

SciTemp™ Temperature Monitor & Sensor

Operations Manual

Temperature Monitoring with Disposable Sensors



SciTemp™ Temperature 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 C1, Firmware Version 0.16, 07/09, P/N 300-035

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

1. WARRANTY AND RETURNS POLICY:

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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.

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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.

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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.

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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.

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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 SCILOG 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 ENTREtenir 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 SciTemp Temperature 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 SciTemp™ Temperature 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 SciTemp™ Temperature 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 SciTemp™ Temperature Sensor are observed. See “SciTemp™ Temperature Sensor Specifications”.

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

Maintenance & Cleaning:



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



Please read the following instructions carefully!

Inspections: Unpack the SciTemp 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 SciTemp 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

SciTemp™ Temperature 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:** Aluminum / Molded plastic.

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. **"Sensor T1 & T2"**, Female Switchcraft 9 pin twist-lock, connector for sensor cable.
 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:**
- **Temperature Mode:** Captures stored calibration from sensors, digital display of up to two temperature sensor values, with High and Low user-definable alarms for each.
- **Custom Calibration Mode:** Used to perform custom calibrations, selecting User-defined Calibration Temperature.

Sensors:


- **Power:** 5 VDC provided by SciTemp™ Temperature Monitor.
- **Fluid Connections:** Available with Luer, 3/8" Hose barb, 1/2" Hose barb, 3/4" TC, and 1" TC.
- **Wetted Materials:** Medical Grade Polysulfone meets USP Class VI and FDA 21CFR177.1520. All Wetted Materials are made of Animal-Free Compounds. Compatible with Most Sanitizing Agents such as NaOH, Hypochlorite. Sensors can be repeatedly autoclaved.
- **Sensor Type:** Thermistor, Epoxy coated, 2252 Ω.
- **Temperature Range:** -40 to +150° Celsius.
- **Accuracy:** +/- 0.10° Celsius in the 4.0 to 70° Celsius range.
- **Resolution:** 0.01 ° Celsius
- **Sensor Microchip:** EPROM, stored Sensor ID, and Cal Factor.
- **Sensor Connector & Cables:** Lockable and waterproof.

SciDoc Documentation Software for PC

SciTemp™ Temperature Sensor System Documentation Software Package

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

Spreadsheet example:

| | A | B | C | D | E | F | G | H | I | J | K | L | | | |
|----|---|---------------|---------------|-------------------|-----------------------|---|---|---|-------|---|---|---|--|--|--|
| 1 |  | | | | Operator | | | | | | | | | | |
| 2 | | | | | Date | | | | | | | | | | |
| 3 | | | | | Time | | | | | | | | | | |
| 4 | | | | | Product Batch Number | | | | | | | | | | |
| 5 | | | | | Product Description | | | | | | | | | | |
| 6 | | | | | Conditions | | | | | | | | | | |
| 7 | | | | | Membrane Manufacturer | | | | | | | | | | |
| 8 | | | | | Membrane Type | | | | | | | | | | |
| 9 | | | | | Membrane Lot Number | | | | | | | | | | |
| 10 | Membrane Serial Number | | | | | | | | | | | | | | |
| 11 | Membrane Pore Size | | | | | | | | | | | | | | |
| 12 | Membrane Surface Area, sq M | | | | | | | | 0.005 | | | | | | |
| 13 | SciTemp v0.11; C ALARMS: HT1= 0.0&C; LT1= 0.0&C; HT2= 0.0&C; LT2= 0.0&C; Sens or ID= T1-001075-0206; CF= 1.024 | | | | | | | | | | | | | | |
| 14 | ComPort Setup | | Operator Info | | Clear Data | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | | | |
| 17 | | | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | | | |
| 19 | Time | Temp 1 | Temp 2 | Diff. Temp | Alarm | | | | | | | | | | |
| 20 | 00:00:00 | 23.90 | 22.90 | 1.00 | | | | | | | | | | | |
| 21 | 00:00:00 | 23.90 | 22.90 | 1.00 | | | | | | | | | | | |
| 22 | 00:00:05 | 23.90 | 22.90 | 1.00 | | | | | | | | | | | |
| 23 | 00:00:10 | 23.80 | 22.80 | 1.00 | | | | | | | | | | | |
| 24 | 00:00:15 | 23.80 | 22.80 | 1.00 | | | | | | | | | | | |
| 25 | 00:00:20 | 23.80 | 22.80 | 1.00 | | | | | | | | | | | |
| 26 | 00:00:25 | 23.80 | 22.80 | 1.00 | | | | | | | | | | | |
| 27 | 00:00:30 | 23.80 | 22.80 | 1.00 | | | | | | | | | | | |
| 28 | 00:00:35 | 23.80 | 22.80 | 1.00 | | | | | | | | | | | |
| 29 | 00:00:40 | 23.80 | 22.80 | 1.00 | | | | | | | | | | | |
| 30 | 00:00:45 | 23.80 | 22.80 | 1.00 | | | | | | | | | | | |
| 31 | 00:00:50 | 23.80 | 22.80 | 1.00 | | | | | | | | | | | |
| 32 | 00:00:55 | 23.80 | 22.80 | 1.00 | | | | | | | | | | | |
| 33 | 00:01:00 | 23.80 | 22.80 | 1.00 | | | | | | | | | | | |
| 34 | 00:01:05 | 23.80 | 22.80 | 1.00 | | | | | | | | | | | |
| 35 | 00:01:10 | 23.80 | 22.80 | 1.00 | | | | | | | | | | | |
| 36 | 00:01:15 | 23.80 | 22.80 | 1.00 | | | | | | | | | | | |
| 37 | 00:01:20 | 23.80 | 22.80 | 1.00 | | | | | | | | | | | |
| 38 | 00:01:25 | 23.80 | 22.80 | 1.00 | | | | | | | | | | | |
| 39 | 00:01:30 | 23.80 | 22.80 | 1.00 | | | | | | | | | | | |
| 40 | 00:01:35 | 23.80 | 22.80 | 1.00 | | | | | | | | | | | |
| 41 | 00:01:40 | 23.80 | 22.80 | 1.00 | | | | | | | | | | | |

Part A: SciTemp™ Temperature Sensor Hardware

1.0 Overview:

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

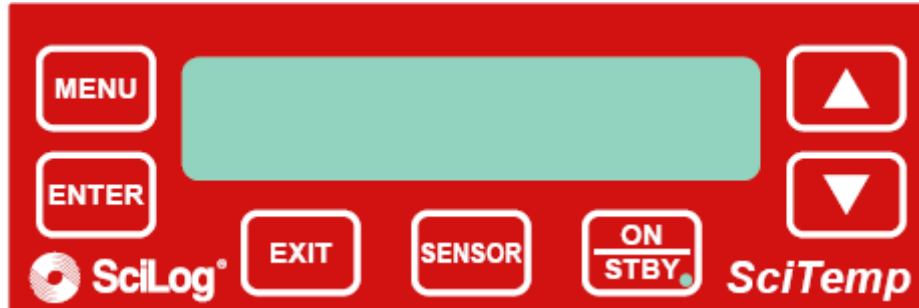
The Monitor is a small desktop package with a backlit display and seven buttons for easy interface and menu selections. It displays up to two measured temperatures in real time in digital format and the differential temperature. The monitor's output signals are in both analog and digital formats. It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

The disposable SciTemp™ Temperature Sensor flow cells utilize an epoxy coated 2252 Ω Thermistor in a polysulphone 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 Factor

2.0 Front Panel: Data Entry & Display



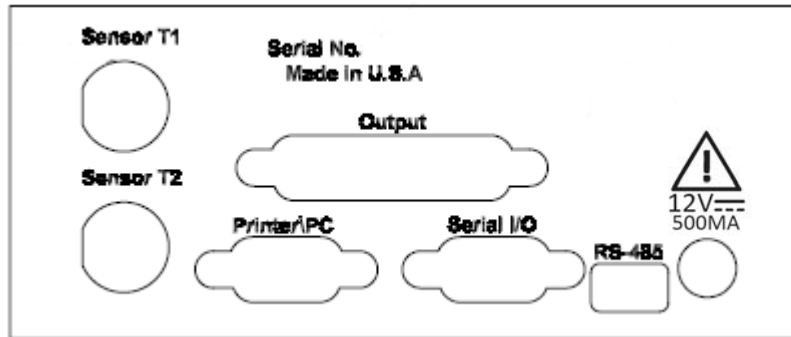
The front panel consists of a user interface, which includes an alphanumeric display and a membrane keypad to select operational modes and alarm settings. The display is a two line, 20 character, liquid crystal display (LCD). The display is backlit to allow easy viewing over a wide range of lighting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

The keypad consists of seven keys whose function does not change. These keys are used for basic control and programming of the SciTemp™ Temperature 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 custom calibrate the sensor using NIST traceable equipment.
- 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 SciTemp™ Temperature Sensor back panel provides interfacing ports for:

- * **Disposable SciTemp™ Temperature Sensor Sensors:** Female 9 pin twist-lock, labeled “Sensor T1, T2”.
- * **Analog and TTL Output:** Female DB25, labeled “Output”.
- * **RS-232:** Female DB9, labeled “Printer/PC”.
- * **2nd RS-232:** Female DB9, labeled “Serial I/O”, dedicated to Barcode Scanner 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 temperature sensors are connected to these two using the included cables.

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

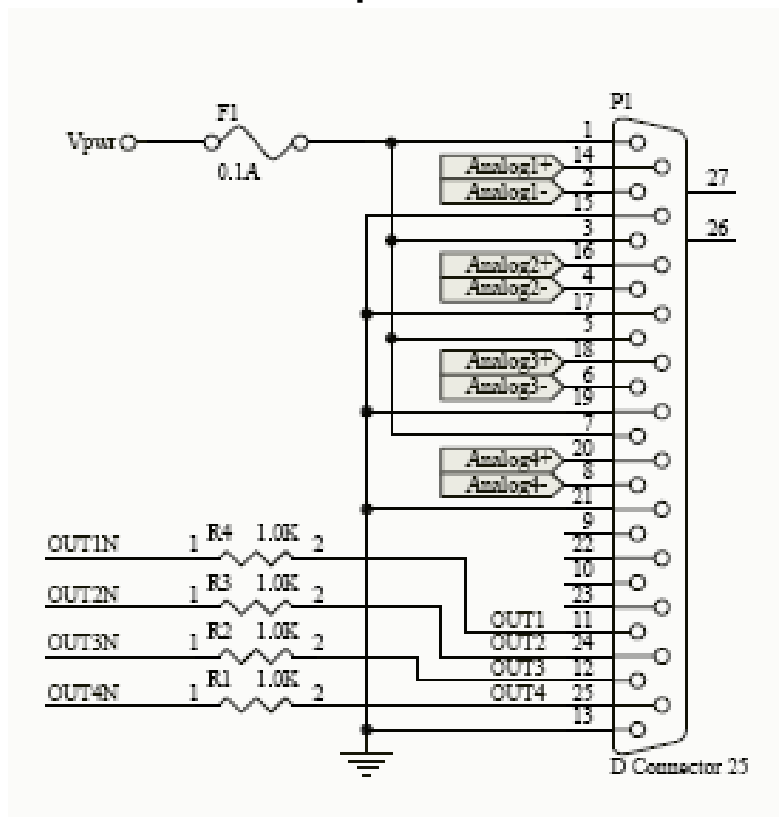
3.3 Printer/PC Port: The SciTemp™ printer is connected to the SciTemp™ Temperature Monitor via this port. You need a printer cable to make the connection between the printer and the SciTemp™ Temperature Monitor, or a SciTemp™ RS-232 cable to connect the SciTemp™ Temperature Monitor to your PC for data archival.

3.4 Serial I/O Port: 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 Temperature at T1 (Analog 1), use pins 2 (4-20 -) and 14 (4-20 +). If excitation is needed in the loop, connect pin 1 (V_{pwr}) to pin 14 (4-20 +), and connect the output cable to pin 2 (4-20 -) and pin 15 (Gnd).

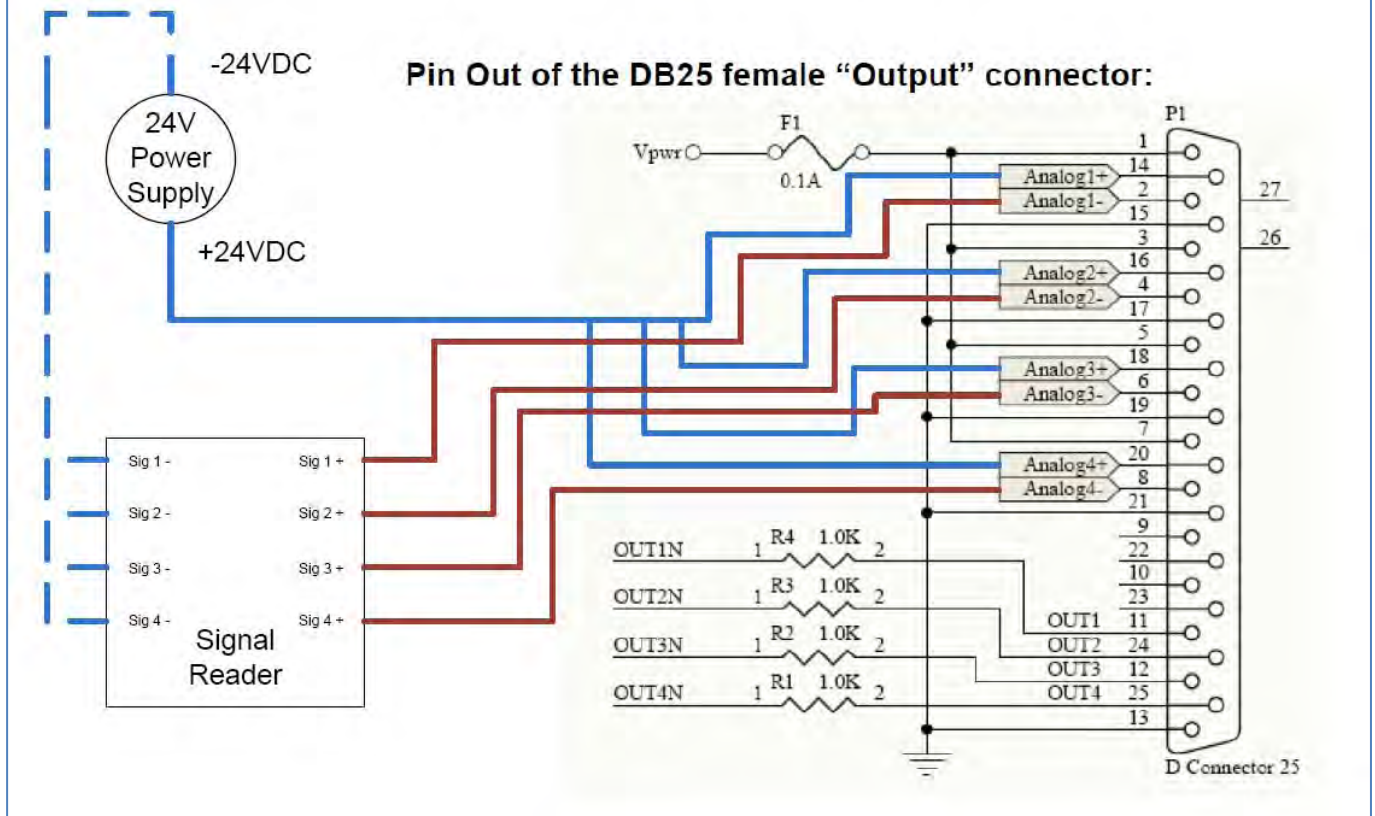
For 4-20 ma output of Temperature at T2 (Analog 2), use pins 4 (4-20 -) and 16 (4-20 +). If excitation is needed in the loop, connect pin 3 (V_{pwr}) to pin 16 (4-20 +), and connect the output cable to pin 4 (4-20 -) and pin 17 (Gnd).

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 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 Temperature 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 SciTemp™ Temperature Sensor Flow Thru Temperature Sensors

| | |
|---------------------------------------|---|
| Material, Fluid Contact: | Natural PP, meets USP Class VI and FDA 21 CFR 177.1520 Medical Grade Polysulfone meets USP Class VI and FDA 21CFR177.1520. All Wetted Materials are made of Animal-Free Compounds. Compatible with Most Sanitizing Agents such as NaOH, Hypochlorite. Sensors can be repeatedly autoclaved. |
| Sensor Type: | Thermistor, Epoxy Coated, 2252 ohm. |
| Temperature Sensor Range: | -40 to +150 ° C for all sizes. |
| Temperature Sensor Accuracy: | 0.01° C In the 4.0 to 70.0° C Range. |
| Temperature Sensor Resolution: | 0.01° C. |
| Temperature Sensor Microchip: | EPROM, stores Device ID & Factory Cal Data |
| Temperature Sensor Cleaning: | Sensors may be flushed with Alcohol, 0.1M or 0.5M NaOH, dilute Bleach, or Formaldehyde for inline sanitization several times. The Sensors may also be autoclaved. See section 4.0. |
| Sensor Connector and Cables: | Lockable & Waterproof |

Part B: SciTemp™ Temperature Sensor Monitor Software

1.0 Software Overview:

The SciTemp™ Temperature Monitor digitally displays inputs from up to two disposable SciTemp™ Temperature Sensors simultaneously, and displays the Differential Temperature.

The Main Menu allows you to change the temperature units (C or F), the high and low analog range settings, adjust the baud rate and print time, as well as configure user-defined Hi/Low temperature alarms for both displayed values.

The SciTemp™ Temperature Monitor will also allow custom calibration of the sensors thru the use of the “Sensor” button on the front panel.

(The remainder of this page intentionally left blank.)

2.0 Main Menu

Main screen:

T1: 0.00 T2: 0.00
TD: 0.00

See 2.1

Menu C or F

TEMP UNITS: C

See 2.2

Menu 100 C or 121 F Max

RANGE HI: 100 C
Analog out at 100 %

See 2.3

Menu 0 C or 32 F

RANGE LO: 0.0 C
Analog out at 0 %

See 2.4

Menu

Baud: 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 See HI Range above

HI-ALARM T1: 0.0 C

See 2.7

Menu Min: 0.00

LO-ALARM T1: 0.0 C

See 2.8

Menu See HI Range above

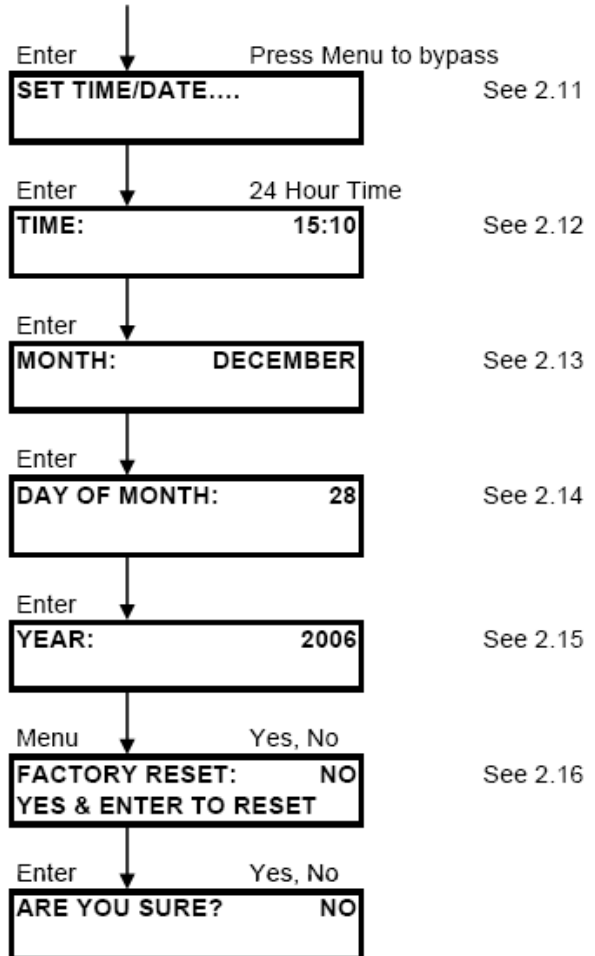
HI-ALARM T2: 0.0 C

See 2.9

Menu Min: 0.00

LO-ALARM T2: 0.0 C

See 2.10



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 both temperatures, T1 and T2 to a resolution of 0.01
- 2.2 **Temperature Units:** Use the up/down arrows to select between C (Celsius) and F (Fahrenheit).
- 2.3 **Range Hi:** Use to set the upper range limit of the Analog output signal (100% full scale). Allowable maximums are 100.0 °C, 212.0 °F. Default = **100.0 °C**.
- 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 the 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 **Hi-Alarm T1:** Used to set High Temperature Alarm, value should be within High and Low Range set in 2.3 and 2.4 above. Hi-Alarms exist for both temperature outputs. Default = **0.0 psi**.
- 2.8 **Lo-Alarm T1:** Used to set Low Temperature Alarm, value should be within High and Low Range set in 2.3 and 2.4 above. Lo-Alarms exist for both temperature outputs. Default = **0.0 psi**.
- 2.9 **Set Time/Date.....:** Press Enter to enter this submenu, press Menu to bypass to Factory Reset.
- 2.10 **Time:** Use up/down arrows to set current time in 24 hour format, HH:mm, and press Enter.
- 2.11 **Month:** Use up/down arrows to set current Month, and press Enter.
- 2.12 **Day of Month:** Use up/down arrows to set current Date, and press Enter.
- 2.13 **Year:** Use up/down arrows to set current Year, and press Enter.
- 2.14 **Factory Reset:** Used to restore the SciTemp™ Temperature Sensor 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.

3.0 CUSTOM CALIBRATION

PRESS SENSOR BUTTON. THE FOLLOWING WILL BE DISPLAYED:

SENSOR PORT: T1

USE UP/DOWN ARROWS TO CHOOSE PORT. PRESS ENTER, AND CAL DATA WILL RELOAD AND PRESENT THE NEXT SCREEN:

CUSTOM CAL....

Press Enter

SENSOR PORT: P1

See 3.1

Enter

CAL TEMP: 25.00 C

See 3.2

Enter

**CUSTOM CAL SENSOR
PRESS ENTER TO CAL**

See 3.3

Enter

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

See 3.4

**CUSTOM CAL FACTOR:
CF: 3.61**

See 3.5

**CALIBRATION ERROR!
OUT OF RANGE**

See 3.6

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

See 3.7

3.0 Custom Calibration Menu:

SUMMARY: This menu shows the settings used for performing a custom calibration of a given disposable temperature sensor. This allows you to calibrate the unit using a different temperature standard using a NIST traceable thermometer if you wish. This procedure adds a modification to the existing Factory Calibration, it does not replace it, and it can be reset if needed.

After connecting the sensor, press the “Sensor” button, you will be prompted for the sensor to re-load, 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 T1 or T2 and press “Enter”.
Default = T1.
- 3.2 **Cal Temp:** To Re-Cal the sensor at a specific value, use the up/down arrows to select the temperature being used for the custom calibration and press enter. To bypass, press “Exit”.
- 3.3 **Custom Cal Sensor:** When you reach this screen, and are ready to perform the custom calibration at the upper limit. Be sure you have verified the temperature of the calibration solution using a NIST traceable thermometer. Press the “Enter” key to perform the calibration. You may press “Exit” to cancel the process.
- 3.4 **Cal in Progress:** This screen is displayed during the calibration, and will count up to 10 to complete the custom calibration.
- 3.5 **Custom Cal Factors:** This screen displays the Custom Cal Factor, (CCF).
- 3.6 **Calibration Error! / Out of Range:** This message will be displayed if the temperature is out of range. I. E. you’ve tried to perform a custom calibration at 100 °C with the sensor at room temperature.
- 3.7 **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 SciTemp™ Temperature Sensor Printout Format

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

```
1/28/08 0.14
02/01/08; SciTemp v0.14; UNITS=C; ALARMS: HT1= 0.00; LT1= 0.00; HT2= 0.0
0; LT2= 0.00;
Sensor 1 ID=A1-210151-0108; CF= 0.16; CCF= 0.00;
Sensor 2 ID=A1-210186-0108; CF= -0.15; CCF= 0.00;
RT,      T1,  T2,
10:52:58, 21.72, 21.96,
10:53:18, 21.72, 21.96,
10:53:23, 21.72, 21.96,
10:53:28, 21.72, 21.96,
10:53:33, 21.72, 21.96,
10:53:38, 21.72, 21.96,
10:53:43, 21.72, 21.96,
10:53:48, 21.72, 21.96,
10:53:53, 21.72, 21.96,
10:53:58, 21.72, 21.96,
10:54:03, 21.72, 21.96,
```

Abbreviations:

RT = Real Time

T2 = Temperature at Sensor T2

T1 = Temperature at Sensor T1

CF = Calibration Factor

CCF = Custom Calibration Factor

Alarms:

HT1 / LT1 = Hi / Low Temperature @ T1

HT2 / LT2 = Hi / Low Temperature @ T2



Please Note: SciTemp™ SciDoc Software is available to collect this data automatically into an Excel spreadsheet. See Section 5.

5.0 Data Collection

Summary: The SciTemp™ Temperature 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.

SciTemp™ 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 Remainder of This Page Intentionally Left Blank)

5.1 SciTemp™ Temperature Sensor Data Collection Software:

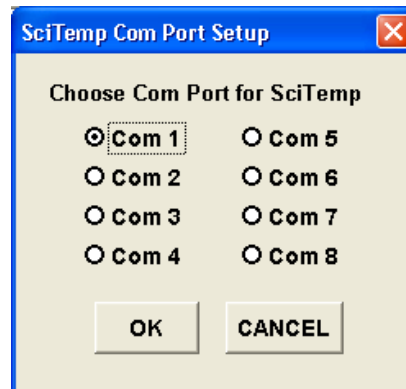
SciTemp™ has made available a software package that captures the data output of the SciTemp™ Temperature Monitor and places it in an Excel spreadsheet in real time. This spreadsheet also populates a graph to aid you in the analysis of your process. It consists of a copy of WinWedge32 and a customized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

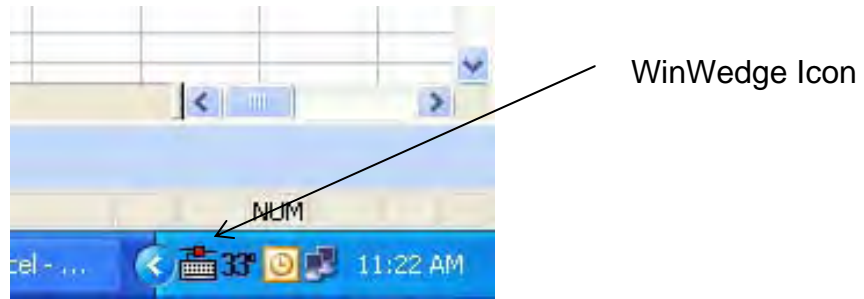


Press “Enable Macros” to begin the process for data collection. If you are not presented with this screen, you need to adjust the security level Excel’s Macros. Choose Tools – Macros – Security from the Menu Bar, and set the Security level to Medium. Then close and re-open the file, and you will be able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

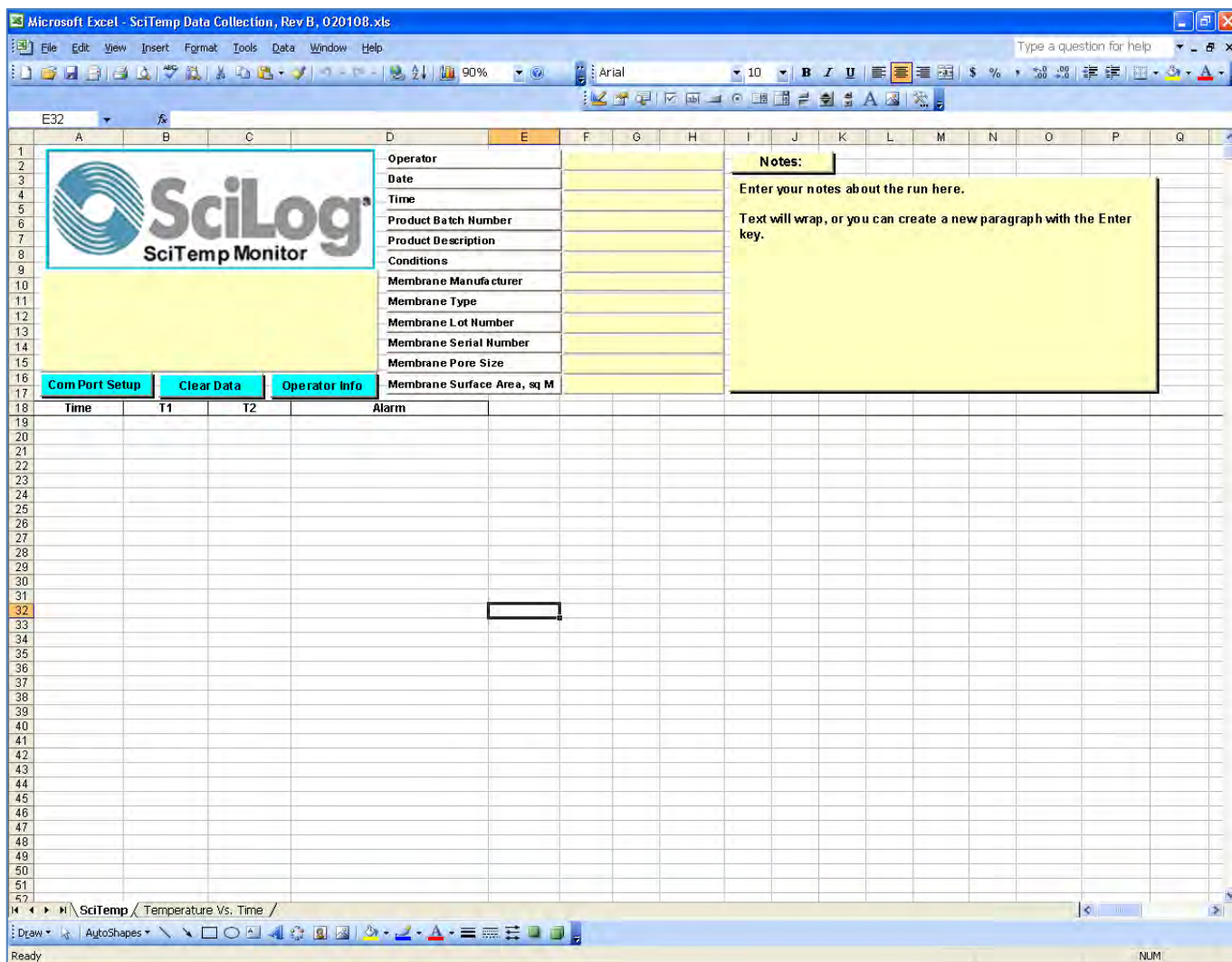
A dialog box titled 'UserForm1' with a blue title bar and a red close button. It contains a list of input fields for operator information. The fields are: Operator, Date, Time, Product Batch Number, Product Description, Conditions, Membrane Manufacturer, Membrane Type, Membrane Lot Number, Membrane Serial Number, Membrane Pore Size, and Membrane Surface Area, Square Meters. At the bottom of the dialog box are two buttons: 'OK' and 'Cancel'.

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



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

Clicking on “OK” leaves you with this screen, ready to get started collecting data from the SciTemp™ Temperature Sensor:



When ready, turn on the SciTemp™ Temperature Monitor, pressing the “On / Stby” button, or connect the disposable temperature sensor. The monitor will load the calibration data from the sensor, and place that information in the spread sheet. 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 SciTemp™ Temperature Sensor and Monitor. This will list the version, the calibration data, all operating parameters, alarm settings and alarm limits.

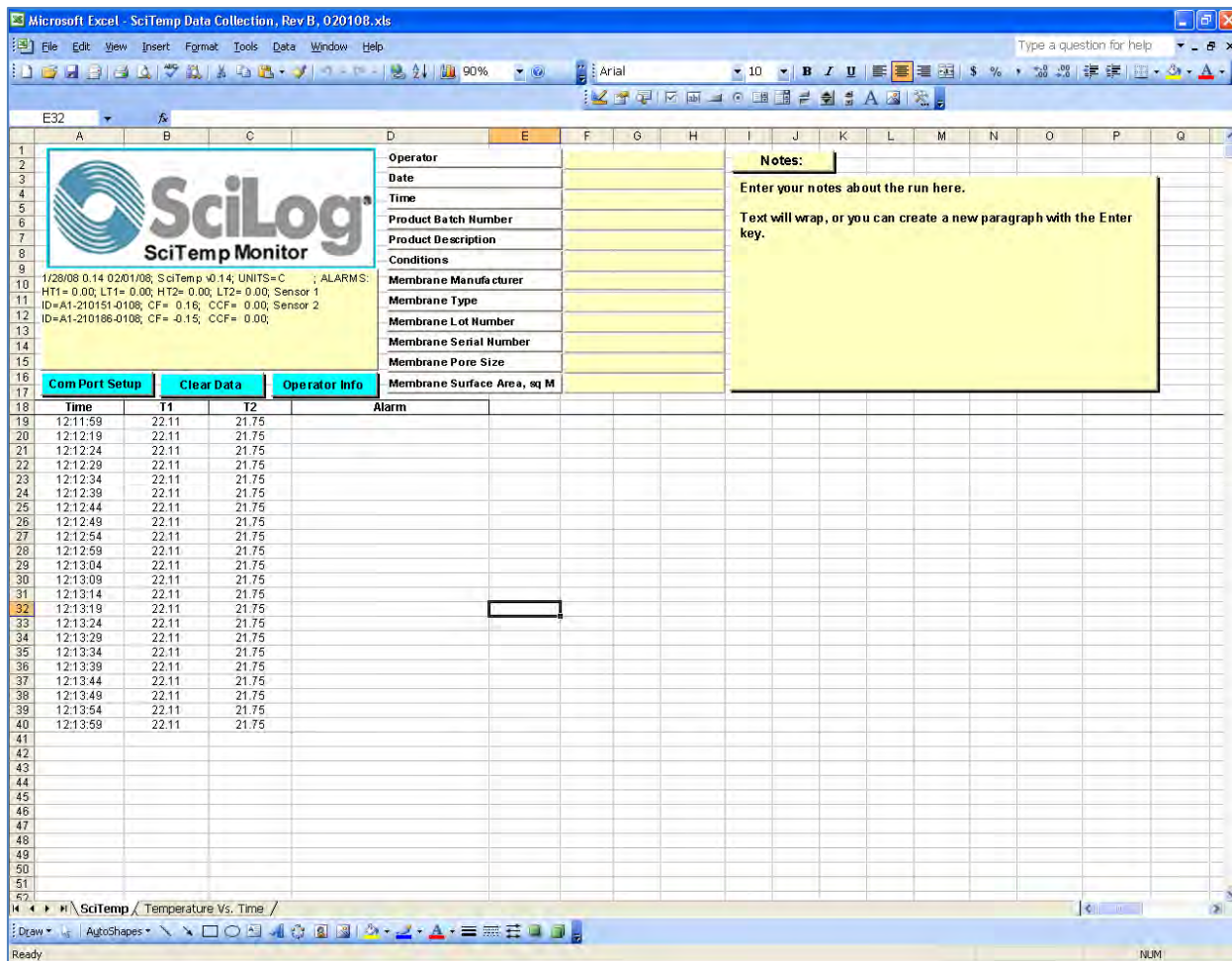


Note: If you have clicked on “Cancel on either of the two previous screens, you may click on the “Com Port Setup” or “Operator Info” buttons to complete these tasks.

A chart of Temperature 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, 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.

5.2 PC HyperTerminal Settings:

SciTemp™ Temperature Monitor to PC: PC communications via the Serial Port labeled “Printer / PC” requires a SciTemp™ RS-232 Cable. NOTE: When you are not using the SciTemp 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 SciTemp™ Temperature 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. SciTemp™ Temperature 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 “**SciTemp™ Temperature 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 “SciTemp™ Temperature Sensor Setup” screen.

Press “**Ok**” at the bottom of the “SciTemp™ Temperature Sensor Property – Setting” screen

Appendix A: Sensor Performance Data

| SciTemp Sanitization Protocol (1): | | | | | | |
|------------------------------------|---------|-----------|-------|------------------|-------------------|-----------------------|
| Sanitizing Agent (2) | Conc. | Temp. ° C | pH | Pressure psi (4) | Contact Time, Min | Sani-Cycles Limit (3) |
| NaOH | 0.10 N | 20-30 | 13 | 0 - 10 | 15-30 | 10 |
| NaOH | 0.50 N | 20-30 | 13 | 0 - 10 | 15-30 | 10 |
| NaOCl (5) | 500 ppm | 20-30 | 7 - 8 | 0 - 10 | 15-30 | 10 |
| Formaldehyde Solution | 1 - 2% | 20-30 | 5 - 8 | 0 - 10 | 30 | 10 |
| Isopropyl Alcolol | 70% | 20-30 | | 0 - 10 | 15-30 | 10 |

Notes:

- (1) SciTemp sensor sanitization should be performed after flow cell has been thoroughly cleaned and flushed with distilled water.
- (2) SciTemp 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 by excessive cleaning / sanitization.
- (3) Recommended, Maximum Number of Cleaning / Sanitization cycles.
- (4) Do Not Exceed Recommended Sanitizing Pressure Range
- (5) 1:100 dilution of Clorox Bleach, 500 ppm of Active Chlorine

Test Protocol: Pre-calibrated SciTemp flow-through Temperature 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.

SciLog DN 3131: SciTemp Temperature Sensor, Post Autoclaving Sensor Response

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

| SciTemp, Luer Sensor ID | Pre-Autoclave | | | Post Trial 1 | | | Post Trial 2 | | | Post Trial 3 | | |
|-------------------------|---------------|--------------|------|--------------|--------------|-------|--------------|--------------|-------|--------------|--------------|-------|
| | NIST T1 | SciTemp T2 | ΔT | NIST T1 | SciTemp T2 | ΔT | NIST T1 | SciTemp T2 | ΔT | NIST T1 | SciTemp T2 | ΔT |
| A1-210164-0108 | 25.07 | 25.00 | 0.07 | 25.01 | 25.03 | -0.02 | 24.88 | 24.96 | -0.08 | 25.05 | 24.96 | 0.09 |
| A1-210165-0108 | 25.07 | 25.02 | 0.05 | 25.01 | 25.05 | -0.04 | 24.88 | 24.96 | -0.08 | 25.05 | 25.05 | 0.00 |
| A1-210166-0108 | 25.07 | 25.04 | 0.03 | 25.01 | 25.06 | -0.05 | 24.88 | 24.98 | -0.10 | 25.05 | NR | |
| A1-210167-0108 | 25.07 | 25.05 | 0.02 | 25.01 | 25.04 | -0.03 | 24.88 | 24.91 | -0.03 | 25.05 | 24.98 | 0.07 |
| A1-210168-0108 | 25.07 | 25.06 | 0.01 | 25.01 | 25.05 | -0.04 | 24.88 | 24.94 | -0.06 | 25.05 | 25.07 | -0.02 |
| Group Average | | 25.03 | | | 25.05 | | | 24.95 | | | 25.02 | |
| Group SD* | | 0.02 | | | 0.01 | | | 0.03 | | | 0.05 | |

* SD = Standard Deviation

NR = No and/or Erratic Response

Test Protocol: Prior to autoclaving, factory-calibrated SciTemp sensors (5) were removed from inventory and temperature-tested at 25.00 °C in a temperature equilibrated glove box. The "out-of-box" sensor response data is listed as "Pre-Autoclave" in the table above. The SciTemp sensor air-vent as well as the 8-pin sensor connector were sealed 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: 18 psi, 4. Drying Time 30 min. After each trial, the SciTemp sensors were placed in a temperature equilibrated glove box for 45 minutes. Utilizing a peristaltic pump, a temperature equilibrated solution (0.100 molar KCl, 25 °C) was re-circulated through the in-line SciTemp sensor assembly. An in-line NIST-traceable thermistor was used as a temperature reference. Four of the five SciTemp sensors survived the three autoclaving trials while maintaining good sensor accuracy and precision during the initial autoclave cycles. All trial measurements were carried out with the original factory calibration. No sensor calibration were made before, during or after the three post-autoclave trials.

Summary: *Sensor accuracy becomes increasingly compromised after the 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

Released 4/30/08, SciLog Metrology, KS

SciLog DN 3027: SciTemp Sensors-Monitor Accuracy and Precision

| SciTemp Sensor ID | NIST Reference °C | SciTemp Monitor Input | |
|-----------------------|-------------------------|-----------------------|---------------|
| | | T1 °C | T2 °C |
| A1-210159-0108 | 25.68 | 25.70 | 25.70 |
| A1-210160-0108 | 25.68 | 25.68 | 25.69 |
| A1-210161-0108 | 25.68 | 25.67 | 25.67 |
| A1-210162-0108 | 25.68 | 25.68 | 25.69 |
| A1-210163-0108 | 25.68 | 25.67 | 25.68 |
| A1-210164-0108 | 25.68 | 25.68 | 25.69 |
| A1-210165-0108 | 25.68 | 25.67 | 25.69 |
| A1-210166-0108 | 25.68 | 25.67 | 25.68 |
| A1-210167-0108 | 25.68 | 25.68 | 25.69 |
| A1-210168-0108 | 25.68 | 25.69 | 25.70 |
| Group Average: | 25.68 | 25.679 | 25.688 |
| Group SD*: | 0.000 | 0.010 | 0.009 |

*Standard Deviation

Test Summary: For the group of 10 SciTemp sensors, the sensor to sensor accuracy level is within +/- 0.01 °C of the NIST-traceable reference thermistor. The accuracy of monitor input channels T1 and T2 for a given sensor is within +/-0.02 °C. The group averages for input channels T1 and T2 vary by 0.010 °C. The collected data show accuracy and precision levels of sensors and monitors to be well within the established levels of +/- 0.10 °C

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: The I/O channels "T1" and "T2" of SciTemp monitor ST0208B-1012 were previously factory calibrated. Ten pre-calibrated sensors were used to test the sensor/monitor accuracy and precision. In a temperature controlled glove box, the sensors were assembled in-line and hooked up to a re-circulating peristaltic pump. A temperature-equilibrated (25.68 °C) solution (0.100N KCl) was pumped (150ml/min) through the sensor assembly for 30 minutes. A NIST-traceable thermistor was used as a temperature reference and included in the sensor test assembly.

Released, 4/16/08, SciLog Metrology, KS