, 4.2 & 4.3). In general, the higher the dispensing (pump) rate, the poorer the dispensing precision and accuracy. Conversely, the dispensing precision and accuracy generally will improve with lowering of the pump rate.

Volume units are milliliters by default. To change to liters or micro liters (μl), access Setup Mode; Volume Units.

NOTE: Use “Up” and “Down” keys to make a selection, then press, “Select” to implement the selection.

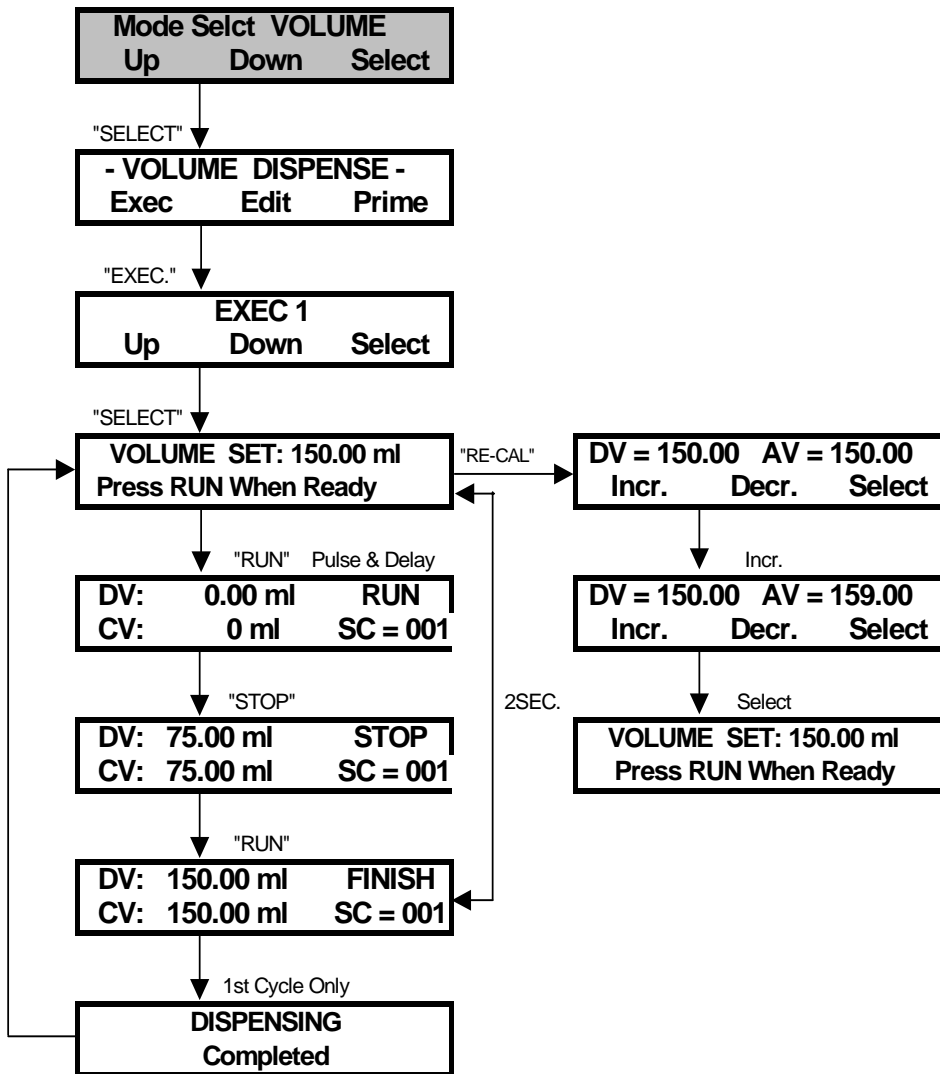
- 3.1 DISP. VOLUME:** Defines the volume to be dispensed in terms of milliliters. For example, if you want to dispense 50.00 ml, use the “Incr”, key to scroll to 50.00, then press “Select”. It is advisable to recalibrate the LabTec (**Re-Cal** key) when you change the DISP. VOLUME parameter. **Default Setting: 10.00 ml**
- 3.2 TUBING:** Defines the tubing used in the Tandem Pump Head. Accesses appropriate factory calibration curve. Choose between 13, 14, 16, 25, 17, & 18 for thin-walled in a Tandem 1081, and 15, 24, & 35 thick walled when using a Tandem 1082. (This option not displayed if RH series head or Mag gear head is chosen in Setup, Pump, Pump Head.) **Default Setting: 13**
- 3.3 SNIFFLE:** The SNIFFLE function consists of a brief pump reversal to suck back the droplet that typically hangs at the dispensing tip. The length of time for the pump reversal is user-selectable from 0 to 2.0 seconds, The SNIFFLE default value is set at 0.5 seconds. The SNIFFLE function allows you to avoid carry-over between dispensing cycles and provides for a cleaner dispensing environment. **Default Setting: 0.5 sec.**
- 3.4 SLOW FACTOR:** Defines the solution volume that is dispensed slowly at the end of the dispensing cycle. For example, if the solution volume to be dispensed is 100 ml, then the SLOW FACTOR is selected to be approximately 10% or 10 ml. When the LabTec initiates volumetric dispensing, the first 90 ml (90% of total) will be dispensed at a high pump rate (e.g. 100% of max.), while the last 10 ml (10% of total) will be dispensed slowly to avoid overshooting the solution target volume. **Default Setting: 1.00 ml**
- 3.5 PUMP DIRECTION:** Defines the rotation of the pump head; this parameter can be changed from clockwise (CW, default) to counter clock-wise (CCW). **Default Setting: CW**
- 3.6 PUMP RATE:** Defines the relative pump speed (0% to 100% of max.) with which the batch volume is being dispensed. Typically, this parameter is set at 100% (default), however, a slower pump speed is advisable if excessive back-splashing should occur. **Default: 100%.**
- 3.7 TIME DELAY:** Defines the time interval between dispensing cycles (0.1 to 50 seconds). **Default Setting: 0.1 second**
- 3.8 COUNT:** Defines how often the dispensing cycle will be repeated. For example, when COUNT = 10, then the selected DISP. VOLUME will be dispensed 10 times. **Default Setting: 1**

3.0 Volume: Execute



5.0 Volume: *Re-Calibration*

Use of the **RE-CAL** Key for quick Re-calibration



4.0 Volume: Factory Calibration

The LabTec has two (2) volumetric calibration features, namely, built in **Factory Calibration** as well as a **Re-Cal** feature (see section 5.0):

The LabTec utilizes a number of factory calibrations. If you have not requested SciLog to pre-configure and optimize your dispensing aliquots for you, or are editing a new one, you need to confirm a couple of settings. The LabTec accesses built in calibration curves based on the motor rpm setting in SETUP: Pump: Motor RPM, and the head setting in SETUP: Pump: Pump Head. (This is set at the factory, but it's good to double check.) If using a peristaltic head, select the correct tubing, and your ready to optimize and finally perform a RE-CAL (see next section). Calibrations for RH series heads are based on a vernier setting of 200, and those for the Magnetic gear heads are specific to that head. Again, a simple optimization and RE-CAL, and you're done.

Optimization involves choosing and fine-tuning the Pump Speed and Slow Factor settings to obtain fast, precise aliquots without overshooting. Small aliquots require slower pump speeds than large ones, and a similar relationship with aliquot size, pump speed and Slow Factor exists. Faster pump speeds will require larger Slow Factors. Please refer to Part C of this manual which contains some example dispensing parameters that will provide a starting point.

The **Re-Cal** feature allows you to quickly update the Factory Calibration. For peristaltic pumps in particular, slow pump tube wear will change the pump output over time. The Re-Cal function will compensate for this change in pump output by adjusting the stored calibration curve.

5.0 Volume: Re-calibration, use of the Re-Cal key

Any fine-adjustment of the stored Factory Calibration curve, i.e. to accommodate peristaltic pump tube wear, can be readily accomplished with a quick **Re-Cal**. The Re-Cal feature is accessible through the **Re-Cal** key at the LabTec front panel.

As shown on the opposite page, the **Re-Cal** feature is active when the following display is shown:

VOLUME SET: 150.00
Press RUN When Ready

Press the **Re-Cal** key at the LabTec front panel, the following display will appear:

DV = 150.00	AV = 150.00
Incr.	Decr. Select

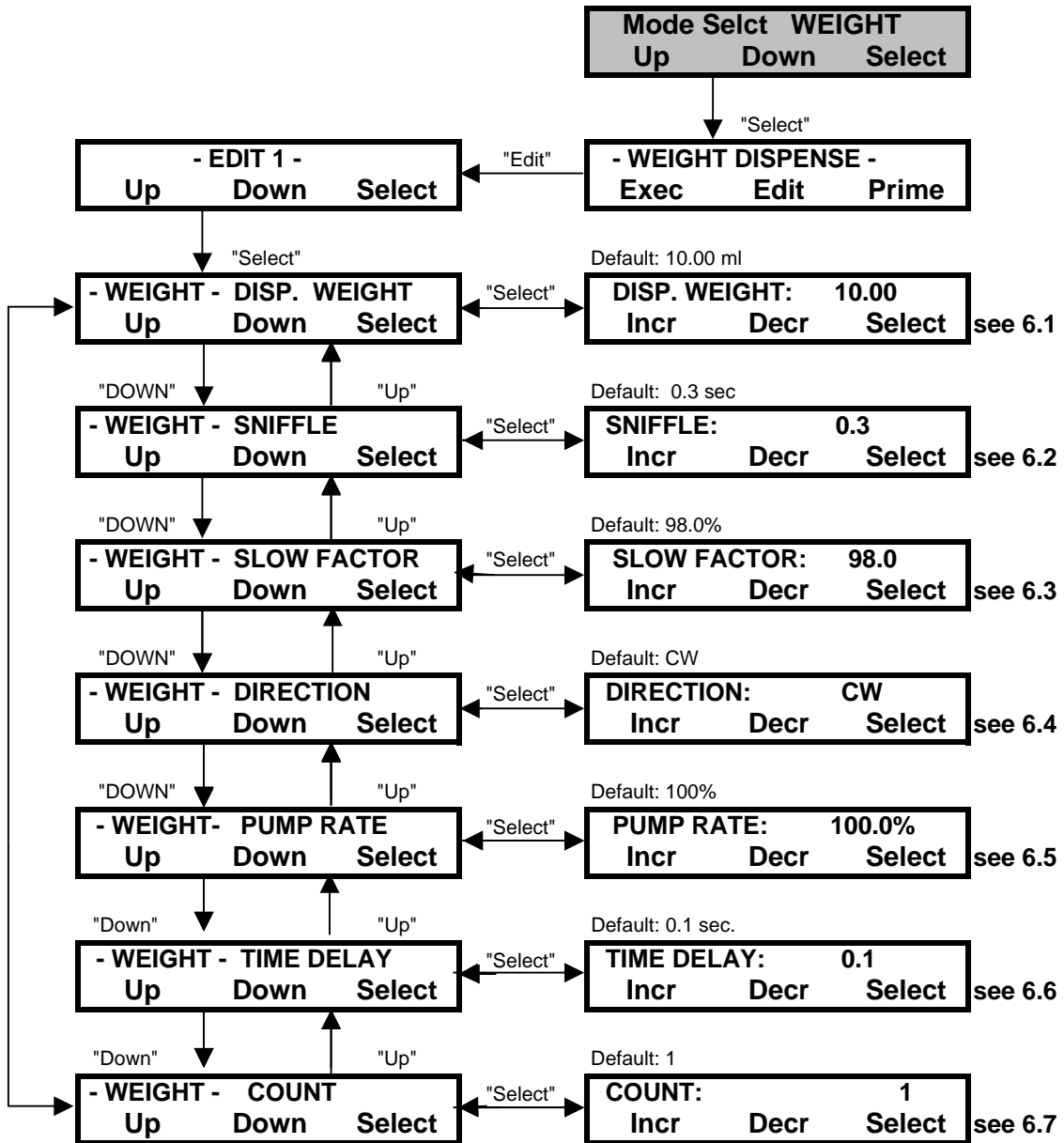
Only the **AV parameter** (AV= Average Value) can be changed in this display, use the **“Incr.”**(Key “A”) and **“Decr.”** (Key “B”) to adjust the AV parameter.

For re-calibration purposes, you should dispense at **least three (3) aliquots** (distilled water) of your selected volume; e.g. 150.00 ml. Record the weight of each aliquot, then determine the average (AV) aliquot weight. Use an electronic top-loading balance to weigh each aliquot. For example, assume that you obtained the following values:

Trial 1	152.50 g
Trial 2	151.80 g
Trial 3	152.10 g
AV = Average Value:	152.13 g

In this example, you would adjust (assume 1.00ml = 1.00 grams) the AV parameter to 152.13; the LabTec will automatically correct the factory calibration curve. You may want to repeat the Re-Cal in order to check the improved dispensing accuracy.

6.0 Weight: Edit



6.0 Weight: Dispensing by Weight, Edit

SUMMARY: In the Weight Dispense mode, the LabTec is connected to an electronic, top-loading balance while dispensing by weight. The **SETUP: Scale** sub mode (see Part B, Section 7.10) provides electronic balance options, i.e. balances that can be interfaced with the LabTec: Mettler, Ohaus, Sartorius and Toledo balances. The selected balance is connected to Serial Port 1 labeled “Balance” or “Serial Port”(see Part A, Section 3.2) The LabTec also has provisions for printing / documenting your dispensing data. The printer (P/N: 080-095) is connected to the LabTec via Serial Port 2 (see Part A, Section 3.1). Use **SETUP: Printer** for setting up the printer communications parameters.

When executing the Weight Dispensing mode (press “**Exec**”) the LabTec will display “**SCALE INITIALIZATION // Please Wait**”. While this message is being displayed, the LabTec checks the balance communication. If balance communication is not possible the LabTec will display “**SCALE ERROR // Hit any key**”. Check the RS-232 cable connection as well as the communications parameters in your balance (see Part B, Section 7.10); also make sure you have selected the correct balance manufacturer in the LabTec **SETUP: Scale** sub mode.

NOTE: Use “**Up**” and “**Down**” keys to make a selection, then press, “**Select**” to implement the selection.

6.1 DISP. WEIGHT: Defines the dispensed weight in terms of grams. For example, if you want to dispense 50.00 grams, use the “**Incr**”, key to scroll to 50.00, then press “**Select**”

6.2 SNIFFLE: The SNIFFLE function consists of a brief pump reversal to suck in the droplet that typically hangs at the end of the dispensing tip. The length of time for the pump reversal is user-selectable from 0 to 2.0 seconds. The SNIFFLE function allows you to avoid carry-over between dispensing cycles and provides for a cleaner dispensing environment.

6.3 SLOW FACTOR: Defines the solution weight that is dispensed slowly at the end of the dispensing cycle. For example, if the total solution to be dispensed weighs 100 grams, then the SLOW FACTOR is selected to be approximately 10% or 10 grams. When the LabTec initiates weight dispensing, the first 90 grams (90% of total) will be dispensed at a high pump rate (e.g.100% of max.), while the last 10 grams (10% of total) will be dispensed slowly to avoid overshooting the target weight. The SLOW FACTOR as well as the LabTec pump rate are user-selectable.

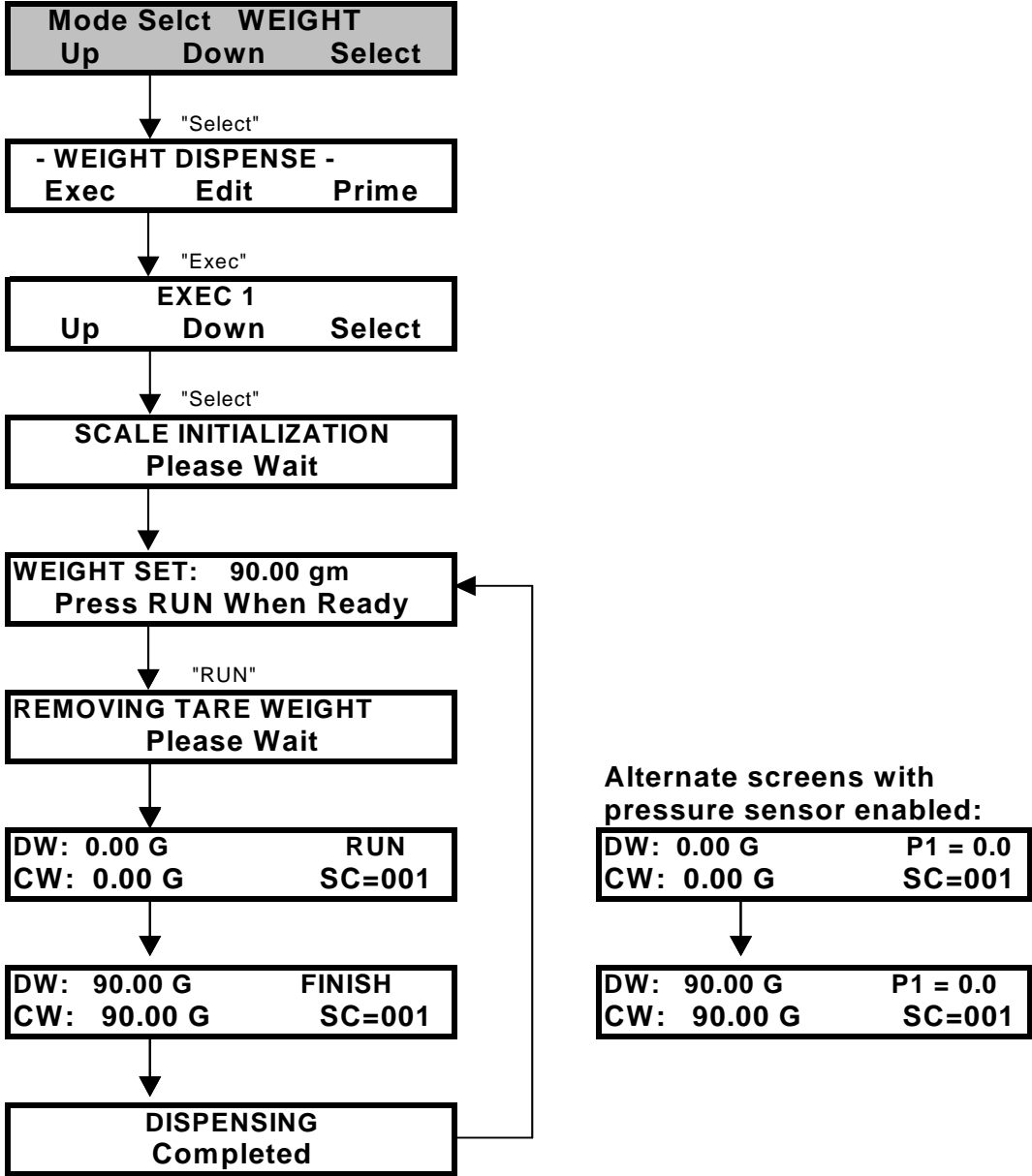
6.4 PUMP DIRECTION: Defines the rotation of the pump head; this parameter can be changed from clock-wise (CW, default) to counter clock-wise (CCW).

6.5 PUMP RATE: Defines the relative pump speed (0% to 100% of max.) with which the solution is being dispensed. Typically, this parameter is set at 100% (default), however, a slower pump speed is advisable if excessive back-splashing should occur.

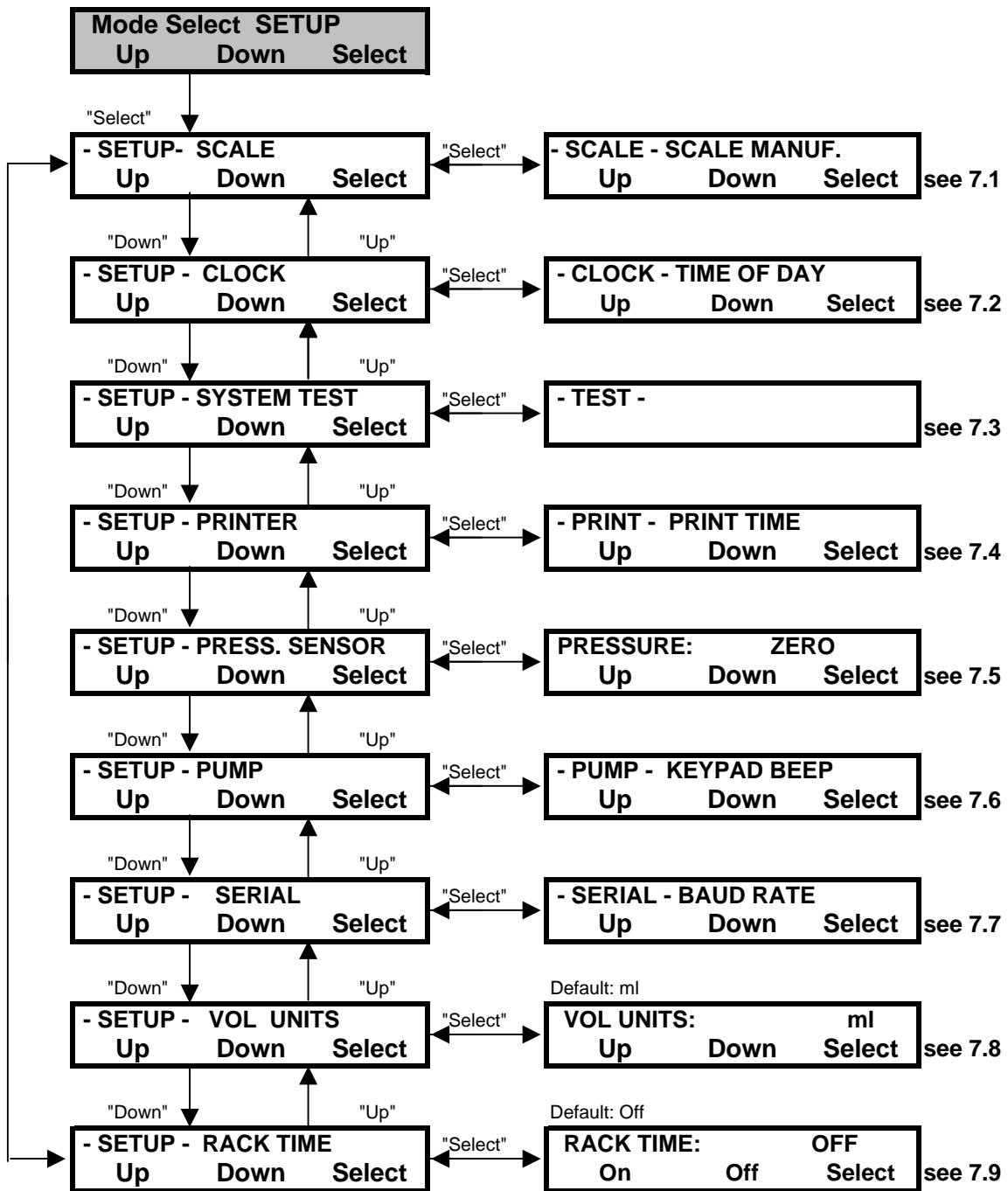
6.6 TIME DELAY: Defines the time interval, in seconds, between dispensing cycles

6.7 COUNT: Defines how often the dispensing cycle will be repeated. For example, when COUNT = 10, then the selected DISP. WEIGHT will be dispensed 10 times.

6.0 Weight: Execute



7.0 Setup: Edit



7.0 Setup: Edit

Summary: In the Setup menu consists of nine (9) entries. In 7.1 **Setup: Scale**, you select from five (6) different types of electronic balances: Sartorius, Mettler, Ohaus 1, Ohaus 2, Ohaus3, and Toledo. However, only certain models with serial communications capability can be accommodated. By choosing the scale manufacturer the LabTec automatically selects and implements the correct communications protocol. In 7.2 **Setup: Clock** you set the date and time for the system. In 7.3 **Setup: System Test** you can diagnose the electronic outputs of the LabTec. For testing purposes you need a set of test jumpers (P/N 080-058). In 7.4 **Setup: Printer**, the communications parameters for hooking up to a SciLog printer (Cable: P/N 080-095) or a PC (RS-232 Cable for Serial Port 2: P/N: 080-073) are selected. In 7.5 **Setup: Press. Sensor** you configure the pressure alarm and limit, and zero the disposable pressure sensor from the optional pressure sensor kit. In 7.6 **Setup: Pump** certain user-preferences can be selected, whereas the 7.7 **Setup: Serial** allows you to set the communications parameter for Serial Port 1 (RS-232 Cable: P/N: 080-050) labeled “Balance” or “Serial Port”. In 7.8 **Setup: Vol Units** you can toggle the displayed and printed volumetric units from “ml” to “ μ l”, whereas in 7.9 **Setup: Rack** the control of the robotic dispensing station (P/N: 100-204) is activated. However if the robotic dispensing station is not used, the **Setup: Rack** parameter must be deactivated, i.e. **Off** (default).

NOTE: Use “Up” and “Down” keys to make a selection, then press, “Select” to implement that selection.

- 7.1 **Setup: Scale** The following electronic scales can be accommodated by the LabTec: **Mettler PM and PGS Series** balances (Mettler); **Ohaus GT Series, GT “Precision Advanced”** models (Ohaus) as well as the **Ohaus “Explorer” Series**. . The **Ohaus High Capacity “IP” Series** can be used when the “Ohaus2 ” parameter is selected, **Ohaus Adventurer Pro** uses “Ohaus3” and the **Sartorius MC-1 Series** can be interfaced when “Sartorius” is the selected manufacturer. Also see Part B, Section 7.10, for setting communications parameters in the various balances.
- 7.2 **Setup: Clock** Allows you to set **Time of Day, Year, Month**, and set **Print Enable** to either Time of Day or Relative Time. If using SciDoc, this must be set to Time of Day (default)
- 7.3 **Setup: System Test** Allows you to diagnose the outputs of the LabTec; requires you to connect a set of test jumpers (P/N 080-058) into the DB37 labeled “I/O” port for testing.
- 7.4 **Setup: Printer:** Select communications parameters for SciLog printer (P/N 080-095) or PC. Default settings are for communications with a printer, select **Print Time** (1), (one update per minute), **Baud Rate** 9600, **Stop Bits** 2, **Parity** None, **Word Length** 8, **Print Delay** = 4 sec. for printer, 0 sec. for PC. Also see Section 7.30 “LabTec Print-out Format”

- 7.5 **Setup: Press. Sensor:** Used to **Zero** the sensor, set **Units (Psi, Bar, Kpa)**, set the **Alarm** (Off, Alarm Only, Pump Stop) (Default = Off) and the **Limit** for the Alarm (Default=30.0) **Max = 30.0 psi**. If you have not purchased the optional pressure sensor kit, the Alarm must remain set to OFF.
- 7.6 **Setup: Pump** Select the following user preferences: **Keypad Beep** (On/Off), **Factory Reset:** (Resets all variable pump parameters to their original, factory defaults), **ASCII Feedback** (On / Off, output at Serial Port 1 labeled “Balance”, need RS-232 cable (P/N 080-050)), **LCD Adjust** (Display Contrast Adjust), **Power Up** (Mode/Menu/Run), **Pump Head** (Peristaltic, RH1, RH0, RH00, Mag201, Mag122, Mag120, Mag040) Choices are motor dependant, **Motor RPM** (3400, 600, 450, 160, 8) **Motor RPM and Pump head will be set at the factory prior to shipping**, **Motor Start** (Hard / Soft-Ramp), **TTL1:On-Off** (Yes/No) used for master/slave control of another SciLog pump, **Switch Polarity** (Inverted/Normal), **Switch Configuration** (Level / Pulse) Output of TTL’s.
- 7.7 **Setup: Serial** User-selectable communications parameters for the Serial Port 1 labeled “Balance” or “Serial Port”. Default values: **Baud Rate:** 9600; **Address:** 0; **Stop Bits:** 2; **Parity:** None; **Word length:** 8. Used for remote slaved control of LabTec. Weight Ratio, Weight and Volume Dispense modes not accessible in the Serial mode.
- 7.8 **Setup: Vol. Unit** User-selected volumetric units; **liters (l)**, **milliliters (ml)** or **micro liters (µl)**. Selected units will be displayed as well as printed out. *Requires volumetric re-calibration (RE-Cal key) when changed.*
- 7.9 **Setup: Rack** Is set to “On” when Gilson 204 Fraction Collector is connected to the LabTec, see Part C, Section 5.0 for details, **Setup: Rack** parameter must be set to “Off” (default) when the Gilson 204 is not connected.

7.10 Setup: Scale

7.11 Mettler - Toledo Balance Parameters:

7.111 Models PG-S (1997), i.e. PG5002-S

Hardware Requirement: 1. SciLog PGS Balance Cable (P/N:080-067PGS) 2. Order Mettler PGS Balance with RS232C Interface. **NOTE: Delta range balances cannot be accommodated**

Select the following parameters in the PGS Mettler Balance “MENU”, all other balance parameters are at their factory settings.

4.4	Selection of the Calibration:	CAL int
4.7	Vibration Adapter	2
4.8	Process Adapter	2
4.9	Repeatability:	Good
4.12	Auto Zero Switched OFF	no AZero
4.13	No Automatic Shutdown:	A.oFF
4.17	Baud Rate:	bd 9600
4.18	Setting Parity/Bit:	8b-no
4.19	Setting Handshake:	HS Hard

Note: Verify that all the above parameters have been entered and accepted by the balance. In the LabTec Setup mode, select SCALE, then select “Mettler”. Connect the SciLog balance cable P/N: 080-067PGS.

7.112 Mettler Viper PM, PB Series

To enter the Technical Setup mode, press and hold the “Print” key until the word **CODE** appears on the display. Then press “Zero”, “Tare”, “Zero”, “Tare”, “Print”, and the word **SCALE** will appear. You are at the top of the menu. Use the “Zero” and “Tare” buttons to scroll thru choices on a level, and the “Print” button to select.

Menu Level 1	Level 2	Level 3 Selected Menu Item		
SCALE	1.1 Serial Number (snr)			
	1.2 Metrology(metrolo)			
	1.3 Build		Unit	g (grams)
			Resolution	0.1g
	1.4 Linearity (linear)			
	1.5 Geo Value (geo)			
	1.6 Calibration (cal)			
	1.8 Units		Displayed	g (grams)
	1.9 Tare			
	1.10 Zero			
	1.11 Filtering (filter)			
	1.12 Sreset?			
TERMINAL				
COMMUNICATION	Mode		Output	SICS
(comm)				
Parameters (params)	Baud	9600	Parity	8 no P
Control				
CReset ?				
DIAGNOSTICS				
(diagnos)				
END				

NOTE: The **Bold** parameters are the only custom settings needed for communication with the LabTec. All others should remain at factory defaults. If you are uncertain as to which parameters have been implemented in your scale, review all parameter settings by stepping through the scale menu. Alternatively, carry out a parameter reset by pressing the ‘print’ key at the ‘Sreset?’ or ‘Creset?’ in the BUILD and COMM Menus, then add all custom parameters outlined in Bold. The scale parameters outlined above insure that the Viper scale is capable of communicating with the LabTec. Consult your scale manual for help navigating through the scale menu.

In the LabTec Setup Mode, select “**METTLER**”, see **SETUP: SCALE: MANUF**. By making this selection, the LabTec will implement the correct parameters for communicating with the Viper scale. You will also need SciLog P/N 080-067PGS Mettler PGS Balance-Pump Interface Cable.

7.113 PM Series Mettler Balances, i.e. PM 3000, PM 6000, etc.

Consult your Mettler manual; enter the following parameters into the Mettler balance using the “**I-Face**” menu:

S = All

Baud Rate = 9600

P = N (Parity = None)

Pause = 0

Au = Off

Weighing Process Adapter: (Droplet Symbol) should be set to “Universal”, i.e. standard setting, second largest droplet symbol.

Vibration Adapter: (Wave Symbol) should be set to “unstable”, i.e. largest wave symbol.

NOTE: Delta range balances cannot be accommodated.

Note: Verify that all the above parameters have been entered and accepted by the balance. In the LabTec Setup mode, select SCALE, then select “Mettler”. Connect the Mettler balance cable P/N: 080-067

7.114 Mettler Panther & SpeedWeigh Scales

You must first access the switch SW1 (see Mettler Technical Manual: Terminal Main PCB”) and turn it to the “ON” position in order to enter the scale SETUP menu. Press “Zero” and “Enter” keys simultaneously to get access to the scale Setup Menu. Use the “ENTER” key to step through the menu. First, make sure that all parameters are in their factory default settings, then make the following changes to the default settings:

- F1.2** Enter weight units: “1” for lb “2” for kg., or “3” for grams. Select “3” when interfacing with the LabTec.
- F1.3** Enter scale capacity for which you want to calibrate the scale. For example, select 2000gr. if you wish to display and control in grams and have a scale capacity of 2000 gr .
- F1.4** Select scale increment size, this value is dependent on the entered scale capacity, for 2000gr the smallest scale increment size is 0.2gr. For optimal pump control, always select the smallest available scale increment size.
NOTE: at this point you may want to calibrate the scale with a known weight, set CAL = 1.
- F3.2** Enter “2” for SICS Protocol, this will set up the appropriate communications protocol in the Mettler scale.
- F4.1** Enter “0”, disables discrete input function.
- F5.1** Enter “1”, if scale is a Mettler “Speedweigh”, i.e. Model SW 15000

All other scale parameters should be at their factory default settings. In the LabTec (SETUP: Scale) select “**Mettler 2**” as scale manufacturer, by selecting “Mettler 2” you are implementing the appropriate communications protocol that enables the LabTec to “talk” with your Mettler scale.

Scale RS-232 Connection: In addition to selecting the appropriate parameters in your scale as well as in the LabTec, you must make the correct cable connections (P/N: 780-066) between your and the LabTec. Open the scale terminal enclosure and identify the TB2 terminal block at the bottom of the scale Terminal Main PCB, which constitutes the RS-232 Interface. The 9-pin TB2 header is labeled “TBS RS232/TTL”. Make the following connections at the TB2 connector:

Scale / TB2 (Labeled “TB2 RS232/TTL”)	Wire/Color	LabTec/ DB9 Connector
2 (RxD)	White	2
1 (TxD)	Black	3
3 (GND)	Red	5
1&5 Jumper		

7.12 Ohaus Balance Parameters:

7.121 Older Models (before 1988) GT 2100; GT 4100:



NOTE: You need a SciLog RS-232 interface cable (P/N: 080-066)
Select the following parameters from the Ohaus **Setup Menu**:

A.L. = 0 , Selectable Integration.
Stb. = 0 , Stability Level.
A.t. = off, Auto-Zero Tracking

Select the following parameters from the Ohaus **Print Menu**:

Select RS-232 sub-mode;
br. = 9600, Baud Rate
Fr. = 0, Frame 0: 7 Data Bits, 2 Stop Bits, No Parity.



NOTE: In the SciLog pump SETUP mode, select SCALE, then select OHAUS. Connect the SciLog RS-232 cable (080-066) marked “Ohaus” to the balance. The LabTec will now be able to communicate with the Ohaus balance.

7.122 Newer Ohaus Models “Precision Advanced”: GT Series

NOTE: You need a SciLog RS-232 interface cable (080-066)

Select the following parameters from the Ohaus **User Menu**:

A.L = 1 , Averaging Level
Stb. = 1d, Stability Range
Auto-O = off, Auto-zero function turned off.

Select the following parameters from the Ohaus **Print Menu**:

Select COM Sub-mode:
bAud = 9600, Baud Rate
dAtA = 7, Data Bits
PARity = none, Parity
StOP = 2, Stop Bits



NOTE: Verify that all of the above parameters have been entered and accepted by the balance. In the SciLog pump SETUP mode, select SCALE, then select OHAUS. Connect the SciLog RS-232 cable (P/N:080-066) marked “Ohaus” to the balance. The LabTec will now be able to communicate with the Ohaus balance.

7.123. “Explorer” & “Voyager” Series Ohaus Balances: 2100, 4100, 6100, 8100



NOTE: You need a SciLog RS-232 interface cable (P/N: 080-066). Delta range balances with movable Fine Range™ cannot be accommodated.

Select the following parameters from the Ohaus **Setup Menu**: Press the Ohaus Balance “SETUP” button at the front panel. From the “READOUT” menu select the following parameters:

Filter: 2
Stable: 1d
Auto O: Off

From the “RS-232” menu select the following parameters:

Baud: 9600
Parity: None
Data: 7
Stop: 2



NOTE: Verify that all of above parameters have been entered and accepted by the balance. In the SciLog pump SETUP mode, select SCALE, then select OHAUS. Connect the SciLog Balance RS-232 cable (P/N 080-066) marked “Ohaus” to the balance. The LabTec is now able to communicate with the Ohaus balance.

7.124. “IP Series” Ohaus High Capacity: Models IP12KS & IP15KS



NOTE: Select “Ohaus 2” in the LabTec Setup Scale mode. You also need a SciLog RS-232 interface cable (P/N: 080-067)

Select the following parameters from the Ohaus **Setup Menu**:

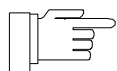
Enter the main menu of the IP balance and select “USER”. From the “USER” sub-menu, select the following parameters:

Stability: STB = .5
Averaging: AL = 1

Enter the main menu of the IP balance and select “CONF”. From the “CONF.” sub-menu, select the following parameters:

Baud: 9600

Parity: None
Handshake: HS
Print Key: Off
Number: Off



NOTE: Verify that all of above parameters have been entered and accepted by the balance. In the SciLog pump SETUP mode, select SCALE, then select Ohaus 2. Connect the IP Balance RS-232 (P/N: 080-067) cable to the LabTec. The LabTec is now able to communicate with the Ohaus IP balance.

7.125. Ohaus Adventurer Pro Series, Model AV8101, etc.

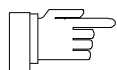


NOTE: Select “Ohaus 3” in the LabTec Setup Scale mode. You also need a SciLog RS-232 interface cable (P/N: 080-067PGS)

Press and hold the Menu button until MENU appears on the display. Release this button, and use the Yes, No, and Back buttons to navigate the Sub-menus.

Please set the following Menu Items, all others are left at their factory defaults:

Readout	
Auto Zero	Off
Print	
Output	
When stable	Off
Auto Print	Off
Content	
Num Only	Off
Header	Off
Gross	Off
Net	Off
Tare	Off
Reference	Off
Result	<u>On</u>
GLP	Off
Layout	
Line Format	Multi
RS232-1	
Baud	9600
Parity	7 Noparity
Handshake	Off



NOTE: In the Setup Mode, Scale Manufacturer, select “OHAUS3”. You will also need SciLog P/N 080-067PGS, Balance Interface Cable. (Note: The 080-066 SciLog Ohaus Balance interface cable will not work with this balance series.)

7.13 Sartorius Balance Parameters:

7.131 Sartorius MC-1 Series (20 models)

NOTE: You need a SciLog RS-232 cable (P/N: 080-068) to interface with the Sartorius MC-1 Series balances. Consult your Sartorius manual; enter the following protocol into the Sartorius scale:

611 Print w/o stability
822 Beep off

All other communications parameters of the Sartorius balance are at their factory settings.

7.132 Sartorius Model EA 6 DCE-1SG

NOTE: You need a SciLog RS-232 cable (P/N: 080-068) to interface with the Sartorius EA Series balances. Consult your Sartorius manual; enter the following protocol into the Sartorius scale:

Menu Level 2	Selected Menu Item
1.4 Weight Units for Cal	1.4.1 Grams
1.6 Auto Zero	1.6.2 Off
1.7 Weight Units	1.7.2 Grams
6.1 Manual/Auto Print	6.1.1 Manual without Stability
7.1 Printout Format	7.1.1. No Data ID Codes

7.133 Sartorius Model EB 6 DCE-1SG

NOTE: You need a SciLog RS-232 cable (P/N: 080-068) to interface with the Sartorius EB Series balances. Consult your Sartorius manual; enter the following protocol into the Sartorius scale:

Menu Level 2	Selected Menu Item
1.4 Weight Units for Cal	1.4.1 Grams
1.6 Auto Zero	1.6.2 Off
1.7 Weight Units	1.7.2 Grams
2.1 Program Selection	2.1.1 Weighing
3.1 Weight Unit 2	3.1.2 Grams
6.1 Manual/Auto Print	6.1.1 Manual without Stability
7.1 Printout Format	7.1.1. No Data ID Codes

7.14 AND GF Series Balance Parameters:

7.134 AND GF Series Balances:

To enter Setup: Press & Hold "Sample" until display changes.

Menu Level 1: To Scroll press: "Sample", Select press: "Print", Exit press: "Cal"

Menu Level 2: To Scroll press: "Sample", Change value press: "Re-Zero", Exit press: "Print"

You only need to change values in Serial Interface section:

Scroll to Level 1 value: S iF, press "Print"

Scroll to Level 2 value: bPS (baud), Press "Re-Zero" set value to 4 (9600)

Scroll to Level 2 value: bt Pr (Data Bit, Parity), set value to 2 (8 bits, none)

Scroll to Level 2 value: tYPE (Data Format), set value to 3 (Mettler)

Press "Print" and then "Cal" to exit Setup.

NOTE: Choose "Mettler" under Setup:Scale:Scale Manufacturer. You will need a special interface cable, SciLog p/n 080-066AD for this balance.

7.30 LabTec Print-out Format:

7.31 Weight Ratio Dispensing

5/27/4; 11:00; DILU2.30; Weight Ratio; Exec 1; Ratio set = 9.00; Count= 1; Rate= 80%; CW; Units=psi; Alarms:HP=1; Limits; HP=30.0; Slow Factor = 25.00

MT,	SC,	SW,	DW,	P1,	ST,
11:00:00	1	10.0	90.0	0.0	FINISH
11:02:00	2	10.5	94.5	0.0	FINISH
11:02:00	3	10.1	90.9	0.0	FINISH

7.32 Dispensing By Volume:

5/27/4; 11:10; DILU2.30; Volume; Exec 1; Volume Set= 10.00ml; Count= 1; Rate=100.0%; CW, Tubing=13; Units=psi; Alarms:HP=2; Limits; HP=30.0; Slow Factor = 1.00

MT,	SC,	DV,	CV,	P1,	ST,
11:10:00	1	10.01	10.01	0.0	FINISH
11:12:00	2	10.02	20.03	0.0	FINISH
11:12:30	3	10.00	30.03	0.0	FINISH

7.33 Dispensing By Weight:

5/27/4; 11:30; DILU2.30; Weight; Exec 1; Weight set= 25.00gm; Count= 1; Rate= 80.0%; CW; Units=psi; Alarms:HP=3; Limits; HP=30.0; Slow Factor = 25.00;

MT,	SC,	DW,	CW,	P1,	ST,
11:30:00	1	25.01	25.01	0.0	FINISH
11:31:00	2	25.02	50.03	0.0	FINISH
11:32:30	3	25.00	75.03	0.0	FINISH

NOTE: Immediate data printout when “STOP” key is pressed; all other data are printed out at the completion of the dispensing cycle. The following abbreviations are used in the printout:

SC=Sample # **SW**=Sample Weight **DW**= Diluent Weight **DV**=Dil. Volume
ST=Status **CV**=Cumul. Volume **CW**= Cumulative. Weight

8.0 Manual:

Summary: In the Manual Mode the LabTec pump can be manually operated. The pump speed can be set by pressing the “Rate” key. In the Manual Mode, the pump speed can only be selected in terms of % of maximum pump speed (600 RPM at 100%).

Note: The Weight Ratio, Weight and Volume Dispensing parameters cannot be accessed in the Manual Mode.

9.0 Serial

Summary: The LabTec has two (2) serial ports. The **serial port 1** (male DB9), which is either labeled “Balance,” is used for interfacing with an electronic balance or alternatively for remote control of the LabTec pump with a PC. In the case of remote control of the pump with a PC, a set of ASCII codes (see Section 9.2) are used to control pump speed and direction. **Please note, the Weight Ratio, Weight as well as Volume dispensing parameters are not available in this remote control (serial) mode using port 1.** When interfacing with a PC via serial port 1 you will need a RS-232 cable (P/N 080-050)

The LabTec **serial port 2** (female DB9), which is labeled “Printer” is reserved for use with a SciLog printer or alternatively for data hook-up with a PC. When a PC is connected to serial port 2, all data generated in Weight Ratio, Weight or Volume dispensing modes (see Part B, Section 7.3: LabTec Print-out format) can be sent to the PC for archiving. However, the connected PC must be in the “Terminal” mode (usually to be found in the “Accessory” or “HyperTerminal” program of your PC). The HyperTerminal settings are provided for you in section 9.1 entitled “PC HyperTerminal Settings.” When interfacing with a PC via serial port 2, you will need a separate RS-232 cable (P/N: 080-073). **Note:** For a successful hook-up with your PC via serial port 2, the LabTec and the PC must use the same communications protocol. Make sure, that the communication parameters in Setup: Printer (see Part B, Section 7.3) are the same as those listed in Section 9.1 mentioned above.

Alternatively, Scilog has available the **SciDoc LabTec Documentation software** package that includes data retrieval software and a custom Excel spreadsheet that is automatically populated when either of the modes is executed. **See Section 10.0 below.**

The LabTec can be controlled in limited fashion via the HyperTerminal Mode of your PC and a connection to **serial port 2**. Dispense Amounts and Start/Stop of dispense cycle can be entered directly in an active and configured HyperTerminal window. Other Dispense Parameters like Pump Rate, Slow Factor, Count, Time Delay, Sniffle and Slow Factor must be entered locally via the –EDIT 1- Mode of the LabTec. –EXEC 1- references the Calibration –CAL 1- for volumetric dispensing. In order for different volumes sizes to be accurately dispensed, the calibration –CAL 1- should be performed at the high value of the range and the dispense parameters (i.e. Pump Rate) should be optimized for all aliquots in the range. See Section 9.3, for settings and commands.

9.1 PC HyperTerminal Settings:

LabTec to PC: For PC Connections via Serial Port 2 labeled “Printer Port” requires a SciLog RS-232 Cable (P/N: 080-073). NOTE: When you are not using the SciLog printer, the Serial Port 2 allows Mass-Flow and Volu-Flow data to be “dumped” into your PC for archiving. For PC Connections using Serial Port 1 labeled “Balance Port” requires SciLog Serial Cable (P/N: 080-050). This connection allows Remote Control of the LabTec using the ASCII Protocols listed in Section 9.2 that follows.

The following terminal setting procedure is intended for PCs with a **Window 95/98** software installation: Press the Window 95/98 **START** key in the lower left corner of your screen, select “**Program**” then select and open “**Accessories**”, select “**Hyper Terminal**”, double-click at the Hyper Terminal icon.

1. From the “**Connection Description**” screen, select an icon and enter a file name, i.e. LabTec. Press “**Ok**”
2. From the “**Phone Number**” screen, select “**Direct to Com 1**” in the box labeled **Connect Using:** or select any other available Com port. Press “**Ok**”
3. From the “**Com 1 Property**” screen, select the following parameters

Bits per Second:	9600
Data Bits:	8
Parity:	None
Stop Bits:	1
Flow Control:	None

Press “**Ok**”

4. Go to “**File**” and open “**Properties**”, from the “**LabTec Property**” screen, select the “**Setting**” screen, enter the following:

Terminal Keys:	Select
Emulation:	TTY
Backscroll Buffer:	500

While still in the “**Setting**” screen, press “**ASCII Setup**” key & select the following from the “**ASCII Setup**” screen:

Send Line Ends with Line Feed:	Select
Echo Typed Characters Locally:	No Selection
Line Delay	10 msec.
Character Delay:	10 msec
Append Line Feeds.....:	No Selection
Force Incoming.....:	No Selection
Wrap Lines That Exceed	Select

Press “**Ok**” at the bottom of the “LabTec Setup” screen.

Press “**Ok**” at the bottom of the “LabTec Property – Setting” screen

9.2 LabTec Serial Port 1 ASCII Protocol:

The LabTec pump can be remotely controlled from a PC via the LabTec **Serial Port 1**. Up to 32 LabTec pumps can be daisy-chained together and controlled from a single PC with a special cable (contact SciLog Inc. for cable). The cable is made by running the serial output from a PC to the Serial Port 1 of the first pump. The output of the first pump is routed to the Serial Port 1 of the second pump. This chain is completed by running the data output of the last pump back to the serial data input of the PC. **RS-232 cables and connectors for establishing single (P/N: 080-050) or multi-pump communications are available from SciLog.**

The LabTec pumps can be remotely controlled with a fixed command set. All commands are preceded by a carriage return and a pump identifier made up of the letter “**P**” followed by a number **0** to **31**. The number indicates the pump address. Valid commands for the LabTec pump are:

- * **N** **Turns pump on**
Example: **P1N** turns pump 1 on
- * **F** **Turns pump off**
Example: **P3F** turns pump 3 off
- * **D** **Sets pump direction**
Example: **P2D0** sets the direction of pump to clockwise. The value after the “**D**” command defines the direction (**0** = **CW**; **1** = **CCW**)
- * **S** **Sets pump speed**
Example: **P7S0500** sets the speed of pump 7 to 50% if not calibrated or 500ml/min. if calibrated in milliliters. The four digit number following the ‘**S**’ command defines the speed.
- * **Z** **Assigns pump addresses, auto-address feature**
Example: By sending the command **Z1** to the first pump, a pump address P1 is assigned that pump. In multi-pump applications, the pump P1 automatically sends the command **Z2** to the second pump in the chain thereby assigning pump address P2 to the second pump. The last pump in the chain echoes the last Z-command, incremented by one, back to the PC.
- * **T** **Sets the TTL switches**
Example: **P0T1001** sets TTL #1 and TTL #2 high on pump 0. The four numbers following the ‘**T**’ command define the state of the TTL output. A **0** for low and a **1** for high.

9.3 Remote Volume and Weight Dispensing Via Serial Port 2

For Remote Volume Dispensing: Connect LabTec-to-PC RS-232 Cable (P/N: 080-073) to the “Printer” Serial Port located on the Back Panel of the LabTec. **NOTE:** Remote Volume Dispensing can only be done in **EXEC 1** based upon a successful calibration in **CAL 1** (see Manual).

For Remote Weight Dispensing: Connect LabTec-to-PC RS-232 Cable (P/N: 080-073) to the “Printer” Serial Port and connect LabTec-to-Balance RS-232 cable the “Balance” Serial Port (P/N: 080-050), both Serial Ports are located on the Back Panel of the LabTec. **NOTE:** Remote Weight Dispensing can only be done in **EXEC 1**.

Check the Communications Parameters in your PC (see HyperTerminal Settings) as well as in **Setup: Printer**. Make sure that the Communications Parameters are identical for your LabTec and PC; i.e. Baud Rate (9600), Parity (None), Stop Bits (2), Data Bits (8), Print Delay = 0.

1. Select **EXEC 1** of the Volume Dispensing Mode; carry out a communications check by pressing “**EXEC**” then “**RUN**”. The following Print out should appear on your monitor.

LabTec: Exec 1: Disp Volume = 10.00ml, Count = 1 Rate = 100%
ID = 1 CV = 10.00 DV = 10.00 ST = Finish

2. From your PC keyboard write “**V25.00**”. This entry will appear on your monitor, press “**ENTER**”. The LabTec will now dispense 25.00 ml. When the dispensing cycle has been completed, the following lines will have been added:

V25.00
ID = 2 CV: 25.00 DV = 35.00 ST = Finish

3. Try out different volumes, the dispensed volume parameter has the general form of **Vxxxx.xx**, thus the largest volume that can be entered and dispensed by the LabTec is **V9999.99** or **9999.99ml**.
4. The volume dispensing cycle can be initiated from the PC keyboard, from the LabTec Front panel (“**RUN**” key) or via the Foot Switch.

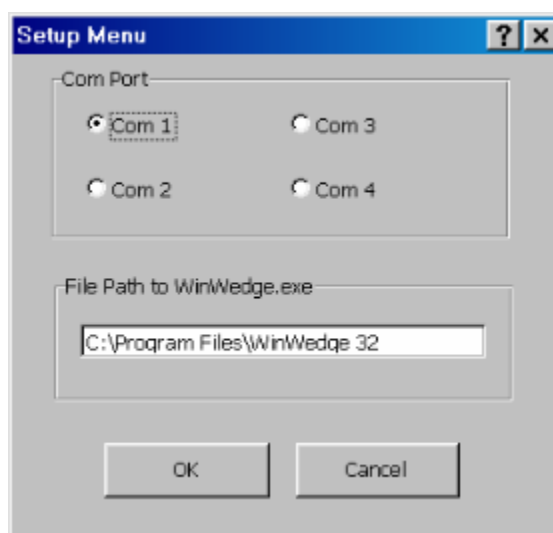
For remote weight dispensing, select **EXEC 1** of the Weight Dispensing Mode, press “**Exec**” then “**RUN**”. The dispensed weight parameter has the general form of **Wxxxx.xx**, thus the largest weight that can be entered and dispensed by the LabTec is **W9999.99** or **9999.99grams**.

10.0 SciDoc LabTec Documentation Software

Scilog has available a software package that captures the data output of the LabTec and places it in an Excel spreadsheet. This customized spreadsheet also performs some basic calculations to aid you in the control of your process. It consists of a copy of WinWedge32 from TalTech Inc. and a custom spreadsheet with built in macros. It requires the use of a SciLog RS-232 cable, p/n 080-073 to connect your LabTec to an available Com Port on your PC. (Com1 – 4)

- Minimum system requirements are Windows 98, Excel 2000 and WinWedge32 v3.0, which is included in the package.

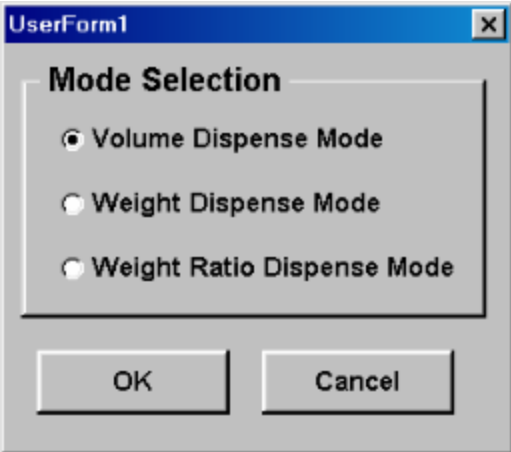
Once installed, click on the shortcut for the spreadsheet, Excel launches and you are presented with the following Setup dialog box:



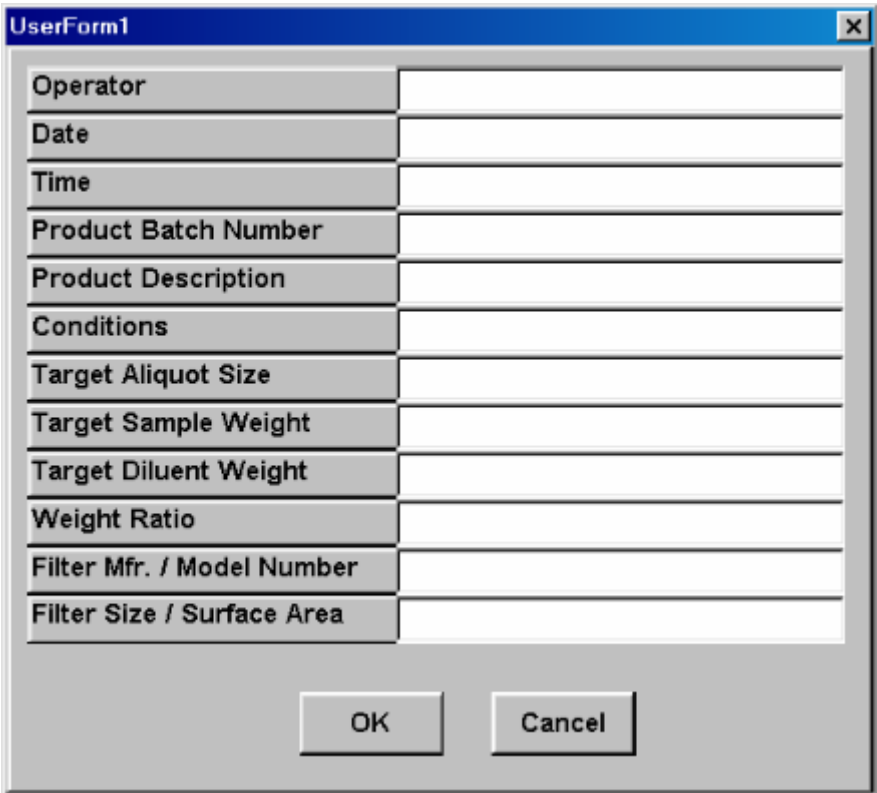
Choose the Com Port you have the LabTec connected to, and enter the directory you installed WinWedge32 into if different than the default directory. (We highly recommend the use of the default directory!) Click on the OK button and WinWedge32 will start, showing itself as an icon in your system tray.

If you chose cancel on the Setup dialog box, the “Clear Data” button will not be visible, WinWedge32 won’t be in the system tray, and you won’t get the next dialog box. When you are ready, you will need to click on the “Setup” button and then the “Data Sheet Setup” and “Operator Info” buttons to complete these tasks in order for data collection to be possible.

The dialog box that appears next allows you to setup the spreadsheet to correctly deal with the data from Volume Dispense, Weight Dispense, or Weight Ratio Dispense Modes. It’s displayed on the next page:




Select the correct mode, and press the "OK" button. You are now presented with the final setup dialog box.



This one allows you to enter all the operator's information: name, date, time, product description and batch number, etc. Enter all of the appropriate Operator Information in this dialog box and click on "OK". Please note: the "Clear Data" button does not affect the information in these fields. You may click on the "Operator Info" button and update these fields as needed.

Clicking on "OK" leaves you with the screen on the next page, ready to get started collecting data from the LabTec.

					Operator		A. Dawson		
					Date		06/09/2004		
6/9/4; 08:32 DILU2.30; Volume; Exec 1; Volume set= 50.00ml; Count= 20; Rate= 90.0%; CW; Tubing=15; Units=psi; Alarms:HP=2; Limits; HP=20.0; Slow Factor = 3.00;		Time		08:30					
		Product Batch Number		123456					
		Product Description		Distilled Water					
		Conditions		72F					
		Target Aliquot Size		50.0 ml					
		Target Sample Weight		n/a					
		Target Diluent Weight		n/a					
		Weight Ratio		n/a					
		Filter Mfr. / Model Number		n/a					
		Filter Size / Surface Area		n/a					
Setup		Data Sheet Setup		Operator Info					
Clear Data		Volume Dispense Mode							
MT	SC	DV	CV	P1	ST	AL	Aliquot	Error	% Error
8:32:57	1	50.03	50.00	0.0	FINISH		50.00	0.03	0.06
8:33:04	2	50.02	100.00	0.0	FINISH		50.00	0.02	0.04
8:33:11	3	50.02	150.10	0.0	FINISH		50.00	0.02	0.04
8:33:18	4	50.02	200.10	0.0	FINISH		50.00	0.02	0.04
8:33:25	5	50.04	250.10	0.0	FINISH		50.00	0.04	0.08
8:33:33	6	50.03	300.20	0.0	FINISH		50.00	0.03	0.06
8:33:40	7	50.03	350.20	0.0	FINISH		50.00	0.03	0.06
8:33:47	8	50.03	400.20	0.0	FINISH		50.00	0.03	0.06
8:33:54	9	50.03	450.20	0.0	FINISH		50.00	0.03	0.06
8:34:01	10	50.03	500.30	0.0	FINISH		50.00	0.03	0.06
8:34:08	11	50.03	550.30	0.0	FINISH		50.00	0.03	0.06
8:34:15	12	50.02	600.30	0.0	FINISH		50.00	0.02	0.04
8:34:22	13	50.02	650.30	0.0	FINISH		50.00	0.02	0.04
8:34:29	14	50.03	700.40	0.0	FINISH		50.00	0.03	0.06
8:34:36	15	50.03	750.40	0.0	FINISH		50.00	0.03	0.06
8:34:43	16	50.04	800.40	0.0	FINISH		50.00	0.04	0.08
8:34:51	17	50.03	850.50	0.0	FINISH		50.00	0.03	0.06
8:34:58	18	50.03	900.50	0.0	FINISH		50.00	0.03	0.06
8:35:05	19	50.02	950.50	0.0	FINISH		50.00	0.02	0.04
8:35:12	20	50.03	1000.50	0.0	FINISH		50.00	0.03	0.06

Abbreviations:

MT = Military Time	SC = Sample Count
DV = Dispensed Volume	CV = Cumulative Volume (Volume Dispense Mode)
DW = Dispensed Weight	CW = Cumulative Weight (Weight Dispense Mode)
SW = Sample Weight	DW = Diluent Weight (Weight Ratio Mode)
P1 = Pressure, psi	ST = Pump Status
AL = Alarm (HP)	HP = High Pressure (1=OFF, 2=Alarm Only, 3=Pump Stop)
CW = Clockwise Pump Direction	CCW = Counter Clockwise Pump Direction

Click on File-Save as: and choose an appropriate file name based on your needs. When ready for another run, simply press the “Clear Data” button, or close and re-open the file.

Please note the following:

- You may use the **STOP** key on the LabTec front panel to interrupt the dispensing process. This shows up in the data set by displaying the word STOP in the **ST** (Status) column of the Data worksheet.

- Using the **EXIT** key however and then pressing Exec and RUN again in the same data collection run, will replace the header information in the text box at the top of the worksheet, while continuing to add data to the bottom of the sheet. While the spreadsheet will pick up on any aliquot or ratio change that has occurred, the initial header information will be lost. It is recommended that you either save the data as mentioned above, or dispose of it by clicking on the “Clear Data” button prior to pressing the Exec and RUN keys again to begin a new set of data.

- The LabTec allows you to change the Amount or Count on the fly by pressing the AMOUNT or COUNT keys on the front panel. This is a better way to change your aliquot size (if the change is small) to record different aliquots in the same run and not lose the header info. As your process is continuing while you do this, the data will reflect the change. **IF THE ALIQUOT SIZE CHANGE IS LARGE, SAVE THE DATA, CLEAR THE SHEET, CHANGE THE LABTEC TO A DIFFERENT EXEC# AND PROCEED.**

- To open the saved data at a later time and not lose any information, click on “Disable Macros” when the spreadsheet is opened.

Please contact SciLog Inc. at 800-955-1993 if you require technical support for this software package. We have adapters available for USB ports, and for use of TCP/IP over a LAN. We welcome your suggestions regarding this software as well.

While the LabTec and all other SciLog Smart Pumps are 21CFR11 compliant, this documentation software is not, and its results will need to be incorporated into your compliant documentation system if your situation requires it.

Part C: LabTec Dispensing Applications

1.0 Weight Ratio Dispensing: General Information

The Weight Ratio Dispensing mode is designed for *automated weighing and diluting of samples*. In this operational mode, the LabTec is connected to an electronic, top-loading balance. The LabTec will tare the balance after the sample container has been placed onto the balance. The sample is then placed into the container and the sample weight is stored and displayed by the LabTec. The diluent is automatically dispensed by the LabTec based on a **user-defined sample to diluent weight ratio**.

For example, if the sample weight happens to be 10.00 grams and the user-selected weight ratio is 9.00, then the LabTec will dispense 90.00 grams of diluent to provide 10-fold dilution by weight. Regardless of the sample weight, the desired dilution ratio will be maintained. Only an approximate sample weight needs to be placed into the sample container; careful weighing out of the sample as required by volumetric dilution procedures is not necessary with the weight ratio method.

1.1 Sterile Dispensing: When sterile liquids need to be dispensed, two (2) pump dispensing options are available to you:

First, the **LabTec CP-200** (P/N: 100-1682DILU) mounted with the **TANDEM 1082** peristaltic pump head is the method of choice when dispensing **pre-sterilized solutions**. Utilizing autoclavable Silicone pump tubing and SciLog's Autoclavable Diluent Sterilization (ADS) System (P/N: 400-490, 20 liter ADS System), sterility of the liquid can be readily maintained during the dispensing process. The sterilized solution comes only in contact with the sterilized #24 Silicone pump tubing. The installation of an autoclavable Filling Bell (P/N: 400-487) is recommended in order to minimize cross-contamination during dispensing.

Second, the **LabTec MP320** (P/N: 100-336DILU) mounted with a Magnetic Gear Pump Head (Model 201) and used together with a 0.2 μm filter cartridge, allows **in-line filter-sterilization** of solutions while dispensing. This method avoids the need for pre-sterilizing, i.e. autoclaving of solutions; a significant savings both in labor and energy. Here the magnetic gear pump head is recommended because of the high output capacity (3.5 liters per minute).

In-line filter sterilization is recommended when large batch volumes of sterile solutions are needed, e.g. dilution of combined samples in Salmonella bacteriological testing which typically require 2-4 liters of sterile diluent per sample. By using the optional Pressure Sensor Kit, you can monitor the backpressure generated as the filter becomes plugged, and set a user-definable limit to either Alarm Only (audible beep) or Pump Stop (stops pump and beeps).

In-line filter sterilization is also recommended for large volume dispensing applications in media kitchens. Utilizing large surface area filtration devices, i.e. 0.2 µm **Sartobran “P” Capsule** (P/N: 400-489), 1500 to 2000 liters of media can be dispensed with a single filter cartridge. However, the actual filtration capacity is heavily dependent on the particulate load of the solution to be filtered.

For occasional or **small-volume, sterile dispensing** applications, a 0.2 µm Sartobran 300 filter cartridge (P/N: 400-488) is recommended; this sterilizing filter has a filtration capacity of approximately 50 liters.

When using the LabTec with a 201 magnet gear pump head, you need to install an in-line check valve (P/N: 400-530) preferably at the pump discharge side. The installation of an autoclavable Filling Bell (P/N: 400-487) is recommended in order to minimize cross-contamination during dispensing.

1.2 Balance Installation: In the Weight Ratio Dispensing mode, the LabTec must be connected to one of the balances listed in Part B, Section 7.1. The balance parameters listed in Section 7.1, which are relevant to your particular balance, must be entered and stored in the balance’s memory. Carefully check that all required parameters have been entered and accepted by the balance.

In the LabTec **Setup: Scale** sub-mode, select the balance manufacturer; the LabTec will automatically implement the correct communications parameters. Connect the appropriate Balance to LabTec cable to the “Balance” port of the LabTec, as well as to the serial port of the balance. To test the serial communication between LabTec and balance, enter the Weight Ratio mode and select the “**EXEC 1**” display, then press “**Select**”:

EXEC 1		
Up	Down	Select

Press "Select"

SCALE INTIALIZATION
Please Wait

SCALE ERROR
Press Any Key

The “**Scale Error**” display indicates that communications attempts by the LabTec have failed, carefully check the RS-232 connection between the two devices. Also review the communications parameter stored in the balance and the LabTec, then try again.

2.0 Weight Ratio Dispensing: How To Get Started

1. Complete the balance installation and communications testing as outlined in Part C, Section 1.2. If a data printout is desired, connect the cable (P/N: 080-096) between the LabTec “Printer” port and the SciLog printer (P/N; 080-095). In the LabTec **Setup: Printer** sub mode, make sure all the printer communications parameters have been entered. Turn on the printer, in the LabTec select the **Weight Ratio** mode, then press “**Exec**” key; the first line to be printed will consist of weight ratio dispensing parameters (see Part B, Section 7.31).
2. Install your pump tubing: For most of your weight ratio dispensing applications, #24 thick-walled Silicone pump tubing is recommended (requires a 1082 TANDEM peristaltic pump). Use approximately six (6) feet of #24 tubing; install the tubing such that two (2) feet of tubing are located on the discharge side while four (4) feet of tubing are located on the suction side of the TANDEM.

Note: This arrangement allows used pump tube sections located in the TANDEM to be replaced with new tube section located at the suction side of the pump. When advancing pump tubing in this manner, the used pump tube sections end up on the pump discharge side.

3. If you use a 201 Magnetic Gear Pump Head, #24 Silicone pump tubing is also recommended. However in this case, pipe adapters ($\frac{1}{4} \times \frac{1}{8}$ ”, male, P/N: 400-500) are installed at the inlet and outlet ports of the 201 magnetic gear pump head. The #24 Silicone tubing slips tightly over the inlet and outlet pipe adapters.
4. The balance should be located 8-10 inches away from the LabTec. On the discharge side, fasten the pump tubing to a burette stand (P/N: 400-420) using nylon ties. The dispensing tip should be secured with a clamp and located above the balance with sufficient clearing to allow the easy removal of any sample bags or containers. On the suction side of the LabTec, secure the pump tubing to the solution reservoir. Press the “**Prime**” key at the LabTec front panel until all of the tubing is filled with solution.
5. Consult Part B, Section 2.0 to edit your weight ratio dispensing parameters.

5.1 **WGT FACTOR:** Defines the weight ratio (multiplier) that is applied to the actual sample weight, as determined by the balance, to arrive at the required diluent weight. Select a **WGT FACTOR = 9.00**, if you want a 10-fold dilution. Select a **WGT FACTOR = 99.00**, if you want a 100-fold sample dilution by weight.

5.2 **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. Select **SNIFFLE = 0.3**.

5.3 **SLOW FACTOR:** Defines the diluent weight that is dispensed slowly at the end of the dispensing cycle. For example, if the diluent weight is expected to be 100 grams, then the SLOW FACTOR is selected to be approximately 10% or 10.00 grams.

- 5.4 **PUMP DIRECTION:** Defines the rotation of the pump head, this parameter can be changed from clock-wise (CW) to counter clock-wise (CCW).
- 5.5 **PUMP RATE:** Defines the relative pup speed (0% to 100%) with which the diluent is being dispensed. Select **PUMP RATE = 80%**.
- 5.6 **TIME DELAY:** Not used in the Weight Ratio Dispensing mode, should be set to 00:01 (default).
- 5.7 **COUNT:** Not used in the Weight Ratio Dispensing mode, should be set to 1 (default).

Press “**Exec**” key, select “**Exec 1**”, the LabTec will show the following display:

SCALE INTIALIZATION Please Wait
--

While the message is being displayed, the LabTec checks the balance communications parameters and the following display is shown:

WGT RATIO SET: 9.00 Press RUN When Ready

Press the “**RUN**” key or alternatively press the foot switch:

Press RUN When VESSEL IS ON BALANCE
--

Place the sample bag or container onto the balance and underneath the dispensing tip. Press “**RUN**” key or the foot switch. The LabTec will show the following display:

REMOVING TARE WEIGHT Please Wait

This display is followed by:

Press RUN When SAMPLE IS IN VESSEL

Place your sample into the sample bag or container, only an approximate sample weight is needed. The weight ratio will be applied to the actual sample weight as determined by the balance. Press “**RUN**” key or the foot switch, the LabTec will start dispensing and display the progress:

SW: 10.00 G	RUN
DW: 50.00 G	ID 001

SW stands for the actual **sample weight** and **DW** represents the delivered **diluent weight**. When the dispensing cycle is completed, following displays are shown.

SW: 10.00 G	FINISH
DW: 90.00 G	ID 001

DISPENSING Completed

WGT RATIO SET: 9.00 Press RUN When Ready

Remove your filled sample bag or container and initiate the second dispensing cycle.

NOTE: If you have more than one WGT FACTOR, store one WGT FACTOR in “Edit 1”, e.g. “9.00”, while a second WGT FACTOR is stored in “Edit 2”, e.g. “99.00”. Up to ten different sets of parameters can be stored in “Edit 1” through “Edit 10”

2.1 Weight Ratio Dispensing: Parameter Guide, TANDEM 1082

Silicone: #15 & #24

The following information should be used as a general guide in selecting optimal dispensing parameters: This data was collected with a **600 RPM LabTec Dispenser** mounted with a **TANDEM 1082 pump head**; the “Tube Size” parameter refers to thick-walled (0.096” wall thickness) Silicone pump tubing size #24.

The “Slow Factor” is implemented at the end of each dispensing cycle to allow the electronic balance to stabilize. Thus a Slow Factor of 20.00 ml indicates that the last 20 ml will be dispensed at reduced pump speed. **NOTE: The LabTec will stop pumping just prior to reaching the target weight; once the balance has stabilized, the LabTec will complete the dispensing cycle.** The end of the dispensing cycle will be indicated by a “beep” followed by the display “Dispensing Completed”. The “Sniffle”, i. e. momentary pump reversal at the end of the dispensing cycle, is set at its default value of 0.3 seconds.

Edit Parameter Settings: *All dispensing was done with #24 Silicone pump tubing*

EDIT 1: Wgt Factor = 9.00, Sniffle = 0.3, Slow Factor = 20.00 gr, Pump Rate = 80%, Time Delay = 00:00, Count = 1

EDIT 2: Wgt Factor = 99.00, Sniffle = 0.3, Slow Factor = 20.00 gr, Pump Rate = 80%, Time Delay = 00:00, Count = 1

Sample Weight	Theoretical Diluent Weight	Ave. Delivered Diluent Weight	RSD (%)	Dispensing Time Per Aliquot
<i>EXCE 1: Wgt. Factor = 9.00</i>				
10.00 gr.	90.00 gr.	89.99 gr	0.12%	12 sec.
20.00 gr.	180.00 gr.	180.03 gr	0.04%	16 sec.
<i>EXEC 2: Wgt. Factor = 99.00</i>				
1.00 gr.	99.00 gr	99.01 gr	0.11%	11 sec.
2.00 gr	198.00 gr	198.00 gr	0.07%	18 sec.

NOTE: Weights were used as surrogate samples. Weight sizes: 1.00 gr, 2.00 gr, 10.00 gr and 20.00 gr were placed on PGS Mettler balance. Distilled water was used as a diluent; five (5) separate measurements were made for each of the four (4) sample weights, their average Delivered Diluent Weight and the Relative Standard Deviation (RSD) are summarized above.

**2.2 Weight Ratio Dispensing: Parameter Guide, Magnetic Gear Pump:
201 Micropump Head**

The following information should be used as a general guide in selecting optimal dispensing parameters. This data was collected with a **3400-RPM LabTec Dispenser** mounted with a **201 Micropump Head**. A check valve (P/N: 400-530) was used as a dispensing spout.

The “Slow Factor” is implemented at the end of each dispensing cycle to allow the electronic balance to stabilize. Thus a Slow Factor of 25 ml indicates that the last 25 ml will be dispensed at reduced pump speed. **NOTE: The LabTec will stop pumping just prior to reaching the target weight; once the balance has stabilized, the LabTec will complete the dispensing cycle.** The end of the dispensing cycle will be indicated by a “beep” followed by the display “Dispensing Completed”. The “Sniffle” function is turned off i.e. Sniffle = 0.0

Edit Parameters: *All dispensing was done with a 201 Micropump Head.*

EDIT 1: Wgt Factor = 9.00, Sniffle = 0.0, Slow Factor = 25.00 gr, Pump Rate = 50%, Time Delay = 00:00, Count = 1

EDIT 2: Wgt Factor = 99.00, Sniffle = 0.0, Slow Factor = 25.00 gr, Pump Rate = 50%, Time Delay = 00:00, Count = 1

EDIT 3: Wgt Factor = 6.79, Sniffle = 0.0, Slow Factor = 25.00 gr, Pump Rate = 50%, Time Delay = 00:00, Count = 1

Sample Weight	<u>Theoretical</u> Diluent Weight	<u>Ave. Delivered</u> Diluent Weight	RSD (%)	Dispensing Time Per Aliquot
<i>EXCE 1: Wgt. Factor = 9.00</i>				
10.00 gr.	90.00 gr.	89.93 gr	0.11%	8 sec.
20.00 gr.	180.00 gr.	179.98 gr	0.11%	12 sec.
<i>EXEC 2: Wgt. Factor = 99.00</i>				
1.00 gr.	99.00 gr	98.70 gr	0.40%	8 sec.
2.00 gr	198.00 gr	197.50 gr	0.35%	12 sec.
<i>EXCE 3 Wgt Factor = 6.79</i>				
26.00 gr	176.54	176.52 gr	0.07%	10 sec

NOTE: Weights were used as surrogate samples. Weight sizes: 1.00 gr, 2.00 gr, 10.00 gr and 20.00 gr and 26.0 gr were placed on PGS Mettler balance. Distilled water was used as a diluent; five (5) separate measurements were made for each of the five (5) sample weights, their Average Delivered Diluent Weight and the Relative Standard Deviation (RSD) and Dispensing Time per Aliquot are summarized above.

3.0 Dispensing By Volume: General Considerations:

Dispensing of Pre-sterilized Solutions:

1. Volumetric batch dispensing of pre-sterilized, *i.e. autoclaved solutions*, the TANDEM 1082 peristaltic pump head is recommended together with thick-walled (#24 or #15) Silicone pump tubing
2. For volumetric batch dispensing in the *2.5 ml to 10 ml range*, use *#15 Silicone pump tubing* (P/N: 400-115). Consult Section 4.1 for optimal dispensing/pump parameters.
3. For volumetric batch dispensing in the *10 ml to 500 ml range*, use *# 24 Silicone pump tubing* (P/N 400-124). Consult Section 4.1 for optimal dispensing/pump parameters.
4. Both #15 and #24 Silicone pump tubing can be *autoclaved repeatedly*.

Dispensing with In-Line Filter Sterilization:

5. Volumetric batch dispensing with *in-line filter sterilization*, the TANDEM 1082 peristaltic pump head is recommended together with thick-walled (#15 or #24) Silicone pump tubing.
6. For volumetric batch dispensing with in-line filter sterilization in the *2.5 ml to 10 ml range*, use *#15 Silicone pump tubing* (P/N: 400-115). The Sartobran 300 (0.20µm) filter (P/N: 400-450) is recommended. Consult Section 4.1 for optimal dispensing/pump parameters.
7. For volumetric batch dispensing in the *10 ml to 500 ml range*, use *# 24 Silicone pump tubing* (P/N: 400-124). The large-capacity Sartobran “P” 0.20µm sterilizing filter (SciLog P/N: 400-489) is recommended. Consult Section 4.1 for optimal dispensing/pump parameters.
8. **For large-volume batch dispensing with in-line filter sterilization in the multi-liter range, use the 201 Micropump Head.** The large-capacity Sartobran “P” 0.20µm sterilizing filter (P/N: 400-489) is recommended. Consult Section 4.3 for optimal dispensing/pump parameters.

Dispensing of Non-Sterile Solutions:

9. Either the TANDEM 1082 or the 201 Micropump Head can be used. For batch volumes up to 500ml, the TANDEM 1082 pump head is recommended. For larger batch volumes, the 201 Micropump Head provides a faster dispensing capability. **However, the 201 Micropump Head is not recommended for solutions containing particulates.**
10. For automated dispensing with a dispensing rack (Gilson 204Fraction Collector), the TANDEM 1082 with #15 Silicone pump tubing is recommended.

NOTE: *If you requested a custom calibration from SciLog, then the LabTec was delivered to you calibrated and is ready for use.*

4.0 Dispensing By Volume: How to get started.

1. Select your pump tubing; use #24 or #15 Silicone tubing if you have a TANDEM 1082 peristaltic pump head. Select #24 tubing if you intend to dispense aliquots larger than 10 ml, use #15 pump tubing if you intend to dispense aliquots smaller than 10 ml.
2. Consult Part B, Section 3.0, **Volume: Edit**, go to the following display:

- VOLUME DISPENSE -		
Exec	Edit	Prime

3. After you have connected the tubing to your solution reservoir, fill the tubing with solution and expel all air from the tubing by pressing the **“PRIME”** key at the LabTec front panel. You are now ready to setup your dispense using the built-in calibration; go to the following display and press **“Edit”** key.

Select the following parameters for **“Edit 1”**:

- 5.1 **“DISP VOLUME”** enter **“50.00 ml”**
- 5.2 **“TUBING”** choose **“24”**
- 5.3 **“SNIFFLE”** enter **“0.3”**
- 5.4 **“SLOW FACTOR”** enter **“2.5 ml”**
- 5.5 **“PUMP RATE”** enter **“80%”**
- 5.6 **“TIME DELAY”** enter **“0.1 sec”**
- 5.7 **“COUNT”** enter **“1”**

First press **“Exit”**, then press **“Exec”** (key **“A”**), and then **“Select”** for Exec 1. The following display will appear:

VOLUME SET: 50.00 ml
Press RUN When Ready

when you press the **“RUN”** key, the LabTec will dispense one (1) 50.00ml aliquot

4. At this point you may want to check the accuracy of the LabTec. For this purpose use an electronic balance with 0.01-gram readability, e.g. Mettler PG5002-S or equivalent. Dispense at least three 50.00 ml aliquots of distilled water, record the weight of each aliquot, and then determine the average aliquot weight. For example, assume that you obtained the following results:

Trial 1	50.80g
Trial 2	50.50g
Trial 3	51.10g
AV = Average Value:	50.80g

5. After you have dispensed the third aliquot, press the **RE-CAL** key, the LabTec will show the following display:

DV: 50.00	AV: 50.00
Incr.	Decr. Select

Use the **“Incr.”** And **“Decr.”** Keys until **AV = 50.80**, the average aliquot size, then press **“Select”**. The Master Calibration has now been corrected and will compensate for the 0.80 g inaccuracy.

4.1 Dispensing By Volume: Parameter Guide, TANDEM 1082

Silicone: 15 & 24

The following information should be used as a general guide in selecting optimal dispensing parameters: This data was collected with a **600 RPM LabTec Dispenser** mounted with a **TANDEM 1082 pump head**; the “Tube Size” parameter refers to thick-walled (0.096” wall thickness) Silicone pump tubing sizes: 15 & 24.

The “Slow Factor” is implemented at the end of each dispensing cycle to avoid overshooting of the target volume. Thus a Slow Factor of 1.00 ml indicates that the last 1.0 ml will be dispensed at reduced pump speed. Typically, for dispensed volumes less than 50ml, the “Slow Factor” is approximately 5% of the selected Dispensed Volume. The “Sniffle”, i. e. momentary pump reversal at the end of the dispensing cycle, is set at its default value of 0.3 seconds.

NOTE: After changing pumping parameters, i.e. changing pump tubing, Pump Speed, Slow Factor or Sniffle settings, you should re-calibrate the LabTec Dispenser (see Re-Cal feature) in order to maintain a high accuracy / precision level.

Dispensed Volume (ml)	Tube Size:	Pump Speed: (max. 600 RPM)	Slow Factor:	Typical Precision: (RSD)	Dispensing Time/Aliquot
5.00 ml	#15	25%	0.75 ml	1.00%	4.2 Sec.
10.00 ml	#15	50%	1.20 ml	1.00%	4.5 Sec.
25.00 ml	#15	50 %	1.80 ml	0.20%	7.5 Sec.
50.00 ml	#15	75%	2.00 ml	0.20%	8.0 Sec.
100.00 ml	#15	100%	1.50 ml	0.20%	11.0 Sec.
150.00 ml	#15	100%	3.00 ml	0.15%	14.0 Sec.
200.0 0 ml	#15	100%	3.50 ml	0.15%	18.0 Sec.
10.00 ml	#24	15%	1.00 ml	0.50%	4.0 Sec.
25.00 ml	#24	20%	1.50 ml	0.50%	9.0 Sec.
50.00 ml	#24	50%	2.50 ml	0.15%	7.5 Sec.
100.00 ml	#24	75%	2.50 ml	0.15%	8.5 Sec.
200.00 ml	#24	100%	4.50 ml	0.10%	12.0 Sec
400.00 ml	#24	100%	4.50 ml	0.10%	21.0 Sec.
500.00 ml	#24	100%	5.00 ml	0.10%	24.0 Sec.

NOTE: For each “Dispensed Volume”, ten (10) separate measurements were made; the average “Dispensed Volume” the Standard Deviation and Relative Standard Deviation (RSD, %) as well as the “Dispensing Time per Aliquot” were determined. Distilled water was used as a diluent, each “Dispensed Volume” was verified by weight using a Mettler PG 5002-S, 0.01 gram resolution.

4.2 Dispensing By Volume: Parameter Guide, TANDEM 1081

PharMed: #13, 14, 16, 25, & 17

The following information should be used as a general guide in selecting optimal dispensing parameters. This data was collected with a **600 RPM LabTec Dispenser** mounted with a **TANDEM 1081 pump head**; the “Tube Size” parameter refers to thin-walled (0.063” wall thickness) PharMed™ pump tubing sizes: 13, 14, 16, 25 & 17.

The “Slow Factor” is implemented at the end of each dispensing cycle to avoid overshooting of the target volume. Thus a Slow Factor of 1.00 ml indicates that the last 1.0ml will be dispensed at reduced pump speed. Typically, for dispensed volumes less than 50ml, the “Slow Factor” is approximately 5% to 10% of the selected Dispensed Volume. The “Sniffle”, i. e. momentary pump reversal at the end of the dispensing cycle, is set at its default value of 0.3 seconds.

NOTE: After changing pumping parameters, i.e. changing pump tubing, Pump Speed, Slow Factor or Sniffle settings, you should re-calibrate the LabTec Dispenser (see Re-Cal feature) in order to maintain a high accuracy / precision level.

Dispensed Volume (ml)	Tube Size:	Pump Speed: (max. 600 RPM)	Slow Factor:	Typical Precision: (RSD)	Dispensing Time/Aliquot
0.50 ml	#13	50%	0.05 ml	< 0.5%	5.0 Sec.
1.00ml	#13	50%	0.05 ml	< 0.5%	7.0 Sec.
2.00 ml	#13	75%	0.10 ml	0.5%	9.0 Sec.
4.00 ml	#13	100%	0.20 ml	0.5%	12.0 Sec.
2.00 ml	#14	50%	0.15 ml	< 0.5%	4.5 Sec.
4.00 ml	#14	50%	0.20 ml	< 0.5%	6.5 Sec.
10.00 ml	#14	75%	0.30 ml	< 0.5%	8.5 Sec.
20.00 ml	#14	100%	0.40 ml	< 0.5%	11.0 Sec.
10.00 ml	#16	50%	0.80 ml	0.5%	6.0 Sec.
20.00 ml	#16	50%	1.00 ml	0.5%	9.0 Sec.
50.00 ml	#16	75%	1.00 ml	0.5%	11.5 Sec.
100.00 ml	#16	100%	1.50 ml	0.5%	15.0 Sec.
50.00 ml	#25	50%	1.50 ml	0.7%	8.0 Sec.
100.00 ml	#25	75%	3.00 ml	0.7%	12.5 Sec.
150.00 ml	#25	100%	4.00 ml	0.7%	13.0 Sec.
200.00 ml	#25	100%	5.00 ml	0.7%	14.0 Sec.
100.00 ml	#17	75%	5.00 ml	< 1.0%	9.0 Sec.
200.00 ml	#17	100%	5.00 ml	< 1.0%	14.0 Sec.
400.00 ml	#17	100%	7.00 ml	< 1.0%	25.0 Sec.
500.00 ml	#17	100%	7.00 ml	< 1.0%	24.0 Sec.

NOTE: For each “Dispensed Volume”, ten (10) separate measurements were made; the average “Dispensed Volume”, the Standard Deviation and Relative Standard Deviation (RSD, %) as well as the “Dispensing Time per Aliquot” were determined. Distilled water was used as a diluent; each “Dispensed Volume” was verified by weight using a Mettler PG 5002-S, 0.01 gram resolution.

4.3 Dispensing By Volume: Parameter Guide, Magnetic Gear Pump:

201 Micropump Head

The following information should be used as a general guide in selecting optimal dispensing parameters. This data was collected with a **3400 RPM LabTec Dispenser** mounted with a **201 Micropump Head**. A check valve (P/N: 400-530) was used as a dispensing spout.

The “Slow Factor” is implemented at the end of each dispensing cycle to avoid overshooting of the target volume. Thus a Slow Factor of 1.00 ml indicates that the last 1.0 ml will be dispensed at reduced pump speed. Typically, for dispensed volumes less than 50ml, the “Slow Factor” is approximately 5% to 10% of the selected Dispensed Volume. Because of the check valve installation, the “Sniffle” function is turned off i.e. Sniffle = 0.0

NOTE: After changing pumping parameters, i.e. Pump Speed or Slow Factor settings, you should re-calibrate the LabTec Dispenser (see Re-Cal feature) in order to maintain a high accuracy / precision level.

Dispensed Volume (ml)	Pump Head: #	Pump Speed: (3400 RPM, max)	Slow Factor:	Typical Precision: (RSD)	Dispensing Time/Aliquot
10.00 ml	201	10%	1.50 ml	0.40%	3.0 Sec.
25.00 ml	201	15%	1.50 ml	0.20%	4.5 Sec.
50.00 ml	201	25%	2.00 ml	0.20%	4.5 Sec.
100.00 ml	201	40%	2.50 ml	0.12%	5.0 Sec.
200.00 ml	201	50%	3.00 ml	0.10%	8.0 Sec
400.00 ml	201	75%	5.00 ml	0.05%	10.0 Sec.
1000.00 ml	201	100%	10.00 ml	0.05%	18.0 Sec.

NOTE: For each “Dispensed Volume”, ten (10) separate measurements were made; the average “Dispensed Volume” the Standard Deviation and Relative Standard Deviation (RSD, %) as well as the “Dispensing Time per Aliquot” were determined. Distilled water was used as a diluent, each “Dispensed Volume” was verified by weight using a Mettler PG 5002-S , 0.01 gram resolution.

5.0 Dispensing By Weight: How To Get Started

1. Complete the balance installation and communications testing as outlined in Part C, section 1.2. If a data printout is desired, connect the cable (P/N: 080-096) between the LabTec “Printer” port and the SciLog printer (P/N; 080-095). In the LabTec **Setup: Printer** (see Part B, Section 7.3) sub mode, make sure all the printer communications parameters have been entered. Turn on the printer, in the LabTec select the **Weight** mode, then press “**Exec**” key; the first line to be printed will consist of weight dispensing parameters.
2. Install your pump tubing: For most of your weight dispensing applications, #24 thick-walled Silicone pump tubing is recommended (requires a 1082 TANDEM peristaltic pump). Use approximately six (6) feet of #24 tubing; install the tubing such that two (2) feet of tubing are located on the discharge side while four (4) feet of tubing are located on the suction side of the TANDEM.

Note: This arrangement allows used pump tube sections located in the TANDEM to be replaced with new tube section located at the suction side of the pump. When advancing pump tubing in this manner, the used pump tube sections end up on the pump discharge side.

3. If you use a 201 Magnetic Gear Pump Head, #24 Silicone pump tubing is also recommended. However in this case, pipe adapters ($\frac{1}{4}$ x $\frac{1}{8}$ ”, male, P/N: 400-500) are installed at the inlet and outlet ports of the 201 magnetic gear pump head. The #24 Silicone tubing slips tightly over the inlet and outlet pipe adapters.
4. The balance should be located 8-10 inches away from the LabTec. On the discharge side, fasten the pump tubing to a burette stand (P/N: 400-420) using nylon ties. The dispensing tip should be secured with a clamp and located above the balance with sufficient clearing to allow the easy removal of any sample bags or containers. On the suction side of the LabTec, secure the pump tubing to the solution reservoir. Press the “**Prime**” key at the LabTec front panel until all of the tubing is filled with solution.
5. Consult Part B, Section 6.0 for editing your weight dispensing parameters.
 - 5.1 **DISP. WEIGHT:** Defines the dispensed weight in terms of grams. For example, if you want to dispense 25.00 grams, use the “**Incr,**” key to scroll to 25.00, then press “**Select**”
 - 5.2 **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. Select **SNIFFLE = 0.3**.
 - 5.3 **SLOW FACTOR:** Defines the diluent weight that is dispensed slowly at the end of the dispensing cycle. For example, if the diluent weight is expected to be 100 grams, then the SLOW FACTOR is selected to be approximately 15% or 15.00 grams.
 - 5.4 **PUMP DIRECTION:** Defines the rotation of the pump head, this parameter can be changed from clock-wise (CW) to counter clock-wise (CCW).
 - 5.5 **PUMP RATE:** Defines the relative pup speed (0% to 100%) with which the diluent is being dispensed. Select **PUMP RATE = 80%**.
 - 5.6 **TIME DELAY:** Defines the time interval, in seconds, between dispensing cycles.

5.7 **COUNT:** Defines how often the dispensing cycle will be repeated. For example, when COUNT = 10, then the selected DISP. WEIGHT will be dispensed 10 times.

Press “**Exec**” key, select “**Exec 1**”, the LabTec will show the following display:

SCALE INTIALIZATION Please Wait
--

While the message is being displayed, the LabTec checks the balance communications parameters and the following display is shown:

WEIGHT SET: 25.00G Press RUN When Ready
--

Place the sample bag or container onto the balance and underneath the dispensing tip. Press “**RUN**” key or the foot switch. The LabTec will show the following display:

REMOVING TARE WEIGHT Please Wait

The LabTec starts dispensing while the following display is shown:

DW: 00.00 G	RUN
CW: 00.00 G	ID 001

DW stands for the **Diluent Weight** and **CW** represents the delivered **Cumulative Weight**. When the dispensing cycle is completed, following displays are shown.

DW: 25.00 G	FINISH
CW: 25.00 G	ID 001

DISPENSING Completed

WEIGHT SET: 25.00G Press RUN When Ready
--

Remove your filled sample bag or container and initiate the second dispensing cycle.

NOTE: If you have more than one DISP. WEIGHT, store one DISP. WEIGHT in “Edit 1”, e.g. “10.00G”, while a second DISP. WEIGHT is stored in “Edit 2”, e.g. “100.00G”. Up to ten different sets of parameters can be stored in “Edit 1” through “Edit 10”

5.1 Dispensing By Weight: Parameter Guide, TANDEM 1082

Silicone: 15 & 24

The following information should be used as a general guide in selecting optimal dispensing parameters: This data was collected with a **600 RPM LabTec Dispenser** mounted with a **TANDEM 1082 pump head**; the “Tube Size” parameter refers to thick-walled (0.096” wall thickness) Silicone pump tubing sizes: 15 & 24.

The “Slow Factor” is implemented at the end of each dispensing cycle to allow the electronic balance to stabilize. Thus a Slow Factor of 20.00 ml indicates that the last 20 ml will be dispensed at reduced pump speed. **NOTE: The LabTec will stop pumping just prior to reaching the target weight; once the balance has stabilized, the LabTec will complete the dispensing cycle.** The end of the dispensing cycle will be indicated by a “beep” followed by the display “Dispensing Completed”. The “Sniffle”, i. e. momentary pump reversal at the end of the dispensing cycle, is set at its default value of 0.3 seconds.

Edit Parameters: *All dispensing was done with #15 and #24 Silicone pump tubing*

EDIT 1: #24 Pump Tubing: Disp. Weight = 200.00 gr, Sniffle = 0.3, Slow Factor = 20.00 gr, Pump Rate = 80%, Time Delay = 00:01, Count = 5

EDIT 2: #15 Pump Tubing: Disp. Weight = 50.00 gr, Sniffle = 0.3, Slow Factor = 14.00 gr, Pump Rate = 80%, Time Delay = 00:01, Count = 5

Weight Set	Ave. Dispensed Weight	RSD (%)	Dispensing Time Per Aliquot
#24 Silicone Pump Tubing:			
200.00 gr	199.95 gr	0.03%	16 sec.
150.00 gr	150.00 gr	0.11%	14 sec.
100.00 gr	100.01 gr	0.11%	13 sec.
50.00 gr	49.96 gr	0.18%	12 sec.
25.00 gr	25.05 gr	0.25%	10 sec.
#15 Silicone Pump Tubing			
50.00 gr	50.03 gr	0.10%	13 sec.
25.00 gr	25.06 gr	0.22%	12 sec.
15.00 gr	15.04 gr	0.60%	12 sec.
10.00 gr	10.02 gr	0.65%	12 sec.

NOTE: Distilled water was used as a diluent; five(5) separate measurements were made for each of the sample weights. Each aliquot was weighed on a PGS Mettler balance, readability 0.01 gr. The average Delivered Diluent Weight and the Relative Standard Deviation (RSD) are summarized above.

5.2 Dispensing By Weight: Parameter Guide, Magnetic Gear Pump:

201 Micropump Head

The following information should be used as a general guide in selecting optimal dispensing parameters. This data was collected with a **3400 RPM LabTec Dispenser** mounted with a **201 Micropump Head**. A check valve (P/N: 400-530) was used as a dispensing spout.

The “Slow Factor” is implemented at the end of each dispensing cycle to allow the electronic balance to stabilize. Thus a Slow Factor of 25 ml indicates that the last 25 gr will be dispensed at reduced pump speed. **NOTE: The LabTec will stop pumping just prior to reaching the target weight; once the balance has stabilized, the LabTec will complete the dispensing cycle.** The end of the dispensing cycle will be indicated by a “beep” followed by the display “Dispensing Completed”. The “Sniffle” function is turned off i.e. Sniffle = 0.0.

NOTE: Increase the Slow Factor 35gr or 45gr if the pump does not stop prior to completion of the dispensing cycle. If the pump does not stop, it is an indication that the pump has either overshoot the target weight or that the dispensed weight is within specified margin of error.

Edit Parameters: *All dispensing was done with a 201 Micropump Head.*

Edit 1: *Dispensed Weight 2000 to 500 gr:* Disp. Weight = 2000 gr, Sniffle = 0.0, **Slow Factor = 25 gr**, Pump Rate = 100%, Time Delay = 0.1 sec, Count = 5.

Edit 2: *Dispensed Weight 500 to 100 gr:* Disp. Weight = 500 gr, Sniffle = 0.0, **Slow Factor = 25 gr**, Pump Rate = 70%, Time delay = 0.1 sec, Count = 5

Weight Set	Ave Dispensed Weight	RSD %	Dispensing Time per Aliquot
<i>EXEC 1: Pump Rate = 100%, Slow Factor = 80 gr.</i>			
2000.0 gr	2000.7	0.02%	42 sec
1500.0 gr	1501.2	0.02%	34 sec
1000.0 gr	1001.2	0.04%	24 sec
500.0 gr	501.2	0.04%	16 sec
<i>EXEC 2: Pump Rate = 80%, Slow Factor = 50 gr</i>			
500.0 gr	500.5	0.08%	19 sec
400.0 gr	400.9	0.05%	17 sec
300.0 gr	300.6	0.05%	13 sec
200.0 gr	200.5	0.11%	11 sec
100.0 gr	100.6	0.25%	9 sec

NOTE: For each “Dispensed Weight”, five (5) separate measurements were made; the “Average Dispensed Volume” the “Relative Standard Deviation” (RSD, %) as well as the “Dispensing Time per Aliquot” were determined. Distilled water was used as a diluent, each “Dispensed Weight” was determined using a Mettler PG 5002-S, 0.1 gram resolution.

6.0 Robotics Dispensing Station: How To Get Started

1. The SciLog Robotics Dispensing Station consists of the **LabTec CP-200** (P/N 100-1682 DILU) and a **Gilson FC 204 Fraction Collector** (P/N 100-204).
2. The LabTec CP-200 is a programmable peristaltic dispenser mounted with the TANDEM™ 1082 dual channel peristaltic pump head. The LabTec has been designed to automate the rapid dispensing of liquids while maintaining accuracy and precision.
3. The LabTec controls all aspects of the Robotics Dispensing Station. A cable connects the LabTec with the Gilson FC 204. The LabTec controls the advance (Input A at the Gilson FC 204 back panel) of the dispensing head as well as the return (Input B at the Gilson FC 204 back panel) of the dispensing head to the “Home” position when the batch dispensing cycle has been completed.
4. All dispensing parameters and calibrations are controlled from the LabTec. Read the LabTec manual carefully! Up to ten (10) different sets of dispensing parameters can be stored in the LabTec.
5. For most of your robotics dispensing applications you will be using the Volume Dispensing Mode of the LabTec. Use #15 thick-walled Silicone pump tubing (requires the 1082 TANDEM); consult the Parameter Selection Guide, Part C, Section 4.1 for suggested optimal dispensing parameters.
6. Familiarize yourself with all dispensing parameters listed in the **Volume: Edit** sub mode, Part B, Section 3.0:

Disp. Volume:	Volume of Liquid you want to dispense, i.e. 10.00 ml aliquot.
Tubing:	Size of the peristaltic tubing you are using, accesses built in calibration data for that motor/head/tubing combination. Not applicable to RH or Mag heads.
Sniffle:	Short pump reversal to remove any droplet that may be hanging from the dispensing tip, the Sniffle is typically 0.3 seconds long.
Slow Factor:	Defines the slow-down of the pump at the end of the dispensing cycle, a typical value is 10% of the Disp. Volume . You can readily increase you dispensing accuracy by <i>decreasing</i> the Slow Factor; however, this will also <i>increase</i> the dispensing time.
Direction:	Pump Direction, typically clockwise (CW)
Pump Rate:	% of maximum pump rate, typically 100%
Time Delay:	Time between dispensing cycles, typically 0.1 seconds
Count:	Number of aliquots you want to dispense, e.g. if Count =10, then the LabTec will dispense 10 volumes sequentially. When the dispensing

rack is connected, the LabTec will dispense 10 aliquots into 10 different test tubes.

7. Before using the Dispensing Rack, check the “**Setup: Rack Time**” parameter (Rack Time = ON) in the LabTec Setup mode (see Part B, Section 7.7). The “Rack Time” parameter controls the motion of the Gilson FC 204. However, when dispensing manually, i.e. without using the dispensing rack, the “Rack Time” parameter should be turned off. This will significantly speed-up manual dispensing.

LabTec Start-up Procedure:

1. Place pump tubing (Silicone #15) into the TANDEM 1082 pump head, use a male Luer fitting to connect the tubing to the female Luer end of the dispensing tip located at the Gilson Fraction Collector. Make sure you use long enough tubing; the tubing should not be stretching even in remotest dispensing position.

Power-up the LabTec and select the Volume Dispensing Mode

2. Select **Edit 1**, enter the dispensing parameters: **Disp. Volume**, e.g. 10.00 ml and **Count** = 10 for dispensing ten aliquots into ten test tubes. Press the **Exit** key and select **Exec 1**.
3. Press the “**PRIME**” key on the LabTec front panel; make sure you place a beaker or test tube under the dispensing tip. All tubing is now filled with solution.
4. Connect the communication cable at one end into the 37-pin I/O port (back panel) of the LabTec, the other end of the cable is connected to the Inputs A & B of the Gilson FC 204.
5. **Power up the Gilson FC 204**, from the front panel of the Gilson unit, select MANUAL, and then enter the tube rack number (printed on the front of the tube rack). For the Universal 44 Tube Rack this number is 22.
6. The Robotic Dispensing Rack is now ready for dispensing. The display of LabTec will show:

Volume Set: 10.00 ml // Press RUN when Ready

Press the **RUN** key, the dispensing tip will move over test tube #1 and start to dispense the first 10.00 ml aliquot. After the last aliquot has been dispensed, the dispensing tip will move back to its “home” position.

7.0 Care and Use of Sterilizing Filters

Many laboratories use sterilizing filters instead of autoclaving to sterilize media. Using filters instead of autoclaving increases productivity in the laboratory and protects technicians from handling hot and/or heavy containers. Autoclaving is very labor intensive and also uses a great deal of energy.

When using filters, as with any technology, there is a protocol you should develop and always should be followed to safely and effectively implement your application. The following are guidelines you should consider making part of your sterilizing protocol.

Procedure for Filtering:

1. To “Prime” a filter means to push all the air out that is in the new un-used filter and to fill the filter with the solution that needs to be filtered. You want to prime a filter slowly to avoid creating “air pockets” within the filter.
2. Be sure to open the vent on your filter before you prime it.
3. You will connect the filter to your LabTec tubing. Set the pump rate at a low value, such as 25% of maximum speed when you are priming the filter.
4. Press RUN on the LabTec while you are in the Manual Mode.
5. Periodically Tap the filter as it is being primed; this will dislodge any bubbles and send them on their way.
6. If you pump too quickly while you are priming the filter, air bubbles may remain trapped in the filter. These air bubbles will continually come out during dispensing and affect the precision of your volumetric dispenses. The air bubbles will **not** affect your weight-ratio or gravimetric dispenses.
7. Flush the filter with the vent open until solution comes out of the vent. This means the filter is completely full of liquid, and the priming process is complete.

Autoclaving Your Filter

1. The sterilizing filters you have received are sterile as long as the packaging is unopened. Make sure you do not open the filter package until you are ready to use.
2. Repeated autoclaving may distort different parts of the filter. Distortion will result in rupturing the filter. Thus, you should autoclave the filter only once.
3. Autoclave for at least 20 min. Maximum autoclave temperature is 134C at 2 bar.

Pumping Heated Solutions Through Your Filter

1. If the solution to be pumped is hot, make sure you heat the solution gradually.
2. Maintain a constant temperature.
3. Maximum temperature for prolonged pumping through your filter is 180 F.

Trouble Shooting Your Filters

1. Your filter should be changed on a regular basis. Try to choose a filter size that will accommodate the total volume you need filtered in a day, the flow rate you need through the filter.
2. Sterilizing filters have a pore size of 0.22 microns. If you have a very “dirty” solution, you may want to send your solution through a series of filters, such as first through a pore size of 5 microns to catch the very big, chunky particulate matter and then through the 0.22 micron filter to sterilize
3. Be sure that you have dissolved your media before beginning to filter.
4. You may want to heat the media a little to ensure and speed the dissolving.
5. Be sure to slow the pump down during the priming of the filter.
6. If you are filtering a broth when the solution is hot, allow the temperature to decrease a little before you filter.
7. Go to the next larger size filter if you need to higher capacity or need to use a much faster pump speed.

Reusing Your Sterilizing Filters

1. Chose a filter size that will accommodate the total volume you typically need in a day. For best results use the proper sized filter for your job size.
2. If you have a large sterilizing cartridge filter and you have “used” only a fraction of its life, you can carefully remove it from its tubing connections and wrap it in “Saran Wrap” and place in your refrigerator. There it must be kept at 4C. It can be stored in this manner for several days. When you want to reuse the filter, carefully reattach tubing connections and use.
3. If you have a “used” filter and would like to reuse it. It is possible, to back flush the filter with sterile water, autoclave and then reuse. This procedure should not be repeated more than once, since there is the possibility of repeated autoclaving separating the filter housing from the filter layers. This procedure is not recommended, but is possible.
4. For best results use the proper sized filter for your job size. Consider the costs of a sterilizing filter as a consumable, which is less expensive than autoclaving.
5. “Squeezing” too much life out of a filter will tend to produce unacceptable results.

8.0 Troubleshooting

8.1 Peristaltic Pump Heads

When this occurs:	Check the following:	Possible Solution
When “Check Pump Head” error occurs with your peristaltic head.	<ol style="list-style-type: none">1. Does “Check Pump Head” occur with no tubing in the head?2. Confirm the tubing sizes you are using.	<ol style="list-style-type: none">1. If it occurs with no tubing in the head, call SciLog. You may need a new motor.2. If no, make sure you are using the correct size tubing. Thick walled tubing in a thin wall pump head will cause this, and may break the head
When peristaltic pump head turns, but no fluid flows.	<ol style="list-style-type: none">1. Check the tubing size and pump head type, as you may be using the wrong size for that head.2. Tubing Size is ok	<ol style="list-style-type: none">1. Tandem 1081 is for thin-walled tubing, and 1082 is for thick-walled tubing. Thin-walled tubing in a thick walled head won’t produce much flow. Use the correct size tubing.2. The pump head may be cracked from being forced closed with the tubing crosswise or the wrong size tubing. Contact Scilog for repair or replacement parts.
When the pump head turns ok with no tubing installed, won’t turn when you put tubing in, and you don’t get a “Check Pump Head” error.	The coupler is loose or broken.	Contact SciLog for tech support, or to arrange for service and an RGA#

When this occurs:	Check the following:	Possible Solution
<p>When “Scale Error” “Hit any key” shows on your screen.</p>	<ol style="list-style-type: none"> 1. Is your scale turned on, and are the cables tight? 2. Ok, the scale is on, cables are ok, and it still won’t work? 3. Ok, the scale is chosen correctly, and it still doesn’t work. Now what? 	<ol style="list-style-type: none"> 1. Press any key to clear the error, tighten the cables, turn on the scale, and try it again. 2. Check Section 4, Setup: Scale of this manual, then go to Setup Mode of the pump, select Scale, then Scale Mfr, and confirm the selection is correct. 3. Either refer to the same manual section mentioned above to check the scale settings, or call SciLog tech support for help correcting them.
<p>When the pump is acting weird. The aliquots are all wrong; it gets data from the balance, but slows down way to early; etc.</p>	<ol style="list-style-type: none"> 1. Has someone messed with your LabTec? 2. Have you had electrical problems in the building lately? 	<ol style="list-style-type: none"> 1. If someone other than yourself or your supervisor has changed the settings without your knowledge, you can to return them to their original settings. 2. Power spikes and brown outs can cause problems. Enter Setup; Pump, and then select Factory Reset. This step is a last resort. This will return the unit to the factory default values. You will need to return to Setup; Pump; Motor RPM, and verify its setting, as well as Setup, Pump; Pump Head to verify it as well. You will also need to re-enter your aliquots and re-calibrate them. Call SciLog tech support if needed.

8.2 Piston and Magnetic Gear Heads

When this occurs:	Check the following:	Possible Solution
<p>When “Check Pump Head” error occurs with your piston or magnetic gear head.</p>	<ol style="list-style-type: none"> 1. When was the last time you had the head serviced? 2. Are you pumping a gritty solution, or one that can crystallize if allowed to dry out? 	<ol style="list-style-type: none"> 1. If you believe the head is stuck due to being dried out, you can try wetting it by placing an appropriate solvent in the upper tubing overnight. 2. If it still won't turn, contact SciLog to arrange an RGA to send your pump in for service, or purchasing a service kit if you have a magnetic gear head.
<p>When your piston pump head seems to turn and the motor runs, but no fluid flows.</p>	<p>Either the piston is broken, or the coupler is loose.</p>	<p>Contact SciLog for tech support or to arrange for service for your pump and RGA#</p>
<p>When your magnetic pump head seems to turn and the motor runs, but no fluid flows.</p>	<ol style="list-style-type: none"> 1. Has the unit run dry? 2. Is it a high viscosity fluid? 	<ol style="list-style-type: none"> 1. Magnetic gear head pumps do not dry prime well after they have been broken in. You must keep the pump wet. Be sure you are using a check valve as your dispensing tip so the fluid doesn't run back into the container. 2. Magnetic gear heads do not perform well with viscous fluids, as they can decouple. Either reduce the viscosity, provide head pressure, or choose a different style of head.

When this occurs:	Check the following:	Possible Solution
<p>When “Scale Error” “Hit any key” shows on your screen.</p>	<ol style="list-style-type: none"> 1. Is your scale turned on, and are the cables tight? 2. Ok, the scale is on, the cables are ok, and it still won’t work? 3. Ok, the scale is chosen correctly, and you still get no data? 	<ol style="list-style-type: none"> 1. Press any key to clear the error, tighten the cables, turn on the scale, and try it again. 2. Check Section 4, Setup: Scale of this manual, then go to Setup Mode of the pump, select Scale, then Scale Mfr, and confirm the selection is correct. 3. Either refer to the same manual section mentioned above to check the settings on the scale itself, or call SciLog for tech support’s help in correcting them.
<p>When the pump is acting weird. The aliquots are all wrong; it gets data from the balance, but slows down way to early; etc.</p>	<ol style="list-style-type: none"> 1. Has someone messed with your LabTec? 2. Have you had electrical problems in the building lately? 	<ol style="list-style-type: none"> 1. If someone other than yourself or your supervisor has changed the settings without your knowledge, you can return them to their original settings 2. Power spikes and brown outs can cause problems. Enter Setup; Pump, and then select Factory Reset. <u>This step is a last resort.</u> This will return the unit to the factory default values. You will need to return to Setup; Pump; Motor RPM, and verify its setting, as well as Setup, Pump; Pump Head to verify it as well. You will also need to re-enter all your aliquots and re-calibrate them. Call us for tech support if needed.

8.3 SciDoc Documentation Software

When this occurs:	Check the following:	Possible Solution
<p>When you get a “Device Error, Com Port Not Available” error from your computer.</p>	<p>This is a computer related error, not one generated by the pump. The Com port you specified is in use or does not exist on your computer</p>	<ol style="list-style-type: none"> 1. Check Device Manager from the properties page of the My Computer Icon. Expand the + next to Ports, Com and LPT. What Com ports exist, and are they functioning properly? 2. If all in Device Mgr is fine, then some other program is using the Com Port, consult your IT or MIS dept. for assistance. You may have to specify a different Com Port for use with the SciDoc spreadsheet. 3. Known devices/programs that cause this error: <ol style="list-style-type: none"> a. Installed but not used Serial Mouse. b. RS-232 bar code reader installed on the same Com port. c. Hot Sync or Synchronize program for your PDA. d. An already open instance of SciDoc using that Com port.

When this occurs:	Check the following:	Possible Solution
<p>You have SciDoc open, and the LabTec running, but no data is being collected.</p>	<p>There is no communication between the spreadsheet and the LabTec.</p> <ol style="list-style-type: none"> 1. Check that you are using the correct cable, and that it's installed correctly. 2. WinWedge may not be running. 3. WinWedge may not be able to access the Com Port. 	<ol style="list-style-type: none"> 1. The RS-232 cable for the PC can look nearly identical to that used for the balance. They should be labeled. 2. Check the System Tray for the WinWedge Icon. If it's not there, click on the Setup Button, and indicate which port you are using. 3. You will find a button on the Taskbar indicating a "Device Error", refer to the previous troubleshooting subject for help with Com Port errors.