

SciPres™ Pressure Monitor & Sensor

Operations Manual

Pressure Monitoring with Disposable Sensors



SciPres™ Pressure Sensor Applications:

Tangential Flow Filtration (TFF)
Cross Flow Filtration
Preparative Chromatography
Dead-End Filtration
Single-Use Bag Manifold
In-line Process Monitoring
Metering / Dispensing

Rev E1, 07/09, Firmware Rev0.51, P/N 300-034

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

1. WARRANTY AND RETURNS POLICY:

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

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

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

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

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

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

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

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

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

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

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

2. INTELLECTUAL PROPERTY

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

3. DISCLAIMER OF DAMAGES

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

4. LIMITATION OF LIABILITY

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

5. NO RESPONSIBILITY FOR GRATUITOUS INFORMATION OR ASSISTANCE

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

6. INTERNATIONAL SALES EXPORT

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

7. REVISIONS TO THIS POLICY

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



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

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



Precautions:

READ this manual **BEFORE** operating or servicing this equipment.

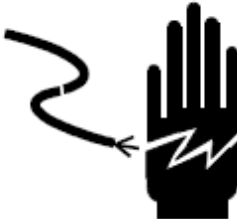

	 WARNING
	DISCONNECT ALL POWER TO THIS UNIT BEFORE INSTALLING, SERVICING, CLEANING, OR REMOVING THE FUSE. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

FOLLOW these instructions carefully.



	 CAUTION
	OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.


SAVE this manual for future reference.

DO NOT allow untrained personnel to operate, clean, inspect, service or tamper with this equipment.

	 WARNING
	ONLY PERMIT QUALIFIED PERSONNEL TO SERVICE THIS EQUIPMENT. EXERCISE CARE WHEN MAKING CHECKS, TESTS AND ADJUSTMENTS THAT MUST BE MADE WITH POWER ON. FAILING TO OBSERVE THESE PRECAUTIONS CAN RESULT IN BODILY HARM.

ALWAYS DISCONNECT this equipment from the power source before cleaning or performing maintenance.

	 WARNING
	FOR CONTINUED PROTECTION AGAINST SHOCK HAZARD, CONNECT TO PROPERLY GROUNDED OUTLET ONLY. DO NOT REMOVE THE GROUND PRONG.

	CAUTION
	Use only Class 2 listed AC/DC power supplies with this device. SciLog # 070-017 (US) (CUI #EPS120050-P5P), # 070-017E (Europe) (CUI #EMS120050-P5P-SZ), Or their equivalents are recommended.

CALL SCILOG for parts, information and service.

PRÉCAUTIONS:

LISEZ ce manuel AVANT de faire fonctionner ou d'entretenir cet équipement.

SUIVEZ attentivement ces instructions.

CONSERVEZ ce manuel pour future référence.

NE LAISSEZ PAS du personnel non qualifié utiliser, nettoyer, inspecter, entretenir, réparer ou manipuler cet équipement.

DÉBRANCHEZ TOUJOURS cet équipement de la source de courant avant de nettoyer ou d'exécuter l'entretien.

APPELEZ SCIOLOG pour pièces détachées, renseignements et entretien.

	 ATTENTION
	DÉBRANCHEZ TOUT COURANT DE CETTE UNITÉ AVANT DE FAIRE L'INSTALLATION, D'EFFECTUER L'ENTRETIEN, LE NETTOYAGE OU AVANT DE RETIRER LE FUSIBLE. NE PAS OBSERVER CES PRÉCAUTIONS RISQUERAIT DE CAUSER DES BLESSURES CORPORELLES OU/ET D'ENDOMMAGER L'ÉQUIPEMENT.

	 PRUDENCE
	SOYEZ PRUDENT LORSQUE VOUS MANIPULEZ DES APPAREILS SENSIBLES À L'ÉLECTROSTATIQUE.

	 ATTENTION
	AUTORISEZ SEULEMENT LE PERSONNEL QUALIFIÉ À ENTRETIENIR CET ÉQUIPEMENT. SOYEZ PRUDENT LORSQUE DES VÉRIFICATIONS, TESTS ET AJUSTEMENTS DOIVENT ÊTRE EFFECTUÉS SOUS TENSION. NE PAS OBSERVER CES PRÉCAUTIONS RISQUERAIT DE CAUSER DES BLESSURES CORPORELLES.

	 ATTENTION
	POUR ASSURER UNE PROTECTION CONTINUE CONTRE UNE DÉCHARGE ÉLECTRIQUE, BRANCHEZ UNIQUEMENT SUR UNE PRISE CORRECTEMENT RELIÉE À LA TERRE. NE RETIREZ PAS LA FICHE DE TERRE.


	PRUDENCE
	Utilisez la classe 2 énumérés AC / DC avec cet appareil. SciLog # 070-017 (US) (CUI #EPS120050-P5P), # 070-017E (Europe) (CUI #EMS120050-P5P-SZ), Ou leurs équivalents sont recommandés.

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Calibration:

The SciPres Monitor is a calibrated device, and is calibrated with test equipment that is traceable to NIST.

A Calibration Certificate is included with each unit, and has a one year expiration date.

It is highly recommended that the monitor be calibrated on an annual basis or more often if your Metrology Department deems it necessary.

SciLog provides this Calibration Service, complete with a new certificate, showing the “as found” and “as left” data.

Contact your SciLog Sales Representative or SciLog Technical Customer Service to make arrangements at 800-955-1993.

Standards:

The SciPres™ Pressure Monitor & Sensors conform to the following standards:



EN 61326-1:2006, Class B
EN 6100-3-2:2006
EN 6100-3-3:1995 +A1:2001 +A2:2006
EN 61010-1 Issued: 2001/03/01
UL 61010-1 Issued: 2004/07/12 Ed.2
CAN/CSA-C22.2 No 61010-1 Ed.2



Installation & Start-Up

Installation of the SciPres™ Pressure Monitor 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 SciPres™ Pressure Sensor are observed. See “SciPres™ Pressure Sensor Specifications”.

The protection provided by this equipment may be impaired if the SciPres™ Pressure Sensor is used in a manner inconsistent with this manual or for purposes not specified by the manufacturer.

Maintenance & Cleaning:



The SciPres™ Pressure Monitor is maintenance free. The disposable sensors come pre-calibrated from the factory and require no maintenance.

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



The disposable sensors may be sanitized with 0.1 Molar NaOH, or 2-propanol. They may be autoclaved, and newer units with the grey rings around the cable connector may be gamma irradiated.

Introduction:

You will find the SciPres™ Pressure Sensor System easy to use. The state-of-the-art hardware and software design of the SciPres™ Pressure Sensor and Monitor combination allows you to measure and document the pressure of many filtration / separation processes. With proper maintenance, the SciPres™ Pressure Monitor will provide many years of excellent service and performance.



Please read the following instructions carefully!

Inspections: Unpack the SciPres 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 SciPres is not used immediately. Many carriers must receive damage claims within seven days 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.

Repair Procedure: Before returning any SciLog equipment for repair or service, contact SciLog to obtain an 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

SciPres™ Pressure Sensor System Specifications:

Monitor:

Mechanical:

- **Dimensions:** Width: 6.0 in (15.2 cm); Height: 2.75 in (7.0 cm); Depth: 5.5 in (14.0 cm)
- **Weight:** 1.5 lbs (0.69kg)
- **Enclosure:** Molded plastic / Aluminum

Electrical:

- **Power:** 110-120 or 220-240 VAC, 60/50Hz AC Adaptor; 12 VDC, 500 ma Output, Center positive. Use only Class 2 listed AC/DC power supplies.
- **Operational Range:** 0 to 60° C, 100% Humidity.
- **Sensor:** Choice of five sensor sizes: Luer, 3/8" Hose barb, 1/2" Hose barb, 3/4" TriClover (TC) sanitary, and 1" TC ("Ladish") Sanitary.
- **I/O Ports:**
 1. **"P1, P2 and P3"**, Female Switchcraft 9 pin twist-lock, connectors for sensor cables.

NOTE: Please use care connecting the Monitor end of the sensor cable to these ports as the male cable end can be damaged if mishandled.



2. **"Output"**, Female DB25, four TTL outputs for alarms, four 4-20 ma Analog output signals, 18 bit resolution.
 3. **"Printer/PC"**, Female DB9, RS-232 output for serial printer or PC.
 4. **"Serial I/O"**, Female DB9, (Disabled, reserved for future use)
 5. **"RS-485"**, 3 wire terminal block. RS-485 output. (Disabled. Future versions will permit RS-485 Connectivity.)
 6. **"12VDC 500ma"**, DC Input for AC adaptor.
- **Display:** Two line LCD, 20 characters each, back-lit.
 - **Data Entry:** Membrane keyboard with auditory feedback.

Software

- **Two operational modes:**
- **Pressure Mode:** Captures stored calibration data from the sensors, digital display of up to three pressure sensor values and either Differential or Trans Membrane pressure, with four user-definable alarms.
- **Custom Calibration Mode:** Used to perform custom calibrations, selecting User-defined Zero and Calibration Pressure.

Sensors:

- **Power:** 5 VDC provided by SciPres™ Pressure Monitor.
- **Fluid Connections:** Available with Luer, 3/8" Hose barb, 1/2" Hose barb, 3/4" TC, and 1" TC.
- **Wetted Materials:** Polysulfone or Polypropylene, meets USP Class VI and FDA 21 CFR 177.1520, all wetted materials made with animal free compounds.
- **Sensor Type:** Medical grade, Silicone Piezoresistive sensing element with on-chip temperature compensation.
- **Sensor Isolation:** Insoluble silicone dielectric gel isolates sensing element from process solution. The gel is a non-toxic, non-allergenic elastomeric system that meets all USP XX Biological Class V requirements.
- **Pressure Range:** 0-60 psi.
- **Accuracy:** +/- 0.30 psi @ 60 psi. (can be improved with 3 point (0, 6, 54) calibration, Contact SciLog)
- **Resolution:** 0.01 psi **Temperature Range:** 0 - 60° Celsius
- **Sensor Microchip:** EPROM, stored Sensor ID, and Cal Factor.
- **Sensor Connector & Cables:** Lockable and waterproof.

SciDoc Documentation Software for PC

SciPres™ Pressure Sensor System Documentation Software Package

- Excel spreadsheet with custom macros for data compilation. Includes Winwedge interface software. Sent ready to use.
- Complete process analysis with graphing of data.
- Real-time verification and documentation of process parameters.
- Includes graph of: Pressure vs. Time.

Spreadsheet example:

The screenshot shows the Microsoft Excel interface for 'SciPres Data Collection, Rev C_111908AD.xls'. The spreadsheet contains a data table with columns for Time, P1, P2, P3, TMDP, and Alarm. A 'Notes' section is visible on the right side of the spreadsheet, containing instructions for entering notes about the run.

Time	P1	P2	P3	TMDP	Alarm
12:09:34	0.03	0.00	0.02	-0.01	
12:09:42	0.03	0.01	0.02	0.00	
12:09:47	0.03	0.01	0.02	0.00	
12:09:52	0.03	0.01	0.02	0.00	
12:09:57	0.03	0.01	0.02	0.00	
12:10:02	0.03	0.01	0.02	0.00	
12:10:07	0.03	0.01	0.02	0.00	
12:10:12	0.03	0.01	0.02	0.00	
12:10:17	0.03	0.01	0.02	0.00	
12:10:22	0.03	0.01	0.02	0.00	
12:10:27	0.02	0.01	0.02	0.00	
12:10:32	0.03	0.02	0.02	0.00	
12:10:37	0.03	0.00	0.02	-0.01	
12:10:42	0.02	0.01	0.02	0.00	
12:10:47	0.02	0.01	0.02	0.00	
12:10:52	0.03	0.01	0.02	0.00	
12:10:57	0.03	0.01	0.02	0.00	
12:11:02	0.03	0.01	0.02	0.00	
12:11:07	0.03	0.01	0.02	0.00	
12:11:12	0.03	0.01	0.02	0.00	
12:11:17	0.03	0.01	0.02	0.00	
12:11:22	0.03	0.01	0.02	0.00	
12:11:27	0.03	0.01	0.02	0.00	
12:11:32	0.03	0.01	0.02	0.00	
12:11:37	0.03	0.01	0.02	0.00	
12:11:42	0.03	0.01	0.02	0.00	
12:11:47	0.03	0.01	0.02	0.00	
12:11:52	0.03	0.01	0.02	0.00	
12:11:57	0.03	0.01	0.02	0.00	

Notes:
 Enter your notes about the run here.
 Text will wrap, or you can create a new paragraph with the Enter key.

Part A: SciPres™ Pressure Sensor Hardware

1.0 Overview:

The SciPres™ Pressure Sensor System consists of two major components, the SciPres™ Pressure Monitor, with its power supply, and the Disposable SciPres™ Pressure Sensor flow cell, with its cable.

The Monitor is a small desktop package with a backlit display and seven buttons for easy interface and menu selections. It displays up to three measured pressures and one calculated pressure in real time in digital format. The monitor's output signals are in both analog and digital formats. It comes with a small 110 VAC wall adapter as a power supply.

The Monitor reads and utilizes calibration data from SciPres Sensors that have been calibrated to two points, 0 and 30 psi, or three points, 0, 54 and 6 psi depending upon the software version purchased. It has also been equipped with a Supervisor Password, a Max Pressure Watchdog, and a Noise Filter setting.

The Max Pressure Watchdog feature records in the sensor's memory the maximum pressure seen by the sensor while it is connected to the SciPres Monitor. This value is displayed for a few seconds along with the Sensor ID and Cal information when the Monitor is powered up and a sensor connected.



The maximum recommended pressure for the sensors is 60 psi. If this is exceeded, problems with leakage and functionality can occur.

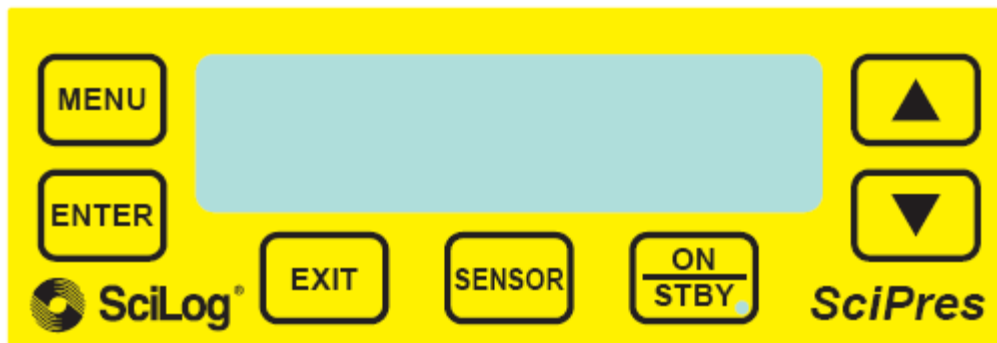
The Filter setting is used to average the pressure signals when peristaltic pump heads are used. This increases the sensor precision and accuracy, makes the display readings easier to interpret, and produces cleaner graphs that are easier to read. At the lowest setting, the data is "live", and at the highest, it is averaged over a 4 second period.

The disposable SciPres™ Pressure Sensor flow cells utilize a silicone peizo-resistive sensing element in a polysulfone flow cell available in five sizes: Luer, 3/8" or 1/2" hose barb, 3/4" and 1" "Ladish" Sanitary TC connections.

All are pre-calibrated at the factory, and retain the calibration data on a small chip embedded in the sensor body. The following information is retained and is accessed upon connection to the sensor:

- ID number (Contains Size, Lot number, Mfr Code, and Calibration date)
- Calibration Factors
- Calibration Points
- Pressure Zero Offset
- Max Pressure Value

2.0 Front Panel: Data Entry & Display



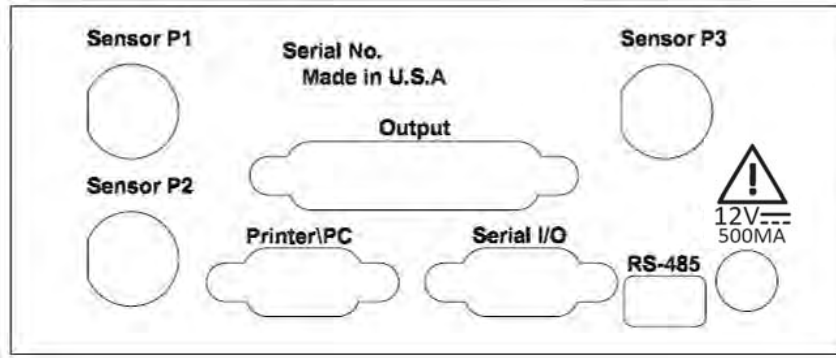
The front panel consists of a user interface, which includes an alphanumeric display and a membrane keypad to select operational modes and alarm settings. The display is a two line, 20 character, liquid crystal display (LCD). The display is backlit to allow easy viewing over a wide range of lighting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

The keypad consists of seven keys whose function does not change. These keys are used for basic control and programming of the SciPres™ Pressure Monitor. The basic key definitions are:

- MENU** Allows entry into the parameter settings menu.
- ENTER** Accepts the selected parameter setting.
- EXIT** Exits the menu, returning to the main operational screen.
- SENSOR** Recaptures the factory calibration settings stored on the sensor, and allows entry into the custom calibration menu. This allows the user to zero and/or custom calibrate the upper span value using equipment traceable to NIST.
- ON/STBY** Turns the monitor on and off.
- ▲ ▼** Up and Down arrows used to change parameters within the menus.

One LED is also on the front panel, on the ON/STBY key. This indicates the monitor is connected to power.

3.0 Back Panel: Interface Options



The SciPres™ Pressure Sensor back panel provides interfacing ports for:

- * **Disposable SciPres™ Pressure Sensor Sensors:** Female 9 pin twist-lock, labeled “Sensor P1, P2, and P3”.
- * **Analog and TTL Output:** Female DB25, labeled “Output”.
- * **RS-232 Data Output:** Female DB9, labeled “Printer/PC”.
- * **2nd RS-232:** Female DB9, labeled “Serial I/O”, (Disabled, reserved for future use.)
- * **RS-485:** 3 wire terminal block, labeled “RS-485”, (Disabled. Future versions will permit RS-485 connectivity.)
- * **Input power:** Round male connector for AC Adapter, labeled “12 VDC/500 mA”.

3.1 Sensor Ports: The disposable pressure sensors are connected to these three using the included cables.



NOTE: Please use care connecting the Monitor end of the cable to these ports as the male cable end can be damaged if mishandled.

3.2 Output Port: Provides four 4-20 mA analog outputs (18 bit resolution) and TTL outputs for the 4 alarms, Hi/Low for each pressure channel. TTL outputs provide a 0 / 5 VDC control signal, carry minimal current. (See Pin out on next page.)

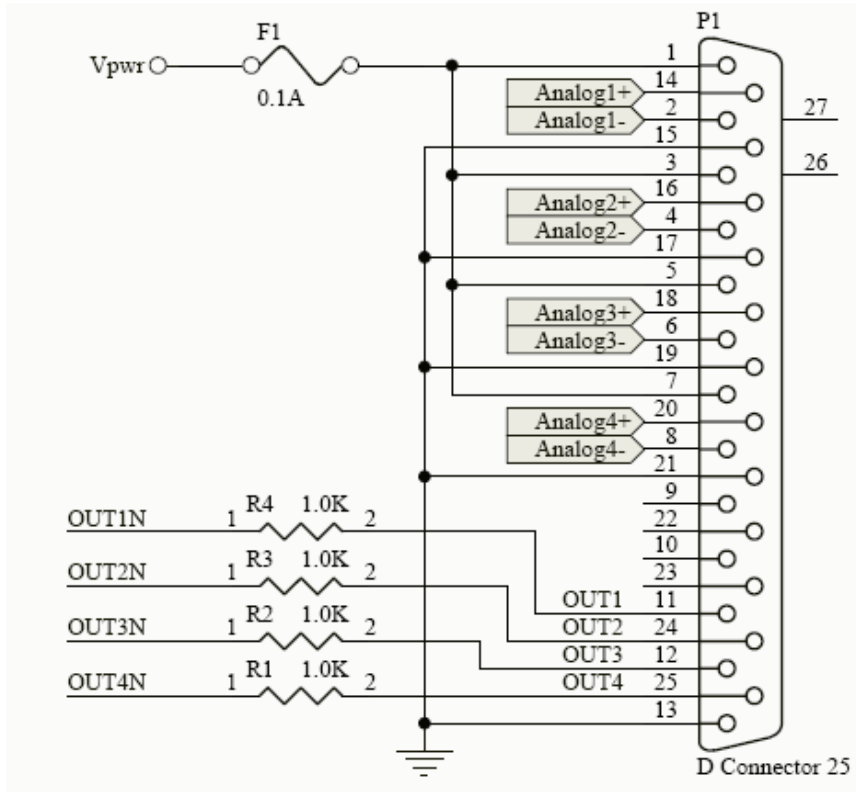
3.3 Printer/PC Port: To connect the SciPres™ Pressure Monitor to your PC for data archival. Alternatively, you may connect to a serial printer via this port.

3.4 Serial I/O Port: RS-232 – Disabled, reserved for future use.

3.5 RS-485 Port: Disabled. Future Versions will enable connectivity via RS-485.

3.6 Power Input Jack: Connect the AC adapter here.

Pin Out of the DB25 female “Output” connector:



Analog Outputs are from an 18 bit resolution A/D converter:

For 4-20 ma output of Pressure at P1 (Analog 1), use pins 2 (4-20 -) and 14 (4-20 +). If excitation is needed in the loop, connect pin 1 (Vpwr) to pin 14 (4-20 +), and connect the output cable to pin 2 (4-20 -) and pin 15 (Gnd).

For 4-20 ma output of Pressure at P2 (Analog 2), use pins 4 (4-20 -) and 16 (4-20 +). If excitation is needed in the loop, connect pin 3 (Vpwr) to pin 16 (4-20 +), and connect the output cable to pin 4 (4-20 -) and pin 17 (Gnd).

For 4-20 ma output of Pressure at P3 (Analog 3), use pins 6 (4-20 -) and 18 (4-20 +). If excitation is needed in the loop, connect pin 5 (Vpwr) to pin 18 (4-20 +), and connect the output cable to pin 6 (4-20 -) and pin 19 (Gnd).

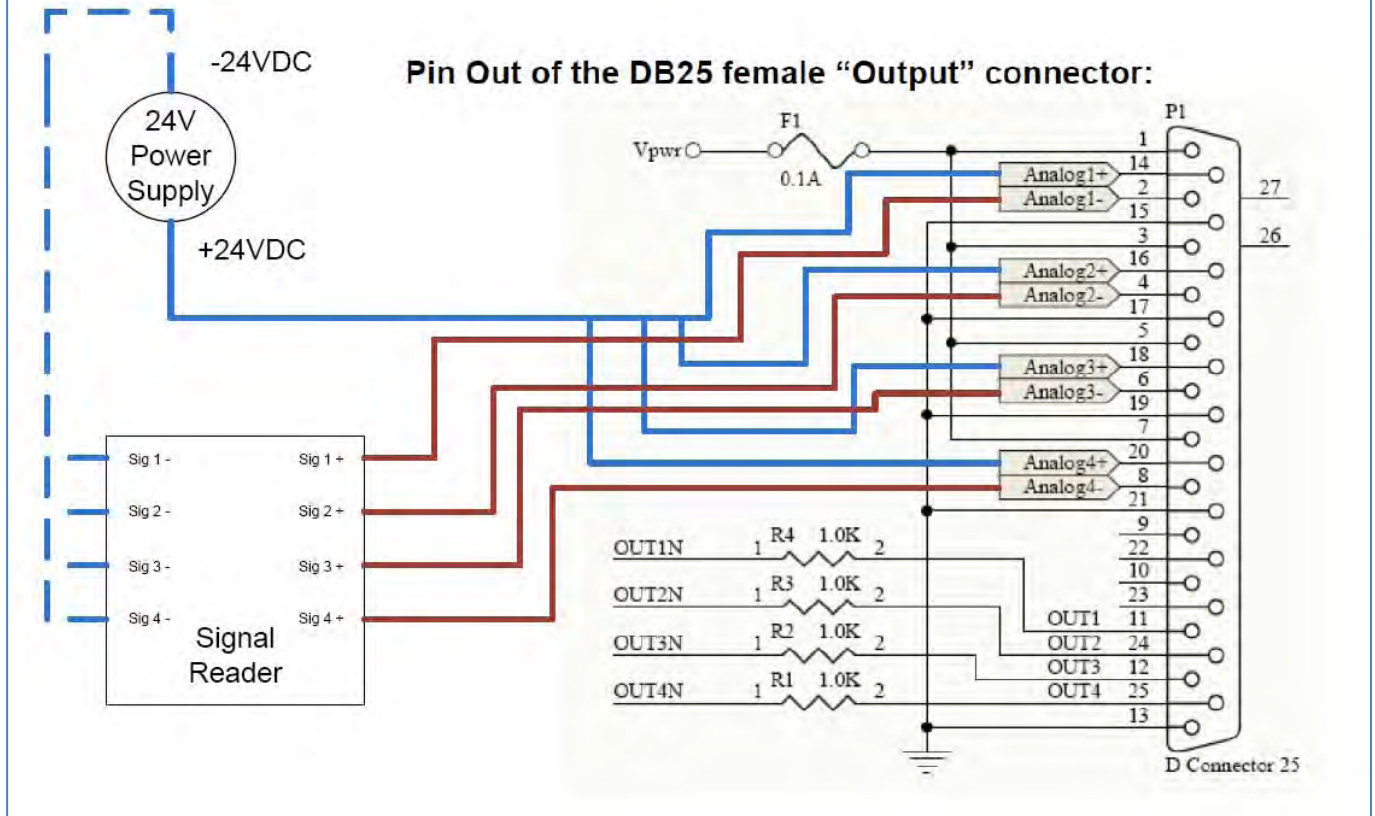
For 4-20 ma output of Pressure at TM or DP (Analog 4), use pins 8 (4-20 -) and 20 (4-20 +). If excitation is needed in the loop, connect pin 7 (Vpwr) to pin 20 (4-20 +), and connect the output cable to pin 8 (4-20 -) and pin 21 (Gnd).

The use of an end-user supplied analog loop power source is presented on the next page:

SciPres Monitor – Analog Output



Providing Excitation Voltage for Analog Output using Customer Provided Power Supply



TTL Alarm Outputs:

P1 Hi/Low Alarm: TTL 1 Pins 11 (Out0) and 13 (Gnd)
 P2 Hi/Low Alarm: TTL 2 Pins 24 (Out1) and 13 (Gnd)
 P3 Hi/Low Alarm: TTL 3 Pins 12 (Out2) and 13 (Gnd)
 TM or DP Hi/Low Alarm: TTL 4 Pins 25 (Out3) and 13 (Gnd)

TTL outputs are either 0 or 5 VDC, and carry minimal current. They are for TTL inputs on a PLC, or control of a 5 VDC electronic relay.

4.0 Disposable Pressure Sensors:



CONNECTOR TYPE	Max FLOW RATE *	Max PRESSURE
Luer	1 liter/min	60 psi
3/8" Barb	8 liters/min	60 psi
1/2" Barb	17 liters/min	60 psi
3/4" TC	31 liters/min	60 psi
1" Ladish TC	60 liters/min	60 psi

*At a 1.0 psi drop across the sensor

Specifications for all SciPres™ Pressure Sensor Flow Thru Pressure Sensors

Material, Fluid Contact:	Polysulfone, meets USP Class VI and FDA 21 CFR 177.1520 All wetted materials are made of animal-free compounds. Compatible with most sanitizing agents such as NaOH for flow cell sanitization.
Sensor Type:	Medical grade silicone piezo-resistive sensing element with on-chip temperature compensation
Sensor Isolation:	Insoluble silicone dielectric gel isolates sensing element from process solution.
Pressure Sensor Range:	0-60 psi for all sizes.
Pressure Sensor Accuracy:	+/- 0.30 psi 0-60 psi.
Pressure Sensor Resolution:	0.01 psi.
Temperature Range:	0 - 60 Celsius
Pressure Sensor Microchip:	EPROM, stores Device ID, Factory Cal Data, Max Pressure Value
Pressure Sensor Cleaning:	Sensors may be flushed with Alcohol, 0.1 M NaOH, dilute Bleach, or Formaldehyde for inline sanitization several times. The Sensors may also be autoclaved up to 2 times, or gamma irradiated, see 4.1
Sensor Connectors:	Lockable & Watertight
Sensor Shelf Life:	Sensor calibrations are stable indefinitely for any un-used SciPres sensors in their original factory packaging stored under normal laboratory conditions. No degradation of sensor performance has been observed with passage of time. Based on current shelf-life experience, SciLog sensor data is stable for at least 2 years.

Part B: SciPres™ Pressure Sensor Monitor Software

1.0 Software Overview:

The SciPres™ Pressure Monitor digitally displays inputs from up to three disposable SciPres™ Pressure Sensor simultaneously, while also calculating and displaying either Trans-membrane or Differential pressure.

It has also been equipped with a Supervisor Password, a Max Pressure Watchdog, and a Filter setting.

The **Max Pressure Watchdog** feature records in the sensor's memory the maximum pressure seen by the sensor while it is connected to the SciPres Monitor. The maximum recommended pressure for the sensors is 60 psi. If this is exceeded, problems with leakage and functionality can occur. This value is displayed for a few seconds along with the Sensor ID and Cal information when the Monitor is powered up and a sensor connected.

The **Filter setting** is used to average the pressure signals when peristaltic pump heads are used. This increases the sensor precision as well as accuracy and makes the display readings easier to interpret when compared to ever changing values caused by pulsation. Thus it produces cleaner graphs that are easier to read. At the lowest setting, the data is "live", and at the highest, it is averaged over a 4 second period. Please refer to the graph in section 4.0.

The **Supervisor Password** is a number between 1 and 9999 that must be entered to access the Menu and its settings. Setting the password to 0 disables it.

The Main Menu allows you to change the pressure units, (psi, kPa, bar, mmHg are available) the high and low analog range settings, adjust the baud rate and print time, change the mode between Trans-membrane, Differential and None, adjust the Filter setting, as well as configure user-defined Hi/Low pressure alarms for all four displayed values.

The SciPres™ Pressure Monitor will also allow custom zero and single point full span calibration of the sensors thru the use of the "Sensor" button on the front panel. This is a modification of the existing factory two or three point calibration.

2.0 Main Menu

Main screen:

P1: 0.00 P2: 0.00
P3: 0.00 TM: 0.00

See 2.1

Menu psi, kPa, bar, mmHg

PRES UNITS: psi

See 2.2

Menu 689.4 kPa, 6.80 bar,
5171 mmHg

RANGE HI: 60 psi
Analog out at 100 %

See 2.3

Menu Min 0.00

RANGE LO: 0.0 psi
Analog out at 0 %

See 2.4

Menu 800, 1200, 2400,
4800, 9600, 19200, 28800,
38400, 57600

SERIAL: BR:9600
WL: 8 SB: 2 PT: N

See 2.5

Menu 1 - 60 seconds

PRINT TIME: 5 Seconds

See 2.6

Menu Transmembrane,
Differential, None

MODE: TRANSMEMBRANE

See 2.7

Menu SciPress, OEM

TYPE: SCIPRES

See 2.8

Menu Off, P1, P2, P3, TM, DP

CONSTANT PRESSURE:
OFF

See 2.9

Menu 1 Min, 12 Max

FILTER 9

See 2.10

Menu See HI Range above

HI-ALARM P1: 0.0 psi

See 2.11

Menu Min: 0.00

LO-ALARM P1: 0.0 psi

See 2.12

Enter Press Menu to bypass to Password

SET TIME/DATE....

See 2.13

Enter 24 Hour Time

TIME: 15:10

See 2.14

Enter

MONTH: DECEMBER

See 2.15

Enter

DAY OF MONTH: 28

See 2.16

Enter

YEAR: 2006

See 2.17

Menu Yes, No

FACTORY RESET: NO
YES & ENTER TO RESET

See 2.18

Enter Yes, No

ARE YOU SURE? NO

Enter

PASSWORD: 0

See 2.19

2.0 Main Menu:

SUMMARY: This menu allows the setting of various parameters as they relate to your process. Use “Menu” to scroll through the menu, the up/down arrow keys to scroll through choices, and “Enter” to select the choice.

- 2.1 **Main Screen:** Displays all three pressures, P1, P2, P3 and the calculated Trans-Membrane pressure, TM, or Differential pressure DP.
- 2.2 **Pressure Units:** Use the up / down arrows to select between psi (pounds/square inch), kPa (kilo Pascal), bar, or mmHg (millimeters of Mercury). Default = **psi**
- 2.3 **Range Hi:** Use to set the upper range limit of the Analog output signal (100% full scale). Allowable maximums are 100 psi, 689.4 kPa, 6.80 bar, 5171 mmHg. Default = **100.0 psi**.
Do Not pressurize beyond 60 psi. (This setting is to make replacing a 0-100 psi transmitter easy to replace without having to re-scale the interface.)
- 2.4 **Range Lo:** Use to set lower range limit of the Analog output signal (0.0% of full scale). Default minimum is **0.0** regardless of scale.
- 2.5 **Serial:** Displays the RS-232 serial output parameters. Only baud rate can be changed. Available rates are 1200, 2400, 4800, 9600, 19200, 28800, 38400 and 57600. Default = **9600**
- 2.6 **Print Time:** Used to set the data output interval, 1 to 60 sec. Default = **5 sec.**
- 2.7 **Mode:** Use to set display and output mode. Trans-membrane will display and output TM, Differential will display and output DP, None will only display and output P1, P2 and P3. Default = **TM**
- 2.8 **Type:** Sets type of pressure sensor in use, Default is **Calibrated**. OEM is under development.
- 2.9 **Constant Pressure:** Controls 4-20 ma Analog Output 4 inversely as the pressure source changes between the Hi and Lo Alarm settings. Default = **OFF**.
- 2.10 **Filter:** Used to filter out (average) pulsations from peristaltic pumps. Pressure changes are delayed slightly based on setting. Range is 1-12, with 1 = No filter, 12 = Max filter. Default = **9**
- 2.11 **Hi-Alarm P1:** Used to set High Pressure Alarm, Max value of 60.0 psi. Hi-Alarms exist for all four pressure outputs. Default = **0.0 psi**.
- 2.12 **Lo-Alarm P1:** Used to set Low Pressure Alarm. Lo-Alarms exist for all four pressure outputs. Default = **0.0 psi**.
- 2.13 **Set Time/Date.....:** Press Enter to enter this submenu, press Menu to bypass to Password
- 2.14 **Time:** Use up/down arrows to set current time in 24 hour format, HH:mm, and press Enter.
- 2.15 **Month:** Use up/down arrows to set current Month, and press Enter.
- 2.16 **Day of Month:** Use up/down arrows to set current Date, and press Enter.
- 2.17 **Year:** Use up/down arrows to set current Year, and press Enter.
- 2.18 **Factory Reset:** Used to restore the SciPres™ Pressure Sensor Pressure Monitor to the factory default values. Change No to Yes using the arrow keys and press “Enter” to reset, change No to Yes on the “Are You Sure?” screen and press “Enter” again to finish the process.
- 2.19 **Password:** Used to set a Supervisor password. Requires entry of the password to enter the Menus. Choose a number from 1-9999, setting of 0 disables the password feature.

3.0 CUSTOM CALIBRATION

PRESS SENSOR BUTTON. THE FOLLOWING WILL BE DISPLAYED:

SENSOR PORT: P1

USE UP/DOWN ARROWS TO CHOOSE PORT. PRESS ENTER, AND CAL DATA WILL RELOAD

CUSTOM CAL....

Press Enter

SENSOR PORT: P1

See 3.1

Enter

**SENSOR ZERO: NO
YES & ENTER TO ZERO**

See 3.2

Enter

CAL PRESS: 60.00 psi

See 3.3

Enter

**CUSTOM CAL SENSOR
PRESS ENTER TO CAL**

See 3.4

Enter

**CAL IN PROGRESS
Please Wait: 1...2..**

See 3.5

Enter

**CUSTOM CAL FACTORS:
CF: 0.511 PZ: 0.0**

See 3.6

See 3.7

**CALIBRATION ERROR!
OUT OF RANGE**

**SENSOR RESET: NO
YES & ENTER TO RESET**

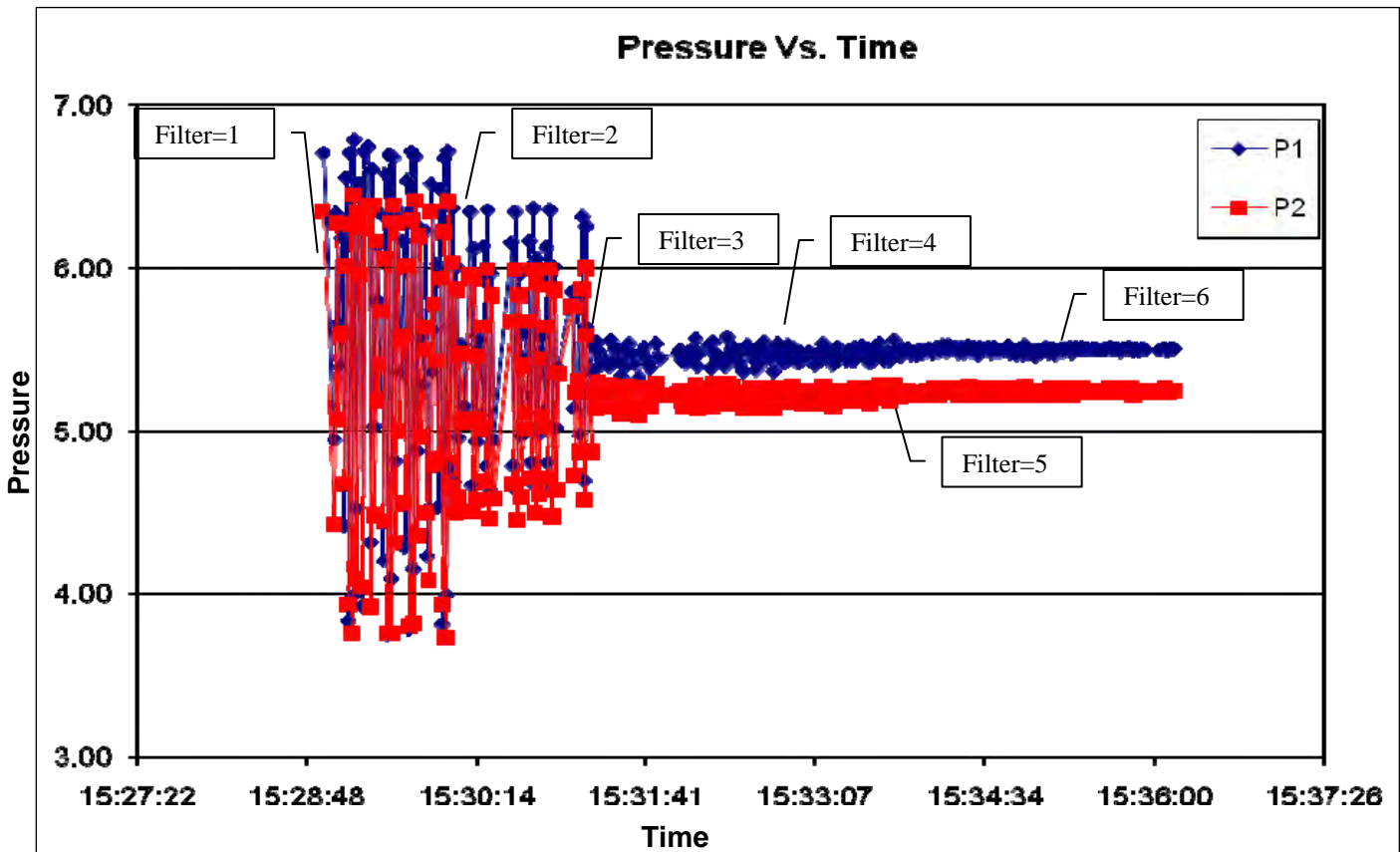
3.0 Custom Calibration Menu:

SUMMARY: This menu shows the settings used for performing a custom calibration of a given disposable pressure sensor. This allows you to calibrate zero the unit for existing pressure offsets, and re-span the unit with a NIST traceable pressure source if you wish. This procedure adds a modification to the existing Factory Calibration, it does not modify it, and it can be reset if needed.

After connecting the sensor, press the “Sensor” button, you will be prompted for the sensor to reload, choose the sensor and press “Enter”. After reloading the data from the sensor, the “Custom Cal...” screen appears. Press the “Enter” key to enter the Custom Cal menu, use the “Exit” key to bypass it.

- 3.1 **Sensor Port:** Use the up/down arrows to select from P1, P2 or P3 and press “Enter”. Default = **0.0 °C**.
- 3.2 **Sensor Zero:** To zero the sensor, use the up/down arrows to change “NO” to “Yes” and press “Enter”. To bypass, leave the setting at NO and press “Enter”. Default = **NO**.
- 3.3 **Cal Press:** To Re-span the sensor at the upper limit, use the up/down arrows to select the pressure being used for the custom calibration and press enter. To bypass, press “Exit”.
- 3.4 **Custom Cal Sensor:** When you reach this screen, and are ready to perform the custom calibration at the upper limit. Be sure you have pressurized the sensor using a NIST traceable pressure source (gauge). Press the “Enter” key to do the calibration. You may press “Exit” to cancel the process.
- 3.5 **Cal in Progress:** This screen is displayed during the calibration, and will count up to 10 to complete the custom calibration.
- 3.6 **Custom Cal Factors:** This screen displays the custom calibration data, the Custom Cal Factor, (CCF) can the Custom Zero Offset (PZ).
- 3.7 **Calibration Error! / Out of Range:** This message will be displayed if the pressure is out of range, i.e. you’ve tried to perform a custom calibration at an elevated pressure with the sensor un-pressurized.
- 3.8 **Sensor Reset:** Used to reset / remove the custom calibration. Press the “Sensor” key to reload the sensor data, and while the custom cal factors are displayed, press the “Enter” key. The Sensor Reset screen will be displayed, and you can change the No to Yes with the Up/Down Arrows, and press the “Enter” key to reset / remove the custom calibration. There is an “Are you sure?” screen that will also need a Yes answer to complete this task.

4.0 Reduced Pump Pulsation; Improved Sensor Precision



This graph shows the effects of the Filter setting on the SciPres Monitor and the incoming signal from the SciPres Sensors.

This provides the added benefit of improving the precision & accuracy of the sensor reading by eliminating the need to interpret between ever changing high and low values caused by pump-generated pulsation. It makes the processes easier to control and the cleaner graphs are easier to read.

Data was collected at 1 second intervals. A peristaltic pump running at 100 ml/min was connected to the SciPres Sensors and back pressure was applied.

The Filter setting was changed from 1 through 6 over the course of the run. Data was stable at that point, and it was not increased further due to lack of noticeable effect at these flows and pressures.

As the Filter setting is increased, a small delay occurs in the response of the filtered data when the pressure is changing. The maximum delay at a setting of 12 is 4 seconds. A setting of 1 yields "live" data with no delay and no filtering.

5.0 SciPres™ Pressure Sensor Printout Format

RS-232 Output as sent to Serial Printer or Windows HyperTerminal:

```

11/14/08 0.48
11/19/08; Pressure v0.48; UNITS=psi    ; ALARMS: HP1= 0.00; LP1= 0.00; HP2= 0.00; LP2= 0.00;
HP3= 0.00; LP3= 0.00; HTM= 0.00; LTM= 0.00;
Sensor 1 ID=S1-220160-1008; MAXP= 6.03; 11/14/08; PZ=-0003; CF1= 1.081; CF2= 0.953;
CP1=54.00; CP2= 6.00; CCF= 1.000; CPZ=00000
Sensor 2 ID=S1-220161-1008; MAXP= 6.02; 11/14/08; PZ=00002; CF1= 1.012; CF2= 1.013;
CP1=54.00; CP2= 6.00; CCF= 1.000; CPZ=00000
Sensor 3 Disconnected;
RT,      P1,  P2,  P3,  TM
10:54:09, 0.02, 0.02, ---, 0.02,
10:54:19, 0.02, 0.02, ---, 0.02,
10:54:24, 0.02, 0.02, ---, 0.02,
10:54:29, 0.02, 0.02, ---, 0.02,
10:54:34, 0.02, 0.02, ---, 0.02,
10:54:39, 0.02, 0.02, ---, 0.02,

```

Abbreviations:

RT = Real Time	P1 = Pressure at Sensor P1
P2 = Pressure at Sensor P2	P3 = Pressure at Sensor P3
TM = Trans-Membrane Pressure	DP = Differential Pressure (P1 – P2)
CF1 = Calibration Factor 1	Alarms:
CF2 = Calibration Factor 2	HP1 / LP1 = Hi / Low Pressure @ P1
PZ = Zero Offset	HP2 / LP2 = Hi / Low Pressure @ P2
CP1 = Calibration Point 1 (High point)	HP3 / LP3 = Hi / Low Pressure @ P3
CP2 = Calibration Point 2 (Low Point)	HTM/ LTM = Hi / Low Pressure @ TM or DP
CCF = Custom Calibration Factor	
CPZ = Custom Zero Offset	-.— Indicates a disconnected or failed sensor



Please Note: SciPres™ SciDoc Software is available to collect this data automatically into an Excel spreadsheet. See Section 6.

Part C: SciPres Data

6.0 Data Collection

Summary: The SciPres™ Pressure Monitor has two serial ports. The serial port which is labeled “Pinter / PC,” is used for RS-232 serial communication with a PC or serial printer.

SciPres™ has made available a software package that includes an Excel spreadsheet with custom macros that is automatically populated when data is received. It also automatically populates a graph in real time as the data is generated. Discussion of this package begins on the next page.

Alternatively, when a PC is connected to this serial port, all data generated can be sent to the “HyperTerminal” program of your PC. HyperTerminal is ok for viewing the data in real time, but can be a challenge for actually capturing and retrieving the data. The HyperTerminal settings are provided for you in section 6.2 entitled “PC HyperTerminal Settings.”

The other port, labeled “Serial I/O” is currently disabled and reserved for future use.

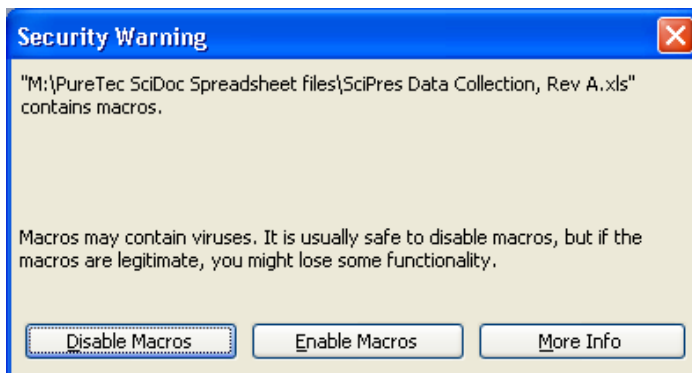
(The Remainder of This Page Intentionally Left Blank)

6.1 SciPres™ Pressure Sensor Data Collection Software:

SciPres™ has made available a software package that captures the data output of the SciPres™ Pressure Monitor and places it in an Excel spreadsheet in real time. This spreadsheet also populates a graph to aid you in the analysis of your process. It consists of a copy of WinWedge32 and a customized spreadsheet with built in macros. It requires the use of a SciPres™ RS-232 cable to connect your SciPres™ Pressure Sensor to an available Com Port on your PC.

Minimum system requirements are Windows 98, Excel 2000 and WinWedge32 v3.4, which is included in the package.

Once installed, click on the shortcut for the spreadsheet, and you will have the following screen:

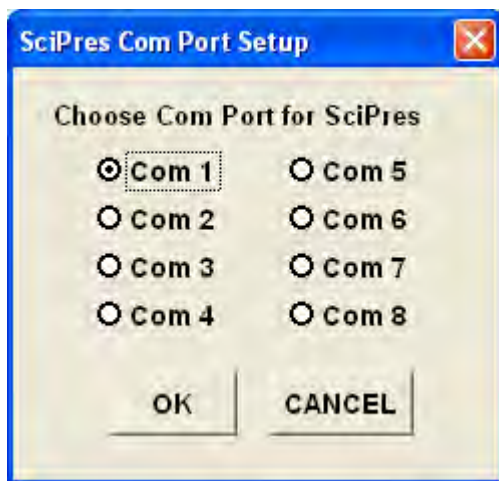


Press “Enable Macros” to begin the process for data collection. If you are not presented with this screen, you need to adjust the security level Excel’s Macros. Choose Tools – Macros – Security from the Menu Bar, and set the Security level to Medium. Then close and re-open the file, and you will be able to enable the macros.



Note: 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 SciPres™ Pressure Monitor connected to. Click on the OK button and WinWedge32 will start, showing itself as an icon in your system tray.

You are then presented with the next screen:

WinWedge Icon



Enter all of the appropriate Operator Information in this dialog box and click on “OK”.

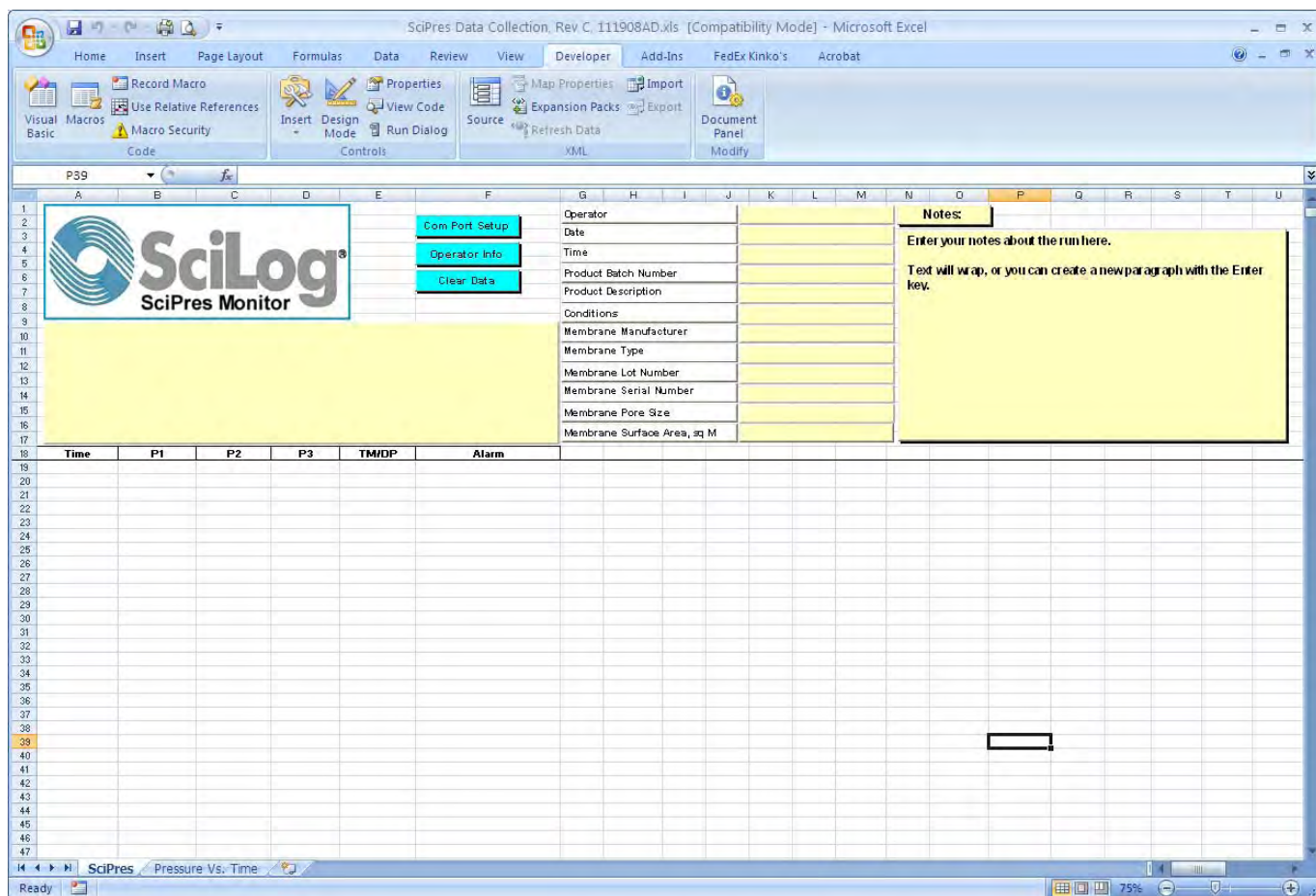
A screenshot of a Windows dialog box titled "Operator Information". The dialog box has a blue title bar with a close button (X) in the top right corner. It contains a list of input fields for operator information. The fields are: Operator, Date, Time, Product Batch Number, Product Description, Conditions, Membrane Manufacturer, Membrane Type, Membrane Lot Number, Membrane Serial Number, Membrane Pore Size, and Membrane Surface Area, Square Meters. At the bottom of the dialog box, there are two buttons: "OK" and "Cancel".

Field Name	Input Field
Operator	<input type="text"/>
Date	<input type="text"/>
Time	<input type="text"/>
Product Batch Number	<input type="text"/>
Product Description	<input type="text"/>
Conditions	<input type="text"/>
Membrane Manufacturer	<input type="text"/>
Membrane Type	<input type="text"/>
Membrane Lot Number	<input type="text"/>
Membrane Serial Number	<input type="text"/>
Membrane Pore Size	<input type="text"/>
Membrane Surface Area, Square Meters	<input type="text"/>



Note: The “Clear Data” button does not affect the information in these fields. You may click on the “Operator Info” button and update these fields as needed.

Clicking on “OK” leaves the next screen, ready to get started collecting data from the SciPres™ Pressure Sensors:



When ready, turn on the SciPres™ Pressure Monitor, pressing the “On / Stby” button, or connect the disposable pressure sensor. The monitor will load the calibration data from the sensor, and place that information in the spreadsheet. All remaining 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 left of the spreadsheet contains the header information that is generated by the SciPres™ Pressure Sensor and Monitor. This will list the version, the calibration data, all operating parameters, alarm settings and alarm limits.

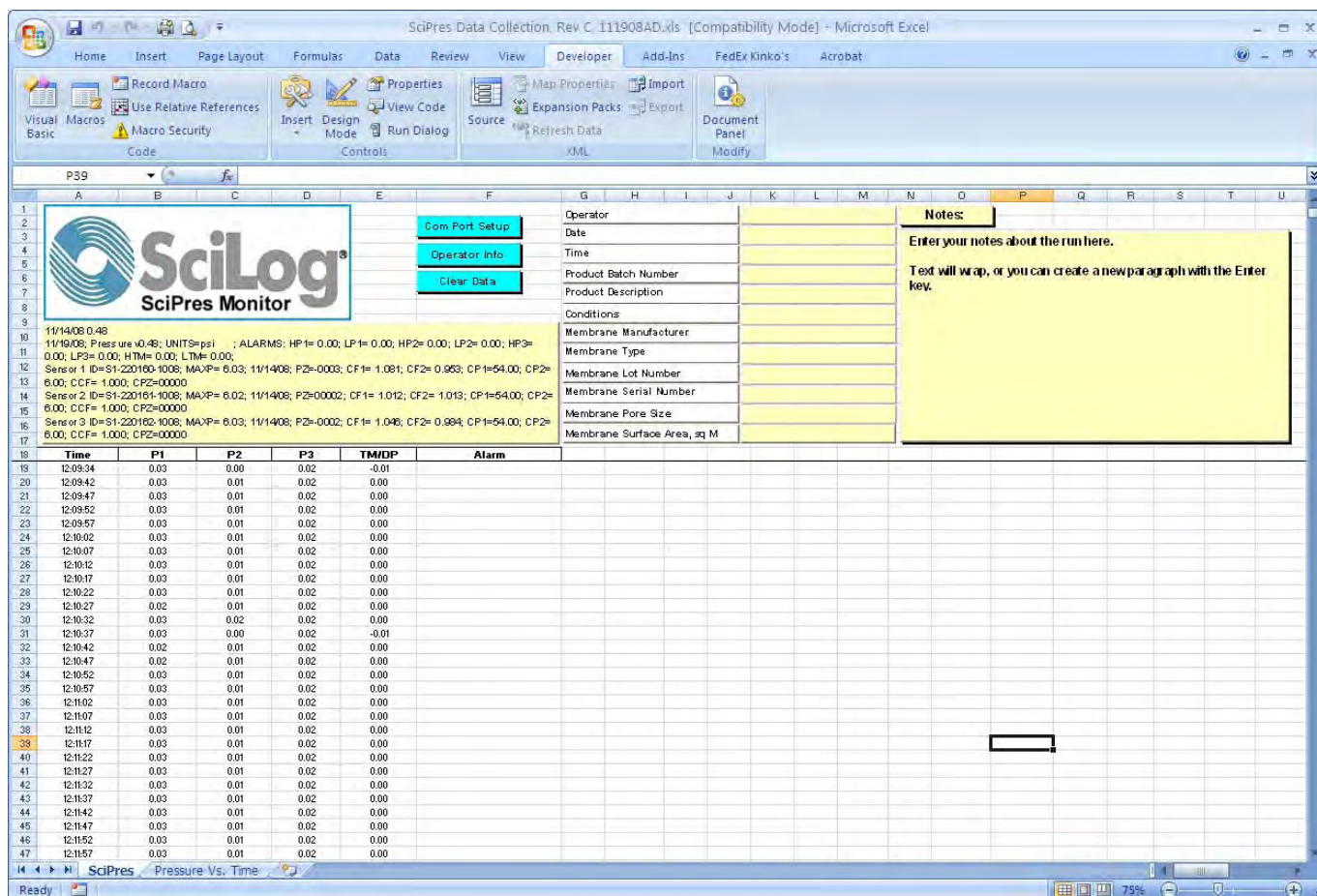


Note: *If you have clicked on “Cancel on either of the two previous screens, you may click on the “Com Port Setup” or “Operator Info” buttons to complete these tasks.*

A chart of Pressure vs. Time has been included for your use, and you may view it by clicking on the appropriate tab at the bottom of the worksheet.

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, the 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.



Notes on the use of Office 2007, especially with Vista:

The version of Excel included in Office 2007 treats macros differently than any previous version. This is especially troublesome with Vista. To use macros with Excel 2007 you must make a change in the “Trust Center” settings.

To access the Trust Center:

1. Open Excel.
2. Click on the Office Icon in the upper left corner and choose the “Excel Options” button.
3. In the Excel Options window, click on “Trust Center” on the list on the left.
4. Click on the Trust Center Settings button, and then do one of the following:
 - a. Click on “Macro Settings” on the left, and choose “Enable All Macros” or
 - b. Click on “Trusted Locations” on the left, then “Add new location” and browse to the location of the SciDoc files.

6.2 PC HyperTerminal Settings:

SciPres™ Pressure Monitor to PC: PC communications via the Serial Port labeled “Printer / PC” requires a SciPres™ RS-232 Cable. NOTE: When you are not using the SciPres printer, this allows process data to be “dumped” into your PC for archiving. The list of settings below must match those in Serial section of the SciPres™ Pressure Sensor main menu.

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

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

Bits per Second:	9600
Data Bits:	8
Parity:	None
Stop Bits:	1
Flow Control:	None
Press “ Ok ”	

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

Terminal Keys:	Select
Emulation:	TTY
Backscroll Buffer:	500

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

Send Line Ends with Line Feed:	Select
Echo Typed Characters Locally:	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 “SciPres™ Pressure Sensor Setup” screen.

Press “**Ok**” at the bottom of the “SciPres™ Pressure Sensor Property – Setting” screen

Appendix A: Sensor Performance Data

SciLog DN 3021: *SciPres Pressure Sensor Sanitization Protocol (1):*

Sanitizing Agent (2)	Conc.	Temp. ° C	pH	Pressure psi (4)	Contact Time, Min	Sani-Cycles Limit (3)	%SD ⁽⁶⁾ 10 Cycles
NaOH	0.10 N	20-30	13	0 - 10	15-30	10	0.20%
NaOH	0.50 N	20-30	13.5	0 - 10	15-30	10	0.25%
NaOCl (5)	500 ppm	20-30	7 - 8	0 - 10	15-30	10	0.70%
Formaldehyde Solution	1 - 2%	20-30	5 - 8	0 - 10	30	10	0.10%
Isopropyl Alcohol	70%	20-30		0 - 10	15-30	10	0.10%

NOTE:

1. SciPres pressure sensors have been designed for disposable, single-use applications. However, with proper care, SciPres sensors can be re-used repeatedly while maintaining good accuracy and precision. If required, the SciPres sensor can be re-calibrated,

2. SciPres sensors can be repeatedly sanitized with any of the listed sanitizing solutions. Do not exceed the recommended number of sanitization cycles. Sensor accuracy and precision will be affected adversely by excessive cleaning/sanitization.

3. Recommended number of cleaning / sanitization cycles.

4 Do not exceed recommended sanitization pressure range.

5. 1:100 dilution of Clorox Bleach, 500 ppm of active chlorine.

6. Response variance (% standard deviation) of pre-calibrated (30 psi) sensors over 10 sanitization cycles

CAUTION: Do Not Exceed Maximum Pressure of 60 psi

Test Protocol: Pre-calibrated (30.00 psi) SciPres pressure sensors were exposed to sanitizing solution by pumping the solution through the sensor for 30 minutes, followed by a distilled-water flush. Sensor response recovery was tested after each sanitization cycle by applying 30.00 psi of air pressure while monitoring the sensor response. Ten, 30-minute sanitization cycles were implemented; 5 hours of total cumulative exposure

Released 11/15/06, SciLog Metrology, KS

SciLog DN 3123: SciPres Pressure Sensor, 100 Hr. Exposure Test, 1.0 M NaOH
at 22 °C, 10 psi Pressure

* SD = Standard Deviation

Test Data Sensor ID	Start		25 hr Test		50 hr Test		75 hr Test		100 hr Test		Sensor Average 30.00 psi	Sensor SD* 30.00 psi
	psi 0.00	psi 30.00	psi 0.00	psi 30.00	psi 0.00	psi 30.00	psi 0.00	psi 30.00	psi 0.00	psi 30.00		
S1-240058-1007	0.00	30.05	0.00	30.07	0.00	30.06	0.00	30.08	0.00	30.00	30.05	0.03
S1-240057-1007	0.01	30.19	0.00	30.20	0.02	30.18	0.02	30.22	0.00	30.21	30.20	0.02
S1-230238-1007	0.02	30.02	0.01	30.03	0.00	30.03	0.00	30.02	0.00	30.03	30.03	0.01
S1-240061-1007	0.00	30.03	0.01	30.07	0.00	30.06	0.00	30.06	0.00	30.05	30.05	0.02
S1-230107-1007	0.01	30.05	0.00	30.08	0.00	30.06	0.00	30.05	0.00	30.06	30.06	0.01
S1-230110-1007	0.00	30.05	0.00	30.04	0.01	30.03	0.00	30.03	0.00	30.02	30.03	0.01
Group Average	0.01	30.07	0.00	30.08	0.01	30.07	0.00	30.08	0.00	30.06		
Group SD*	0.01	0.06	0.00	0.06	0.01	0.05	0.01	0.07	0.00	0.07		

SUMMARY: The sensor response data, collected over 100 hours of continuous NaOH exposure, show a stable sensor accuracy and precision level over time. For individual sensors, the average accuracy measured @ 30.00 psi of applied pressure, stays well within established limits of +/- 0.3 psi. The same holds for the sensor group averages based on the responses of the five sensors. **The long-term stability of the sensor pre-calibration is verified by the above sensor data.**

NOTE: SciLog sensors have been designed for disposable, single-use applications. However, with proper care, the sensors can be re-used repeatedly while maintaining good accuracy and precision. If required, sensors can be re-calibrated.

CAUTION: Do Not Exceed Maximum Pressure of 60 psi

Test Protocol: Six pre-calibrated (30.00 psi) SciPres Luer pressure sensors were exposed to 1.0 molar NaOH for 100 hours at 22 °C and 10 psi back pressure. The 1.0 Molar NaOH solution was continuously recirculated (150ml/min) through the in-line sensors using a peristaltic pump. At 25 hour intervals, the test was briefly interrupted, the sensors were flushed 3x with distilled water and purged for 5 minutes with distilled water utilizing a peristaltic recirculation pump. The sensors were tested at 0.0 (ambient air) and at 30.00 psi applied pressure (nitrogen). All sensor responses were monitored with a NIST- traceable gauge. Sensors were tested with their original factory calibration; no re-calibration were carried out before or during the test run. All SciPres sensors were randomly selected from SciLog inventory.

Released 4/8/08, SciLog Metrology, KS

SciLog DN 3127: SciPres Pressure Sensor, Post Autoclaving Sensor Response

Objective: Test SciPres Sensor Response after Repeated (3) Autoclaving Cycles.
 Autoclaving Conditions: Sterilization Temperature: 257°F (125°C); Sterilization Time: 30min., Pressure: 19 psi, Drying Time: 30min.

SciPres 0.50" Barb Sensor ID	Pre-Autoclave		Post Trial 1		Post Trial 2		Post Trial 3	
	psi NIST 0.00	psi NIST 30.00	psi NIST 0.00	psi NIST 30.02	psi NIST 0.00	psi NIST 30.00	psi NIST 0.00	psi NIST 30.02
S3-220221-1007	0.00	29.99	0.01	30.06	0.02	30.04	0.04	30.04
S3-220227-1007	0.00	29.99	0.00	30.06	0.02	30.05	0.04	30.06
S3-220229-1007	0.00	29.99	0.02	30.10	0.03	30.06	0.04	30.07
S3-220230-1007	0.00	29.99	0.01	30.06	0.30	30.24	NR	NR
S3-220234-1007	0.00	29.99	0.00	30.05	0.10	30.22	0.05	30.06
S3-220240-1007	0.00	30.00	0.02	30.06	0.79	31.06	NR	NR
Group Average	0.00	29.99	0.01	30.07	0.21	30.28	0.04	30.06
Group SD*		0.00		0.02		0.39		0.01

* SD = Standard Deviation NR = No and/or Erratic Response

Test Protocol: Prior to autoclaving, factory-calibrated SciPres sensors (6) were removed from inventory and pressure-tested at 0.00 and 30.00 psi. The "out-of-box" sensor response data are listed as "Pre-Autoclave" in the table above. The SciPres sensor ambient air-vent as well as the 8-pin sensor connector were covered with autoclavable tape (Cole-Parmer P/N: EG-08277-62). The sensors were placed into a paper bag (6 1/2"x 4" x12 3/8"), sealed with tape and placed in a Tuttnauer EZ9 Autoclave. The following conditions were maintained throughout the three autoclaving trials: 1.Sterilization Temperature: 257°F (125 °C); 2.Sterilization Time: 30 min; 3.Sterilization Pressure: 19 psi, 4.Drying Time 30 min.

After each trial, the SciPres sensors were allowed to cool to room temperature for one hour, followed by pressure tests at 0.00 psi and at 30.00psi. The applied pressure (30 psi) was generated with a regulated nitrogen gas source while monitoring the applied pressure with a NIST-traceable pressure gauge. The SciPres sensor response data (displayed by the SciPres Monitor) are listed in the table above as "Post-Trial 1", "Post-Trial 2" and "Post-Trial 3". Post-autoclave sensor response tests were carried out with the original factory calibration. No sensor re-calibration were made before, during or after the three trials.

Summary: The tested SciPres sensors survived the autoclave conditions. However, sensor accuracy becomes increasingly compromised after multiple autoclave cycles. For accurate performance, sensors should not be autoclaved more than two times.

NOTE: SciLog sensors have been designed for disposable, single-use applications. However, with proper care, the sensors can be re-used while maintaining good accuracy and precision. If required, sensors can be re-calibrated.

CAUTION: Do Not Exceed Maximum Pressure of 60 psi

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DN 3127B SciPres Post-Autoclave Response KS050508.xls



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SciLog DN 3129: Post-Gamma SciPres Sensors Response:

Test Summary: Twenty-six (26) pre-calibrated (30.00 psi) SciPres sensors were gamma irradiated at 38.4 kGy. Post-gamma sensor survival and sensor accuracy were tested at 0.00 and 29.99 psi of applied air pressure. All sensors survived gamma-irradiation and tested accurately well within SciLog's established accuracy limits of +/- 0.35psi

SciPres, 3/4" TC Sensor ID	Pre-Gamma Test Applied Pressure		Post-Gamma Test Applied Pressure	
	NIST 0.00 psi	NIST 30.00	NIST 0.00 psi	NIST 29.99 psi
S4-290006-0408	0.00	30.00	-0.01	29.94
S4-290008-0408	0.00	30.00	0.00	29.97
S4-290011-0408	0.00	30.00	0.00	29.97
S4-290013-0408	0.00	30.00	-0.01	29.92
S4-290017-0408	0.00	30.00	-0.02	30.01
S4-290018-0408	0.00	30.00	0.00	29.96
S4-290020-0408	0.00	30.00	-0.01	29.95
S4-290021-0408	0.00	30.00	0.00	29.96
S4-290022-0408	0.00	30.00	0.00	30.03
S4-290023-0408	0.00	30.00	-0.03	29.92
S4-290024-0408	0.00	30.00	-0.02	29.92
S4-290025-0408	0.00	30.00	0.00	30.01
S4-290026-0408	0.00	30.00	0.00	29.95
S4-290027-0408	0.00	30.00	0.00	29.95
Group Average	0.00	30.00	-0.01	29.96
Group SD*			0.01	0.03

* Standard Deviation

SciPres, Luer Sensor ID	Pre-Gamma Test Applied Pressure		Post-Gamma Test Applied Test Pressure	
	NIST 0.00 psi	NIST 30.00 psi	NIST 0.00 psi	NIST 29.99 psi
S1-290001-0408	0.00	30.00	-0.01	29.95
S1-290003-0408	0.00	30.00	0.00	30.05
S1-290004-0408	0.00	30.00	-0.01	29.99
S1-290005-0408	0.00	30.00	-0.05	29.95
S1-290007-0408	0.00	30.00	0.00	30.00
S1-290009-0408	0.00	30.00	0.00	30.00
S1-290010-0408	0.00	30.00	-0.02	29.96
S1-290012-0408	0.00	30.00	-0.01	29.94
S1-290014-0408	0.00	30.00	0.00	29.96
S1-290015-0408	0.00	30.00	0.00	29.95
S1-290016-0408	0.00	30.00	-0.03	29.98
S1-290019-0408	0.00	30.00	0.00	29.96
Group Average	0.00	30.00	-0.01	29.97
Group SD*			0.02	0.03