

PureTecTM

Auto-Purification System

Operations Manual

PureTecTM Applications:

TFF:
Concentration
Diafiltration
Ultrafiltration
Microfiltration

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Rev D, Firmware V2.73 and up, 08/06



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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

PureTec Maintenance

A factory cleaning, testing and recalibration should be performed to your PureTec 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 the 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, and recalibrate your PureTec.** **\$300**
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 \$425; a new piston head is \$695; a new peristaltic Tandem head is \$250. 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.
4. Once you receive your cleaned/repared PureTec, use the packing material to repack the loaner and send it back to SciLog.
Assuming no replacement parts are required,
Total Cost, including Loaner and 3rd day Shipping: **\$600**

Please Check all of the following that are appropriate:

Yes, I need my PureTec cleaned and recalibrated.

Yes, I need a loaner PureTec sent to me.

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

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

Company: _____

Address: _____

Contact: _____

Contact Phone #: _____

Contact Fax #: _____

Contact Email: _____

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

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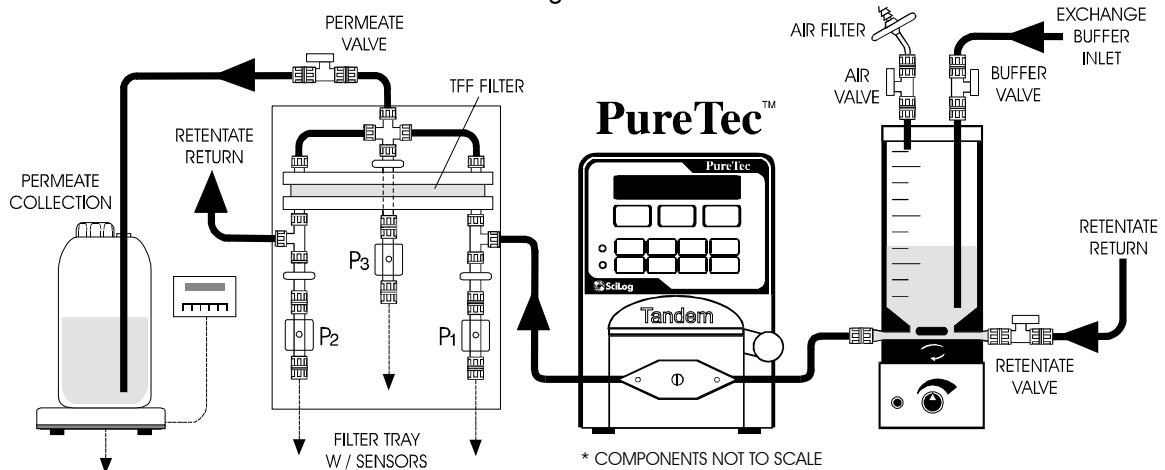
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Start-up: “Diafiltration at a Constant Flow Rate with Pressure Monitoring and Control”

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

SciLog P/N	Description	Quantity
100-782PURE	PureTec CP-200 w/1082 Peristaltic Head, 600rpm and Integral Diafiltration Vessel w/ Stirrer. Balance. Tubing and Connector Kit. (Includes #15 PharMed tubing, #16 Tygon tubing, Luer fittings, etc.) Data Collection Software. Both Balance and RS232 Cables. Filter Manifold / Organizer. 3 Disposable Pressure Sensors.	1 pc
	Appropriate TFF Cartridge (Pelicon, Minmate, etc)	1 pc
	Appropriate Exchange Buffer, Permeate Reservoirs	1 ea
	Filter Manifold/Organizer – Pellicon, (Optional)	1 pc
	Filter Manifold/Organizer – Minimate, Centramate (Optional)	1 pc

Figure 1



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

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
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	0.1 - 1.6	0.4 - 6.4	0.9 - 12.6	1.1 - 18.3	1.7 - 24.3	0.4 - 13	0.6 - 20	0.8 - 32
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	16 - 650
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		

Hardware Setup:

1. Unpack all the components, visually identify and inspect for damage. Refer to Figure 1 above for assembly steps listed below. The drawing is not to scale, and may seem reversed.
2. Place the Diafiltration Vessel on the Stirrer, rotating it until it is seated firmly. Remove the small luer caps from the SS ports. Do not attempt to remove the SS ports, or to separate the clear polycarbonate vessel from its black base. They are sealed with epoxy for your benefit.

Connect the power to the Stirrer using the jack provided on the rear of the base. (The Stirrer is usually attached to the base of the PureTec and already connected.)

3. At the Diafiltration bench, place the Exchange Buffer reservoir to the far left. Then, moving to the right on the bench, place the PureTec and Diafiltration Vessel, then the Filter Manifold with the TFF cartridge, and finally the Filtrate reservoir on top of the Balance. Leave some space between these items so you can hook up cables and tubing. The Filter Manifold may be placed on top of the PureTec if bench space is at a premium.
4. Connect the interface cable between the PureTec and the balance paying close attention to the labels on the cable and those on the rear of the PureTec. The "Pump" end of the cable is connected to the "Balance" connector on the rear panel of the PureTec. The "Balance" end of the cable plugs into the output connector on the rear of the balance. (The cable may ship attached to the balance already, and if so, simply attach it to the PureTec.)
5. Connect the RS232 Cable (P/N 080-073) to the "Printer" connector on the rear panel of the PureTec. Plug the other end of the cable into Com 1 or any other available Com port on the rear of your PC. Plug in and power-up all the equipment.
6. Using the parts from the Fittings Kit, connect one of the blue Valves (P/N 060-005) to each of the lower (Feed and Retentate Return) ports of the Diafiltration Vessel. Connect one of the same valves to 2 or 3 of the ports on the top of the vessel. One of these will be an Air Vent, another the Exchange Buffer port, and the third can be used as an alternate Retentate Return port. If not used, you may cap this third port with one of the caps removed from the valves you just installed. Install one of the included Syringe Filters (P/N 060-007) into the Air Vent Valve.
Close all valves at this time!
7. Next, connect one of the Tee fittings (P/N 060-032) to the Inlet and Retentate ports of your filter cartridge. Using the Tygon tubing cut 2 pieces approx 3 ½ " long. (Depending on your TFF cartridge, this may need to be adjusted.) One of these tubing pieces will need male Luer connectors (P/N 400-514) installed on both ends, and the other will need male on one end, and female (P/N 400-515) on the other. Connect these two pieces of tubing to the two Permeate ports of the filter cartridge. Use another of the Tee fittings to connect these pieces of tubing together, and connect another Tee fitting to it. You will need to connect one of the blue Valves to this last fitting on the bottom leg of the fitting.
8. At this point, place the filter cartridge into the Filter Manifold with the Feed port to the left (the end labeled P1). You can now loosen the black thumbscrews on the filter Manifold, and slide the Disposable Pressure Sensors under the thumbscrews and connect them to the Tee connectors on your filter cartridge, and plug the Pressure sensor into the appropriate jack. The sensor connected to the Feed port should be near and plugged into P1. Plug the sensor connected to the Retentate port into P2, and the one connected to the Permeate port into P3. Plug the cable from the Filter Manifold into the matching connector on the rear panel of the PureTec.
9. You will need to cut four pieces of the Pharmed tubing to complete the plumbing with the PureTec. We recommend you secure the Luer connectors used with this tubing using the Nylon Ties (P/N 010-002) included in the Fittings Kit. Keep the tubing that is part of the recirculation loop as short as possible to minimize your hold-up volume. The first two pieces will need male Luer connectors on both ends. One piece connects to the Diafiltration Vessel using the port nearest the pump head. Open the pump head by rotating the lever 180 degrees counter clockwise, and route 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. Connect the other end of this tubing to the Tee fitting connected to the inlet port of the filter cartridge. The other piece of tubing with Luer fittings on both ends will connect between the Tee fitting on the Retentate port of filter cartridge and the remaining port on the bottom of the Diafiltration Vessel. (Alternatively, this could be connected to one of the ports on the cover of the Diafiltration Vessel.) The remaining pieces of tubing needed to complete the plumbing need a male Luer fitting on only one end of the tubing. (These connections may be

made with the included Food Grade Tygon tubing included in the kit if you wish.) One piece is connected to the Exchange Buffer Valve on the cover of the Diafiltration Vessel and routed to its reservoir. The final piece connects to the Tee fitting on the Permeate port of the filter cartridge (It's pressure sensor is plugged into the jack labeled P3), and routed to the Permeate collection reservoir on the Balance.

Note: There are several valves involved in this process. Their position and status is critical to the proper implementation of the system.

Program Editing and Execution:

At this point, you need to consider the parameters of the Diafiltration you are performing, and the programming of PureTec and its alarms. Before programming the system, you should know the maximum pressure rating of the filter cartridge; the flow rate or pressure level and source that you wish to maintain or monitor, and the amount of filtrate you wish to collect if using the Filtrate Weight Alarm. The PureTec operates under two modes, either Rate mode, where it pumps at a constant user-defined flow rate, and monitors the pressures, or Pressure mode, where the flow rate is varied to maintain a constant user-defined pressure. (It should be noted that the Source chosen in **SETUP: Press. Sensor** is used for the Pressure Alarms in both modes as well as the controlled Pump Pressure in Pressure Mode.)

The PureTec displays and documents the Filtrate Weight (FQ), the Cumulative Volume (CV) of media re-circulated thru the pump, the Filtrate Collection Rate (FP), and inputs from all three pressure sensors, as well as the calculated Trans-Membrane pressure (TM) in the system. Five different alarms can be activated, Filtrate Weight, Run Time, Hi-Pressure (or Low-Flow), Low-Pressure and Cumulative Volume. All the alarms may be set to "Off" (disabled), "Alarm Only" (an audible alarm), and "Pump Stop" (stops the pump and sounds the audible alarm).

1. **RATE, Constant Rate Filtration: Edit/Alarm**, PureTec Manual, Part B, Section 2.0
Press the "EXIT" button several times to reach the top of the menu. This display is seen:

Mode Select		RATE
Up	Down	Select
A	B	C

Press "C" to Select. This screen now appears:

- Const. RATE MODE -		
Exec	Edit	Prime
A	B	C

Pressing "B" for Edit gives you access to the following parameters:

PUMP TUBING: Use the "A" and "B" keys to scroll through the size choices of #13,14,16, 25, 17, 18, 15, 24 or 35 tubing, and press "C" to Select. Size #15 is the Default. (Note, #15, 24 and 35 tubing are thick-walled and require the Tandem 1082 head.) The PureTec will access factory installed calibration curves, which relate pump speed to output in ml/min. This calibration may be updated by using the Re-Cal feature, accessed via the star (★) key on the front panel. Refer to Part B, Section 2.17 of the PureTec Manual for instructions in its use.

CLEAR CUMULATIVE: Resets (clears) the counters for Cumulative Volume (CV), Filtrate Weight (FQ), and Run Time (RT). Press "C" to select, then the "A" button to indicate "Yes" to the question: "Clear Totals?"

PRESSURE ZERO: Allows you to Zero all three Pressure sensors, P1, P2 and P3. Release all pressure in the system, press "C" to select, then choose the appropriate sensor, and press "Zero" and then "Exit". Exit takes you up two levels in this menu. (Span is used for Factory Calibration only.)

ALARM ENABLE: Allows you to select the alarm options for five different alarms as listed below. The options are “Off” (disabled), “Alarm Only” (an audible alarm), and “Pump Stop” (stops the pump and sounds the audible alarm).

ALARM LIMITS: Allows you to set the limits for the following five alarms:

CUMULATIVE VOLUME: Total amount of process solution that has been pumped through the filtration device in milliliters. This allows you to define your yield in terms of the amount circulated through the system.

RUN TIME: Allows you to set a timer for the process. The alarm will trigger when the entered total time is achieved.

LOW-PRESSURE: This is typically set 3-5 Psi below the Hi-Pressure setting. This alarm is triggered when a sudden drop in backpressure occurs, i.e. when a leak in the system has occurred.

HI-PRESSURE: For most applications, this represents a critical alarm, and under ALARM: ENABLE should be set to “PUMP STOP”. This value is usually set 5-7 Psi below the pressure limit specified by the filter manufacturer.

FILTRATE WEIGHT: Enter the amount of filtrate you wish to collect in grams. The PureTec will stop or alarm when the desired weight has been collected. You need an electronic top-loading balance connected to the PureTec in order to implement this alarm.

PUMP RATE: Select a pump rate in terms of ml/min., however, be sure you have chosen a pump tube size first. Try to choose a tubing size that places your pump rate in the middle of the flow rate range for your motor/tubing combination. Please refer to the chart at the end of this document, or Part A, Section 6.3 of the PureTec manual for more information.

Priming the system:

- a. The first step in the Diafiltration process is to Prime the system and check for leaks. Fill the Diafiltration Vessel with Exchange Buffer. Note: It is important that the inlet tubing be submerged at all times if using the alternate Retentate Return on the top of the vessel.
- b. Fill the Buffer Reservoir with fluid and connect the Buffer feed line to the Buffer Valve if not already connected. Close the Buffer and Air Vent Valves.
- c. Place the Filtrate line in the Filtrate Reservoir and put it on the balance if you are using one. Close the Filtrate Valve. Open both the Feed and Retentate Return valves at this time.
- d. Select RATE Mode in the PureTec and set the appropriate parameters and alarms as mentioned above if you haven't done so yet.
- e. Pressing the “EXIT” on the PureTec will return you to the Constant Rate Mode screen shown below:

- Const. RATE MODE -		
Exec	Edit	Prime
A	B	C

- f. Press “A” to Execute, and the following screens will be displayed:

-SCALE INITIALIZATION- Please Wait

SET: T15 FF: 100 Press Run when Ready

- g. Press “RUN” on the front panel of the PureTec when you are ready, allowing the Exchange Buffer to be recirculated through the system removing any air bubbles. The balance will tare, and the following screen will be displayed: (NOTE: P1 in this example has been chosen as the Pressure Source, under **SETUP: Press Sensor, Source**). Check for leaks in the system, and note the volume of solution in the Diafiltration Vessel. The following screen is displayed:

09:27:03	P1 10.0	RUN
CV 265.5	FF 100.0	
A	B	C

Pressing the “SWITCH” key on the front panel will allow you to change to the following two additional screens:

P1 10.0	P2 10.0	
P2 10.0	TM 10.0	
A	B	C

T 24.3	FP 20.0	
FQ 100.0	FR 80.0	
A	B	C

CV=Cumulative Volume (ml), 09:27:03=Military Time (hh:mm:ss), FF=Feed (Pump) Flow Rate, RUN=Pump Status, P1=Inlet Pressure (Psi), P2=Retentate Pressure (Psi), P3=Filtrate Pressure (Psi), TM=Trans-Membrane pressure (Psi), T=Temperature (degrees Celsius), FQ=Filtrate Weight (grams), FP=Permeate Flow Rate, FR=Recirculation (Retentate) Flow Rate.

- h. Open the Filtrate and Buffer Valves, be certain that the Air Vent valve is closed. The level in the Diafiltration vessel will drop slightly as a vacuum is created, and then remain constant.
- i. Adjust the flow rate as necessary by using the “RATE” key on the front panel of the PureTec.
- j. Before stopping, close the Filtrate and Buffer Valves and then press the “STOP” or “EXIT” key on the front panel.

Processing Product:

- k. Note: always close the Buffer and Filtrate valve before starting or stopping the PureTec. Fill the Diafiltration Vessel with the solution to be processed and close the container.
- l. If needed, refill the Exchange Buffer Reservoir and empty the Filtrate Reservoir. Place the tubing back in both containers.
- m. If required, edit the Pump Rate and other parameters entered during the priming process above. Press “Execute” and then “RUN” from the front panel to start the pump. If the system was not previously primed, you will observe a decrease in volume in the Diafiltration Vessel. This volume will be recovered at the end of the process.
- n. **To concentrate the product**, keep the Buffer Valve closed and open the Filtrate Valve and Air Vent Valve. This will reduce the volume in the Diafiltration Vessel as the Filtrate is removed, thus concentrating the solution. When the desired concentration volume has been achieved, close the Filtrate and Air Vent Valves.
- o. **To wash the concentrated solution**, open only the Filtrate and Buffer Valves. Once the solution is concentrated, the PureTec could be stopped, the Cumulative Counters cleared, and the Filtrate Weight alarm set to stop the pump when the desired amount of Exchange Buffer has been collected in the Filtrate Reservoir. The balance also allows you to monitor

the Permeate Flow Rate (FP), which can be optimized by altering the pump rate on the fly from the front panel of the PureTec. Press the "RATE" key, increase or decrease the rate as needed, and press "C" to select it. The Exchange Buffer will be added at the same rate the Filtrate is removed by the vacuum created in the Diafiltration Vessel.

If you have more solution to process than the Diafiltration Vessel would originally hold, more can be added by connecting the Exchange Buffer tubing to a container with additional process solution. When this container is empty, the pump could be stopped, the tubing reconnected to the Exchange Buffer, and the solution either concentrated further or washed.

- p. **To empty the Diafiltration Vessel at the end of the run**, close the Buffer and Filtrate valves, and Stop the pump. Close the Valve on the Retentate return line at the bottom of the Vessel. Have a container ready for the transfer. Disconnect the return line at the valve, and carefully place it in the container. Open the Air Vent valve, and press RUN on the pump, this will pump the contents of the Diafiltration Vessel out through the pump and filter cartridge and into the transfer container. Re-connect the tubing, open the Retentate valve again, and your system is ready for cleaning.

Documentation:

The PureTec displays and prints out eleven (11) filtration-related parameters. The user can scroll through three display options providing an instantaneous overview of the filtration progress and status. All information is printed out in an "Excel-friendly" format. Alternatively, WinWedge software is used in conjunction with a customized Excel spreadsheet to summarize the filtration data and create graphical representations of the data on your PC as shown below:

MT	CV	FQ	P1	P2	P3	TM	FF	FP	FR	ST	AL
9:05:15	0.0	0.0	-0.1	0.0	0.0	0.0	30.0	0.0	0.0	START	
9:05:45	15.0	8.1	18.9	6.6	0.0	12.7	30.0	16.2	13.8	RUN	
9:06:16	30.0	17.0	19.1	6.8	0.0	12.9	30.0	17.8	12.2	RUN	
9:06:45	45.0	25.4	19.2	6.9	0.0	13.0	30.0	16.8	13.2	RUN	
9:07:16	60.0	34.5	19.3	7.0	0.0	13.1	30.0	18.2	11.8	RUN	
9:07:46	75.0	43.1	19.5	7.0	0.0	13.2	30.0	17.2	12.8	RUN	
9:08:15	90.0	51.8	19.6	7.1	0.0	13.3	30.0	17.2	12.8	RUN	
9:08:46	105.0	60.4	19.5	7.1	0.0	13.4	30.0	17.4	12.6	RUN	
9:09:16	120.0	69.1	19.4	7.2	0.0	13.3	30.0	17.2	12.8	RUN	
9:09:46	135.0	77.6	19.7	7.3	0.0	13.5	30.0	17.2	12.8	RUN	
9:10:16	150.0	86.1	19.6	7.3	0.0	13.4	30.0	17.0	13.0	RUN	
9:10:46	165.0	94.7	19.7	7.3	0.0	13.5	30.0	17.0	13.0	RUN	
9:11:16	180.0	103.2	19.7	7.4	0.0	13.5	30.0	17.2	12.8	RUN	
9:11:46	195.0	111.7	20.1	7.4	0.0	13.7	30.0	16.8	13.2	RUN	
9:12:16	210.0	120.1	19.8	7.4	0.0	13.6	30.0	17.0	13.0	RUN	
9:12:45	225.0	128.2	20.1	7.5	0.0	13.7	30.0	16.2	13.8	RUN	

Abbreviations:

MT = Military Time, HH:MM:SS	FF = Feed (Pump) Rate
RT = Run Time, 00:00:00 at START	CV = Cumulative Feed Volume, ml
FQ = Collected Filtrate /Permeate Weight	FP = Permeate Flow Rate ("Flux"), gr/min
P1 = Feed Line Pressure, psi	FR = Re-circulation Rate; FR = FF - FP
P2 = Retentate Line Pressure, psi	CW = Clockwise Pump Direction
P3 = Permeate Line Pressure, psi	CCW =Counter Clockwise Pump Direction
TM = Calculated Trans-Membrane Pressure	ST = Pump Status, START, RUN, PAUSE, EXIT
AL = Alarm, e.g. AL: CV Cumul. Volume Alarm	CV = 1, Cumulative Volume Alarm is "OFF"
HP = 3, High Pressure Alarm is "PUMP STOP"	RT = 2, Run Time Alarm is "ALERT ONLY"
LP = 1, Low Pressure Alarm is "OFF"	LF = 2, Low Flow Alarm is "ALERT ONLY"
T = Temperature, degrees C.	NWP = Normalized Water Permeability @ 20 C
FLUX = Liters/square Meter/Hour (LMH)	CF = Concentration Factor, FQ/Initial Volume

NOTE: Three alarm levels are defined and displayed in the program header of the printout as follows: **1=Off** (Deactivated); **2=Alert** (Metering continues, auditory beep/5V output to remote alarm occurs); **3=Stop pump** (Stops the pump, auditory beep/5V output to remote alarm occurs). Immediate data printout occurs when **RUN, STOP** or **EXIT** keys are pressed, and when an alarm occurs. All other printouts occur at a user definable frequency in hours:minutes. (Mode:Setup, Printer, Time)

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.

Safety Information:

Be sure to read and observe the following requirements!

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

Opening the PureTec 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 PureTec 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 PureTec 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 PureTec must be made inoperative and secured against any unintended operation. The protection is likely to be impaired if, for example:

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

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

Installation & Start-Up



Installation of the PureTec 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 PureTec are observed. See “PureTec Specifications”

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

The PureTec 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 PureTec is used in a manner or for purposes not specified by the manufacturer, SciLog, Inc.



Start-up of the PureTec 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 PureTec memory and are battery backed for approximately one (1) year. After longer power outages these data can be lost.

Maintenance & Cleaning:



The PureTec pump controller is maintenance free, however, for long term performance of the PureTec, a factory cleaning, testing and recalibration is recommended at least one a year. The pump head and associated pump tubing should 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 PureTec 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 PureTec meets the following generic standards:

- 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
- PureTec Hardware, Part A
- PureTec Software, Part B



WARNING:

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

Introduction:

You will find the PureTec™ system easy to learn and simple to use. The state-of-the-art hardware and software design of the PureTec allows you to automate many filtration / separation processes. With proper maintenance, the PureTec will provide many years of excellent service and performance.

Please read the following instructions carefully!

Inspections: Unpack the PureTec 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 PureTec 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 and 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, RGA number and purchase order to cover repair costs, return and shipping charges, if your institution requires it. Ship to:

SciLog Inc.
8845 S. Greenview Drive.; Suite 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.

PureTec System Specifications:

Mechanical:

- **Dimensions:** Width: 5.75 in (14.6cm); Height: 8.5 in (212.6); Depth: 11in (27.9)
- **Weight:** 14 lbs (6.4kg)
- **Enclosure:** Aluminum / Steel; Corrosion Resistant, Recessible Handle.
- **Pump Head / Motor Options:**
 1. **Tandem 1081 peristaltic pump head with 8-RPM motor**, accommodates thin-walled (0.060") pump tubing: #13, 14, 16, 25, 17, and #18. Pump Rate Range: 0.03 to 24.3 ml/min. **Recommended for virus filtration applications.**
 2. **Tandem 1081 peristaltic pump head with 160-RPM motor**, accommodates thin-walled (0.060") pump tubing: #13, 14, 16, 25, 17, and #18. Pump Rate Range: 0.5 to 554 ml/min. **Recommended for lab-scale TFF applications with filter area from 50 cm² to 200 cm²** e.g." Pellicon XL 50" (Millipore), "Minimate" (Pall), "LV Centramate" (Pall), "Sartocon Slice of a Slice" (Sartorius).
 3. **Tandem 1082 peristaltic pump head with 600-RPM motor**, accommodates thick-walled (0.090") pump tubing: #15, 24 and #35. Pump Rate Range: 59 to 2,258 ml/min. **Recommended for process-development TFF applications with a combined filter area of up to 0.40m²**, e.g. "Pellicon Mini" (Millipore), "Pellicon Cassette" (Millipore), "Ultrasette" (Pall), "Centramate" (Pall), "Maximate" (Pall), "Sartocon Slice", "Sartocon Casstte" (Sartorius).
 4. **High Pressure / High Performance peristaltic pump head with 8 RPM motor**, accommodates high pressure tubing 16HP (max. 6.4 ml/min) and 15HP (max.13 ml/min), capable of generating working pressure in excess of 60 psi. **Recommended for high-pressure virus filtration; requires pressure-compatible filtration device.**
- **Pressure Sensors:** Accommodates up to three (3) disposable pressure sensors: P1 = Feed Line Pressure. P2 = Retentate Line Pressure, P3 = Permeate Line Pressure. PureTec calculates and displays Trans-membrane Pressure (TM), **TM = (P1 + P2) / 2 - P3**. In the Constant Pressure Mode, pressure control is achieved by modulating pump output. The user selects P1, P2, P3 or TM as the controlled pressure.
- **Pressure Displayed** with a resolution of 0.1 psi; choice of **bar, psi, kpa**.
- **Pressure Range: 0-60psi**. This can be re-calibrated using an external pressure reference source.

Electrical:

- **Power:** 110-120 / 220-240 VAC, 60/50Hz, 75 Watts; double fused: T1AL, 250V (CE: IR35A 250VAC)
- **Operational Range:** 4 to 40° C, 100% Humidity.
- **Motor:** Choice of three (3) motors: 8, 160 and 600 RPM at 30VDC, 3.8 Amperes, Variable Pump Speed optically encoded servo-controlled motors.
- **Encoder:** 100 lines per motor revolution for 600-RPM motor.
120 lines per motor revolution for 8 and 160 RPM motors.
- **I/O Ports:**
 1. **First serial port labeled "Balance"**, Male DB9 connector for hook-up of electronic scale.
 2. **Second Serial Port labeled "Printer"**, Female DB9; also used to interface to PC for data storage in an Excel file in your PC.

3. **External I/O port, Female DB 37 connector, Used for remote On/Off control of PureTec via footswitch, or for Analog interface with SciCon or other 4-20 ma source, A1, A2, A3. (A3 is 0-1 vdc)**
 4. **Pressure Sensor Ports: Phone plugs for P1 = Feed Line Pressure Sensor, P2 = Retentate Pressure Sensor, P3 = Permeate Pressure Sensor.**
 5. **Temperature Probe Port, 2-conductor twist-lock connector for SciLog inline temperature probe.**
- **Display:** Two line LCD, 20 characters each, back-lit.
 - **Data Entry:** Membrane keyboard with auditory feedback.

PureTec Stirrer

- **Compact magnetic stirrer, small yet powerful.** Stainless steel housing. Smooth continuous speed adjustment.
- **Stirrer Speed Range:** 0 to 900 RPM; LED light on/off
- **Maximum Stirring Volume:** about 500 ml
- **Overall Dimensions of Stirrer:** 3.4 in Wide x 3.4 in Deep x 2 in High
- **Dimensions of Stirrer with Vessel:** 3.4 in Wide x 3.4 in Deep x 9 in High
- **Mono-Mold Stir bar** with spinning ring: 5/8" long; Teflon (PTFE) coated.

PureTec Vessel

- **Vessel:** Clear polysulfone with graduations every 25 ml, with polysulfone cap & base. **No threaded parts.** O-rings on outside of vessel and cap. Cap can be sealed. Can be sanitized with isopropyl alcohol, dilute bleach or dilute sodium hydroxide.
- **316 stainless steel channels and Luer adaptors in cap and base.** All wetted parts made of FDA approved materials. **No threaded parts.**
- **Three ports in cap:** air vent, exchange bugger, alternate retentate return.
- **Two ports in base:** retentate return and feed outlet.
- **Vessel Volume:** 500 ml volume, using a dedicated inlet port, additional process solution can be siphoned into PureTec vessel. 50 ml and 1000 ml versions are available.

PureTec Balance

- **Balance with capacity of 2,000 grams x 0.01 g resolution included with PureTec CP-8**
- **Balance with capacity of 8100 grams x 0.1 g resolution included with all other PureTec models.**

PureTec Software

- **Main menu with four operational modes:**
- **Rate Mode:** Constant Rate Filtration with eleven user-definable alarms.
- **Pressure Mode:** Constant Pressure Filtration with eleven user-definable alarms.
- **Setup Mode:** Selection of user preferences and interface options.
- **Manual Mode:** Manual control, no alarms.
- **Analog Interface:** SciCon for Conductivity & Temperature, or other device with 4-20ma output can be directly connected for monitoring and alarms.
- **Can change the Rate or Pressure on the fly.** This is a very useful tool in determining the optimum parameters for your process.
- **Optimizes TFF Applications:** Concentration, Diafiltration, Ultrafiltration

Documentation Software for PC

- Win Wedge PC interface software with custom macros for Excel for data compilation. Sent to you ready to use.
- Complete process analysis with graphing of data
- Real-time verification and documentation of process parameters
- Includes graphs of:

Permeate Flow Rate (FP) vs. Trans-Membrane Pressure (TMP)
Permeate Flow Rate (FP) vs. Time
Permeate Flow Rate (FP) vs. Ln {Retentate Flow Rate (FR)}
Permeate Flow Rate (FP) vs. Ln {Concentration Factor (CF)}
Permeate Flux (LMH) vs. Trans-Membrane Pressure (TMP)

Display, Printout and Excel Abbreviations:

MT = Military Time, HH:MM:SS

RT = Run Time, 00:00:00 at START

FQ = Filtrate Weight collected

P1 = Feed Line Pressure, psi, bar or kpa

P2 = Retentate Line Pressure, psi, bar or kpa

P3 = Permeate Line Pressure, psi, bar or kpa

TM = Calculated Trans-Membrane Pressure

AL = Alarm, e.g. AL: CV Cumulative Volume Alarm

HP = 3, High Pressure Alarm is "PUMP STOP"

LP = 1, Low Pressure Alarm is "OFF"

FQ = 3, Filtrate Weight Alarm is "PUMP STOP"

CF = Concentration Factor, if concentrating a solution, be sure to enter the Initial Process Volume where indicated.

NWP = Normalized Water Permeability @ 20 degrees C

A1 = Analog 1 Value

A3 = Analog 3 Value

FF = Flow Rate, Feed, ml/min

CV = Cumulative Feed Volume, ml

FP = Flow Rate, Permeate ("Flux"), gr/min

FR = Re-circulation Rate; FR = FF - FP

CW = Clockwise Pump Direction

CCW = Counter Clockwise Pump Direction

ST = Pump Status, START, RUN, PAUSE, EXIT

CV = 1, Cumulative Volume Alarm is "OFF"

RT = 2, Run Time Alarm is "ALERT ONLY"

LF = 2, Low Flow Alarm is "ALERT ONLY"

RF = Response Factor

T = Temperature, degrees C

Flux = Liters per square Meter per Hour (LMH)

A2 = Analog 2 Value

Part A: PureTec™ Hardware

1.0 Overview:

The PureTec is a TFF laboratory-scale ultrafiltration system that enables you to purify and desalt protein solutions, concentrate antibodies, enzymes, lymphokines and other protein solutions, as well as, cell harvesting or cell removal, the washing of cells and viruses, and the depyrogenation of small molecule solutions. In a typical concentration application the PureTec automates and optimizes TFF to separate filtrate and concentrate retentate. This optimization makes the TFF application more efficient and increases product yield.

The PureTec is designed to process minimal volumes of material and includes a **500 ml feed reservoir incorporating a magnetic stirrer** to ensure product mixing during concentration or diafiltration. Up to four pressures can be monitored with SciLog's **disposable pressure sensor assemblies**. (3 pressures are monitored: feed/inlet line, retentate and permeate/filtrate. The PureTec calculates and displays the trans-membrane pressure (TMP).) Any one of the four pressures can be chosen for Alarm and/or Control. In addition, an inline **Temperature Probe** monitors the product temperature, allowing for easy calculation of the **Normalized Water Permeability (NWP)** values. Finally, an **electronic balance** is connected to the PureTec for monitoring the quantitative collection of filtrate and its collection rate.

The PureTec can be connected directly to the SciCon Conductivity Monitor to monitor and alarm based on Conductivity or Temperature via a 4-20 ma interface cable. Analog channel 1 (A1) is used for Conductivity, and channel 2 or 3 is used for Temperature based on version of SciCon is used. (Analog channels 1 and 2 are for 4-20 ma inputs; channel 3 is for 0-1V input.)

The PureTec system provides ease of use and operational safety: Up to **eleven (11) user definable alarm conditions** can be continuously monitored and displayed.

The user programmable alarms include:

1. **High Pressure (Low Flow) Alarm** to monitor filter plug-up conditions,
2. **Low Pressure Alarm** to monitor system leakage,
3. **Cumulative Volume Alarm** to monitor total volume based on the feed rate.
4. **Filtrate Weight Alarm** to quantitatively measure the filtrate / permeate yield,
5. **Run Time Alarm** that stops the pump action when a user defined filtration time has elapsed.
6. **High Analog 1** to stop/alert when a high conductivity value is achieved.
7. **Low Analog 1** to stop/alert when a low conductivity value is achieved
8. **High Analog 2 or 3** to stop/alert when a high temperature occurs.
9. **Low Analog 2 or 3** to stop/alert when low temperatures occur.

All alarms provide an auditory signal; the pump stops when user defined alarm limits are exceeded. Alternatively, any alarm can be selectively disabled. All pump filtration, as well as alarm parameters can be printed out at user defined time intervals with a SciLog serial printer. Alternatively, all of the collected data can be sent to a supervisory computer for data archiving.

The two-channel **TANDEM™ 1081 peristaltic pump head** can accommodate PharMed and Silicone pump tubing, **including sizes 13, 14, 16, 25, 17 & 18**. If equipped with the **TANDEM™ 1082** model, sizes **15, 24 & 35** can be accommodated. All pump tube sizes are factory calibrated, however, the user can easily recalibrate any tube size with a single keystroke from the PureTec front panel. The TANDEM™ pump head delivers flow rates ranging from 0.03 ml / min. to 2200 ml / min. for each of the two pump channels depending on motor rpm. Two TANDEM pump heads can be mounted together to provide a four-channel pumping capability, and drastic reduction in pulsation when two upper or lower channels are combined into one.

NOTE: The PureTec usually is configured with a 160-rpm motor. However, if your flow rate needs require, the PureTec is available with either a 600-rpm or 8-rpm motor. In Setup:Pump:Motor Rpm, select the RPM of your installed motor. By doing so, the PureTec will select the appropriate factory installed calibration curves and flow rates.

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.

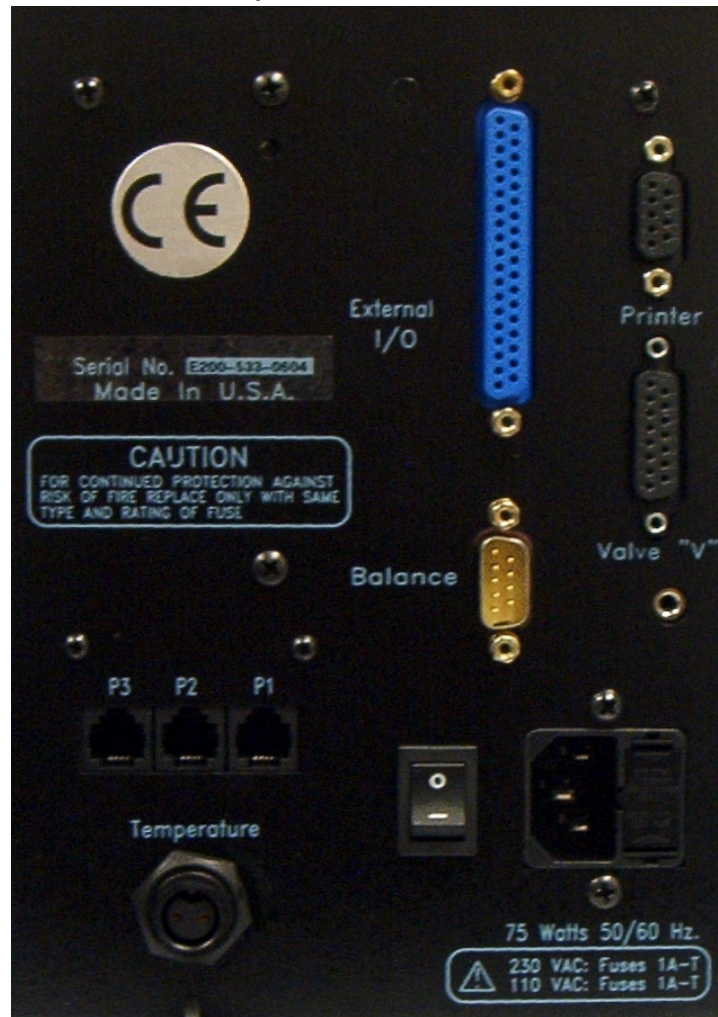
The lower line on the LCD is used to signify the function of the “soft keys” marked “A”, “B” and “C”. The “soft key” current labels are displayed in the lower line of the LCD. If you press these keys, then the function displayed above it will be performed.

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

RUN	Executes the selected operational mode and starts pump.
STOP	Interrupts current operational mode and stops pump.
RATE/PRESSURE	Sets pump RATE in ml/min, or PRESSURE in psi, depending on Mode being implemented. Used to change these parameters “on the fly”.
TIME	Displays motor pulses per second in Manual mode, otherwise not used.
↔	CW or CCW pump direction.
DISPLAY/SWITCH	Changes between three operational displays in RATE or Pressure modes.
EXIT	Exits current operational mode or menu level, stops pump.
STAR (*)	Pump rate recalibration.

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 indicated the pump is in motion; the red light indicated that the pump has stopped.

3.0 Back Panel: Interface Options



The PureTec back panel provides interfacing ports for:

- * **SciLog Printer (P/N: 080-095) or PC RS-232 connection:** Female DB9, Serial Port 2, labeled “Printer”.
- * **Electronic Balance:** Male DB9, Serial port 1, labeled “Balance”.
- * **Foot Switch (P/N: 080-059) or SciCon Monitor:** Male DB37, Labeled “External I/O”.
- * **Disposable Pressure Sensors, (P/N: 080-601A):** 3 telephone jacks, one for each pressure sensor. Labeled “P1, P2, P3”
- * **Temperature Probe:** Watertight 2 pin connector. Labeled “Temperature”.

3.6 External I/O Connector: DB37 connector used to interface with the SciCon Conductivity Monitor, allowing 4-20 ma Analog inputs (A1, A2) and 0-1 vdc Analog input (A3) for monitoring and alarms of Conductivity and Temperature. It also allows an interface with SciLog foot switch (P/N: 080-059) and allows remote Start / Stop control of the PureTec.

For pin configuration, consult the drawing on this page. The DB37 port at the back panel provides three analog input channels:

Analog channel 1 (A1, pin 6 power, pin 7 signal, pin 25 ground, pin 26 common)

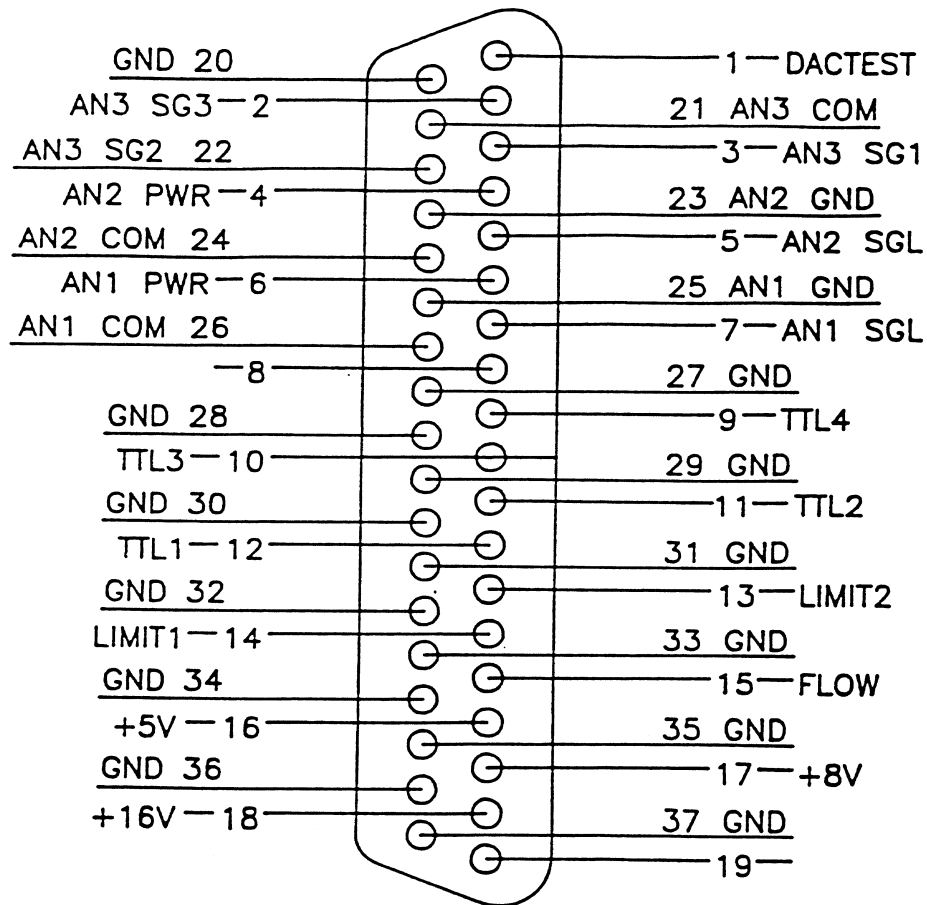
Analog channel 2 (A2, pin 4 power, pin 5 signal, pin 23 ground, pin 24 common)

Analog channel 3 (A3, pin 2 signal SG3, pin 21 common)

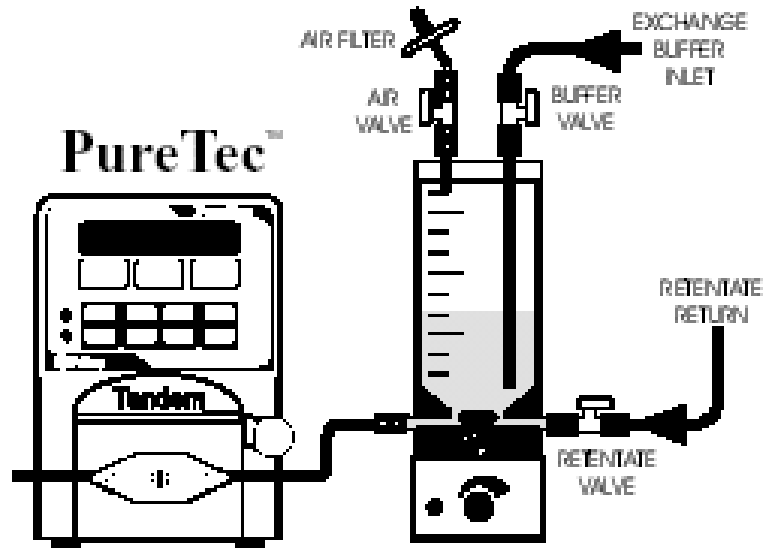
Analog channel 1 and 2 are dedicated to 4-20ma signals, and when paired with the SciCon, provide inputs to the PureTec for Conductivity (A1) and Temperature (A2) signals from the disposable flow cells.

Analog channel 3 is for 0-1vdc signals, and is used for the Temperature (A3) signal from the original (Rev C) SciCon monitor.

Pin out of DB37 External I/O Connector on Rear Panel:



4.0 500 ml Diafiltration Sample Reservoir/Mixer.



This graduated reservoir resides on a magnetic stirrer with its own power supply and a magnetic stir bar is included. It is constructed of FDA approved polysulfone and can be easily sanitized using alcohol, bleach or dilute sodium hydroxide. It has 5 ports, 3 of them with shut off valves. (You may use valves on all 5 if you wish.)

On the lid is the Air Vent with its valve and filter, the Exchange Buffer Inlet port with a valve, as well as an alternate Retentate Return port. This lid is sealed to the reservoir with an O-ring, and easily lifted off the top for filling and cleaning. **Note: Seal quality is improved by wetting the O-rings with distilled water immediately before use.**

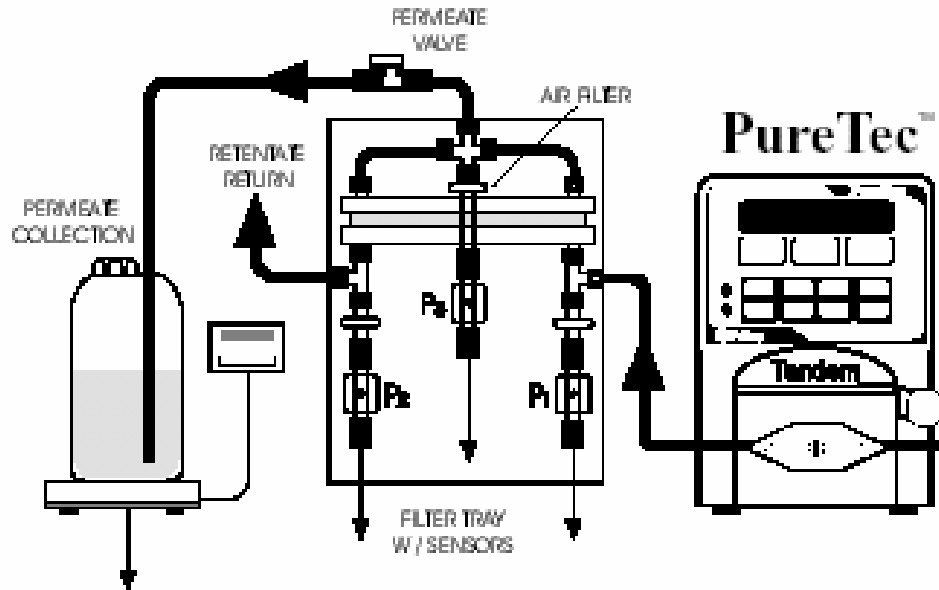
The alternate Retentate Return port is used in high-flow (>500 ml/min.) diafiltration applications to ensure complete mixing of the retentate.

The bottom of the reservoir also has 2 ports. The Outlet port, nearest the pump head, is where the tubing that passes through the pump head to the inlet of the filter is attached. The Return port has a valve used when emptying the system, and is where the Retentate Return line from the filter cartridge is usually attached.

The position of the valves and the proper plumbing of the system are critical to its proper use.

The vessel is also available in a 50 ml size, and a larger 1000 ml size that is twice the height of the standard one.

5.0 Filter Manifold.



The Filter Manifold is an available accessory designed with ease of use in mind. It incorporates a holder for your filter cartridge (Pelican XL or MiniMate), all three pressure sensors and cable connections, and easy access to the plumbing connections. The Manifold can be placed on top of the PureTec to minimize bench space, or placed alongside. Cables for all three sensors are bundled for easier routing to the PureTec.

If you are using a larger style filter cartridge, simply route the cables to the rear of the PureTec and connect them to the appropriate jacks.

In either case, the disposable pressure sensors are easy to change when the need arises, and are readily available from SciLog in packs of 10 with the proper cable attached.

5.1 Pressure Sensor Installation:

In most applications, the disposable pressure sensors are connected to one end of a T fitting, and used in a dead-end manner. The sensors currently available have the cap solvent welded in place. The sensors have polycarbonate and silicone wetted surfaces that meet all USP Class VI requirements. They may be sanitized with alcohol, a mild bleach, or sodium hydroxide solution. Please note: repeated use of strong buffers has been known to drastically shorten the life of these sensors.

CAUTION: Make sure you have secured all of the connecting tubing for the pressure sensors with Nylon cable ties. **At least one of the pressure sensors and tubing are located at the high-pressure side of your filtration system!**

6.0 TANDEM™ Dual Channel Pump Head:

The TANDEM peristaltic pump head is specifically designed for use with the PureTec system. The SciLog TANDEM pump head will provide you with rugged reliability as long as common sense maintenance and good quality pump tubing are used. For filtration applications, you should be using either Silicone or PharMed pump tubing in the correct sizes.

The TANDEM pump head is driven by an 8, 160, or 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 filtration conditions.

However, when the pump head requires excessive torque because of pump tube failure or “freezing” of the pump head, then the PureTec 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 PureTec 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.

6.1 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 PureTec, 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 PureTec 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 PureTec.

6.2 Pump Tubing / Rate Selection:

The approximate flow rate ranges associated with various pump tube sizes and motor speeds are shown in the table below:

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
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	0.1 - 1.6	0.4-6.4	0.9 - 12.6	1.1 -18.3	1.7 - 24.3	0.4 – 13	0.6 – 20	0.8 - 32
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	16 – 650
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		

For tangential flow filter applications, the selected PureTec pump rate should not fall below the minimum feed rate for your system. First select the appropriate pump tubing size from the table above. The minimum feed rate of your system should fall into the midrange for the selected pump tube size. For example, if your Minimum Recirculation Flow rate is 60 ml/min., then the appropriate pump tubing is #16 when using a 160-rpm motor. In general, avoid using pump tube sizes that force you to work at either the low or high pump rate extremes whenever possible.

The PureTec software contains permanent, factory installed calibration tables for each of the nine (9) pump tube sizes listed above. The calibration table relates the pump motor RPM to the pump output in terms of ml / minute. However, the PureTec can be recalibrated by utilizing the front panel star (*) key of the PureTec.

NOTE: The PureTec usually is configured with a 160-rpm motor, and the built-in calibration curves for that motor. If your flow rate needs require, the PureTec is also available with either a 600-rpm or 8-rpm motor. By accessing SETUP:PUMP:Motor RPM, from the front panel, you can select the RPM of the installed motor. The PureTec will then implement the factory installed calibration curves for that motor. This will have been done for you at the factory prior to testing and shipping.

Differences in pump tube formulation/manufacture, as well as pump tube wear over time may cause the PureTec pump output to change slightly. Thus for very high pump rate accuracy you may want to recalibrate the PureTec with your particular pump tubing in place. Recalibration of the PureTec is very easy and straightforward, please refer to the page on Re-calibration.

6.3 Pump Tube Installation:

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

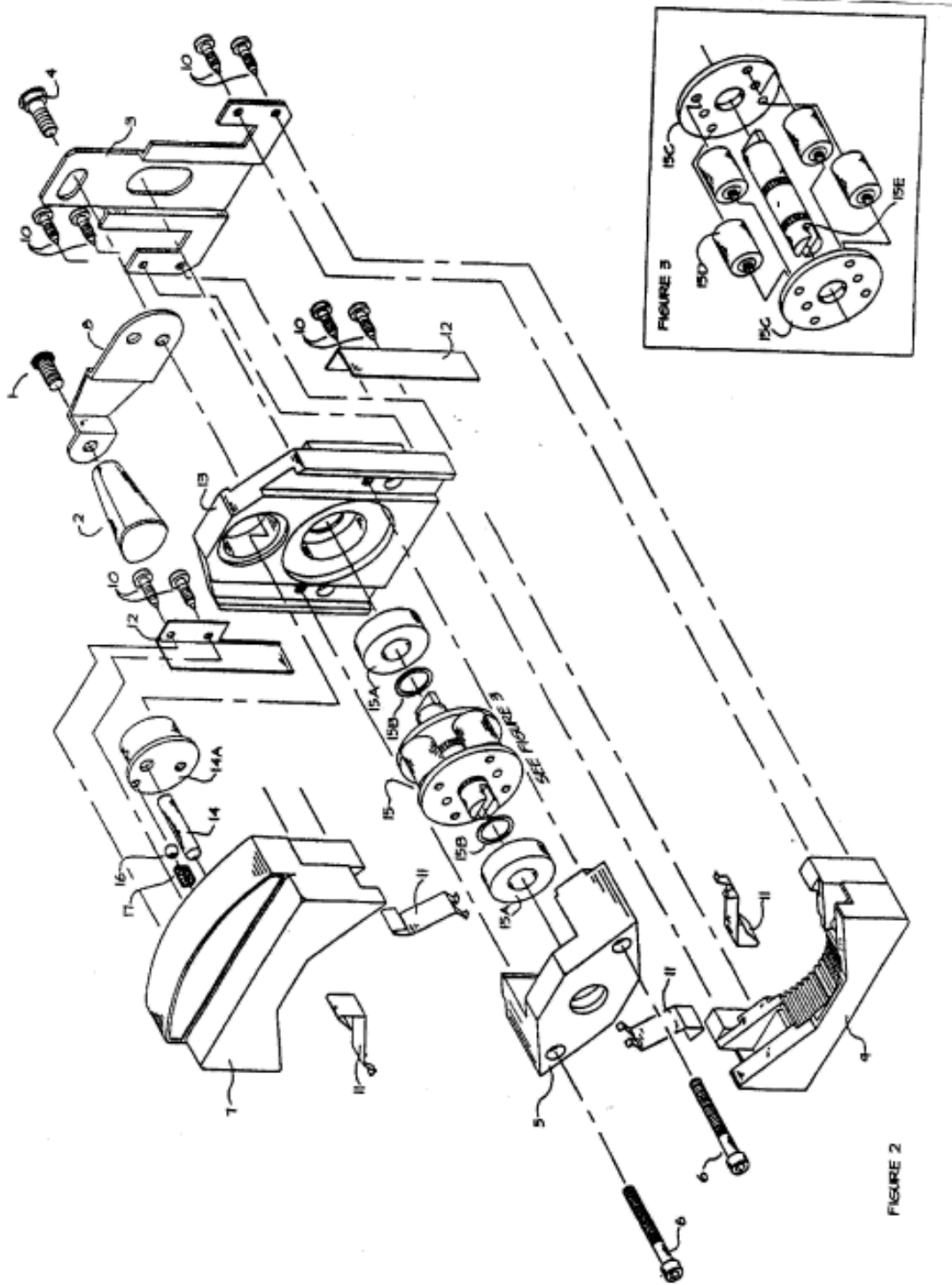
1. Open the TANDEM pump head by moving the black loading lever 180° to the left. If you are going to use the upper pump channel, feed the tubing through the upper channel; this is over the pump roller cage. If the lower pump channel is used, feed the tubing through the lower channel; this is under the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

6.4 TANDEM™ Dual Channel Peristaltic Pump: Parts Identification

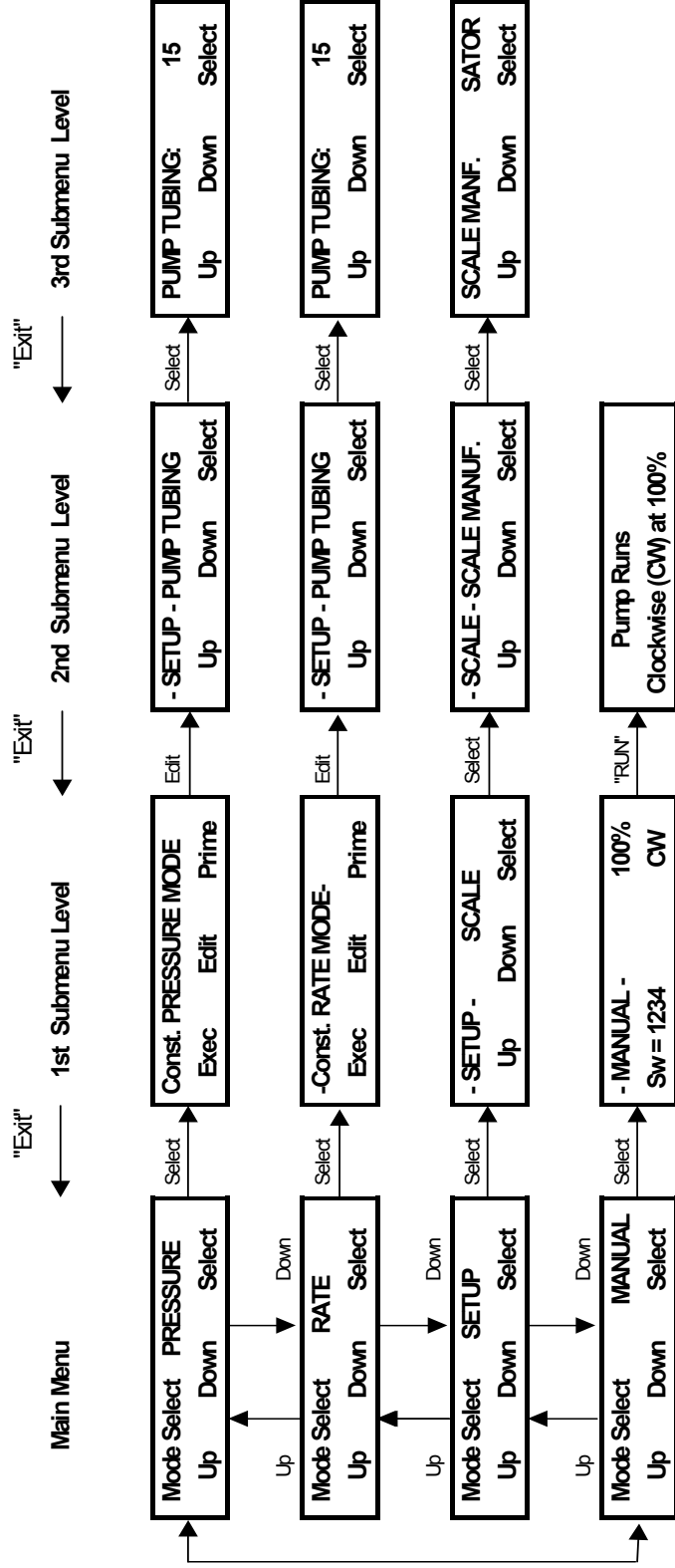


6.5 TANDEM™ Parts List:

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)

Part B: PureTec™ Software



1.0 Software Overview: Main Menu

The PureTec main menu consists of **five (5) operational modes** as shown on the previous page. By using “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. RATE. By pressing the “Select” key you are also entering the 1st submenu level, which provides you access to the “Exec”, “Edit”, and “Prime” functions. In the “Edit” sub mode, you select the pump parameters for your filter application. In the “Exec” sub mode, you will be executing the parameters chosen under “Edit”. The “Prime” sub mode runs the pump when the key is held down to ‘prime’ the system and remove the air bubbles when needed. Press the “Exit” key whenever you want to return to the main menu.

RATE Mode: This operation mode allows you to implement Constant Pump Rate Filtration, i.e. a user selected pump rate (filtration feed rate) is maintained during filtration. In the “Edit” sub mode you first select the pump tubing you want to use in your application. Based upon your **pump tube size selection**, the PureTec will access factory installed calibration tables, which relate the pump output in ml/min. to pump motor speed. Please note: the pump tube calibration data can be updated by the user utilizing the star (★) key. This provides simple modification of the factory-installed data for your particular motor/pump head/tubing combination.

Eleven (11) user-programmable **alarm parameters** can be selected: **Cumulative Volume** (Retentate); **Run Time**; **Lo-Pressure** (Low Filter Back Pressure); **Hi-Pressure** (High Filter Back Pressure); **Filtrate** (or Permeate) **Weight**, and **High / Low Analog 1-3**. Each alarm parameter can be: 1. Turned off, 2. Provide auditory alarm only or 3. Stop the pump and provide an auditory alarm when alarm limits are exceeded. The PureTec simultaneously monitors and displays the inlet, retentate, and filtrate line pressures, as well as the calculated trans-membrane pressure, as provided by the 3 disposable pressure sensors. The Hi and Low Pressure alarms relate to the pressure sensor chosen as the “Pressure Source” as defined in the **SETUP: Pump, Press Sensor** sub mode.

At user-defined intervals, all filter/pump parameters can be printed out or send to a PC for archiving. Print parameters are set in the **SETUP: Printer**

The balance allows quantitative permeate collection by weight, use of the Filtrate Weight alarm mentioned above, and the display and printout of the Filtrate Collection Rate.

PRESSURE Mode: This operation mode allows you to implement Constant Pressure Filtration, i.e. a user selected filter backpressure is maintained by modulating the pump output. When the filtration device starts to plug up, the PureTec will maintain the selected filter backpressure by automatically decreasing the pump rate. The PureTec simultaneously monitors and displays the inlet, retentate, permeate line pressures, and the calculated trans-membrane pressure as provided by the 3 disposable pressure sensors. The process can be controlled by any one of the 3 line pressures or the trans-membrane pressure (TM) as selected by the user in the **SETUP: Pump, Press Sensor** sub mode.

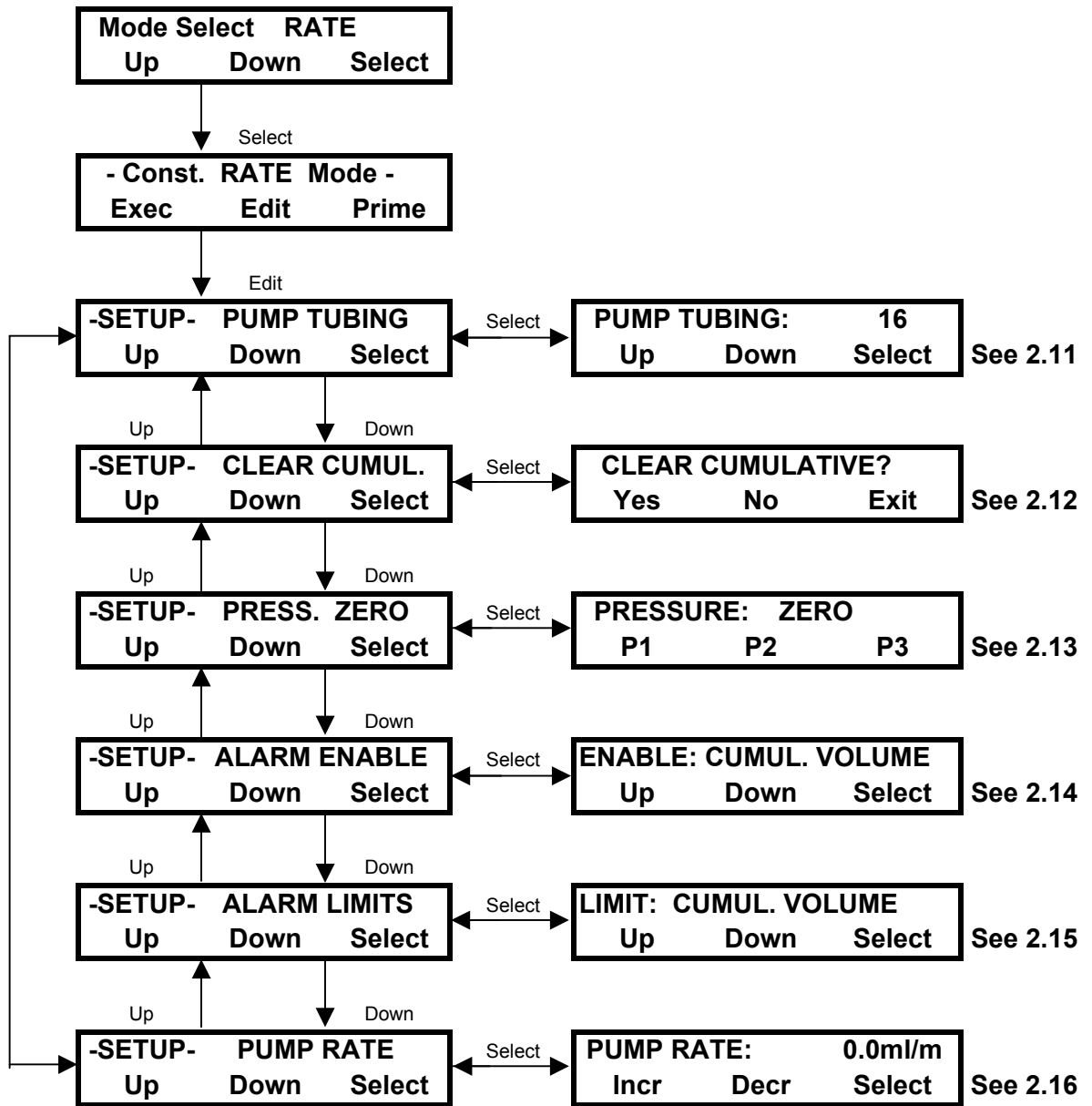
The filter backpressure setting, **Pump Pressure**, is selected in the “Edit” sub mode. This setting allows you to choose a safe backpressure that also is consistent with a desired filtrate/permeate flow rate.

NOTE: All Alarm and Print and Balance parameters are the same as discussed in RATE Mode, except that Hi-Pressure is replaced by Lo-Flow.

SETUP: This operational mode allows you to select various user preferences and interface options. The **Setup: Scale** sub mode provides electronic balance options. Balances that can interface with the PureTec must have bi-directional serial communication, and NOT have internal calibration or be “delta” models that change readability. Many Mettler, Ohaus, AND, and Sartorius balances can be used. The **Setup: Clock** sub mode allows you to set the time and date used in the display. It also allows you to choose between Relative Time and Time of Day for the PureTec’s printout. The **Setup: System Test** sub mode allows checkout of PureTec outputs and requires purchase of a special set of connectors. **Setup: Printer** is used for setting up the printer communications parameters as well as print time interval and the print delay. **Setup: Analog** is used to set the upper and lower ranges for the analog inputs. These settings relate directly to their related alarms. **Setup: Temperature Offset** is used to offset the temperature measured by the available in-line probe. **Setup: Pressure Sensor** is used to zero the three pressure sensors, set the units (psi, bar, kpa), and choose the source for control and the main display, while **Setup: Pump** allows you to set various pump user preferences, most importantly the Motor RPM.

MANUAL: Allows manual control of pump speed and direction. **NOTE: RATE, PRESSURE, Alarm and printer parameters are not functional in the Manual mode.**

2.0 RATE: Constant Rate Filtration; Edit



2.0 RATE Mode: Constant Rate Filtration

SUMMARY: This PureTec mode allows you to implement a **constant filtration rate**, i.e. a user selected pump rate (**filtration feed rate**) is maintained throughout the filtration process. First select the **pump tube size** (#13, 14, 16, 25, 17, 18, 15, 24, or 35), and then select your **pump rate** in terms of ml/min. The optically encoded, servo controlled pump motor is capable of maintaining the selected pump rate over a wide range of filtration conditions. However the PureTec pump output can also be re-calibrated by the utilizing the front panel star (★) key. (If you have changed the motor sub-assembly from the factory installed one, select the correct RPM of your new motor in SETUP:PUMP:Motor RPM. The choices are 8, 160 or 600-RPM. You may also wish to confirm this setting when you first receive the PureTec.)

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

- 2.11 Pump Tubing:** Select sizes #13, 14, 16, 25, 17, 18, 15, 24, or #35, using “Up” and “Down” keys for choice of pump tubing size, then press “Select”. Based upon your **size selection**, the PureTec will access factory installed calibration tables, which relate the pump output in ml/min. to pump motor speed. PureTec pump output can also be re-calibrated by the utilizing the front panel star (★) key.
- 2.12 Clear Cumul:** Resets (Clears) the following counters in the “Exec” front panel display: CV = Cumulative (Retentate) Volume; RT = Run Time; FQ = Filtrate Weight.
- 2.13 Pressure Zero:** Allows you to zero the filter backpressure reading for all 3 pressure sensors, P1, P2 and P3. The PureTec pump must not be running when resetting pressure sensor output.
- 2.14 Alarm Enable:** Allows you to select alarm options for eleven (11) different (see 2.15) alarm conditions. Three options are available: 1. Disable the Alarm (**Off**); 2.Enable an auditory alarm (**Alarm Only**); or 3. Stop the pump and provide an auditory alarm (**Pump Stop**) when user defined alarm limits are exceeded.
- 2.15 Alarm Limits:** Allows you to assign alarm limits for eleven (11) different alarm conditions: **Cumulative Volume** (Retentate) in milliliters; **Run Time** in Hours: Minutes; **Lo-Pressure** (monitor system leakage) in psi; **Hi-Pressure** (filter backpressure) in psi; **Filtrate Weight** (Permeate) in grams; (This alarm must be enabled in order to obtain and display the Filtrate Weight (FQ) and Flow Rate, Permeate (FP) values.) and **Hi / Lo Analog 1-3** for alarms based upon Conductivity or Temperature. Hi and Lo-Pressure alarms are related to the Pressure Source chosen in **SETUP: Press. Sensor, Source.** **Note:** Alarm condition is triggered when alarm limit is exceeded. **Alarms are not mutually exclusive. You may select any combination of alarms.**
- 2.16 Pump Rate:** Select pump rate in terms of **ml/minute**, however first select pump tube size, see 2.11. Pump Rate may be changed “on the fly” by pressing the RATE key on the front panel, making the change, and pressing ‘Select’. PureTec pump rate can be re-calibrated by the utilizing the front panel star (★) key. **For re-calibration** purposes, pump water into a container, e.g. 250 grams, placed onto a top-loading balance. Press “STOP” (not EXIT) when 250 grams have been dispensed. Press the star (★) key at the front panel and adjust the AV (Average Volume) parameter to 250, or whatever the dispensed weight is. Press “Select”. **See detailed explanation on the next page.**

2.17 Pump Re-calibration:

The PureTec software contains a permanent calibration table for each of the nine (9) tubing sizes: 13, 14, 16, 25, 17, 18, 15, 24 & 35. For a given pump tube size, the calibration table relates the pump motor RPM with the pump output in terms of ml / minute. However, the user can update the PureTec pump calibration very easily.

NOTE: The PureTec usually is configured with a 600-rpm motor, and the built-in calibration curves for that motor. If your flow rate needs require, the PureTec is also available with either a 160-rpm or 8-rpm motor. In order for the PureTec to properly display the correct flow rates and cumulative volume when using these motors, access SETUP:PUMP:Motor RPM and select the appropriate RPM for the installed motor. The PureTec will then implement the factory installed calibration curves for that particular motor. (This will have been done for you at the factory prior to testing and shipping, and should only need to be changed if you purchase and install a different motor subassembly.)

In order to use this recalibration feature, first select (in **EDIT**) the pump tube size you are using, e.g. size #17, then select the pump rate, e.g. 500ml/min. Press the **EXIT** key and then the **EXEC** key. PureTec will now show the following display:

SET: T17 PR: 500ml/m
Press RUN when Ready

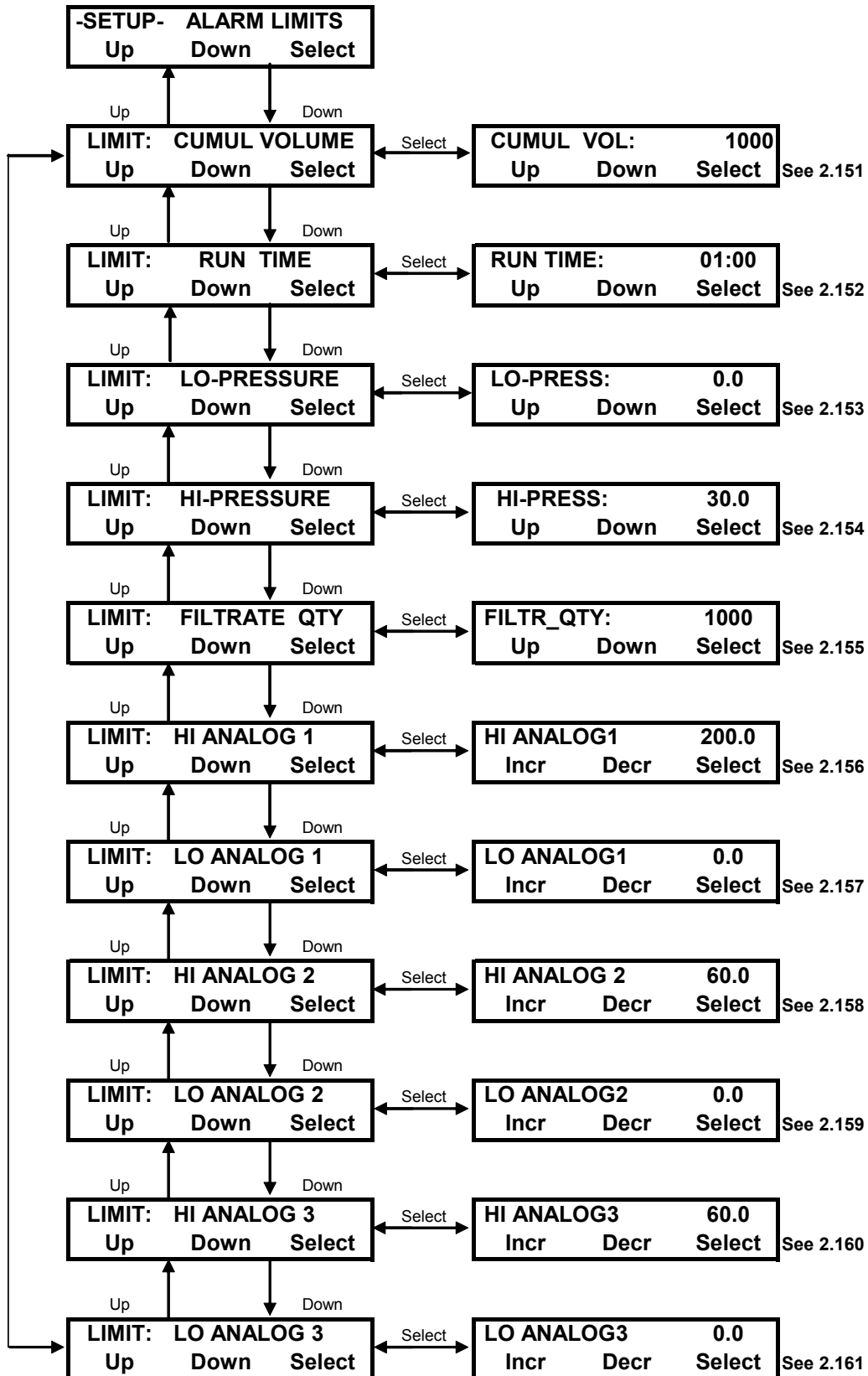
You are now ready to recalibrate your #17 pump tubing. For calibration purposes, pump water into a container, e.g. 1000grams, placed onto a top-loading balance. Alternatively use a 1000ml volumetric flask. Press the **RUN** key and begin dispensing. Press the **STOP** key (not **EXIT**) to stop pumping when 1000 grams have been dispensed. Press the **Star** (★) key and the following display will be shown:

DV:1000	AV:1000
Incr.	Decr. Select

Adjust (increase or decrease) the AV (Average Volume) parameter to 1000, or whatever the actual dispensed weight is, press **Select**, the calibration table for #17 pump tubing has now been updated.

NOTE: The selected calibration volume or weight should be 2-4 times the selected pump rate. For example, if your selected pump rate is 500 ml/min. the minimum calibration volume / weight should be between 1000 - 2000 mls or grams.

2.15 RATE Mode, Alarm Limits



2.15 RATE Mode: Alarm Limits

SUMMARY: This section (2.15 Alarm Limits) allows you to assign limiting values for eleven (11) different alarm conditions: **Cumulative Volume** (based on feed rate) in milliliters; **Run Time** in Hours: Minutes; **Lo-Pressure** (monitor system leakage) in psi; **Hi-Pressure** (filter back pressure) in psi.; **Filtrate Weight** (Permeate) in grams; **Hi and Low Analog 1-3** for Conductivity and Temperature. **Note: The alarm condition is triggered when the alarm limit is exceeded.** Alarms are not mutually exclusive. You may select any combination of alarms. See section 2.14 for the two different alarm responses. For critical alarms (i.e. Hi-Pressure Alarm) you want the PureTec pump to stop (**Pump Stop**), for less critical alarm conditions you may want to choose an auditory alarm (**Alarm Only**). Each alarm may be disabled if not required.

Note: Cumulative Volume, Filtrate Weight and Run Time are cumulative alarms. If you have stopped the process and are starting over, don't forget to go back to the EDIT mode, and Clear the Cumulative values!

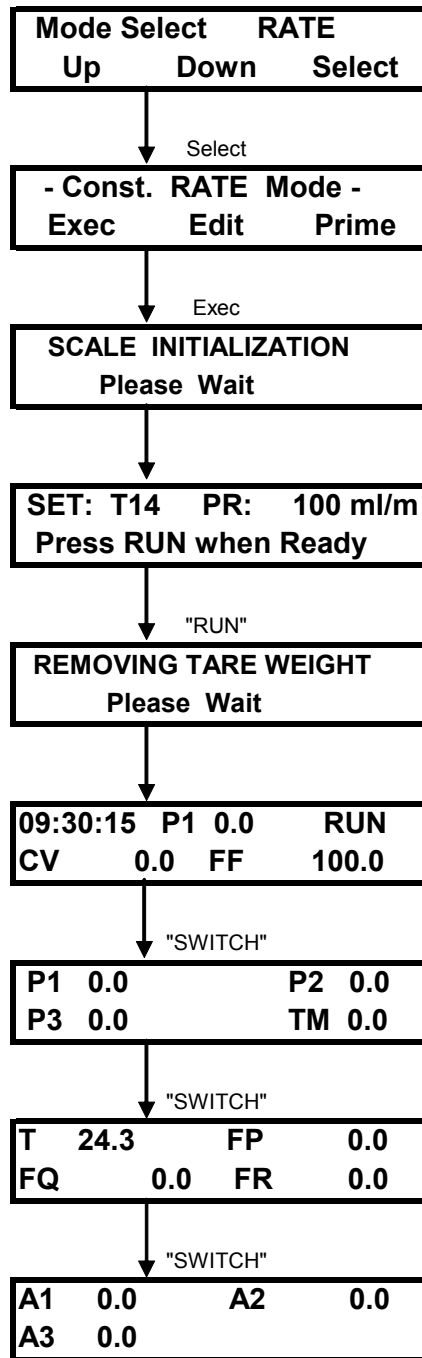
NOTE: Use “Up” and “Down” keys to make a selection, then press “Select” to implement that selection.

- 2.151 **Cumulative Volume:** This alarm setting represents the total volume of process solution (based on the feed rate) that is pumped through your filtration device. For example: if you set the **Cumulative Volume Alarm** to 10,000ml or 10 liters, the PureTec will either alarm and/or stop the pump (see 2.14) when 10 liters of retentate has been pumped through the filtration device. This allows you to define your permeate yield in terms of the amount of retentate recirculated through the filtration system.
- 2.152 **Run Time:** This alarm setting allows you to set a timer for the filtration of your process solution. For example, if you set the **Run Time Alarm** to 01:30, then the PureTec will provide you (see 2.14) with an auditory alarm and / or stop the pump after one (1) hour and thirty (30) minutes have passed. This allows you to define the processing time, i.e. the time required to obtain a desired permeate yield.
- 2.153 **Lo-Pressure:** Typically set 3-5 psi units below the Hi-Pressure setting. The Lo-Pressure Alarm is triggered when a sudden filter backpressure drop occurs after rising above this setting. Such a change in the filter backpressure usually indicates a system leak, i.e. pump tubing has slipped off the filter connection. This is usually a critical alarm and should be set to Pump Stop.
- 2.154 **Hi-Pressure:** For most applications, this represents a critical alarm condition. If this is the case choose Pump Stop in section 2.15 (Alarm Enable). Make sure you stay below the pressure limit specified by the filter manufacturer. For example, if your filtration device specifies an upper pressure limit of 25 psi, you may want to set your **Hi-Pressure Alarm** to 20 psi. The PureTec will alarm and stop the pump when the filter backpressure exceeds 20 psi.
- 2.155 **Filtrate Wgt:** The PureTec comes with a top-loading balance. Enter the filtrate / permeate weight (grams) that you want to collect, and the PureTec will either alarm or stop the pump when the desired filtrate / permeate weight has been collected. Set this value to its maximum if you do not wish it to trigger during normal use. This alarm must be enabled in at least “alarm only” mode in order for the FQ (Filtrate Weight) and FP (Flow Rate, Permeate) to be obtained or displayed.

Connecting the **SciCon Conductivity Monitor** to the PureTec provides a pair of 4-20 ma signals (one 4-20 ma and one 0-1vdc on the original model) for input of the Conductivity and Temperature values. Analog 1 is used for Conductivity, and Analog 2 or 3 is used for Temperature. Temperature is assigned to Analog 2 (4-20ma) for SciCon Rev E and later, Analog 3 (0-1vdc) for Rev C. Any other device that has 4-20 ma outputs can be utilized using Analog 1 and 2.

- 2.156 **Hi Analog 1:** Set Hi Analog 1 to an appropriate high value for Conductivity. The alarm will trigger when the limit is exceeded going high.
- 2.157 **Lo Analog 1:** Set Lo Analog 1 to an appropriate low value for Conductivity. The alarm will trigger when the limit is exceeded going low.
- 2.158 **Hi Analog 2:** Set Hi Analog 2 to an appropriate high value for Temperature. The alarm will trigger when the limit is exceeded going high.
- 2.159 **Lo Analog 2:** Set Lo Analog 2 to an appropriate low value for Temperature. The alarm will trigger when the limit is exceeded going low.
- 2.160 **Hi Analog 3:** Set Hi Analog 2 to an appropriate high value for Temperature. The alarm will trigger when the limit is exceeded going high.
- 2.161 **Lo Analog 3:** Set Lo Analog 2 to an appropriate low value for Temperature. The alarm will trigger when the limit is exceeded going low.

2.2 RATE: Constant Rate Filtration; Execute Display



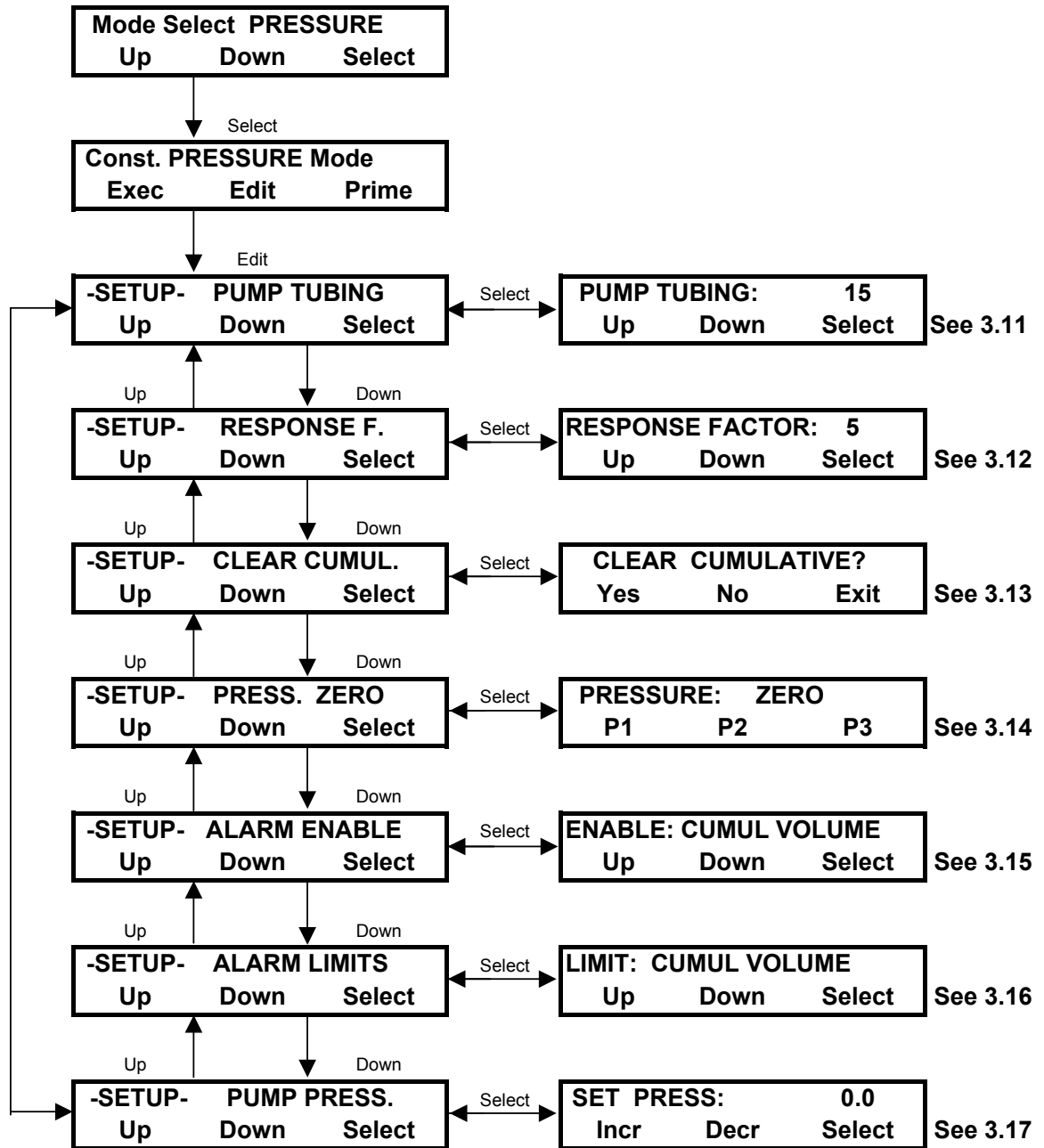
The "SWITCH" key on the front panel allows you to change between 3 operational display screens.

Abbreviations are as follows:

P1= Inlet Line Pressure
 P2= Retentate Line Pressure
 P3= Filtrate Line Pressure
 TM= Trans-Membrane Pressure
 CV= Cumulative Volume
 FF= Flow Rate, Feed
 FQ= Filtrate Quantity
 FP= Flow Rate, Permeate (Collection Rate)
 FR= Flow Rate, Recirculation
 T = Temperature (By in-line probe)
 A1 = Conductivity from SciCon
 A2 or A3 = Temperature from SciCon
 RUN= Pump Status

Unless a Balance is connected and properly configured, and the Filtrate Weight Alarm is enabled, the Filtrate Quantity and Flow Rate, Permeate displays will be zero. The "Scale Initialization" and "Removing Tare Weight" screens, will only occur in this case as well.

3.0 PRESSURE: Constant Pressure Filtration; Edit



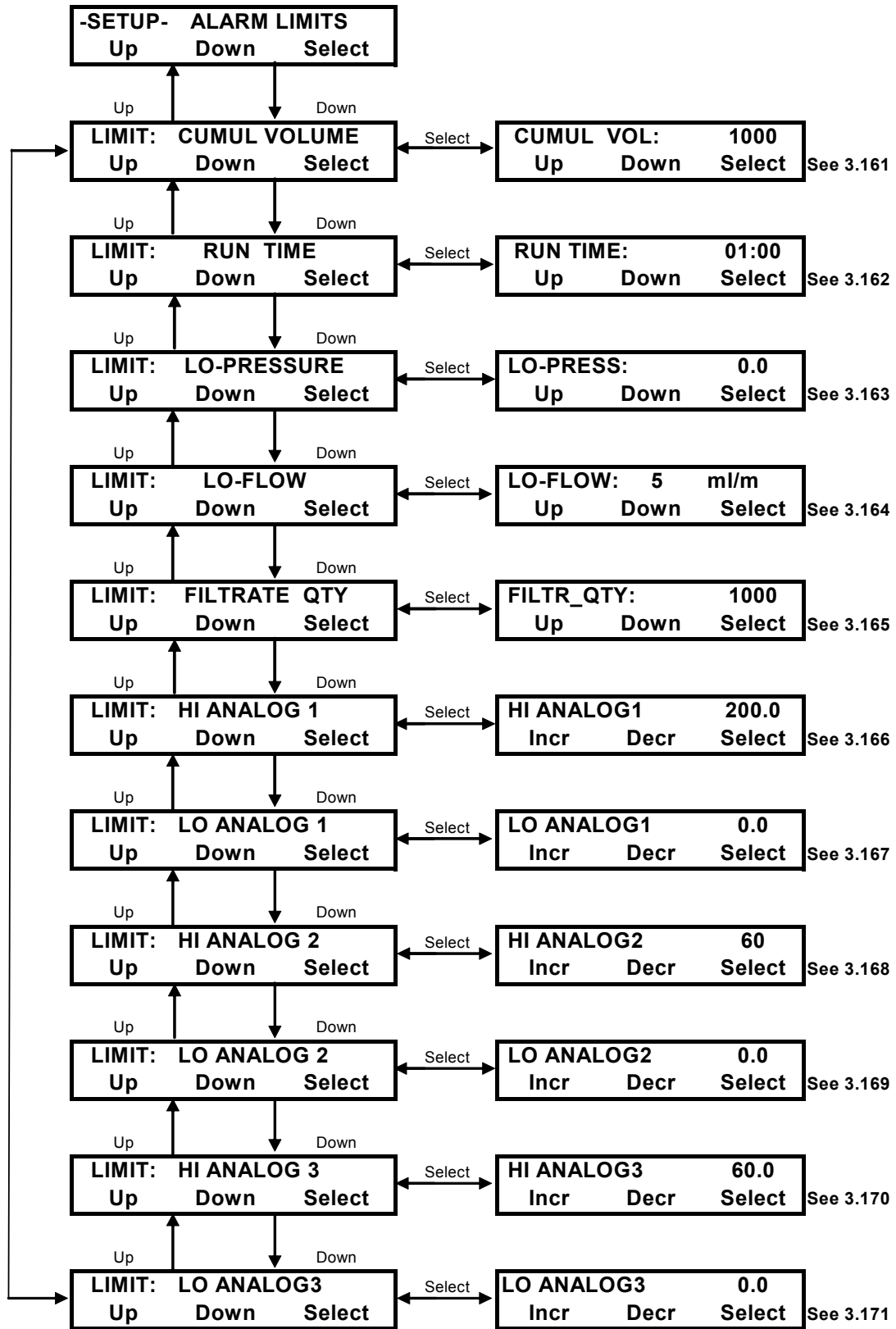
3.0 PRESSURE: Constant Pressure Filtration

SUMMARY: This PureTec mode allows you to implement a **constant pressure filtration**, i.e. a user selected filter backpressure (30 psi. max.) is maintained throughout the filtration process. When the filter device starts plugging up, the PureTec detects a corresponding increase in filter backpressure. In order to maintain the selected filter backpressure setting, **the PureTec will automatically decrease the pump (feed) rate**. Thus the constant pressure function of the PureTec allows you to choose a safe backpressure setting that is consistent with a high filtrate/permeate flow rate.

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

- 3.11 Pump Tubing:** Select sizes #13, 14, 16, 25, 17, 18, 15, 24 or #35, use “Up” and “Down” keys for choice of pump tubing size, then press “Select”. Based upon your **size selection**, the PureTec will access factory installed calibration tables, which relate the pump output in ml/min. to pump motor speed. PureTec pump output can also be re-calibrated by the utilizing the front panel star (★) key. (See RATE Mode)
- 3.12 Clear Cumul:** Resets (Clears) the following counters in the “Exec” front panel display: CV = Cumulative Volume; RT = Run Time; FQ = Filtrate Weight.
- 3.13 Response F:** Response Factor setting. The Pump Response Factor = 5 is the default value. Increasing the Pump Response Factor will increase the pumps responsiveness.
- 3.14 Pressure Zero:** Allows you to zero and span the backpressure readings of all 3 pressure sensors. Span is done only when using a known pressure source that matches the Range set in **SETUP, PUMP, PRESS. SENSOR, Range** (Default = 60) **Do not run the PureTec while resetting pressure sensor output.**
- 3.15 Alarm Enable:** Allows you to select alarm options for eleven (11) different alarm conditions. There are 3 options available: 1. Disable the alarm (**Off**); 2.Enable an auditory alarm (**Alarm Only**); 3. Stop pump and provide an auditory alarm (**Pump Stop**) when user defined alarm limits are exceeded.
- 3.16 Alarm Limits:** Allows you to assign alarm limits for eleven (11) different alarm conditions: **Cumulative Volume** in milliliters; **Run Time** in Hours: Minutes; **Lo-Pressure** (monitor system leakage) in psi; **Lo-Flow** (high filter backpressure) in ml/min; **Filtrate Weight** (Permeate) in grams (This alarm must be enabled in order to obtain and display the Filtrate Weight (FQ) and Flow Rate, Permeate (FP) values.); and **Hi / Lo Analog 1-3**. The Lo-Pressure and Lo-Flow alarms are related to the pressure source chosen in **SETUP: Press. Sensor, Source**. **Note:** Alarm condition is triggered when alarm limit is exceeded. **Alarms are not mutually exclusive. You may select any combination of alarms.**
- 3.17 Pump Pressure:** Allows you to select **filter backpressure** (30psi, max.) for your filtration application. The PureTec will maintain the selected setting throughout the filtration process. Pump Pressure may be changed “on the fly” by pressing the RATE key on the front panel, making the change, and pressing the ‘Select’ button. **Do not exceed the pressure rating for your filtration device**, consult the specifications provided by the filter manufacturer. **NOTE:** The Source chosen in **SETUP: Press. Sensor, Source** i.e. P1 or TM (Trans-membrane Pressure) is the pressure that will be controlled by this setting.

3.16 PRESSURE: Alarm Limits



3.16 PRESSURE: Alarm Limits

SUMMARY: This section (3.15 Alarm Limits) allows you to assign limiting values for five (5) different alarm conditions: **Cumulative** (Retentate) **Volume** in milliliters; **Run Time** in Hours: Minutes; **Lo-Pressure** (monitor system leakage) in psi; **Lo-Flow** (pump will stop when pump feed rate falls below this limit) in ml/min.; **Filtrate** (Permeate) **Weight** in grams. **Note: The alarm condition is triggered when the alarm limit is exceeded.** Alarms are not mutually exclusive. You may select any combination of alarms. See section 3.14 for the different alarm responses. For critical alarms you may want the PureTec pump to stop (**Pump Stop**), for less critical alarm conditions you may want to choose an auditory alarm (**Alarm Only**). Please Note: The Lo-Pressure alarm is directly related to the Source chosen in SETUP: Press. Sensor, Source, i.e. P1, TM, etc.

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

- 3.161 Cumulative Volume:** This alarm setting represents the total volume of process solution that is pumped through your filtration device. For example: if you set the **Cumulative Volume Alarm** to 10,000ml or 10 liters, the PureTec will either alarm and / or stop the pump (see 3.15) when 10 liters of retentate has been pumped through the filtration device. This allows you to define your permeate yield in terms of the amount of retentate recirculated through the filtration system.
- 3.162 Run Time:** This alarm setting allows you to set a timer for the filtration of your process solution. For example, if you set the **Run Time Alarm** to 01:30, then the PureTec will provide you (see 3.15) with an auditory alarm and / or stop the pump after one (1) hour and thirty (30) minutes have passed. This allows you to define the processing time, i.e. the time required to obtain a desired permeate yield.
- 3.163 Lo-Pressure:** Typically set 3-5 psi units below the **Pump Pressure** setting (see 3.16). The Lo-Pressure Alarm is triggered when a sudden filter backpressure drop occurs after rising above this setting. Such a change in the filter backpressure usually indicates a system leak, i.e. pump tubing has slipped off the filter connection.
- 3.164 Lo-Flow:** For constant pressure filtration, this represents a critical alarm condition. In this operational mode, the PureTec will detect any filter backpressure increases in the source pressure sensor (due to slow filter plug-up) and automatically decrease the pump rate to maintain the selected **Pump Pressure** setting (see 3.17). The Lo-Flow parameter (ml/min) represents lowest pump rate before the pump shuts down. The Lo-Flow parameter should be set just below your desired minimum feed flow rate.
- 3.165 Filtrate Wgt:** The PureTec comes with a top-loading balance. Enter the filtrate / permeate weight (grams) that you want to collect, and the PureTec will either alarm or stop the pump when the desired filtrate / permeate weight has been collected. Set this value to its maximum if you do not wish it to trigger during normal use. This alarm must be enabled in at least “alarm only” mode in order for the FQ (Filtrate Weight) and FP (Flow Rate, Permeate) to be obtained or displayed.

Connecting the **SciCon Conductivity Monitor** to the PureTec provides a pair of 4-20 ma signals (one 4-20 ma and one 0-1vdc on the original model) for input of the Conductivity and Temperature values. Analog 1 is used for Conductivity, and Analog 2 or 3 is used for Temperature. Temperature is assigned to Analog 2 (4-20ma) for SciCon Rev E and later, Analog 3 (0-1vdc) for Rev C. Any other device that has 4-20 ma outputs can be utilized using Analog 1 and 2.

3.166 Hi Analog 1: Set Hi Analog 1 to an appropriate high value for Conductivity. The alarm will trigger when the limit is exceeded going high.

3.167 Lo Analog 1: Set Lo Analog 1 to an appropriate low value for Conductivity. The alarm will trigger when the limit is exceeded going low.

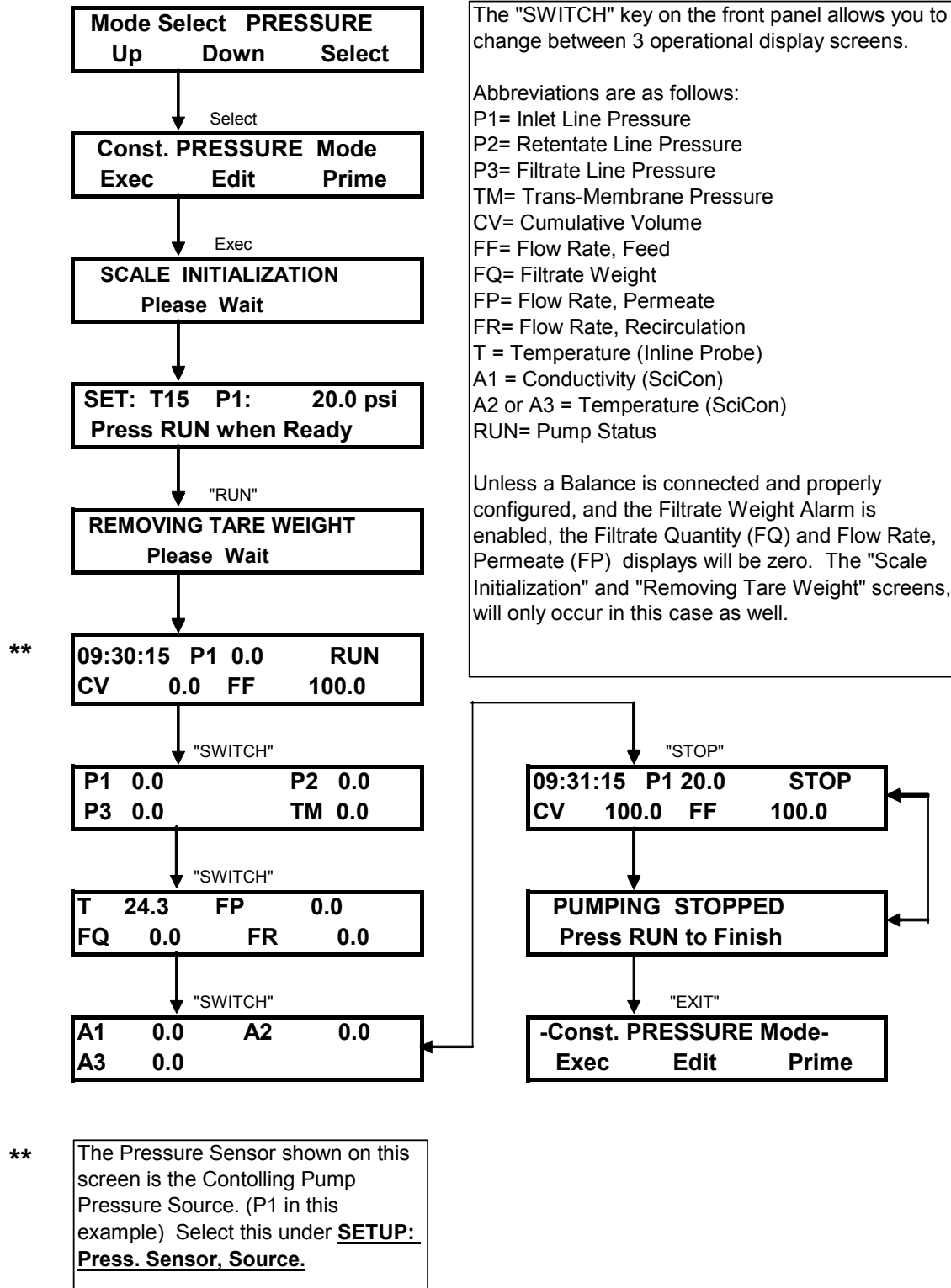
3.168 Hi Analog 2: Set Hi Analog 2 to an appropriate high value for Temperature. The alarm will trigger when the limit is exceeded going high.

3.169 Lo Analog 2: Set Lo Analog 2 to an appropriate low value for Temperature. The alarm will trigger when the limit is exceeded going low.

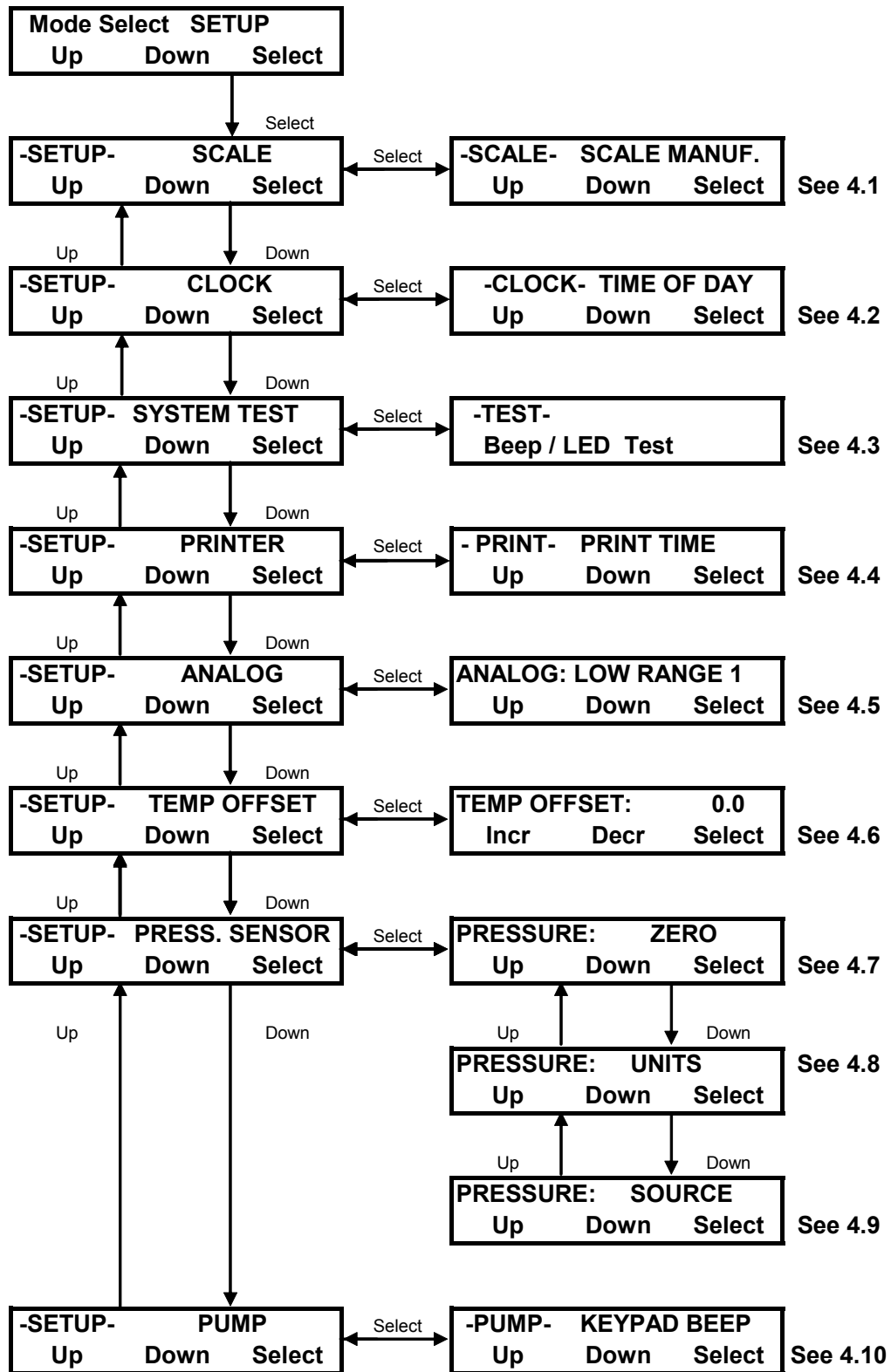
3.170 Hi Analog 3: Set Hi Analog 2 to an appropriate high value for Temperature. The alarm will trigger when the limit is exceeded going high.

3.171 Lo Analog 3: Set Lo Analog 2 to an appropriate low value for Temperature. The alarm will trigger when the limit is exceeded going low.

PRESSURE: Constant Pressure Filtration: Execute Display



4.0 Setup: Edit



4.0 Setup: Edit

Summary: In the Setup menu consists of five (5) entries. In 4.1 **Setup: Scale**, you select from several different manufacturers of electronic balances: Sartorius, Mettler, AND, Ohaus, and Toledo. However, only certain models with serial communications capability can be accommodated. By choosing the scale manufacturer, the PureTec automatically implements the correct communications protocol. In 4.2 **Setup: Clock**, you can set the date and time, which is shown on the PureTec front panel. In 4.3 **Setup: System Test** you can diagnose the electronic outputs of the PureTec. For testing purposes you need a set of test jumpers (P/N 080-058). In 4.4 **Setup: Printer**, the communications parameters for hooking up to a SciLog printer (P/N 080-095) or a PC are selected. In 4.5 **Setup: Analog**, the Hi and Lo ranges, as well as offset for Analog inputs 1-3 are configured. In 4.6 **Setup: Temperature Offset**, an offset may be chosen for the in-line temperature probe. In 4.7 **Setup: Press. Sensor**, you can zero and span the inputs for all three sensors, set the Range, select one of them as the Source, and choose between psi, bar or kpa units. The Source chosen is used for the Alarms in both modes, and as the control pressure in **PRESSURE Mode**. In 4.10 **Setup: Pump** certain user-preferences can be selected, in particular the Motor RPM.

- 4.1 Setup: Scale** The following electronic scales can be accommodated by the PureTec: **Mettler PM and PGS Series**, as well as **AND GF Series** balances (Mettler); **Ohaus GT Series, GT “Precision Advanced”** models (Ohaus) as well as the **Ohaus “Explorer”** and **“Navigator” Series**. The **Ohaus High Capacity “IP” Series** can be used when the “Ohaus2” parameter is selected and the **Sartorius MC-1 & Acculab AL Series** can be interfaced when “Sartorius” is the selected manufacturer.
- 4.2 Setup: Clock** Set the time of day (military), day, month, and year. With Print Enable, choose between Time of Day, and Relative (Run) Time for the printout. Default is Time of Day.
- 4.3 Setup: System Test** Allows you to diagnose the outputs of the PureTec; requires you to connect a set of test jumpers (P/N 080-058) for testing.
- 4.4 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 (Default = 30 sec.), Baud Rate (9600), Stop Bits (2), Parity (None), Word Length (8), Print Delay = 4 sec. for printer, Print Delay = 0 sec. for PC.
- 4.5 Setup: Analog:** Set **Hi** and **Low Range** values for **Analog 1, Analog 2** and **Analog 3**. Analog 1 and 2 are 4-20ma inputs; Analog 3 is 0-1vdc. All may be set to a max of 9999.9, and the related alarms have limits that match this setting. Analog 1 is usually Conductivity from the SciCon, and the Hi Range defaults to 200. By setting this range to match the range used on the SciCon, the values will be similar. Analog 2 and 3 are usually Temperature from the SciCon, and Hi Range for both defaults to 60. The default Temp range on the SciCon is 60 degrees C. All Low Ranges default to 0.0. **Analog Offsets** for all three signals may also be implemented, +/- 5.0.
- 4.6 Setup: Temperature Offset:** You may offset the input of the in-line Temperature Probe available with the PureTec, +/- 5.0 degrees.

- 4.7 Setup: Press. Sensor: Zero** Allows you to **Zero** all three pressure sensors. (**Span** is used for calibrating against a known pressure source equal to the Range Value and done at the factory prior to shipment.)
- 4.8 Source** is used to select the control source for Pump Pressure in PRESSURE Mode and Alarms in both modes. P1, P2, P3 and TM are available choices.
- 4.9 Units:** Choose from Psi (default), Bar, or Kpa units.
- 4.10 Range** is used in conjunction with Span to calibrate the software related to the pressure sensors. (Default = 60 psi)
- 4.11 Setup: Pump** Select the following user preferences: **Keypad Beep:** (On/Off), **Switch Configuration:** (Level / Pulse, input for Foot Switch), **Switch Polarity:** (Normal/Inverted), **TTL1:On-Off:** (Yes/No), **Motor Start** (Hard / Soft-Ramp), **Motor RPM:** (600, 160, 8), **Power Up** (Mode/Menu/Run), **LCD Adjust** (Display Contrast Adjust), **ASCII Feedback** (On / Off, output at Serial Port 1 labeled "Balance", need RS-232 cable (P/N 080-050), **Factory Reset:** (Resets all variable parameters to their original, factory defaults).

4.1 Setup: Scale

4.11 Mettler - Toledo Balance Parameters:

4.111 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 PureTec Setup mode, select SCALE, then select “Mettler”. Connect the Mettler balance cable P/N: 080-067

4.112 Mettler Viper PM, PB Models

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)	Control
CReset	?		
DIAGNOSTICS (diagnos)			
END			

NOTE: The **Bold** parameters are the only custom settings needed for communication with the PureTec. 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 PureTec. Consult your scale manual for help navigating through the scale menu.

In the PureTec Setup Mode, select "**METLER**", see **SETUP: SCALE: MANUF**. By making this selection, the PureTec 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.

4.12 Ohaus Balance Parameters:

4.121 Ohaus Adventurer Pro Series:

Press and hold the Menu button until MENU appears on the display. Release this button, and now 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:

<u>ReadOut</u>	
AutoZero	Off
<u>Print</u>	
Output	
Whenstable	Off
AutoPrint	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
<u>RS232-1</u>	
Baud	9600
Parity	7 Noparity
Handshake	Off

In the Setup Mode, Scale Manufacturer, select "OHAUS3". By making this selection, the SciLog Smart Pump will implement the correct parameters for communicating with the Adventurer Pro Series balance. 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.)

4.122 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 PureTec will now be able to communicate with the Ohaus balance.

4.123 "Explorer" & "Voyager" Series Ohaus Balances:

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 PureTec is now able to communicate with the Ohaus balance.

4.13 Sartorius Balance Parameters:

For all Sartorius / Acculab Balances, in Setup:Scale choose SATOR2

4.131 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

4.132 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

4.133 Sartorius Acculab AL Series Balances:

NOTE: You need a SciLog RS-232 cable (P/N: 080-050) to interface with the Acculab AL Series balances.

Consult your Acculab manual; enter the following protocol into the scale:

Filter Selection	111	Very stable conditions
Stability Range	134	2 digits
Auto Zero	162	Off
Baud Rate	514	1200 baud
Parity	523	Odd
Stop Bits	531	1 Stop bit
Handshake Mode	543	Hardware
Print Configuration	611	Manual w/o Stability

4.14 AND GF Series Balance Parameters:

4.134 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.

4.3 PureTec Printout Format

07/22/06; 09:30 PURE2.70; Constant Rate; P-Source: P1; CW; Units=psi; Tubing=16;
 Alarms:
 CV=2;RT=3;LP=3;HP=3;FQ=3; Limits: CV= 150.0; RT=01:00; LP= 0.0; HP=30.0;
 FQ=40.0

RT:	CV:	FQ:	P1:	P2:	P3:	TM:	FF:	FP:	FR:	T:	A1	A2	A3	ST:
00:00:00	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	24.3	0.0	0.0	0.0	ST=START
00:00:30	50.0	10.0	12.5	12.9	12.9	0.2	100.0	20.0	80.0	24.3	0.0	0.0	0.0	ST=RUN
00:01:00	100.0	20.0	12.2	12.6	12.8	0.5	100.0	20.0	80.0	24.3	0.0	0.0	0.0	ST=RUN
00:01:30	150.0	30.0	11.8	12.2	12.3	0.3	100.0	20.0	80.0	24.3	0.0	0.0	0.0	ST=RUN AL=CV
00:02:00	200.0	40.0	11.9	12.2	12.4	0.3	100.0	20.0	80.0	24.3	0.0	0.0	0.0	ST=STOP AL=FQ
00:02:30	200.0	40.0	0.0	0.0	0.0	0.0	100.0	0.0	100.0	24.3	0.0	0.0	0.0	ST=EXIT

07/22/06; 11:30 PURE 2.70; Constant Pressure; P-Source: P1 11.0; RF: 1; CW;
 Units=psi; Tubing=16; Alarms: CV=2;RT=2;LP=2;LF=3;FQ=3; Limits: CV= 134.0;
 RT=01:00; LP= 2.0; LF=30.0; FQ=60.0

MT:	CV:	FQ:	P1:	P2:	P3:	TM:	FF:	FP:	FR:	T:	A1	A2	A3	ST:
11:30:00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.0	0.0	0.0	0.0	ST=START
11:30:30	45.3	15.0	11.1	11.4	11.4	0.2	91.1	29.5	61.6	24.0	0.0	0.0	0.0	ST=RUN
11:31:00	90.0	30.0	11.4	11.8	12.0	0.4	87.4	30.0	57.4	24.0	0.0	0.0	0.0	ST=RUN
11:31:30	134.4	45.0	10.9	11.1	11.2	0.1	89.4	30.0	59.4	24.0	0.0	0.0	0.0	ST=RUN AL=CV
11:32:00	163.5	60.0	11.0	11.5	11.6	0.3	93.5	30.0	63.5	24.0	0.0	0.0	0.0	ST=STOP AL=FQ
11:32:30	163.5	60.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.0	0.0	0.0	0.0	ST=EXIT

Immediate Data Printout occurs when “START” or “STOP” keys are pressed or when and alarm is triggered. All other data are printed out at a user-defined interval, from 10 seconds to 30 minutes. Printout of Relative Time (RT) or Military Time (MT) is chosen in **SETUP: Clock, Print Enable**. **Note:** The three (3) alarm levels are defined as follows: 1=Off, 2=Alarm Only, 3=Pump Stop

Abbreviations:

MT = Military Time, HH:MM:SS
RT = Run Time, 00:00:00 at START
FQ = Filtrate Weight collected
P1 = Feed Line Pressure, psi
P2 = Retentate Line Pressure, psi
P3 = Permeate Line Pressure, psi
TM = Calculated Trans-Membrane Pressure

AL = Alarm, e.g. AL: CV Cumul. Volume Alarm
HP=3, High Pressure Alarm is “PUMP STOP”
LP=1, Low Pressure Alarm is “OFF”
FQ=3, Filtrate Weight Alarm is “PUMP STOP”
T = Temperature, degrees Celsius
A2 = Analog 2 value (usually Temp)

FF = Flow Rate, Feed, ml/min
CV = Cumulative Feed Volume, ml
FP = Flow Rate, Permeate (“Flux”), gr/min
FR = Re-circulation Rate; FR = FF - FP
CW = Clockwise Pump Direction
CCW =Counter Clockwise Pump Direction
ST = Pump Status, START, RUN, PAUSE, EXIT
CV=1, Cumulative Volume Alarm is “OFF”
RT=2, Run Time Alarm is “ALERT ONLY”
LF=2, Low Flow Alarm is “ALERT ONLY”
RF = Response Factor
A1 = Analog 1 value (usually Conductivity)
A3 = Analog 3 value (usually Temp)

4.5 Setup: Pressure Sensor: Span

The PureTec has built in calibration curves for the disposable pressure sensors that are inherently very accurate for the installed default range of 0 – 60 psi, and there should be no need for you to change it. If your metrology department insists that they calibrate them periodically, the procedure for the 3-sensor interface follows. If you have a 1-sensor interface, a large gray plastic connector plugged into the 37-pin I/O port, please contact SciLog, and we will provide the procedure for calibrating that interface, as it is drastically different.

To calibrate the 3-sensor interface:

1. Obtain an accurately regulated source of compressed gas (i.e. air, nitrogen). This source must be NIST traceable.
2. Go to Mode Select: Pressure Sensor, then to Pressure: Range, and note the range specified, change if desired. (Default is 60 psi, do not reduce below 30 or increase above 100.)
3. Press Exit and scroll to Pressure: Zero.
4. Choose P1.
5. With no pressure on the sensor, press Zero (“A” button).
6. Connect regulated pressure source to P1, and increase to match range noted in step 2.
7. Press Span (“B” button).
8. Turn off pressure source, Press exit
9. Repeat steps 5 – 8, choosing P2 and then P3.
10. You have now recalibrated (spanned) all 3 sensors. It is still advisable to zero each sensor again with no pressure in the system, prior to running your tests via the Edit: Press. Sensor menu in the operating mode of choice.

5.0 Manual:

Summary: In the Manual Mode the PureTec 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 motor speed.

Note: The **RATE** and **PRESSURE** parameters, including the alarms, cannot be accessed in the **Manual Mode**.

When in **RATE** or **PRESSURE** operational modes, the pump speed and/or pressure can be adjusted in terms of ml/min while the pump is running. Just press the “RATE” key, make the appropriate adjustment, and press “SELECT”.

6.0 Data Collection

Summary: The PureTec has two (2) serial ports. The **serial port 1** (male DB9), which is labeled “Balance,” is used for interfacing with an electronic balance.

The PureTec **serial port 2** (female DB9) is labeled “Printer”. The serial port 2 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 RATE or PRESSURE modes (see 4.3, Printout 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 6.1 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 PureTec and the PC must use the same communications protocol. Make sure that the communication parameters in Setup: Printer are the same as those listed in Section 6.1 mentioned above.

Alternatively, Scilog has available a software package, **SciDoc**, that includes data retrieval software and a customized Excel spreadsheet that is automatically populated when either of the modes is executed. It also several charts that automatically are populated as the data is generated. See Section 6.2 below.

6.1 PC HyperTerminal Settings:

PureTec 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 process data to be "dumped" into your PC for archiving. The list of settings below must match those in Setup:Printer of the PureTec, and Print Delay should be set to "0".

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. PureTec. 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:	2
Flow Control:	None

Press "**Ok**"

4. Go to "**File**" and open "**Properties**", from the "**PureTec 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:	No Selection
Echo Typed Characters Locally:	Select
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 "PureTec Setup" screen.

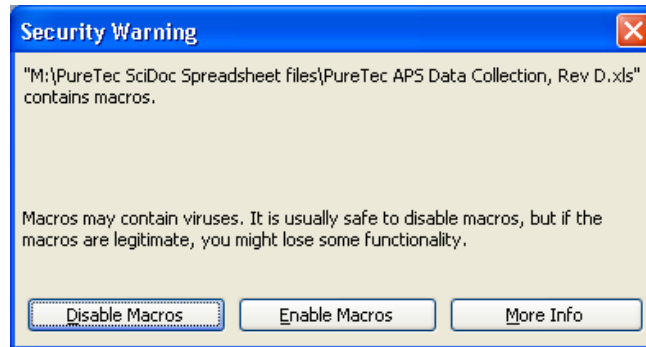
Press "**Ok**" at the bottom of the "PureTec Property – Setting" screen

6.2 PureTec SciDoc Data Collection Software:

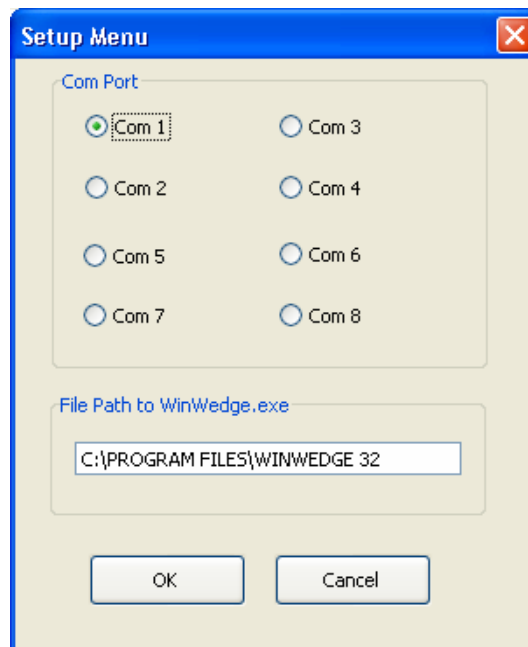
Scilog has available a software package that captures the data output of the PureTec and places it in an Excel spreadsheet. This spreadsheet also performs some basic calculations and populates several graphs to aid you in the analysis of your process. It consists of a copy of WinWedge32 from TalTech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

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, and you will have the following screen:



Press "Enable Macros" to begin the process for data collection. If you are opening a previously saved data set, choose "Disable Macros" instead. The following screen will be displayed:



Choose the Com Port you have the PureTec 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,



and leaving you with the next screen:

A screenshot of a dialog box titled 'UserForm1'. It contains a table with the following fields and values:

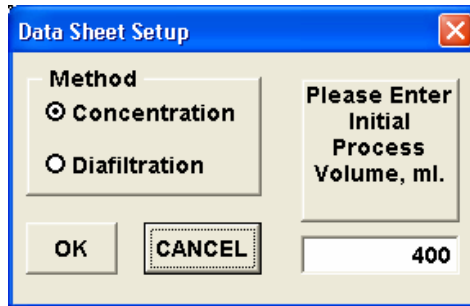
Operator	
Date	
Time	
Product Batch Number	
Product Description	
Conditions	
Membrane Manufacturer	
Membrane Type	
Membrane Lot Number	
Membrane Serial Number	
Membrane Pore Size	
Membrane Surface Area, Square Meters	0.005

At the bottom of the dialog box are two buttons: 'OK' and 'Cancel'.

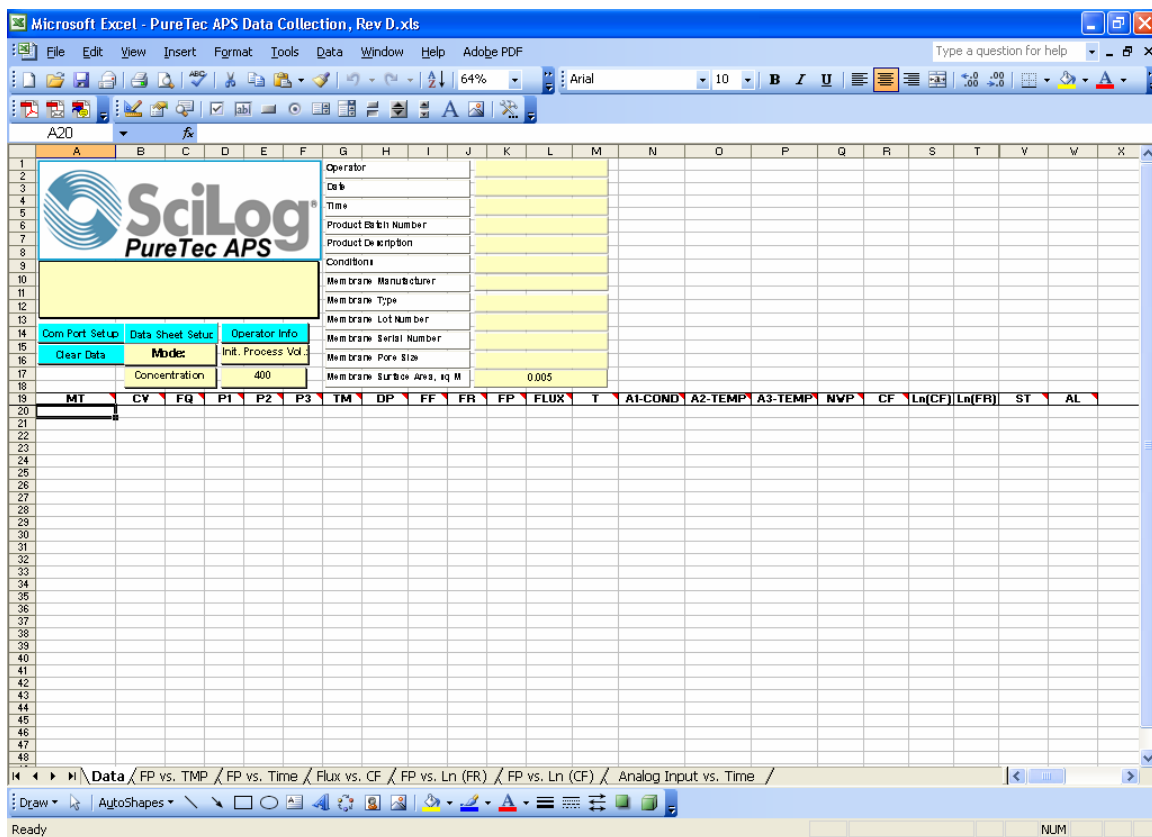
If you chose cancel on the Setup dialog box, WinWedge32 won't be in the system tray, and you won't get this dialog box. When you are ready, you will need to click on the "Setup" button and then the "Operator Info" button to complete these tasks in order for data collection to be possible.

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.

The next screen will prompt you for a choice between Concentration and Diafiltration, as well as the Initial Process Volume, used in Concentration Factor and Volume Exchange calculations.



Clicking on “OK” leaves you with the screen on the next page, ready to get started collecting data from the PureTec.



Decide whether you are performing a Diafiltration or Concentration, and click on the appropriate button. **If concentrating a solution, be sure to enter the Initial Process Volume where indicated, or the Concentration Factor will not be accurately calculated for you.** A default value of 400 ml is entered in this box automatically.

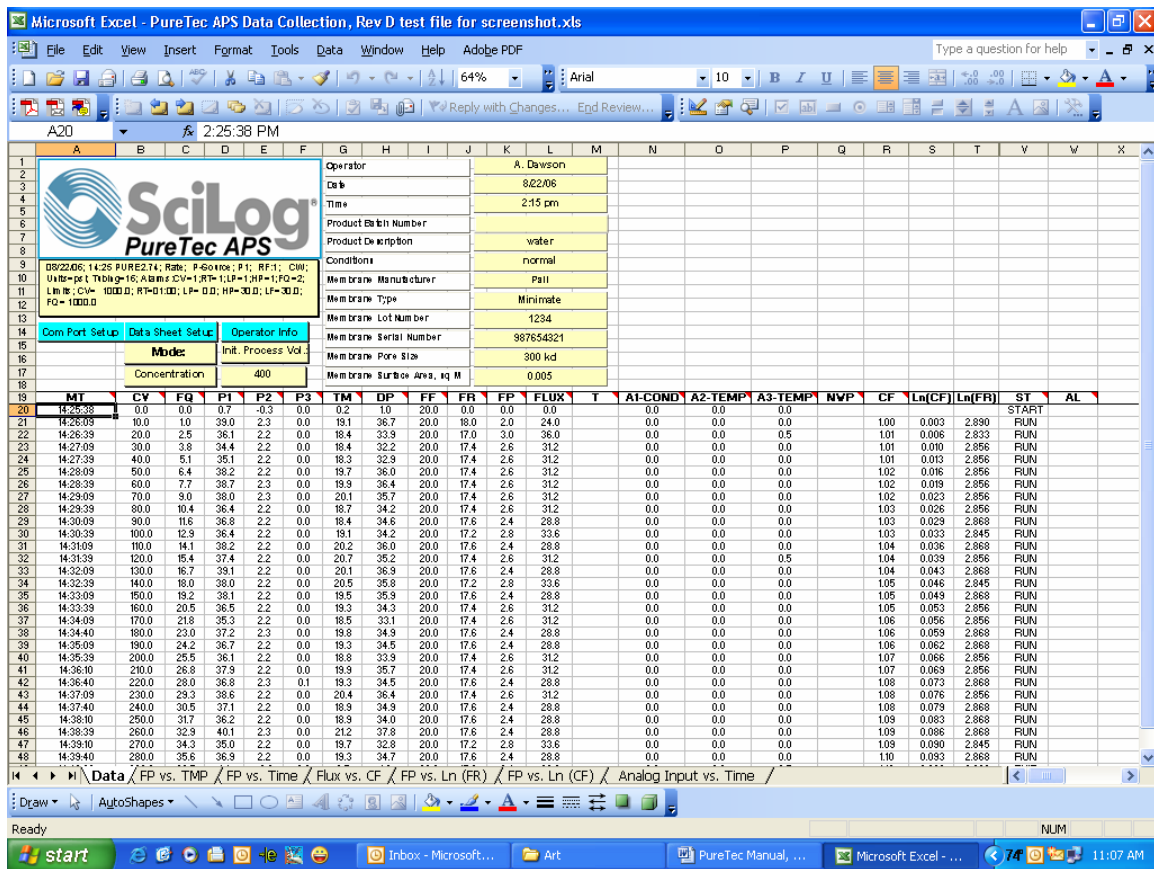
When ready, press Exec on the PureTec, and then RUN after the balance has initialized. The data generated will automatically be placed in the cells of the spreadsheet, and the charts populated with the same data. The text box in the upper right of the spreadsheet contains the header information that is generated by the PureTec. This will list the Operational Mode, the date and time, all operating parameters, alarm settings and alarm limits.

The following charts have been included for your use, and you may view them by clicking on the appropriate tab at the bottom of the worksheet:

- Permeate Flow Rate (FP) vs. Trans-Membrane Pressure (TMP)
- Permeate Flow Rate (FP) vs. Time
- Flux (FX) vs. Concentration Factor (CF)
- Permeate Flow Rate (FP) vs. Ln {Retentate Flow Rate (FR)}
- Permeate Flow Rate (FP) vs. Ln {Concentration Factor (CF)}

You may, of course, create your own charts or modify those included by adding trend lines, changing titles, etc. While the Data worksheet cells are protected, the charts are not with this purpose in mind.

When you are finished with a run, your screen will look similar to this one:



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** and **RUN** keys on the PureTec front panel to interrupt the filtration process. This will only cause minor changes in the data and charts. They show up in the data set by displaying the word PAUSE 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. 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 PureTec allows you to change the Rate or Pressure on the fly by pressing the RATE key on the front panel. This is a very useful tool in determining the optimum parameters for your process. When you press the RATE key, the PureTec will stop sending data to the worksheet until approx 15 seconds after you have pressed the “Select” button on the front panel to finalize your choice. As your process is continuing while you do this, the data will reflect the change.

Appendix A: Application Examples

PureTec Application Example: Concentration of Protein Solution

Equipment used:

PureTec CP200 w/ Tandem 1082 peristaltic head.
#15 Pharmed and #16 Tygon tubing.
Pall Centramate Omega 10K filter Cartridge, 0.2 Meter² Area

Hardware Setup:

Using #15 Pharmed tubing, connect from the outlet of the Solution Reservoir thru the Tandem 1082 head and to the Tee that connects to the inlet port of the Centramate and pressure sensor P1. Connect from the Tee on the retentate port and sensor P2 to the retentate return port of the reservoir using this same tubing. (Both of the reservoir's ports should be equipped with valves.) Place the pinch clamp provided with the PureTec on this piece of tubing, but do not tighten yet. Place a valve on the Tee that connects the filtrate (permeate) port of the Centramate and sensor P3. Connect #16 Tygon tubing (or Pharmed if you prefer) to this valve and place it in or above the filtrate collection vessel on the balance.

Procedure:

1. Close the valve on the filtrate line at P3, and the air vent and exchange buffer ports on the solution reservoir.
2. Open the valves on the solution outlet and retentate return lines on the solution reservoir.
3. If using the Documentation software, place your initial process volume in the appropriate box on the form.
4. On the PureTec, enter the Constant Rate mode. Edit the parameters as follows: Tubing: #15, Pump rate 140 ml/min, Alarm Enable and Limits as desired. (Suggested: Run Time: OFF, Cumulative Volume: OFF, Hi-Pressure: Pump Stop, 30 psi limit, Lo-Pressure: Pump Stop or Beep Only, 5 psi limit.)
5. Keeping the filtrate valve closed, press Exec and then the Run button on the PureTec. The system will initialize and tare the balance, and begin running at the selected rate.
6. Check all connections at this time for leaks.
7. The pressure at P1 at this time should be about 15 psi. Adjust the pinch clamp on the retentate tubing to provide backpressure of approx. 4 psi at P2.
8. At this time, open the filtrate port valve and the air vent valve. Make any adjustments needed to the pinch clamp to maintain the 4 psi setting. This should yield a Trans-membrane pressure of approx. 9.5 psi with P3 remaining around 0 psi.
9. Continue recirculating solution until the desired concentration level has been achieved. This may be automated by setting the Filtrate Weight Alarm to an appropriate value, i.e. given a 400 ml initial volume, 10x concentration, set the Filtrate Weight Alarm Limit to 360 gm, Filtrate Weight Alarm Enable to Pump Stop, and system will stop with 40 ml of solution remaining in the reservoir.

PureTec Application Example: Diafiltration of a Concentrated Protein Solution

Equipment used:

PureTec CP120 w/ Tandem 1081 peristaltic head.
#16 Pharmmed and #16 Tygon tubing.
Millipore PelliconXL Filter Cartridge, 0.05 Meter². Area

Hardware Setup:

Using #16 Pharmmed tubing, connect from the outlet of the Solution Reservoir thru the Tandem 1081 head and to the Tee that connects to the inlet port of the Pellicon and pressure sensor P1. Connect from the Tee on the retentate port and sensor P2 to the retentate return port of the reservoir using this same tubing. (Both of the reservoir's ports should be equipped with valves.) Place the pinch clamp provided with the PureTec on this piece of tubing, but do not tighten yet. Place a valve on the Tee that connects the filtrate (permeate) port of the Pellicon and sensor P3. Connect #16 Tygon tubing (or Pharmmed if you prefer) to this valve and place it in or above the filtrate collection vessel on the balance. Connect another piece of #16 Tygon to the exchange buffer port and it's valve on the top of the reservoir.

Procedure:

1. Close the valve on the filtrate line at P3, and the air vent and exchange buffer ports on the solution reservoir.
2. Open the valves on the solution outlet and retentate return lines on the solution reservoir.
3. On the PureTec, enter the Constant Rate mode. Edit the parameters as follows: Tubing: #16, Pump rate 35 ml/min, Alarm Enable and Limits as desired. (Suggested: Run Time: OFF, Cumulative Volume: OFF, Hi-Pressure: Pump Stop, 30 psi limit, Lo-Pressure: Pump Stop or Beep Only, 5 psi limit.)
4. Keeping the filtrate valve closed, press Exec and then the Run button on the PureTec. The system will initialize and tare the balance, and begin running at the selected rate.
5. Check all connections at this time for leaks.
6. The pressure at P1 at this time should be about 15 psi. Adjust the pinch clamp on the retentate tubing to provide backpressure of approx. 4-5 psi at P2.
7. At this time, open the filtrate port valve and the exchange buffer valve, making sure to keep the air vent valve closed. Make any adjustments needed to the pinch clamp to maintain the 4-5 psi setting. This should yield a Trans-membrane pressure of approx. 9-10 psi with P3 remaining around 0 psi.
8. Continue processing solution until the desired concentration level has been achieved. This may be automated by setting the Filtrate Weight Alarm to an appropriate value, i.e. given a 40 ml initial volume, 10x diafiltration, set the Filtrate Weight Alarm Limit to 400 gm, Filtrate Weight Alarm Enable to Pump Stop, and system will stop when 400 gm of filtrate has been collected.

PureTec Settings & Parameters Worksheet

Settings for the previous two examples:

Concentration

Filter Cartridge	Centramate Omega 10K
Filter Area, sq M	0.2
Initial Volume	400 ml
Concentration Factor	10x
Desired Final Volume	40
Flow Rate (700 ml/min/ sq meter, approx.)	140 ml/min

Diafiltration

Filter Cartridge	
Filter Area, sq M	
Initial Volume	
Diafilt. Volumes	
Total Wash Volume	
Flow Rate (700 ml/min/ sq meter, approx.)	

Constant Rate Mode

Pump Tubing	15	
Pump Rate	140 ml/min	
Alarm Enable / Limits	Enable	Limit
Cumulative Volume	Off	1000
Filtrate Weight	Pump Stop	360
Run Time	Off	1:00
Hi Pressure	Pump Stop	30
Low Pressure	Pump Stop	5

Constant Pressure Mode

Pump Tubing		
Pump Pressure		
Response Factor		
Alarm Enable / Limits	Enable	Limit
Cumulative Volume		
Filtrate Weight		
Run Time		
Low Flow		
Low Pressure		

Concentration

Filter Cartridge	
Filter Area, sq M	
Initial Volume	
Concentration Factor	
Desired Final Volume	
Flow Rate (700 ml/min/ sq meter, approx.)	

Diafiltration

Filter Cartridge	MP Pellicon XL
Filter Area, sq M	0.05
Initial Volume	40ml
Diafilt. Volumes	10
Total Wash Volume	400 ml
Flow Rate (700 ml/min/ sq meter, approx.)	35 ml/min

Constant Rate Mode

Pump Tubing	16	
Pump Rate	35 ml/min	
Alarm Enable / Limits	Enable	Limit
Cumulative Volume	Off	1000
Filtrate Weight	Pump Stop	400
Run Time	Off	1:00
Hi Pressure	Pump Stop	30
Low Pressure	Pump Stop	5

Constant Pressure Mode

Pump Tubing		
Pump Pressure		
Response Factor		
Alarm Enable / Limits	Enable	Limit
Cumulative Volume		
Filtrate Weight		
Run Time		
Low Flow		

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PureTec Settings & Parameters Worksheet

Concentration

Filter Cartridge	
Filter Area, sq M	
Initial Volume	
Concentration Factor	
Desired Final Volume	
Flow Rate (700 ml/min/ sq meter, approx.)	

Diafiltration

Filter Cartridge	
Filter Area, sq M	
Initial Volume	
Diafilt. Volumes	
Total Wash Volume	
Flow Rate (700 ml/min/ sq meter, approx.)	

Constant Rate Mode

Pump Tubing		
Pump Rate		
Alarm Enable / Limits	Enable	Limit
Cumulative Volume		
Filtrate Weight		
Run Time		
Hi Pressure		
Low Pressure		

Constant Pressure Mode

Pump Tubing		
Pump Pressure		
Response Factor		
Alarm Enable / Limits	Enable	Limit
Cumulative Volume		
Filtrate Weight		
Run Time		
Low Flow		
Low Pressure		

Concentration

Filter Cartridge	
Filter Area, sq M	
Initial Volume	
Concentration Factor	
Desired Final Volume	
Flow Rate (700 ml/min/ sq meter, approx.)	

Diafiltration

Filter Cartridge	
Filter Area, sq M	
Initial Volume	
Diafilt. Volumes	
Total Wash Volume	
Flow Rate (700 ml/min/ sq meter, approx.)	

Constant Rate Mode

Pump Tubing		
Pump Rate		
Alarm Enable / Limits	Enable	Limit
Cumulative Volume		
Filtrate Weight		
Run Time		
Hi Pressure		
Low Pressure		

Constant Pressure Mode

Pump Tubing		
Pump Pressure		
Response Factor		
Alarm Enable / Limits	Enable	Limit
Cumulative Volume		
Filtrate Weight		
Run Time		
Low Flow		
Low Pressure		

