

Protégé™ Portable Gas Monitor



WARNING

READ AND FOLLOW THE ENTIRE CONTENT OF THIS MANUAL PRIOR TO USE. FAILURE TO DO SO MAY RESULT IN SERIOUS INJURY OR DEATH.

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1. Safety and General Information

WARNING

ALL INDIVIDUALS WHO HAVE OR WILL HAVE RESPONSIBILITY FOR USING OR TESTING THIS PRODUCT MUST READ AND UNDERSTAND THE CONTENTS OF THIS MANUAL. THE PRODUCT WILL PERFORM AS DESIGNED ONLY IF USED AND TESTED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS. FAILURE TO FOLLOW MANUFACTURER'S INSTRUCTIONS WILL RENDER THE WARRANTY AND APPROVALS NULL AND VOID. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY ALSO RESULT IN SERIOUS INJURY OR DEATH.

1.1. Important Notices

Scott Health and Safety can take no responsibility for use of its equipment if it is not used in accordance with the instructions. If further operational or maintenance details are required but not provided in this manual, contact Scott Health and Safety or their agent. Scott Health and Safety shall not be liable for any incidental or consequential damages in connection with any modifications, errors or omissions in this manual. While every effort has been made to ensure accuracy in this owner's manual, no responsibility can be accepted for errors or omissions. This publication is not intended to form the basis of a contract, and the company reserves the right to amend the design, content, and specifications of the detector without notice. Additionally, industry standards, codes, and legislation are subject to change. Updated copies should be obtained by users to ensure the most recently issued regulations, standards and guidelines are available.

The Protégé detector can be configured with multiple gas sensors in order to provide gas specific protection for the user's application and compliance requirements.

1.2. Certifications and Approvals

The Protégé has been tested and complies with the following directives, standards, or standardized documents:

UL913	EN 60079-0	IEC 60079-0
	EN 60079-1	IEC 60079-1
	EN 60079-11	IEC 60079-11

USA



CLASS I DIVISION 1 GROUPS A B C D

Ambient temperature: -20° C to +50°C

INTERNATIONAL



Ex d ia IIC T4

DEMKO 08 ATEX 0813482X

Ambient temperature: -20° C to +50°C

1.3. Warnings, Cautions, and Notes

Throughout this document, warnings, cautions, and notes have been interspersed to draw attention to potentially unsafe, hazardous, or unique situations that require user attention. Each warning, caution, or note is labeled and quickly identified using an icon.

WARNING - INDICATES A POTENTIALLY HAZARDOUS SITUATION, WHICH, IF NOT AVOIDED, COULD RESULT IN DEATH OR SERIOUS INJURY.

CAUTION - INDICATES A POTENTIALLY HAZARDOUS SITUATION THAT, IF NOT AVOIDED, MAY RESULT IN MINOR OR MODERATE INJURY. IT MAY ALSO BE USED TO ALERT AGAINST UNSAFE PRACTICES.

NOTE - HIGHLIGHTS VARIOUS INSTANCES WHERE AN ATTENTION TO DETAIL IS CRITICAL TO PRODUCT PERFORMANCE.

1.3.1. General Warnings and Cautions

The following list of warnings and cautions pertain to the general use and care of the Protégé. Failure to follow these warnings and cautions may result in death, injury, or poor equipment performance.

WARNINGS

TO PREVENT IGNITION OF AN EXPLOSIVE ATMOSPHERE, READ AND ADHERE TO THE MANUFACTURER'S LIVE MAINTENANCE PROCEDURES.

READ THIS MANUAL FOR INTRINSIC SAFETY PRECAUTIONS. SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY, RESULTING IN SERIOUS INJURY OR DEATH.

A HIGH OFF-SCALE READING MAY INDICATE EXPLOSIVE CONCENTRATION.

TO PREVENT IGNITION OF A HAZARDOUS ATMOSPHERE, THE PROTÉGÉ MUST BE CHARGED IN AN AREA KNOWN TO BE NONHAZARDOUS.

PUMP ACTIVATION IS VERIFIED AFTER THE BLOCK PUMP, CLEAR PUMP COMMANDS HAVE BEEN COMPLETED. CONNECTING A PUMP TO THE PROTÉGÉ WHEN THE PROTÉGÉ IS ALREADY POWERED ON REQUIRES PUSHING THE LEFT BUTTON TO BEGIN ACTIVATION.

CAUTIONS

VERIFY THE GAS INLET PORTS ARE FREE OF DIRT AND DEBRIS PRIOR TO USE.

NO GAS WILL BE DETECTED WHILE IN THE SET-UP MODE.

DO NOT EXPOSE THE DETECTOR TO SEVERE MECHANICAL OR ELECTRICAL SHOCK. ALWAYS CONDUCT MONITOR STARTUP AND BUMP TEST PROCEDURES AFTER SUCH EXPOSURE TO VERIFY THE MONITOR'S OPERATION AND ACCURACY.

1.3.2. Combustible Sensor Warnings and Cautions

The following list of warnings and cautions pertain to the general use and care of the sensors within the Protégé.

Failure to follow these warnings and cautions may result in death, injury, or poor equipment performance.

WARNINGS

EXTENDED EXPOSURE OF THE DETECTOR TO HIGH CONCENTRATIONS OF TOXIC OR COMBUSTIBLE GASES MAY RESULT IN DEGRADED SENSOR PERFORMANCE. IF AN ALARM OCCURS DUE TO HIGH CONCENTRATION OF COMBUSTIBLE GASES, RECALIBRATE THE MONITOR OR, IF NEEDED, REPLACE THE SENSOR.

THE COMBUSTIBLE SENSOR REQUIRES 10% OXYGEN IN THE ATMOSPHERE TO OPERATE. IF YOU ARE UNAWARE OF THE OXYGEN CONCENTRATION OR IF THE OXYGEN CONCENTRATION IS BELOW 10% DO NOT USE THE PROTÉGÉ TO MONITOR FOR COMBUSTIBLE GAS CONCENTRATIONS.

CAUTIONS

DO NOT USE ANY SOLVENTS, CHEMICALS, OR POLISHES CONTAINING SILICON COMPOUNDS TO CLEAN THE DETECTOR AS THESE CAN CAUSE DAMAGE TO THE SENSOR.

SENSITIVITY OF THE COMBUSTIBLE GAS SENSOR CAN BE ADVERSELY AFFECTED BY EXPOSURE TO SULFUR COMPOUNDS, HALOGENS, SILICONE OR LEAD CONTAINING COMPOUNDS, OR PHOSPHORUS CONTAINING COMPOUNDS. AVOID EXPOSURE TO THESE SUBSTANCES. SHOULD THE DETECTOR BE SUSPECTED OF BEING EXPOSED TO SUCH SUBSTANCES, PERFORM A GAS TEST TO VERIFY ITS ACCURACY AND THAT IT IS CALIBRATED ACCORDINGLY.

1.3.3. Battery Warnings and Cautions

The following list of warnings and cautions pertain to the general use and care of the rechargeable battery installed within the Protégé.

Failure to follow these warnings and cautions may result in death, injury, or poor equipment performance.

WARNINGS

DO NOT ATTEMPT TO CHARGE THE BATTERY CELLS IN POTENTIALLY HAZARDOUS AREAS.

CAUTIONS

NO ATTEMPT SHOULD BE MADE TO ALTER OR REPAIR THE CHARGER.

DO NOT ATTEMPT TO REPLACE THE MONITOR'S BATTERY. RETURN TO SCOTT HEALTH AND SAFETY FOR REPLACEMENT OR REPAIRS.

A FULLY DISCHARGED BATTERY CAN LEAD TO THE LOSS OF MONITOR DATE AND TIME RESULTING IN THE POTENTIAL FOR ERRONEOUS EVENT LOGGING DATA. RECHARGE BATTERY IMMEDIATELY WHEN BATTERY WARNING IS ENCOUNTERED.

BATTERY LIFE (INSTRUMENT RUN TIME) WILL BE REDUCED AT LOW TEMPERATURES.

RECHARGE BATTERY PACK AS SOON AS THE DETECTOR INDICATES A LOW BATTERY ALARM.

1.4. General Rules for Use of the Protégé

It is critical that this gas detector be used and maintained properly. Failure to do so could jeopardize the people whose lives depend on its operation and cause injury or death.

- **USE THE MONITOR CORRECTLY!** Only use the Protégé to monitor the atmosphere for the gases and concentrations for which it is set-up to detect.
- **POWER MUST BE ON TO WORK.** The Protégé will only detect gases while powered on and not while connected to the PC or in Calibration mode. Immediately charge battery when a low battery alarm occurs.
- **PERFORM A DAILY FUNCTIONAL BUMP TEST** Before each day's use, test the sensors using a known concentration of calibration gas. The monitor should indicate a gas concentration within 10% of the actual gas listed on the calibration cylinder label. When the gas indication is outside the 10% limit span calibration should be performed.

WARNING

PERFORM A BUMP TEST EVERY DAY. FAILURE TO PERFORM A DAILY FUNCTIONAL TEST COULD LEAD TO SERIOUS INJURY OR DEATH.

- **BE AWARE OF Poisoned Combustible Sensors!** Operation of catalytic type combustible gas sensors may be seriously affected by silicones, free halogens, halogenated hydrocarbons and metallic oxides present in the ambient air being monitored. If the presence of any of these substances is suspected, increased frequency of calibration verification is recommended.
- **WHEN IN DOUBT – LEAVE THE AREA IMMEDIATELY!** Users should leave the area immediately should the Protégé indicate a warning or alarm condition. Users should know and understand their company's safety protocols.
- **CALIBRATION IS CRITICAL!** Calibration should be performed periodically that takes into account monitor use and environment conditions.
 - Additionally, the Protégé should always be re-calibrated:
 - After exposure to high concentrations of toxic or combustible gases or vapors.
 - If the monitor is dropped, or the monitor is drenched in water or submerged.
 - After a change in monitor custody.
- **ALARMS AND OUT-OF-RANGE CONDITIONS!** Operators should be aware of conditions where the concentration of the gas is outside the detectable range of the monitor. If the monitor indicates an over-range condition, leave the area immediately. If an over-range condition is encountered, perform a Bump Test to ensure monitor functionality. If the monitor fails the Bump Test, perform a full calibration procedure.

1.5. Warranty Statement

SCOTT HEALTH & SAFETY LIMITED WARRANTY ON Protégé™ Gas Monitor

Scott Health & Safety (SCOTT), a division of Scott Technologies Inc. warrants its Protégé PORTABLE GAS DETECTION PRODUCTS (THE PRODUCTS) to be free from defects in workmanship and materials for a period of two (2) years from the date of original manufacture by SCOTT. This warranty applies to all components of THE PRODUCTS supplied at the time of original sale of THE PRODUCTS, EXCEPT pump and consumable filters. SCOTT warrants pump supplied with THE PRODUCTS to be free from defects in workmanship and materials for one (1) year from the date of original manufacture by SCOTT. SCOTT's obligation under this warranty is limited to replacing or repairing (at SCOTT's option) THE PRODUCTS or components shown to be defective in either workmanship or materials.

Only personnel of SCOTT or, when directed by SCOTT, authorized SCOTT agents are permitted to perform warranty obligations. This warranty does not apply to defects or damage caused by any repairs of or alterations to THE PRODUCTS made by owner or any third party unless expressly permitted by SCOTT product manuals or by written authorization from SCOTT. To obtain performance under this warranty, and as a condition precedent to any duty of SCOTT, the purchaser must return such products to SCOTT, a SCOTT authorized distributor or a SCOTT authorized service center. Any product returned to SCOTT shall be sent to "SCOTT HEALTH & SAFETY" (Attn: Warranty Claim Dept.), P.O. Box 569, Monroe, NC 28111.

This warranty does not apply to any malfunction of or damage to THE PRODUCTS resulting from accident, alteration, misuse, or abuse.

THIS WARRANTY IS MADE IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN ADDITION, SCOTT EXPRESSLY DISCLAIMS ANY LIABILITY FOR SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES IN ANY WAY CONNECTED WITH THE SALE OR USE OF SCOTT PRODUCTS, AND NO OTHER FIRM OR PERSON IS AUTHORIZED TO ASSUME ANY SUCH LIABILITY.

1.6. Acronyms Quick Reference

Throughout the duration of this manual, several acronyms are used. Provided in [Table 1-1](#) is a quick reference chart to quickly identify any acronym that may be unfamiliar to users.

Table 1-1. Acronym Quick Reference List

Acronym	Definition
AC	Alternating Current
CO	Carbon Monoxide
°C	Degrees Celsius
°F	Degrees Fahrenheit
H ₂ S	Hydrogen Sulfide
ID	Inside Diameter
JRE	Java Runtime Environment
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LEL	Lower Explosive Limit
O ₂	Oxygen
PC	Personal Computer
ppm	Parts per million
RH	Relative Humidity
STEL	Short Term Exposure Limit
TWA	Time Weighted Average
USB	Universal Serial Bus

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2. Introduction

The Protégé unit comes installed with a re-chargeable lithium ion battery and sensors already installed and ready for use. A CD-ROM containing the Protégé Gas Monitor software comes with the unit and must be installed to modify Protégé settings or capture data from the unit.

Depending on the sensors it is equipped with, the Scott Protégé personal multi-gas monitor is designed for monitoring the atmosphere for potentially hazardous levels of combustible gases, oxygen enrichment or depletion, carbon monoxide, and hydrogen sulfide.

Gas indication is displayed to users by a direct reading backlit LCD, multiple bright LEDs, a loud audible alarm, and a vibratory alarm. The Protégé includes a downloadable data log for up to 4000 events and records STEL / TWA / PEAK exposures, calibrations, and gas values. A built-in USB port on the charging module allows the monitor's data log to be downloaded and, when used with the Protégé's interface software (included), allows users to quickly configure its operating and alarm parameters.

The Protégé is powered by a long life rechargeable lithium-ion battery. An optional sample draw pump is available for remote sampling. Additionally, an optional multi-charger is available that will charge up to six Protégé units simultaneously.

Refer to [Figure 2-1](#) and [Figure 2-2](#).

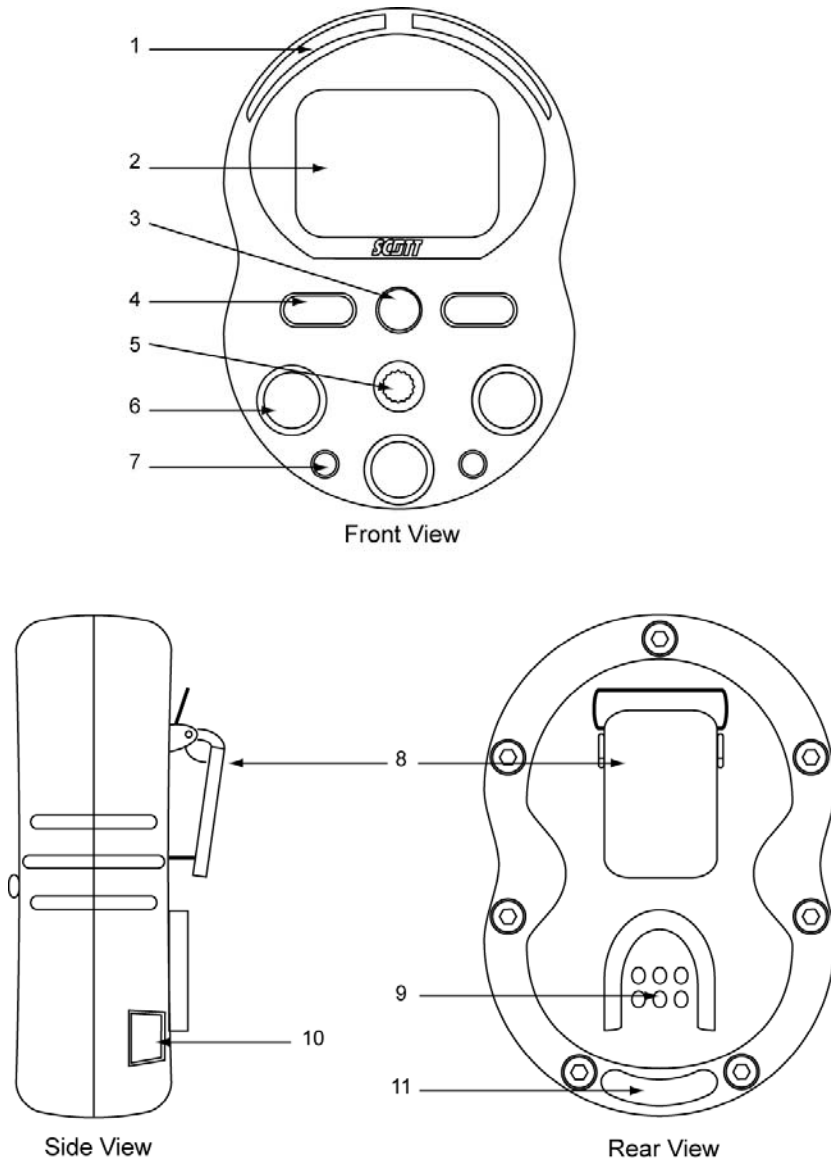


Figure 2-1. Protégé Components

Table 2-1. Protégé Components

Number	Component
1	LED alarms (2)
2	LCD Display
3	Audible Alarm Port
4	Operation Button (2)
5	Threaded Port for Pump
6	Gas Inlet Port (3)
7	Power Contacts for Pump
8	Alligator Clip
9	Charge/Communication Shoe Pad
10	Calibration Adapter Receiving Pad
11	Pump Receiving Tab

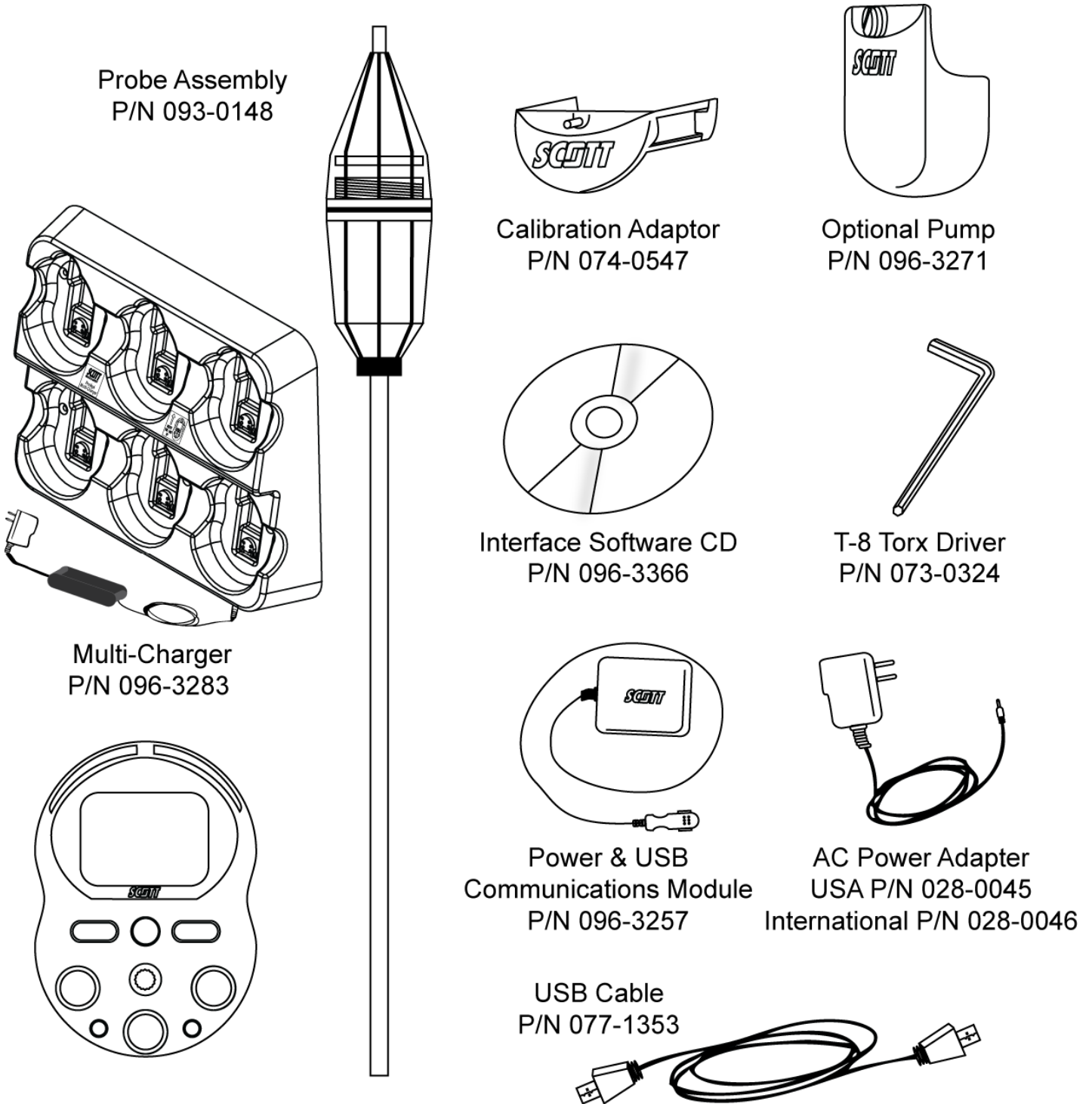


Figure 2-2. Protégé Accessories

2.1. Sensor Specifications

Hydrogen Sulfide Sensor Specifications

Range:	0 to 500 ppm
Response Time:	T90 < 30 sec
Operating Temp:	-4.0° F to +122° F / -20° C to +50° C
Humidity:	15% to 90% RH, Non-Condensing
Storage Temp:	+32° F to +68°F / 0° to 20° C
Sensor Cross Sensitivity:	
Carbon Monoxide at 300 ppm:	< 2 ppm
Sulfur Dioxide, 5 ppm:	approx. -1 ppm
Nitric Oxide, 35 ppm:	< 1 ppm
Hydrogen, 10,000 ppm:	< 10 ppm
Nitrogen Dioxide, 5 ppm:	approx. 1 ppm

Carbon Monoxide Sensor Specifications

Range:	0 to 999 ppm
Response Time:	T90 < 25 seconds
Operating Temp:	-4° to +122° F / -20° to +50° C
Humidity:	15 to 90% RH, Noncondensing
Storage Temp:	+32° to +68° F / 0° to 20° C
Sensor Cross Sensitivity:	
Filtered against H ₂ S, 15 ppm:	< 0.5 ppm
Filtered against SO ₂ , 5 ppm:	approx. 0 ppm
Nitric Oxide, 35 ppm:	< 3 ppm
Nitrogen Dioxide, 5 ppm:	approx. -1 ppm
Chlorine, 1 ppm:	approx. 0 ppm
Hydrogen, 100 ppm:	< 40 ppm
Ethylene, 100 ppm:	< 50 ppm
Ethanol, 200 ppm:	approx. 0 ppm

Oxygen Sensor Specifications

Range:	0.0 to 25.0 %
Response Time:	T95 = 15 seconds
Operating Temp:	-4° to +122° F / -20° to +50° C
Humidity:	0 to 99% RH, Non-condensing
Storage Temp:	+32° to +68° F / 0° to 20° C

Combustible Sensor Specifications

Range:	0 to 80% LEL 0 to 5.0% v/v Gas
Response Time:	T50 = 10 seconds T90 = 30 seconds
Operating Temp:	-40° to + 392° F / -40° to 200° C
Humidity:	0 to 99% RH, Non-condensing
Storage Temp:	+32° to +68° F / 0° to 20° C

2.2. LCD Display

Primary operator interface of the Protégé is via the LCD Display. During operation, continuous data on gas concentrations and alarm conditions will be displayed. Users will also be able to monitor peak values of gas concentrations.

At start up, the display shows current alarm set points for each sensor installed, current date and time, software version installed, and when the next required calibration is due.

WARNING

IF PROTÉGÉ FAILS TO RESPOND PROPERLY UPON START UP, OR IF CALIBRATION IS OUT OF DATE, DO NOT USE MONITOR UNTIL IT HAS BEEN PROPERLY SERVICED OR CALIBRATED. FAILURE TO DO SO COULD RESULT IN DEATH OR INJURY.

Refer to [Figure 2-3](#) and [Table 2-2](#) for more information on LCD Indications.

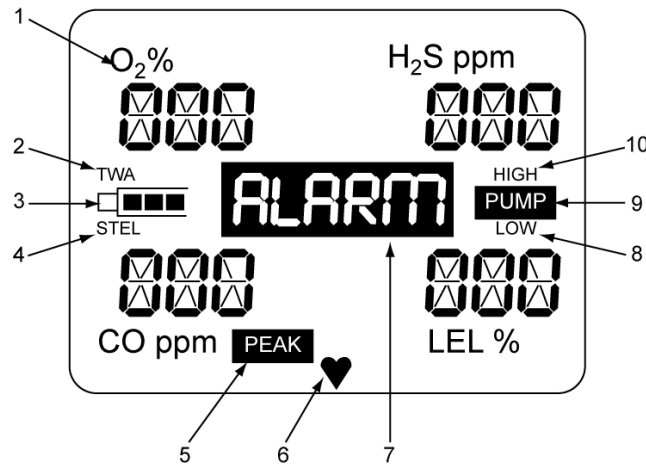


Figure 2-3. LCD Indications

Table 2-2. LCD Indicator Descriptions

Number	Indicator	Description
1	Gas Type Label	Indicates the type gas being detected. Label will blink if an alarm is associated with that gas type.
2	TWA	Indicates TWA displayed when alarm set points have been reached.
3	Battery Charge	Battery charge depletion is indicated as bars disappear to the left.
4	STEL	STEL displayed when STEL alarm set points have been reached.
5	PEAK	Indicates highest gas exposure encountered since turning on the instrument for LEL and toxic sensors; and high and low value for oxygen sensor. Press and release the left button to view.
6	Heart Beat	Blinks to indicate instrument is in monitoring mode. Will not blink during start-up routine or calibration.
7	Alarm	Displayed when alarm set points have been reached.
8	Low Alarm	Indicates low alarm point settings or when low alarms point reached.
9	PUMP	Displayed when pump is activated.
10	High Alarm	Indicates high alarm point settings or when high alarms point reached.

3. Setup

The Protégé unit comes installed with a re-chargeable lithium ion battery and one, two, or three sensors already installed and ready for use. A CD-ROM containing the Protégé Gas Monitor software comes with the unit and must be installed to modify Protégé settings or capture data from the unit.

CAUTION

THE PROTÉGÉ'S BATTERY MUST BE CHARGED PRIOR TO FIRST USE AND DAILY AFTER USE. FAILURE TO DO SO COULD LEAD TO A SHORTAGE OF BATTERY LIFE AND FAILURE OF THE UNIT TO OPERATE.

3.1. Battery

The Protégé is powered by a re-chargeable lithium ion battery. Typical run time is 18 hours with no pump; however, alarming conditions will reduce operating times. Typical charge time is between 4-6 hours. Verify battery is fully charged prior to use.

NOTE

BATTERY LIFE VARIES DEPENDING ON MONITOR USE, ENVIRONMENTAL CONDITIONS, AND BATTERY AGE.

3.1.1. Charging the Battery

To charge the battery, perform the following. Refer to [Figure 3-1](#).

WARNING

DO NOT ATTEMPT TO CHARGE THE BATTERY CELLS IN POTENTIALLY HAZARDOUS AREAS. FAILURE TO DO SO COULD RESULT IN DEATH OR INJURY.

Plug-in the Power and Communications module and connect the Protégé by sliding the connector shoe into the Protégé pad. The monitor's LCD backlighting will illuminate briefly and the battery charge indication icon will begin to blink. The LCD will indicate BATTERY CHARGED on the display when the battery is fully charged.

NOTE

IF A BATTERY VOLTAGE BECOMES VERY LOW, THE BACKLIGHT WILL ILLUMINATE WHEN PLUGGED INTO THE CHARGER, HOWEVER, THE BATTERY CHARGING ICON MAY NOT APPEAR RIGHT AWAY.

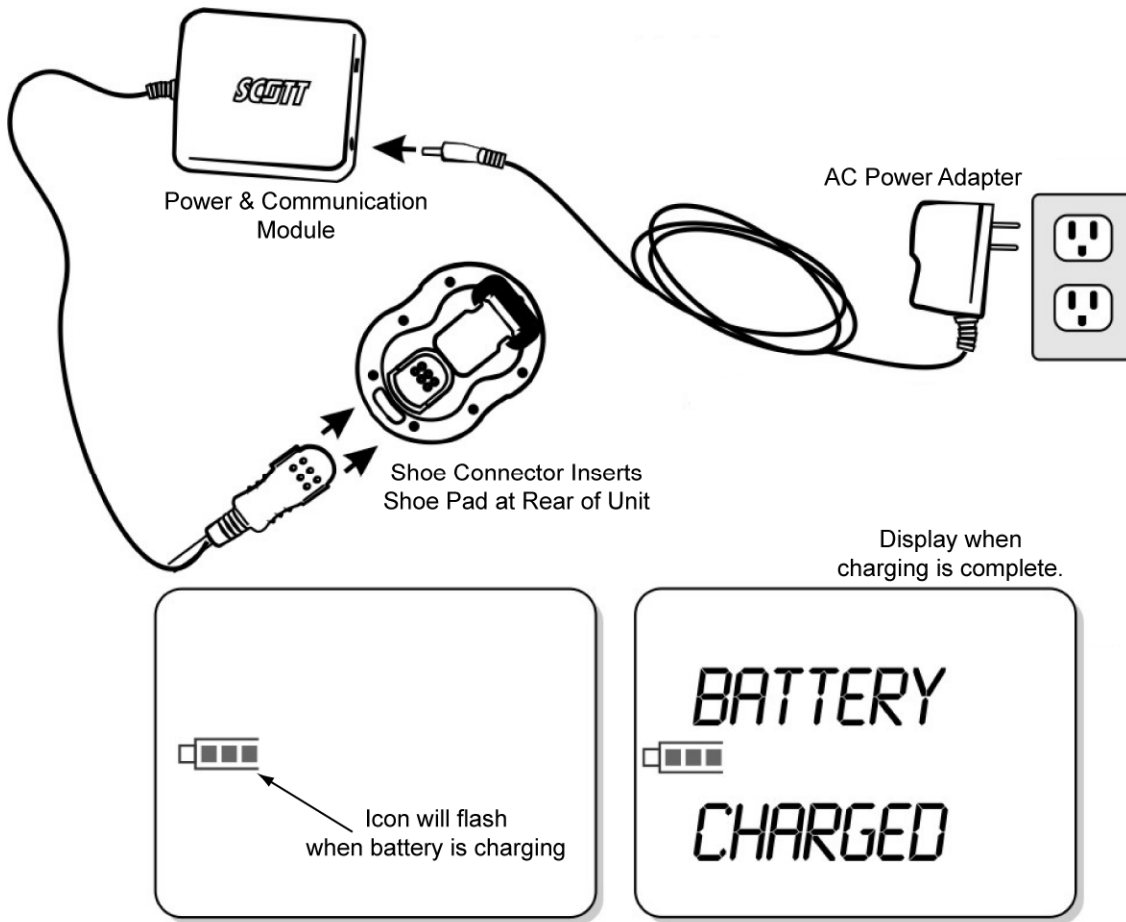


Figure 3-1. Charging the Protégé Battery

NOTE

A FULLY DISCHARGED BATTERY CAN LEAD TO LOSS OF THE MONITOR'S DATE AND TIME SETTINGS CAUSING ERRONEOUS LOGGING OF GAS EVENTS. IF DATE AND TIME ARE LOST, REFER TO [PARAGRAPH 4.6.4](#).

Recharge battery pack as soon as the detector indicates a low battery alarm.

3.1.1.1. Charging the Battery with the Multi-Charger (Optional)

The Protégé Multi-Charger (P/N 096-3283) can be used to charge up to six Protégé units simultaneously. Unlike the single Power and Communication module, the Multi-Charger can not be connected to a PC. The only function is charging Protégé units.

For more information on the Multi-Charger, refer to the Multi-Charger quick guide (P/N 062-0027).

3.1.2. Replacing the Battery

The installed lithium ion battery is a rechargeable unit that is not replaceable or serviceable by users of the product. If the battery no longer holds its charge, it must be replaced at the factory. Do not attempt to replace the monitor's battery pack. Return unit to Scott Health and Safety for replacement or repairs.

3.2. Protégé Software

The Protégé comes with a CDROM that includes Scott Monitors proprietary Gas Monitor software application that enables users to modify the Protégé's settings and access the data log.

The Gas Monitor application requires the installation of Sun Microsystems® JAVA runtime application. If not previously installed on the PC, JAVA runtime can be installed on the PC after installation of the Gas Monitor Software.

PC System Requirements:

- Operating Systems: Windows XP or Windows Vista
- JAVA Version 5 or greater
- USB port

3.2.1. Gas Monitor Software Installation

To install the PCI Gas Monitor software, perform the following.

NOTE

DO NOT CONNECT THE PROTÉGÉ CHARGER TO THE PC UNTIL AFTER THE INSTALLATION IS COMPLETE.

NOTE

FOR WINDOWS® VISTA, PERFORM STEP 1 PRIOR TO BEGINNING INSTALLATION. FOR WINDOWS XP PROCEED TO STEP 2.

- 1) For Windows Vista users only, navigate to USER ACCOUNTS AND FAMILY SAFETY using the control panel and proceed to remove USER ACCOUNT CONTROL (UAC) as shown in [Figure 3-2](#). The checkbox must be unchecked for UAC. Restart the PC as necessary.

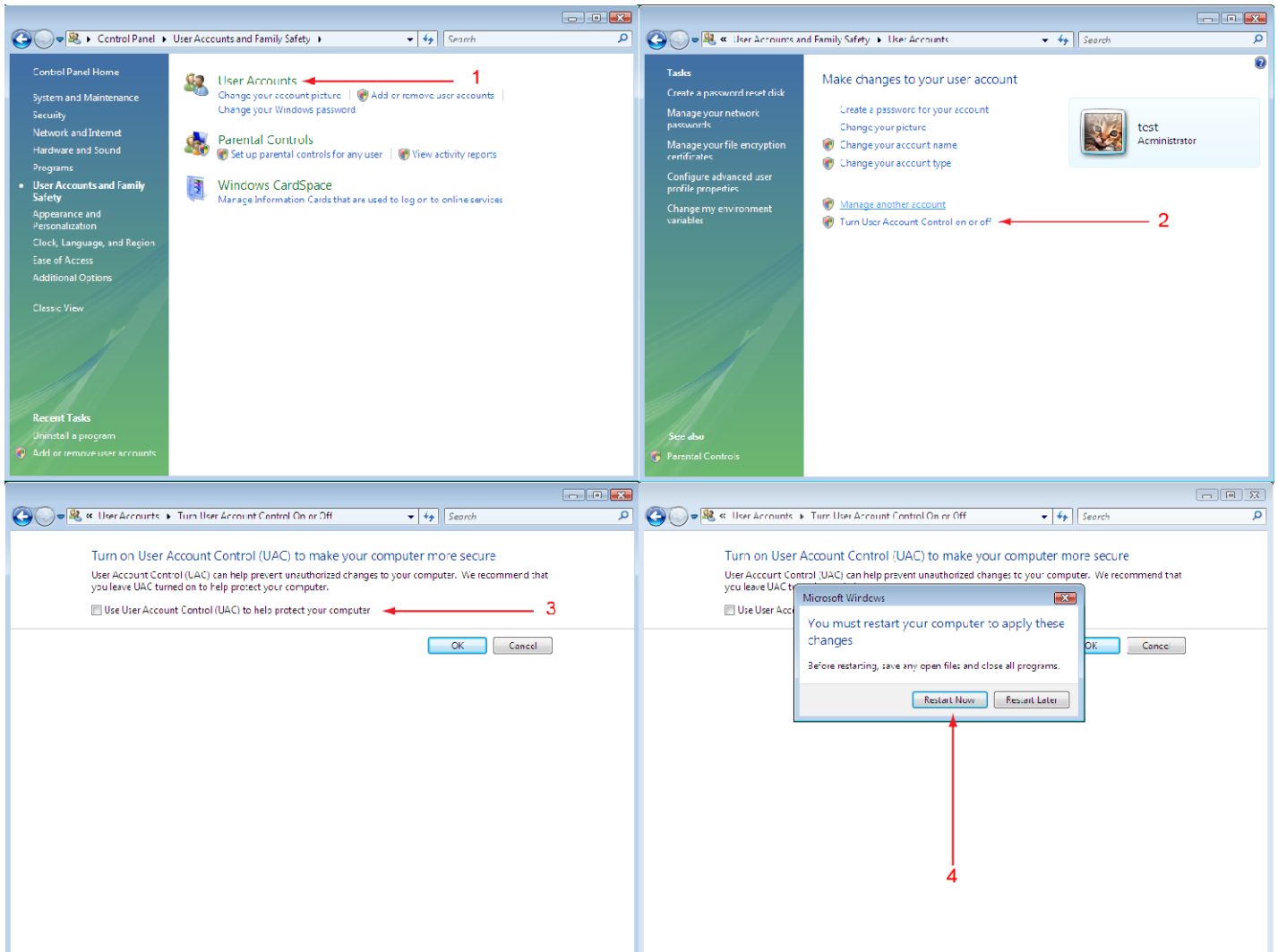


Figure 3-2. Windows Vista User Account Control

- 2) Insert the CD-ROM that came with the Protégé unit into the PC's CD-ROM device.
- 3) If the PC has the auto run enabled, the install program will begin. If the CD-ROM auto run feature is disabled, navigate to the "gasmon.msi" file on the CD-ROM and double click it to begin the installation procedure.
- 4) When prompted, click NEXT to proceed with installation.

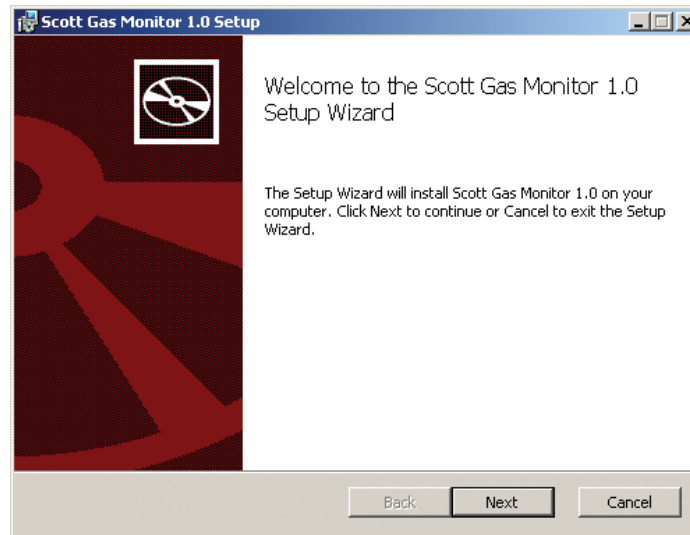


Figure 3-3. Gas Monitor Software Installation

- 5) When prompted, check the box to accept the terms of the License Agreement. Click NEXT to proceed.

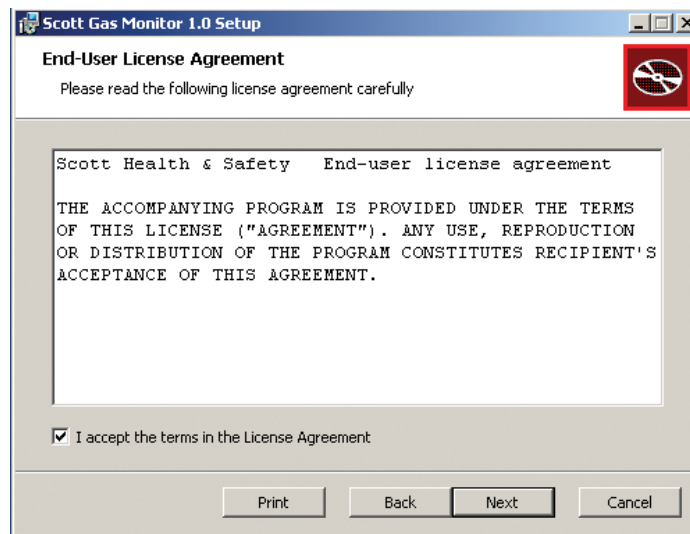


Figure 3-4. Gas Monitor Software Installation

- 6) If desired, select a custom location to install the software or use the default location. Click NEXT to proceed.

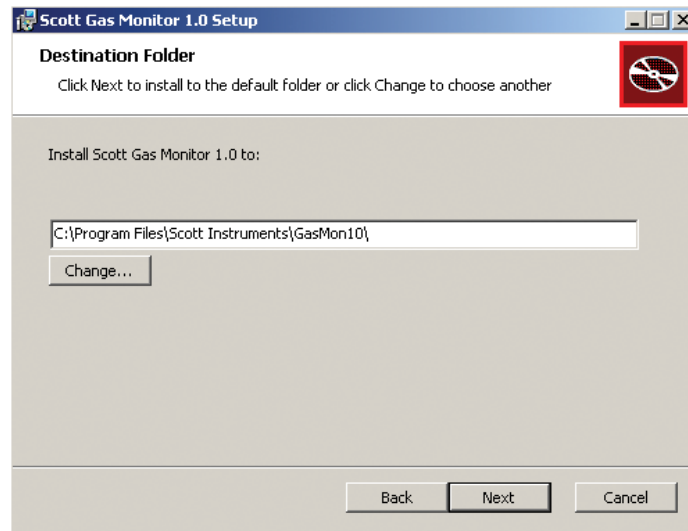


Figure 3-5. Gas Monitor Software Installation

7) Click INSTALL and monitor installation progress.

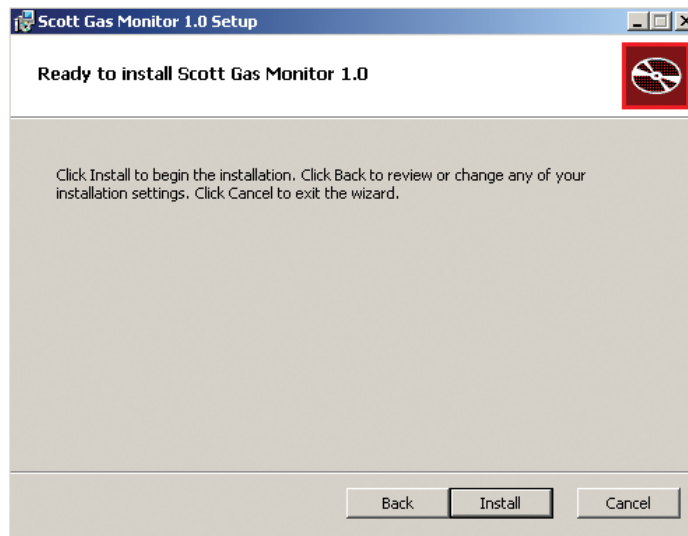


Figure 3-6. Gas Monitor Software Installation

8) When prompted, click FINISH to complete the installation.

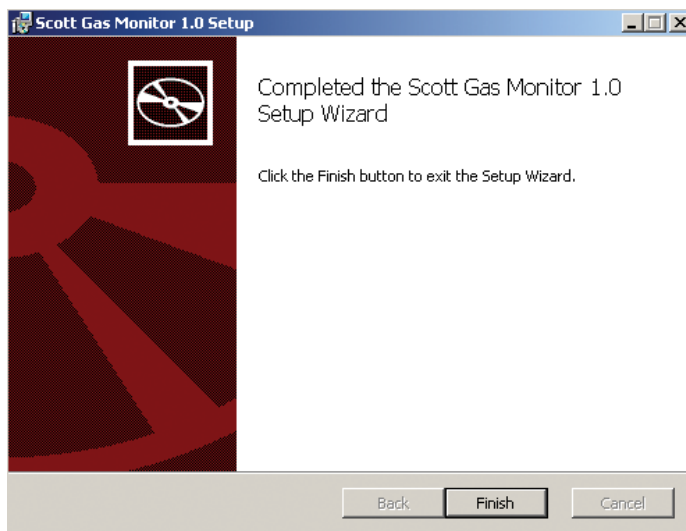


Figure 3-7. Gas Monitor Software Installation

3.2.2. JAVA Software Installation

JAVA software must be installed to use the Scott Gas Monitor Software. The installation software is available on the same CD-ROM provided with the Protégé as the Gas Monitor software.

Advanced users with internet access may choose to download and install JAVA runtime from the application website at www.java.com.

To install JAVA from the CD-ROM, perform the following.

- 1) Navigate to the Java folder and select the JAVA installation file for the appropriate operating system of the PC.
- 2) Double click the file to begin the installation process:
- 3) Observe the Java Runtime Environment (JRE) installation begins. Installation files may be unpacked during an automated process.
- 4) When prompted, select ACCEPT to agree to the User License Agreement and proceed with the installation.



Figure 3-8. JAVA Software Installation

- 5) When prompted, either select or uncheck any of the third party software applications, such as Google Toolbar, that Sun Microsystems provides bundled with the JAVA software installation.

NOTE

ONLY JAVA SOFTWARE IS REQUIRED TO RUN THE SCOTT GAS MONITOR SOFTWARE. INSTALLING OR NOT INSTALLING ANY OPTIONAL SOFTWARE ON THIS SCREEN WILL NOT AFFECT OPERATION OF THE SCOTT GAS MONITOR.

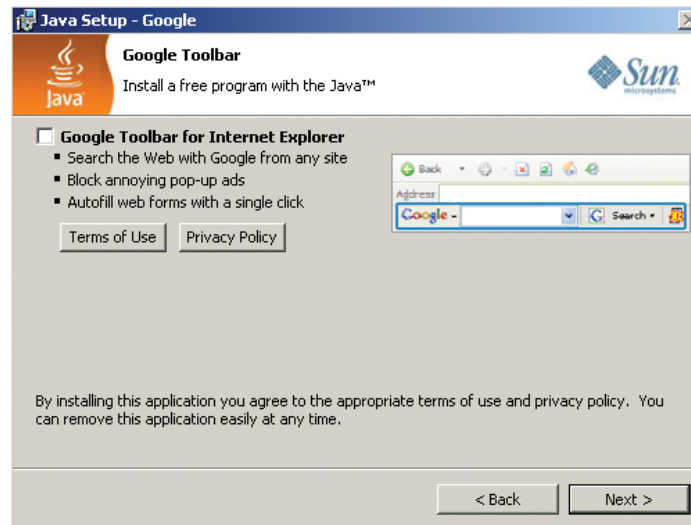


Figure 3-9. JAVA Software Installation

- 6) Click NEXT to proceed.
- 7) Observe the installation progress screen progresses through the installation. Installation times will vary depending on PC performance, but should never take a large period of time.
- 8) When prompted upon successful completion of software installation, click FINISH to complete JAVA software installation.



Figure 3-10. JAVA Software Installation

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4. Operation

4.1. Powering Protégé On and Off

The Protégé monitor comes with a rechargeable lithium-ion battery pack installed. If the monitor fails to turn on after initiating the following steps, connect the monitor to its recharging base until fully charged. Operators should charge the monitor prior to its first use and on a daily basis before operation. The monitor display will indicate BATTERY CHARGED when fully charged.

4.1.1. Powering On

Press and hold either the left or right operation button until the countdown timer has completed and RELEASE is displayed on the LCD. If the operation button is held for 5 seconds after RELEASE is displayed the monitor will not turn on.

NOTE

IF BATTERY VOLTAGE BECOMES VERY LOW WHILE POWERED OFF, THE UNIT MAY DISPLAY PLEASE CHARGE WHEN ATTEMPTING TO POWER ON UNIT. ALWAYS FULLY CHARGE BATTERY PRIOR TO USE.

NOTE

THE COUNTDOWN TIMER PARAMETER WILL VARY AS SET USING THE SCOTT GAS MONITOR SOFTWARE. REFER TO [PARAGRAPH 4.6.3](#) FOR INFORMATION ON HOW TO ADJUST THIS PARAMETER.

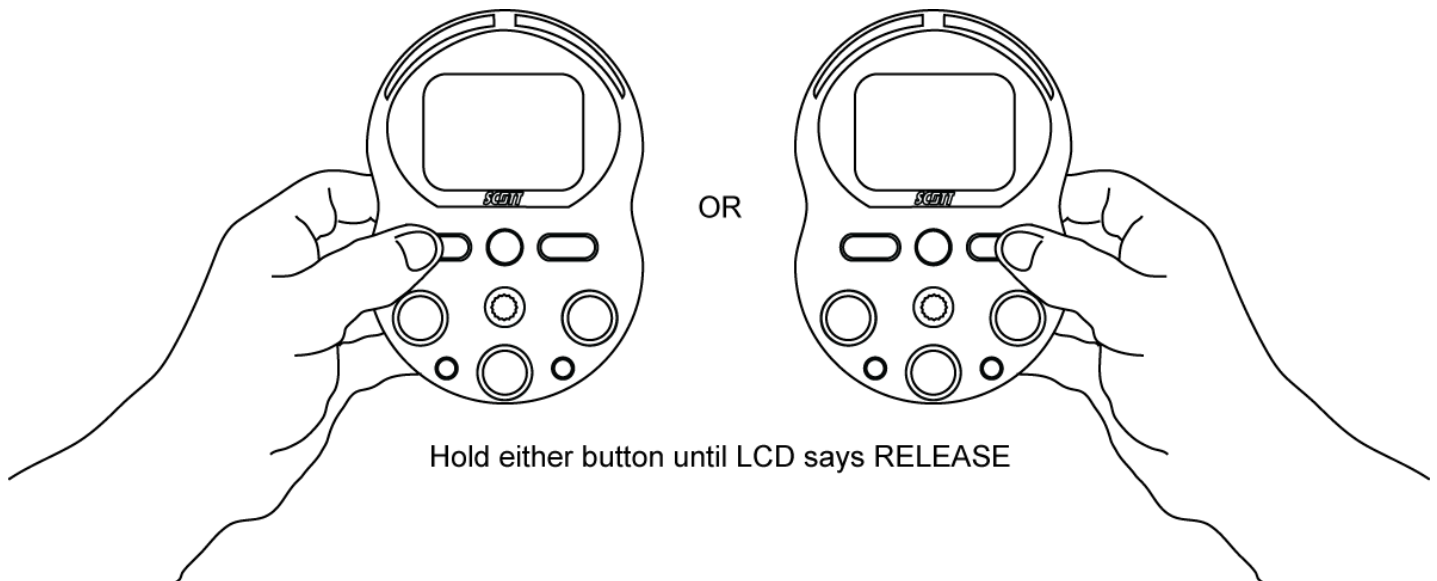


Figure 4-1. Powering On the Protégé

The Protégé will begin its Power-Up Self Test Sequence once the operation button has been released. This sequence consists of the following.

- 1) LED, vibrating, and Audible Alarm Check – All LED's are lighted, audible alarm is sounded, and vibrating alarm is activated.
- 2) Software - The current version is displayed.

- 3) Date is displayed.
- 4) Time is displayed.
- 5) Low Alarm settings displayed.
- 6) High alarm settings displayed.
- 7) STEL alarm setting displayed.
- 8) TWA alarm setting is displayed.
- 9) Cal Due – indicates when next calibration is due in days.

WARNING

OPERATING A PROTÉGÉ MONITOR THAT HAS EXCEEDED ITS CALIBRATION DATE CAN CAUSE FALSE READINGS OF DETECTED GASES. DO NOT TRUST INVALID READINGS OBTAINED WHILE UNIT IS OUT OF CALIBRATION. OPERATING A PROTÉGÉ THAT IS OUT OF CALIBRATION MAY NOT ACCURATELY INDICATE ENVIRONMENTAL CONDITIONS WHICH CAN LEAD TO DEATH OR INJURY.

WARNING

IF CAL EXPIRED IS DISPLAYED UPON POWER ON START UP SEQUENCE INDICATING THE UNIT DOES NOT HAVE VALID CURRENT CALIBRATION, PRESS THE RIGHT OPERATIONAL BUTTON TO OVERRIDE AND IMMEDIATELY CALIBRATE THE MONITOR. A PROTÉGÉ THAT HAS NOT BEEN PROPERLY CALIBRATED CAN LEAD TO DEATH OR INJURY.

WARNING

NEVER OPERATE A PROTÉGÉ MONITOR IN GAS MONITORING MODE WITH THE CALIBRATION ADAPTER ATTACHED. THIS CAN CAUSE FALSE READINGS OF DETECTED GASES. FAILURE TO DO SO CAN LEAD TO DEATH OR INJURY.

After this sequence is complete, the Protégé will resume typical monitoring.

4.1.2. Powering Off

Press and hold both operational buttons simultaneously until the countdown timer has completed and the LCD is blank. If the buttons are held for 5 seconds after the LCD goes blank, the Protégé will attempt to power back on.

NOTE

THE TIMING PARAMETER WILL VARY AS SET USING THE SCOTT GAS MONITOR SOFTWARE. REFER TO [PARAGRAPH 4.6.3](#) FOR INFORMATION ON HOW TO ADJUST THIS PARAMETER.

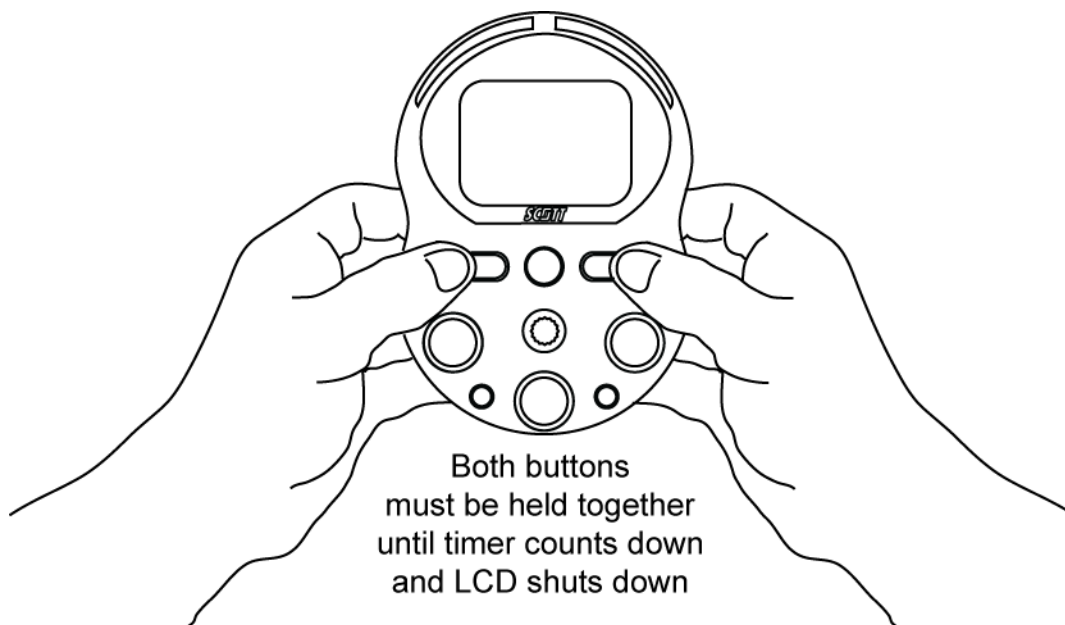


Figure 4-2. Powering Off the Protégé

4.2. LCD Alerts and Displays

4.2.1. Gas Warning and Alarm Alerts

Both gas warnings and alarms will blink the specific gas type that is in alert. Audible, visual, and vibrating alarms will activate and the concentration / value of the sensor in alarm will be indicated.

If a Gas Type Label blinks with no alarm present, the sensor is detecting a negative drift. Perform a Zero Calibration to clear the drift.

If the option to Operate with Failed Sensors has been enabled using the Gas Monitor Software, the Protégé will display FAL in place of the reading for that particular sensor. This option is not recommended for use unless careful consideration is given to the reduced monitoring capabilities of the Protégé and follows locally established practices.

4.2.2. Low Battery

The battery charge icon will blink and monitor will activate the visual, audible, and vibratory alarms when a battery becomes low. Low battery conditions can be silenced by pressing the left button. Users should immediately exit the environment and charge the Protégé as soon as a low battery alarm is indicated.

4.2.3. Over-Range Conditions

If a sensor within the monitor is exposed to a target gas concentration that exceeds the sensor's range, the Protégé will activate its visual, audible, and vibratory alarms and display +++ at the sensor's location on the LCD. Alarms conditions will clear when the gas concentration has subsided.

WARNING

IF AN OVER-RANGE CONDITION IS ENCOUNTERED, PERFORM A BUMP TEST TO ENSURE MONITOR FUNCTIONALITY. IF THE MONITOR FAILS THE BUMP TEST, PERFORM A FULL CALIBRATION PROCEDURE. FAILURE TO DO SO COULD RESULT IN INACCURATE MONITORING BY THE UNIT AND CAUSE DEATH OR INJURY.

4.2.4. Low Flow Pump Warning

Low Flow Pump Warning is displayed when airflow through the pump is diminished or restricted and could compromise accurate readings. Protégé shuts down the pump and the monitor goes into audible, visual, and vibratory alarm while the PUMP icon flashes. After the cause of the low pump flow is cleared, reset the pump by pressing and releasing the Left or Right button.

4.2.5. Sensor Failures

FAL will be indicated for each sensor that fails to zero or span calibrate. Should this occur, recalibrate the monitor. If a sensor continues to fail, replace the sensor and recalibrate or contact an authorized service center.

4.3. Protégé Calibration and Bump Test

WARNING

OPERATING A PROTÉGÉ MONITOR THAT HAS EXCEEDED ITS CALIBRATION DATE CAN CAUSE FALSE READINGS OF DETECTED GASES. READINGS OBTAINED WHILE UNIT IS OUT OF CALIBRATION ARE INVALID AND COULD LEAD TO DEATH OR INJURY.

CAUTION

IF CAL EXPIRED IS DISPLAYED UPON POWER ON START UP SEQUENCE INDICATING THE UNIT DOES NOT HAVE VALID CURRENT CALIBRATION, PRESS THE RIGHT OPERATIONAL BUTTON TO OVERRIDE AND IMMEDIATELY CALIBRATE THE MONITOR. FAILURE TO DO COULD RESULT IN INACCURATE MONITORING BY THE UNIT SENSORS.

Scott Health & Safety recognizes the potential of the Protégé as a life saving device when operated and maintained correctly. As such, verifying proper operation of the Protégé in the form of Span calibration and daily Bump Testing is essential to ensure the Protégé performs as intended in a potentially hazardous environment.

The frequency at which Span calibration and Bump Testing occur is best determined based on local regulatory standards, company policies, and industry best practices. Scott Health & Safety is not responsible for setting policies or practices.

Calibration of the Protégé occurs in two stages. Zero calibration is performed to establish baseline readings of atmospheres that are known to be free of toxic or combustible gases. Span calibration is performed to ensure the monitor detects target gases within specified operating parameters.

Span calibration is the adjustment of the Protégé's response to match a known concentration of gas. Sensors can lose sensitivity through normal degradation, exposure to high gas concentrations, or sensor poisoning. Accurate calibration can be achieved only if specific concentrations of the correct gases are used. Span calibration should be performed when a new sensor is installed or when the Protégé displays CAL EXPIRED. Span calibration must be performed anytime a daily Bump Test fails.

Bump Testing verifies the Span calibration by subjecting the Protégé to a known exposure of gas, verifying the response is within 10% of actual concentration and verifies that all alarms work properly. Scott Health & Safety recommends a daily Bump Test be performed prior to each day's use and whenever the sensor has been exposed to a high gas concentration, submerged in water, or exposed to mechanical shock such as being dropped.

Scott Health & Safety recommends a daily Zero calibration be performed prior to each day's use and when the monitor displays a reading other than its baseline reading in an atmosphere known to be free of any toxic or combustible gases. When an atmosphere is not known to be free of toxic or combustible gases, a Zero Air calibration cylinder may be used.

Table 4-1. When to Perform Calibration or Bump Testing

Calibration or Test	Perform When
Zero Calibration	<ul style="list-style-type: none"> • Daily • When baseline readings are incorrect or suspect • Prior to a Span Calibration
Span Calibration	<ul style="list-style-type: none"> • CAL EXPIRED is displayed • After installing new sensors • When a Bump Test fails
Bump Test	<ul style="list-style-type: none"> • Daily • When a sensor is exposed to a high concentration of gas • When submerged in water • When exposed to mechanical shock, such as being dropped

4.3.1. Zero Calibration

- 1) Verify ambient air is free of toxic or combustible gases. If air is not free or can not be verified free, obtain a Zero Air gas cylinder.
- 2) Power on the Protégé.
- 3) Press and hold the right operational button until PLEASE WAIT is displayed.

WARNING

TO PREVENT AN ERRONEOUS ZERO CALIBRATION FROM OCCURRING, THE PROTÉGÉ WILL DISPLAY IS AIR CLEAR? IF THE MONITOR IS INDICATING A GAS READING THAT IS 50% OR HIGHER OF AN ALARM SET POINT FOR ANY OF THE GASES IT IS EQUIPPED TO DETECT. THE USER HAS 20 SECONDS TO ACKNOWLEDGE THE ALERT. IF THE ALERT IS NOT ACKNOWLEDGED WITHIN 20 SECONDS, THE PROTÉGÉ WILL POWER OFF. DO NOT CONTINUE WITH ZERO CALIBRATION UNTIL AIR HAS BEEN VERIFIED FREE OF TOXIC AND COMBUSTIBLE GASES. FAILURE TO PROPERLY PERFORM A ZERO CALIBRATION MAY RESULT IN INJURY OR DEATH.

NOTE

BASELINE READINGS FOR A ZERO CALIBRATION ARE 0 FOR H₂S, CO, AND LEL, AND 20.9% FOR O₂.

- 4) If display indicates IS AIR CLEAR?, and atmosphere has been verified free, press the right button to start the Zero calibration.
- 5) Wait for Protégé to complete Zero calibration. If passed, the LCD will display APPLY GAS. If failed, the LCD will display FAILED and the appropriate failing sensor(s).

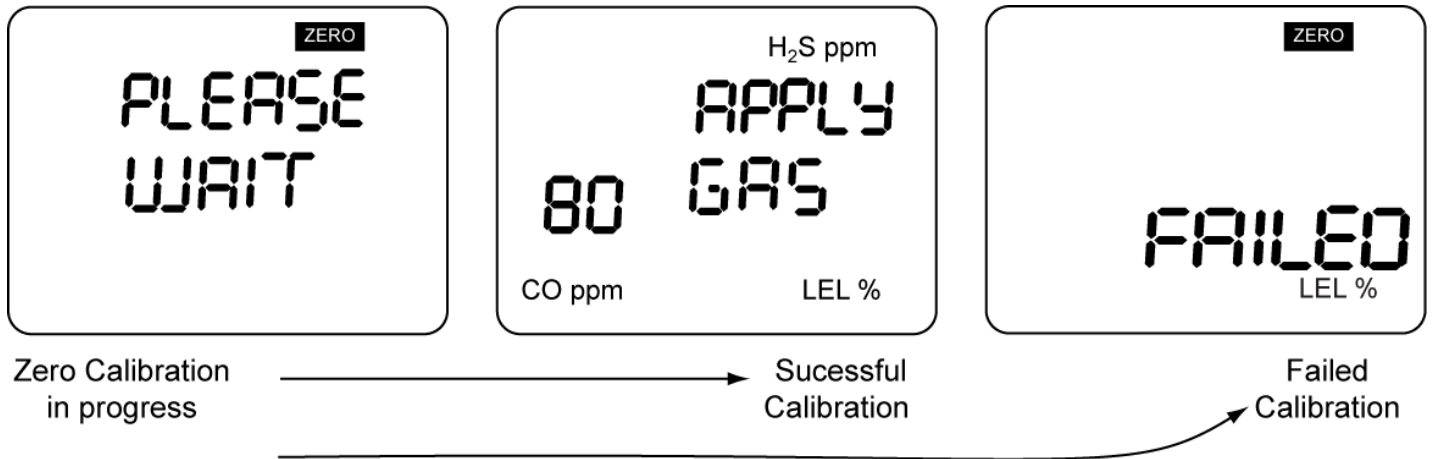


Figure 4-3. Zero Calibration

- 6) If Span calibration is desired, continue to [Paragraph 4.3.2.](#)
- 7) If Span Calibration is not desired, push either the left operational button to exit or allow 80 second timer to expire.
- 8) When the LCD displays CAL STOPPED, push either the left or right operational button to exit calibration mode.

4.3.2. Span Calibration

NOTE

FOR PRECISE K-FACTORS WHEN PERFORMING A SPAN CALIBRATION OF A COMBUSTIBLE SENSOR, REFER TO THE [APPENDIX](#).

Equipment required:

- **Calibration gas** - verify concentration level matches detection set points of monitor and expiration date of cylinder has not passed.
- **Tygon™ tubing** - 2 feet of 3/16" ID
- **Regulator** - set to provide flow at 0.5 liter/min
- **Calibration Adapter** - Included with Protégé

CAUTION

GAS MUST BE APPLIED AT A FLOW RATE OF 0.5 LITERS/MIN TO PERFORM SPAN CALIBRATION. FAILURE TO APPLY GAS AT THE PROPER FLOW RATE WILL RESULT IN FAILED OR INACCURATE CALIBRATION.

NOTE

THE PROTÉGÉ CAN BE SPAN CALIBRATED USING EITHER INDIVIDUAL CALIBRATION GAS CYLINDERS THAT CONTAIN ONE SPECIFIC TARGET GAS FOR THE SENSOR BEING CALIBRATED OR A GAS MIXTURE CYLINDER THAT CONTAINS A MIXTURE OF EACH OF THE TARGET GASES REQUIRED TO CALIBRATE EACH OF THE SENSORS THE INSTRUMENT IS PRESENTLY CONFIGURED TO DETECT. IF USING INDIVIDUAL GAS CYLINDERS TO SPAN CALIBRATE, THE FOLLOWING PROCEDURE MUST BE COMPLETED FOR EACH SENSOR.

NOTE

THE PROTÉGÉ HAS AN AUTOMATIC 80 SECOND TIMER WHEN THE APPLY GAS SCREEN IS DISPLAYED. IF USERS ARE UNABLE TO APPLY GAS TO THE SENSORS WITHIN THE 80 SECONDS, CAL STOPPED WILL BE DISPLAYED. PRESSING THE RIGHT OR LEFT OPERATIONAL BUTTON WILL EXIT CALIBRATION MODE AND THE PROCEDURE MUST BE REPEATED.

- 1) Verify the concentration level of the target gas in the cylinder match the settings of the Protégé as set using the Scott Gas Monitor software. If needed, refer to [Paragraph 4.6.3](#) for information on how to adjust or verify the settings.
- 2) Attach the regulator to the gas cylinder and verify cylinder pressure.
- 3) Connect Tygon tubing to both the regulator and calibration adapter.
- 4) With the Protégé powered on, and if not already accomplished, press and hold the right operational button until the Zero calibration completes and APPLY GAS or the optional password entry screen is displayed on the LCD.

NOTE

IF OPTIONAL PASSWORD SCREEN IS DISPLAYED, PERFORM STEP 5. IF NOT, PROCEED TO STEP 6.

- 5) If needed, enter the 4 digit password using the left button to scroll through the numeric characters and the right button to accept the entry and move to the next character.

NOTE

CAL STOPPED WILL BE DISPLAYED IF LONGER THAN 30 SECONDS HAS PASSED BETWEEN CHARACTER ENTRIES. PRESS EITHER THE LEFT OR RIGHT BUTTON TO EXIT CALIBRATION MODE AND RESTART PROCEDURE.

- 6) Attach the calibration adapter to the Protégé and apply gas from the regulator.

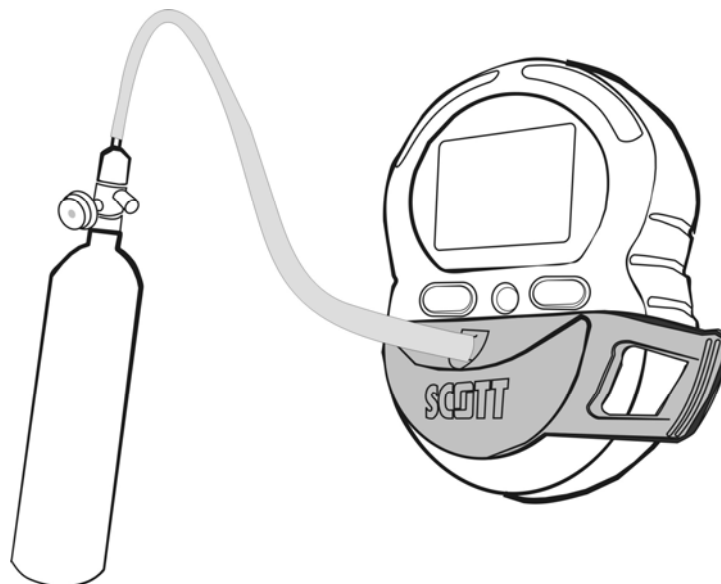


Figure 4-4. Span Calibration Setup

- 7) For single gas cylinders, wait for the display to read CAL PASSED then APPLY GAS. Attach Tygon tubing to next cylinder and apply gas from the regulator. When final gas has been applied and passed calibration, REMOVE GAS will be displayed. Turn off gas cylinder and remove calibration adapter. The monitor will automatically return to gas monitoring mode.
- 8) For gas mixture cylinders, wait for the display to read CAL PASSED then REMOVE GAS. Turn off gas cylinder and remove calibration adapter. The monitor will automatically return to gas monitoring mode.

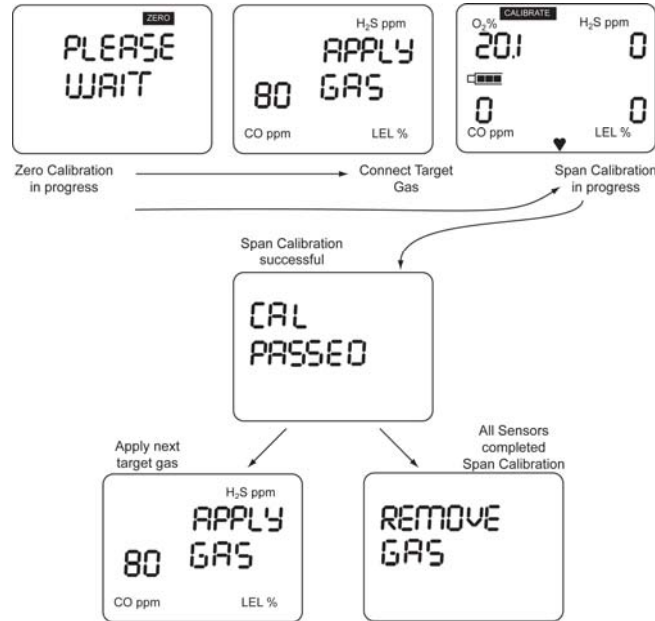


Figure 4-5. Span Calibration

4.3.3. Bump Testing

Equipment required:

- **Calibration gas** - verify concentration level exceeds set points of monitor and expiration date of cylinder has not passed.
- **Tygon™ tubing** - 2 feet of 3/16" ID
- **Regulator** - set to provide flow at 0.5 liter/min
- **Calibration Adapter** - Included with Protégé

- 1) Verify the concentration level of the target gas in the cylinder exceeds alarm settings of the Protégé as set using the Scott Gas Monitor software. If needed, refer to [Paragraph 4.6.3](#) for information on how to adjust or verify the settings.
- 2) Attach the regulator to the gas cylinder and verify cylinder pressure.
- 3) Connect Tygon tubing to both the regulator and calibration adapter.
- 4) If installed, remove optional pump from monitor and restart the monitor.
- 5) Attach calibration adapter to Protégé and apply gas.

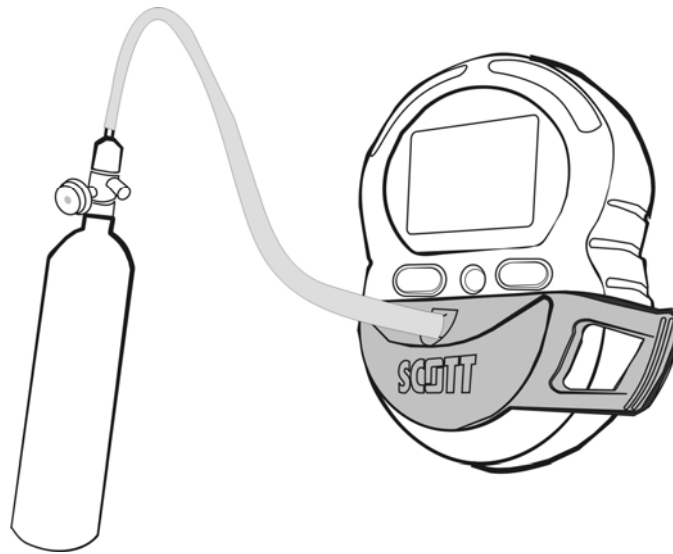


Figure 4-6. Bump Test Setup

- 6) Verify Protégé quickly responds to target gas by activating the visual, audible, and vibrating alarms.
- 7) Verify readings on the LCD display within 10% of actual target gas concentration.
- 8) Turn off gas cylinder and remove calibration adapter.

WARNING

IF THE PROTÉGÉ FAILS TO ACTIVATE ALL ALARMS IN A TIMELY MANNER, THE UNIT MUST BE SERVICED PRIOR TO USAGE. IF THE PROTÉGÉ FAILS TO READ TARGET GAS CONCENTRATION WITHIN 10%, PERFORM A SPAN CALIBRATION. FAILURE TO DO SO COULD LEAD TO DEATH OR INJURY.

4.4. Optional Pump Operation

The Protégé's automatic sample draw pump is powered by the monitor's internal battery. Typical run time with pump is 12 hours; however, environmental conditions and alarm conditions will shorten run time. If the pump is fixed to the monitor when the monitor is powered on, it is automatically recognized.

Scott Health & Safety recommends using the pump only when the tubing and sample draw system including hydrophobic and particulate filters in the probe assembly are attached to avoid possible contamination of the pump.

Troubleshoot a poorly performing pump using [Paragraph 5.3](#).

CAUTION

WHEN USING THE SAMPLE DRAW PUMP, ALLOW SUFFICIENT SAMPLE TIME BASED ON THE LENGTH OF SAMPLE TUBING YOU ARE USING. ALLOW A MINIMUM OF 1 SECOND FOR EVERY FOOT OF SAMPLE TUBING AND WAIT FOR THE GAS READINGS TO STABILIZE. FAILURE TO DO SO COULD LEAD TO INACCURATE READINGS.

4.4.1. Installing Optional Pump with Protégé Powered Off

- 1) Connect the pump by inserting, at an angle, the pump's back tab into the monitor's pump receiving tab. Rotate the pump forward until the pump sits flush with the monitor. Screw the pump retaining screw into the threaded hole located on the front of the monitor.

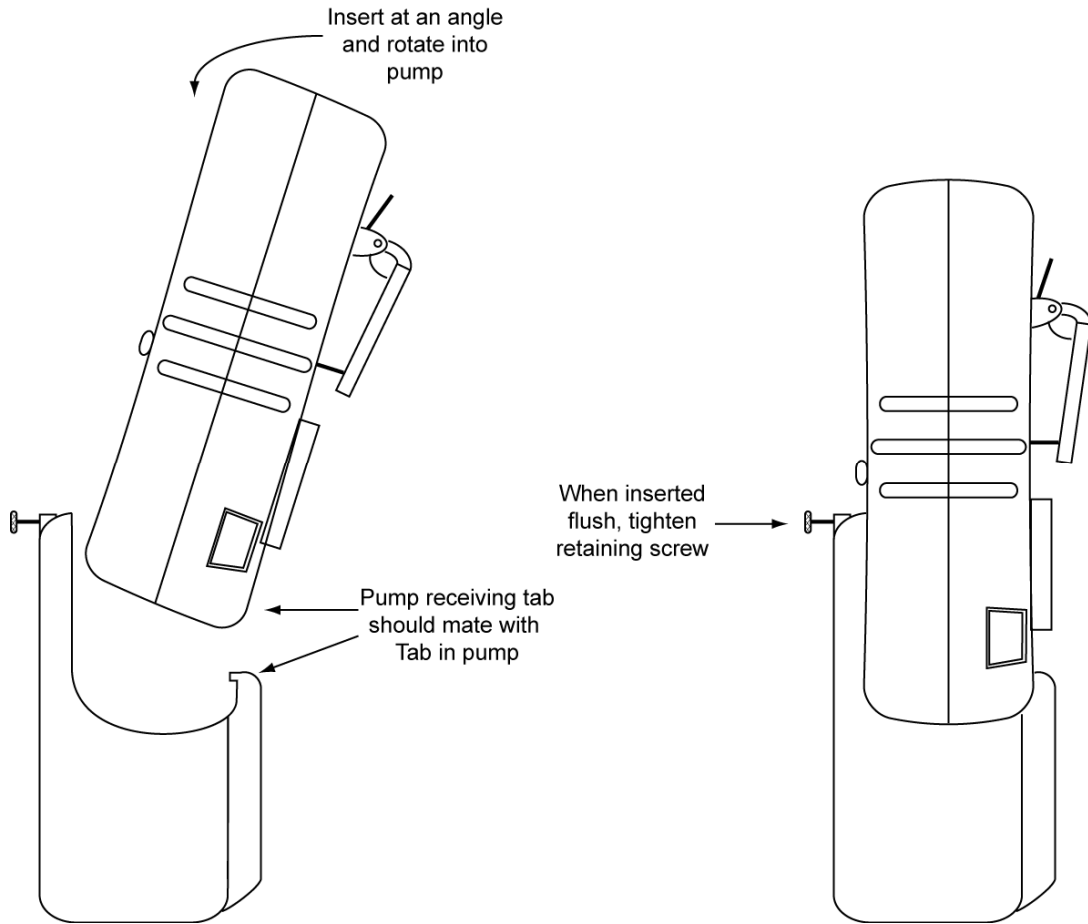


Figure 4-7. Pump Installation

- 2) Power on the Protégé and allow the unit to run through its start-up routine. The pump will not yet be running.
- 3) Upon completion of the start-up routine, the pump will activate and BLOCK PUMP will be displayed. To block pump inlet, place a finger over the probe. Once the test is passed, CLEAR PUMP will be displayed.



Figure 4-8. Pump Setup

NOTE

IF THE MONITOR FAILS TO INDICATE CLEAR PUMP, CHECK FOR ANY POTENTIAL LEAKS IN THE CONNECTION OF THE PUMP TO THE MONITOR OR WITHIN THE SAMPLE DRAW SYSTEM INCLUDING HYDROPHOBIC AND PARTICULATE FILTERS IN THE PROBE ASSEMBLY.

- 4) Remove finger from probe and the monitor is ready for use.

4.4.2. Installing Optional Pump with Protégé Powered On**WARNING**

PUMP WILL NOT AUTOMATICALLY ACTIVATE WHEN ATTACHED TO A POWERED ON PROTÉGÉ. USERS MUST PRESS THE LEFT BUTTON TO BEGIN PUMP ACTIVATION. FAILURE TO ACTIVATE A PUMP WILL LEAD TO UNRELIABLE MONITORING THAT COULD LEAD TO DEATH OR INJURY.

- 1) Connect the pump by inserting, at an angle, the pump's back tab into the monitor's pump receiving tab. Rotate the pump forward until the pump sits flush with the monitor. Screw the pump retaining screw into the threaded hole located on the front of the monitor. Refer to [Figure 4-7](#).
- 2) The pump will not yet be running. Push and hold the left button to activate the pump. Release the left button when BLOCK PUMP is displayed.
- 3) To block pump inlet, place a finger over the probe. Once the test is passed, CLEAR PUMP will be displayed. Refer to [Figure 4-8](#).

NOTE

IF THE MONITOR FAILS TO INDICATE CLEAR PUMP, CHECK FOR ANY POTENTIAL LEAKS IN THE CONNECTION OF THE PUMP TO THE MONITOR OR WITHIN THE SAMPLE DRAW SYSTEM INCLUDING HYDROPHOBIC AND PARTICULATE FILTERS IN THE PROBE ASSEMBLY.

- 4) Remove finger from probe and the monitor is ready for use.

4.4.3. Disconnecting Optional Pump

- 1) Unscrew the pump retaining screw while continuing to hold the pump against the monitor.
- 2) If unit is powered on, press and hold the left button until the monitor starts displaying the PEAK exposures.

NOTE

IF THE PUMP ALARM SOUNDS, ACKNOWLEDGE BY PRESSING AND RELEASING THE LEFT OR RIGHT BUTTON THEN PRESS AND HOLD THE LEFT BUTTON UNTIL THE MONITOR STARTS DISPLAYING PEAK EXPOSURES. PEAK EXPOSURES WILL FLASH BRIEFLY BEFORE RETURNING TO A NORMAL MONITORING DISPLAY.

- 3) Rotate the pump backwards until it comes off the monitor.

4.5. Gas Interferences

There are known gas interferences to a limited number of chemical compounds. Scott H & S attempts to identify possible gas interferences to which gas sensors may be exposed; however, not all chemical compounds that presently exist have been tested.

[Table 4-2](#) displays known toxic gas interferences.

NOTE

TABLE 4-2 DOES NOT SHOW, NOR SHOULD IT BE IMPLIED, THAT NO ADDITIONAL INTERFERENCES MAY OCCUR. THESE SELECTIVITY RATIOS ARE USED AS GUIDES ONLY. THEY ARE NOT TO BE USED AS CALIBRATION FACTORS. THE GAS SPECIES' ACTUAL CROSS-SENSITIVITIES MAY VARY FROM THE VALUES SHOWN.

Table 4-2. Toxic Gas Interference

<i>All values in PPM</i> ~ Approximate < Less than </= Less than or equal to	Sensor Types			
			<i>Dual Tox Sensors</i>	
	CO	H₂S	H₂S	CO
CO		</= 0.5	~ 1	100
H ₂ S	< 3	100	100	-20
SO ₂	0	~ 20	~ 2	< 1
NO	< 10	< 2	< 10	~ 15
NO ₂	</= -20	~ -20	~ -20	~ -25
CL ₂ O	0		~ -5	~ -5
H ₂	< 40		< 0.2	~ 30
HCN				
HCL				

4.6. Gas Monitor Software Usage

4.6.1. Connecting Protégé to a PC

- 1) Start the Gas Monitor software by double-clicking the Protégé PCI icon. The icon is loaded onto the Desktop during a typical install of the Gas Monitor Software. The Protégé PCI icon may be located in another location if a custom installation was performed.



- 2) If not already accomplished, connect the AC Power Adaptor cable to the Communications Module, connect the USB cable to the Communications Module, and connect the USB cable to your PC USB cable port.

NOTE

IF THIS IS THE INITIAL INSTALL OF THE COMMUNICATIONS MODULE, ALLOW THE PC TO LOAD AND RECOGNIZE THE COMMUNICATIONS MODULE BEFORE PROCEEDING.

- 3) Connect the Protégé to the communications module by sliding the connector shoe into the back of the Protégé.

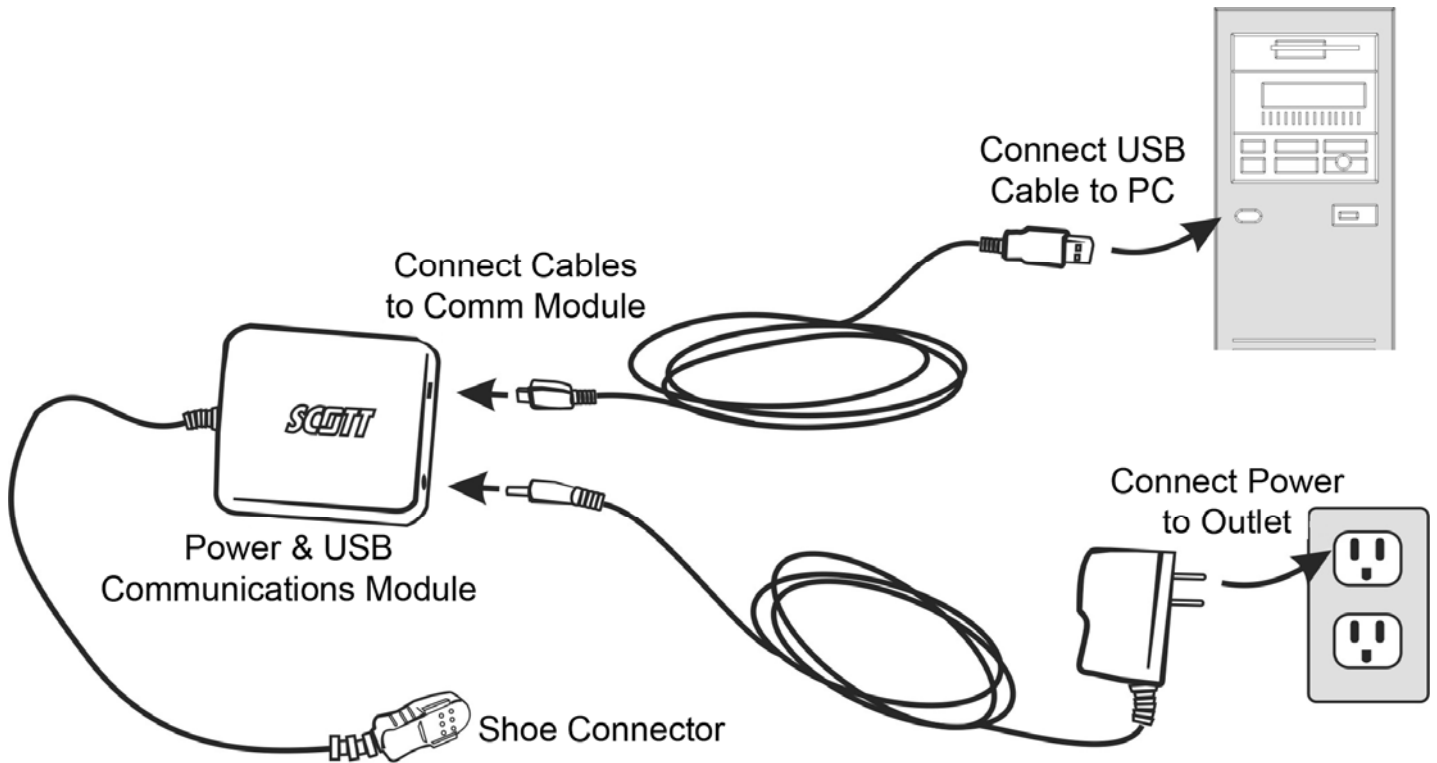


Figure 4-9. Protégé / PC Connection

The Gas Monitor software application confirms connection between the PC and the Protégé via the HOME tab. Displayed underneath the picture of the Protégé will be **CONNECTED** or **PLEASE CONNECT YOUR INSTRUMENT**. Navigate through the software using the PC mouse and keyboard.

4.6.2. Software Description

The Scott Gas Monitor software provides a PC interface to the Protégé to download the data log, adjust settings, and establish alarm set points. Navigation of the software is accomplished using the PC mouse and keyboard. The four tabs located at the top of the interface are HOME, SETTINGS, SET CLOCK, and VIEW LOG.

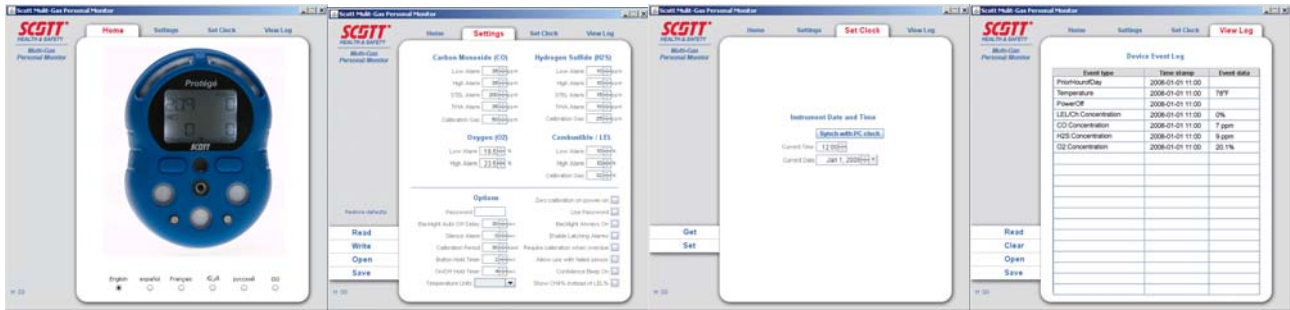


Figure 4-10. Gas Monitor Software Tabs

The HOME tab is the default screen that appears when starting the Gas Monitor software. Users may select the language to display and see the status of the connection to the Protégé from this tab.

The SETTINGS tab provides a number of different options for the user. Alarm set points can be changed, a password can be inserted, timers can be defined and the length of the LCD backlight can be configured all from the settings tab.

The SET CLOCK tab is used to set the date and time of the Protégé. There is an option to synchronize the time of the Protégé with the PC for accurate time keeping ability.

The VIEW LOG tab does not have any configurable user options. It displays the internal data log of events from the Protégé. This data can be read, saved, cleared, and recalled from previously saved files.

4.6.3. Changing Alarm Settings

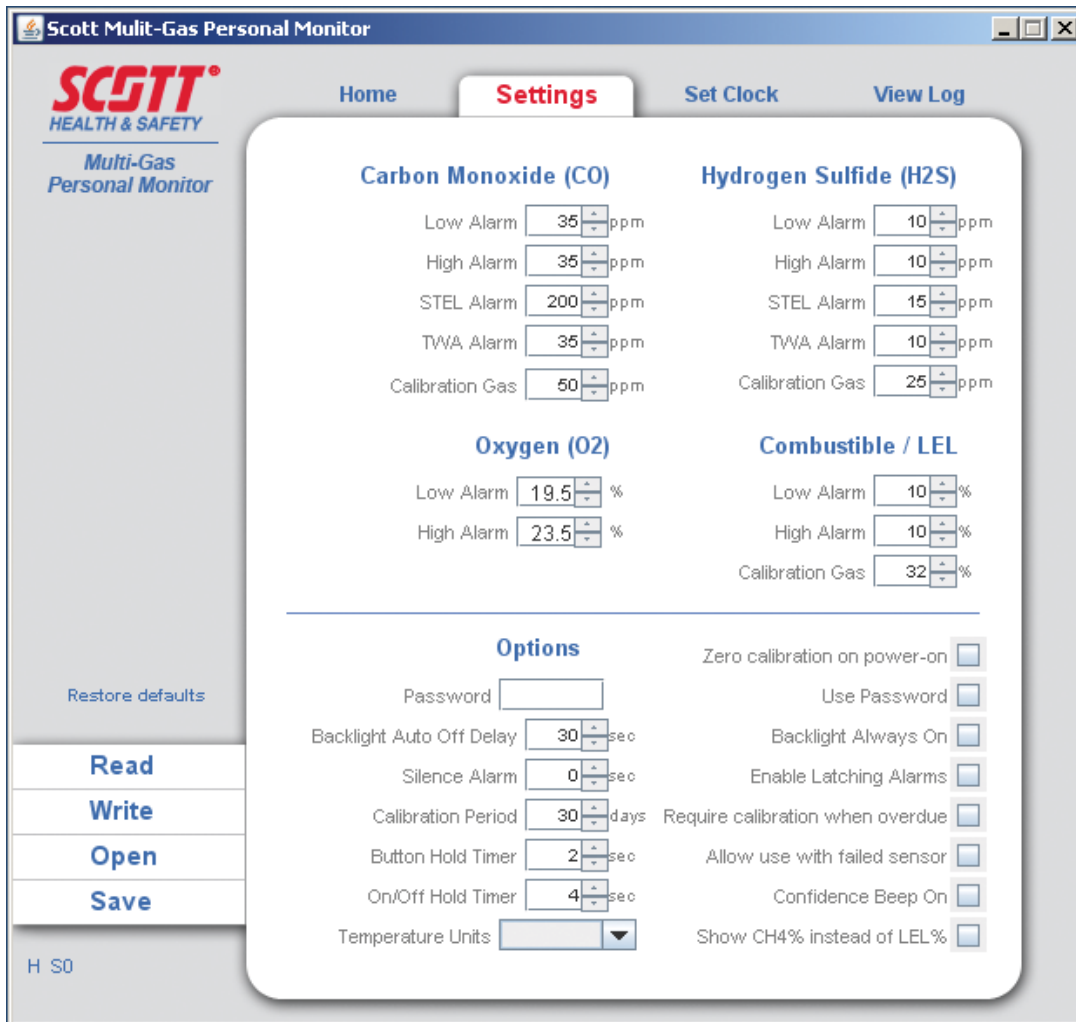


Figure 4-11. Settings Tab

Access the SETTINGS tab to change alarm settings. The following options are available to users.

RESTORE DEFAULT - Restores all monitor settings to the factory default.

READ - Uploads current monitor settings for review or modification.

WRITE - Downloads parameter changes made within the Gas Monitor software to the connected Protégé.

NOTE

CHANGING SETTINGS WITHIN THE GAS MONITOR SOFTWARE DOES NOT CHANGE THE SETTINGS ON THE PROTÉGÉ UNTIL WRITE HAS BEEN ACCOMPLISHED.

OPEN - Opens and displays previously saved Protégé parameter setting profiles.

SAVE - Saves Protégé parameter setting profiles.

CO, H₂S, O₂, and Combustible / LEL - Use the up and down arrows to adjust set points for each alarm as desired.

OPTIONS -

Password - A 4 digit password may be used to limit entry into the Span Calibration of the Protégé. Select the checkbox that says USE PASSWORD and enter a 4 digit number into the box. Once written to the Protégé, all users who attempt to Span Calibrate the unit will require this password. The default setting is unchecked.

Enable Latching Alarms - When checked, this option requires the user to acknowledge all alarms even when the target gas concentration returns to a non-alarm concentration level. The default setting is unchecked.

On/Off Hold Timer - sets the required time in seconds for users to hold the operational buttons when powering on and off the Protégé. The default setting is 4 seconds.

Refer to [Table 4-3](#) for all default settings and ranges of each optional setting.

4.6.4. Setting Date and Time

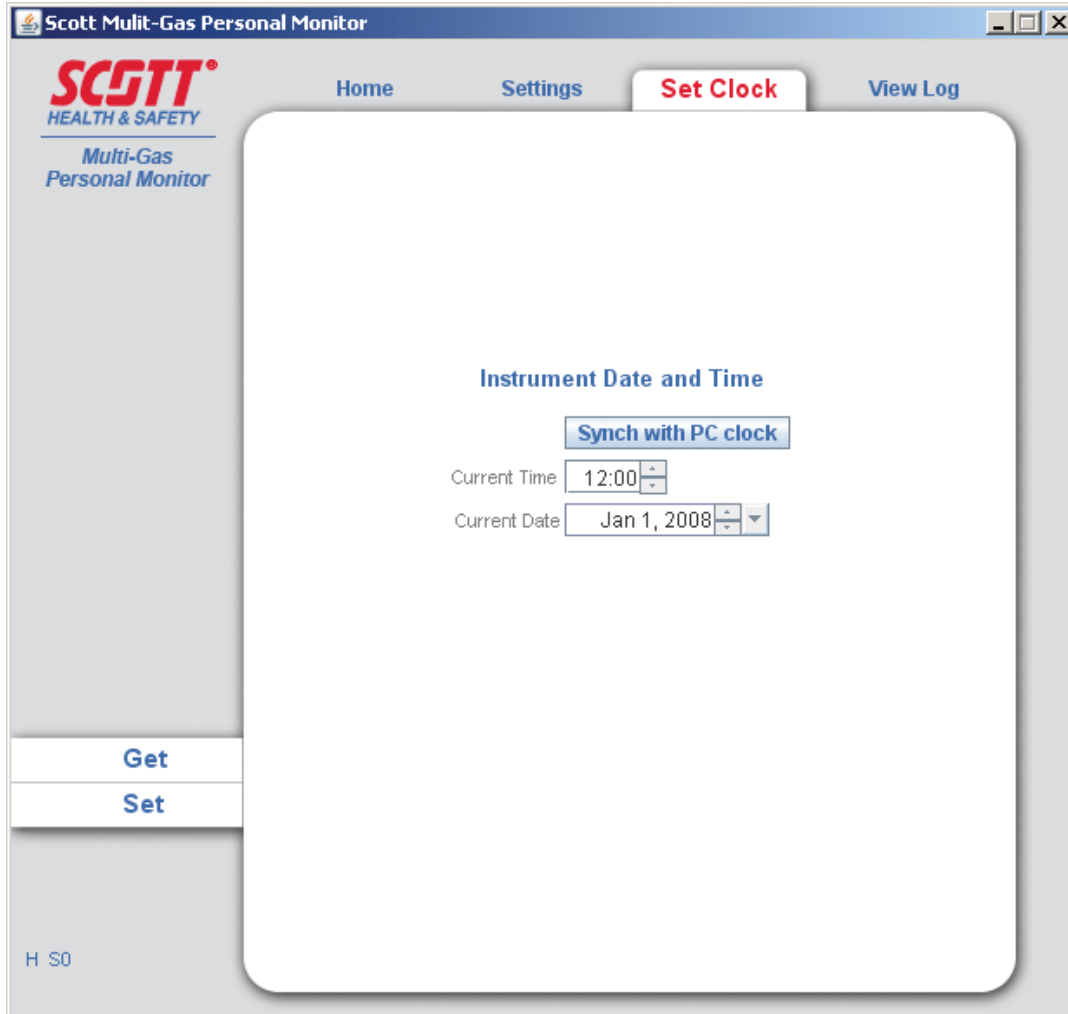


Figure 4-12. Set Clock Tab

Access the SET CLOCK tab to change alarm settings. The following options are available to users.

Synch with PC Clock - Allows users the option to synchronize the Protégé's internal clock with the PC clock.

Get - Reads the time setting of the Protégé presently connected and displays it on the Gas Monitor Set Clock dialogue box.

Set - Uploads the time displayed on the Gas Monitor Set Clock dialogue box to the Protégé presently connected.

4.6.5. View Data Log

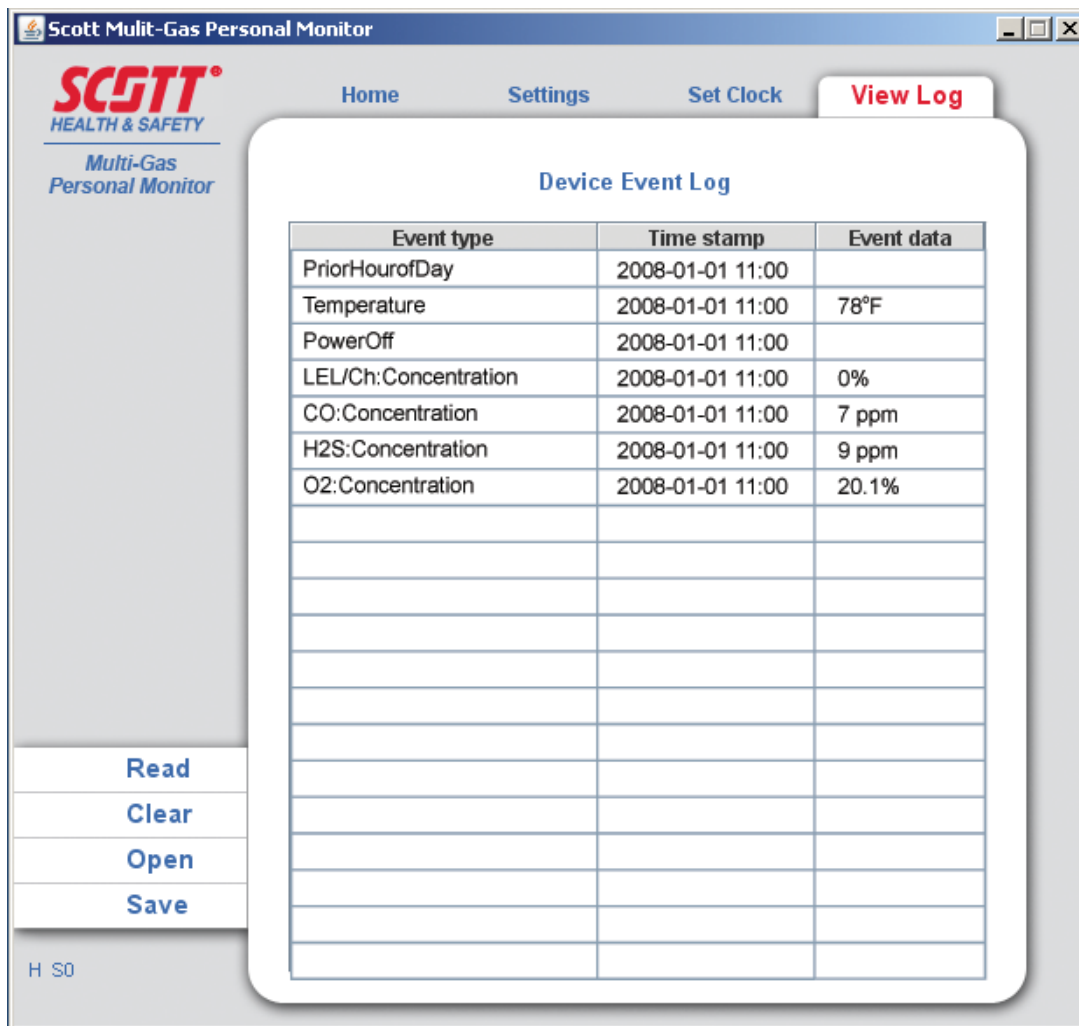


Figure 4-13. View Log Tab

Access the VIEW LOG tab to view downloaded log data from the Protégé. The following options are available to users.

Read - Reads the data log of the Protégé presently connected.

Clear - Clears the data log in the Protégé presently connected.

Open - Opens previously saved data log text files.

Save - Saves data log data to a text file for future use.

4.6.6. Software Settings

[Table 4-3](#) provides the available and default software settings for the Scott Gas Monitor Software.

Table 4-3. Software Settings

Range		Factory Default	Range		Factory Default
Carbon Monoxide			Hydrogen Sulfide		
CO Low Alarm	0 to 500 ppm	35 ppm	H ₂ S Low Alarm	0 to 200 ppm	10 ppm
CO High Alarm	0 to 500 ppm	35 ppm	H ₂ S High Alarm	0 to 200 ppm	10 ppm
CO STEL Alarm	0 to 250 ppm	200 ppm	H ₂ S STEL Alarm	0 to 15 ppm	15 ppm
CO TWA Alarm	0 to 100 ppm	35 ppm	H ₂ S TWA Alarm	0 to 15 ppm	15 ppm
CO Calibration Gas Concentration	0 to 999 ppm	50 ppm	H ₂ S Calibration Gas Concentration	0 to 500 ppm	25 ppm
Oxygen			Combustible		
O ₂ Low Alarm	0 to 25%	19.50%	LEL Low Alarm	0 to 60%	10.00%
O ₂ High Alarm	0 to 25%	23.50%	LEL High Alarm	0 to 60%	10.00%
			LEL Calibration Gas Concentration	0 to 70%	32% LEL
Options					
Password		1234	Zero Calibration upon Power On	On/Off	Off
Backlight Auto Off/Delay	0-255 secs	30 secs	Use Password	Yes/No	No
Silence Latching Alarms	Yes/No	No	Back Light Always On	Yes/No	No
Calibration Period	1-180 days	30 days	Enable Latching Alarms	Yes/No	No
Button Hold	1-4 secs	2 secs	Require Calibration when Overdue	Yes/No	No

Range		Factory Default	Range		Factory Default
On/Off Hold	0-9 secs	2 secs	Allow Use with Failed Sensor**	Yes/No	No
Temp Units	Fahrenheit/Celsius	Fahrenheit	Confidence Beep On	Yes/No	No
			Show CH ₄ % Instead of LEL% (Methane)	Yes/No	No

**** -WARNING**

USE OF THIS OPTION IS DISCOURAGED. OPERATING THE PROTÉGÉ WITH A FAILED SENSOR WILL NOT PROVIDE FULL MONITORING CAPABILITIES. USE THIS OPTION ONLY AFTER CAREFUL CONSIDERATION AND UNDERSTANDING OF THE MONITOR'S REDUCED MONITORING CAPABILITIES AND FOLLOWING LOCAL REGULATIONS. FAILURE TO UNDERSTAND HOW OPERATING THE PROTÉGÉ WITH A FAILED SENSOR MAY LEAD TO DEATH OR INJURY.

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5. Maintenance

5.1. Battery

The Protégé comes installed with a rechargeable lithium ion battery that must be replaced at the factory if needed. Contact Scott Health & Safety if needed.

5.2. Sensor Replacement

Protégé units will come installed in one of four sensor configurations.

A single unit will come installed with an LEL sensor.

A 2 gas unit will come installed with an O₂ sensor and an LEL sensor.

A 3 gas unit will come installed with an O₂ sensor, LEL sensor and either a CO or H₂S sensor.

A 4 gas unit will come installed with an O₂ sensor, LEL sensor, and a dual tox H₂S/CO sensor.

Sensors may be replaced with like sensors or dummy plug with another dummy plug. Dummy plugs and sensors are not interchangeable.

Using a dummy plug, the Protégé can be configured with an O₂ sensor and LEL sensor, or just an LEL sensor.

To replace a sensor, perform the following.

Equipment Required

- **Replacement Sensor or Dummy Plug**
- **T8 Torx Driver**

- 1) Set or verify the Protégé is turned off.
- 2) Unscrew and remove the 7 Torx head screws from the back of the Protégé. Refer to [Figure 5-1](#).

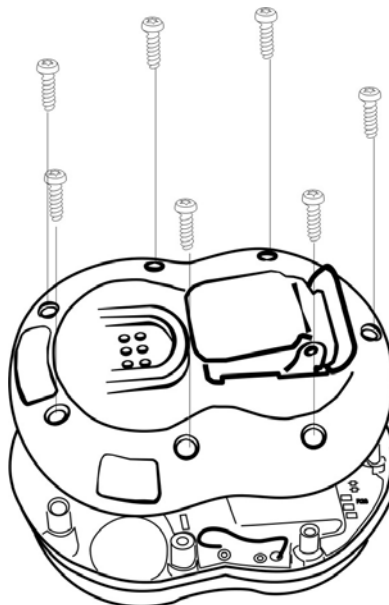


Figure 5-1. Removing Protégé Cover

- 3) Lift and firmly pull housing cover apart. Do not pull apart at an angle or by twisting.
- 4) Rotate the sensor PC board over to expose the three sensors.
- 5) Unplug desired sensor and replace with new sensor. Refer to [Figure 5-2](#).

NOTE

EACH SENSOR TYPE HAS A UNIQUE POSITION AND PIN LOCATIONS TO PREVENT SENSORS BEING INSTALLED IN WRONG LOCATIONS.

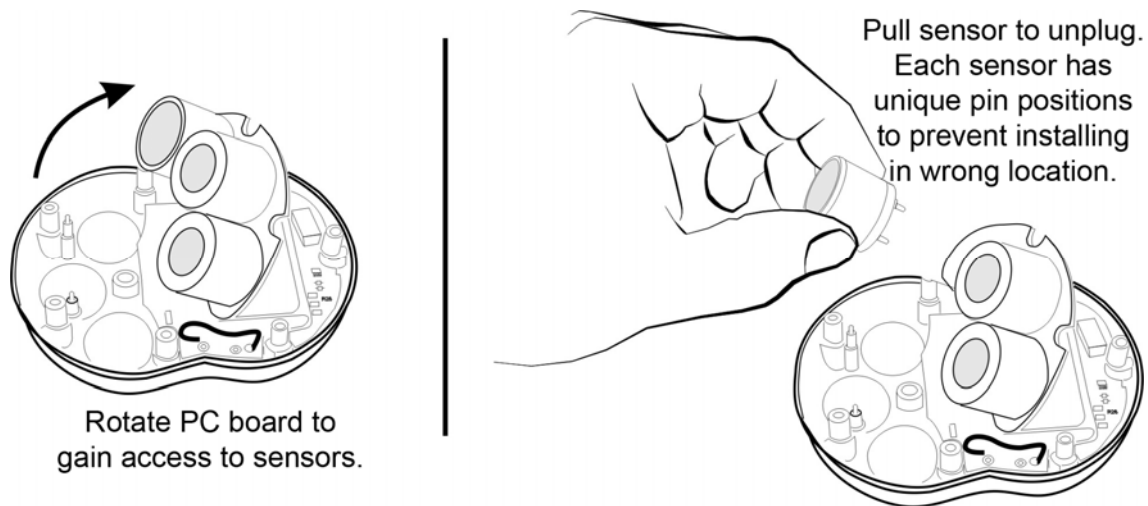


Figure 5-2. Removing Sensor

- 6) Rotate PC board back to its original position aligning the 2 pins to their receptacle socket. Refer to [Figure 5-3](#).

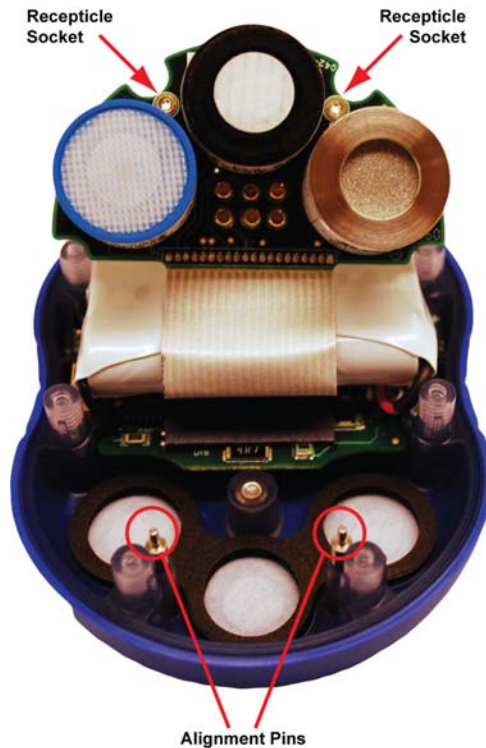


Figure 5-3. Pin Alignment

- 7) Replace back cover and install 7 Torx screws. Hand tighten the screws taking care not to over torque as this can cause damage to the Protégé housing.
- 8) Use the Scott Gas Monitor software to set or verify settings for the newly installed sensor. Refer to Paragraph 4.6.3 for changing alarm set points.
- 9) Perform Zero and Span calibrations of the Protégé in accordance with [Paragraph 4.3.1](#).

5.3. Pump Troubleshooting

Table 5-1. Pump Troubleshooting

Condition	Suggested Actions
Low flow alarm	<ul style="list-style-type: none"> • Check for obstructions, kinks in the hose, or other blockage • Verify no moisture has entered the hose or pump • Unscrew probe assembly and replace filter(s) in probe • Clean pump per Paragraph 5.4
Unexpected noise coming from pump	<ul style="list-style-type: none"> • Verify no moisture has entered the hose or pump • Clean pump per Paragraph 5.4 • Replace pump
Pump does not run when activated	<ul style="list-style-type: none"> • Verify no other alarms are active. Active alarms may inhibit pump from powering on • Replace pump

5.4. Pump Cleaning Procedure

The Protégé's pump requires periodic cleaning to ensure optimum performance. The pump may be cleaned as part of a preventative maintenance schedule, which will depend on the frequency of usage and the environmental conditions under which the pump is used.

Perform the pump-cleaning procedure if:

- The pump fails the start-up flow test.
- The instrument periodically goes into Low Flow Alarm without apparent reason.
- The pump makes a chattering noise during operation.
- The sample draw reading indicates less than 300 cc/min (0.3 Lpm).

To clean the optional pump assembly, perform the following.

Equipment Required:

- **10ML Syringe (077-0422)**
- **Tygon Tubing (40011392)**
- **T8 Torx head screw driver (073-0324)**
- **Isopropyl Alcohol (IPA)**
- **Canned compressed air (Electronic Grade)**

- 1) Using the T8 Torx head driver, remove the four Torx head screws located on the back of the pump assembly.



Figure 5-4. Pump Screws

- 2) Lift the back cover off the pump enclosure and remove the pump retaining plate. This allows access to the pump. Gently lift the pump out of the pump enclosure.

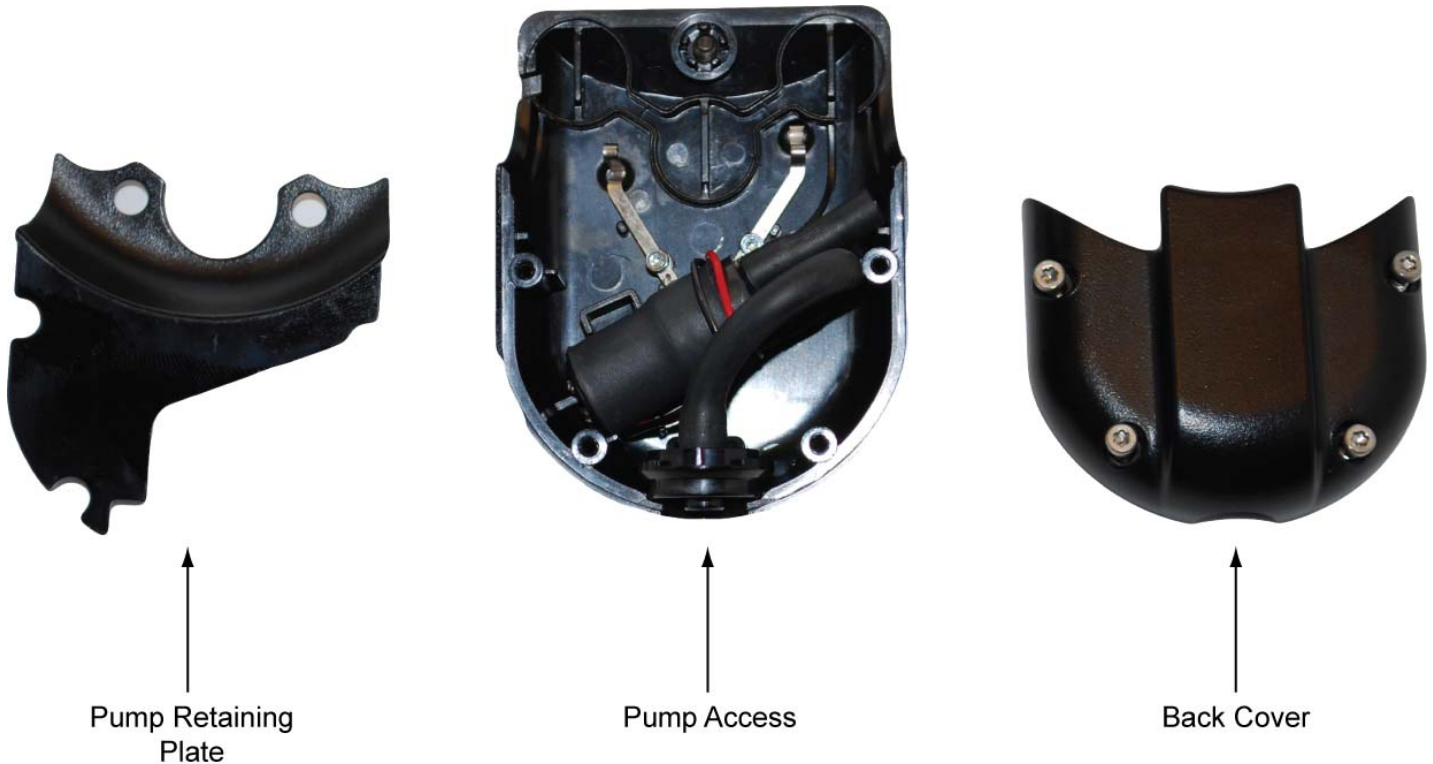


Figure 5-5. Pump Disassembly

- 3) Carefully remove the tubing from the pump ports.

CAUTION

USE ONLY THE MINIMUM FORCE NECESSARY TO REMOVE HOSES FROM PORTS. PUMP PORTS WILL BREAK EASILY IF EXCESSIVE FORCE IS USED.

NOTE

TO EASILY IDENTIFY HOSES FOR REINSTALLATION, ATTACH LOCALLY GENERATED LABELS TO THE HOSES. THE SHORT HOSE IS THE OUTLET AND THE LONG HOSE IS THE INLET.



Figure 5-6. Pump Ports and Hoses

- 4) Connect a piece of the Tygon tubing to the syringe and draw about 3ml of isopropyl alcohol into the tubing and syringe.
- 5) Connect the syringe and Tygon tubing to the INLET port.
- 6) Connect another piece of Tygon tubing to the OUTLET port and run the Tygon tubing to a catch basin such as a small cup or trashcan.



Figure 5-7. Syringe Set-up

- 7) Slowly inject the alcohol through the pump by pressing the plunger on the syringe.
- 8) Once the alcohol is inside the pump and tubing, pump the syringe plunger in and out 5-7 times. Then depress the syringe plunger completely to eject the alcohol from the pump.
- 9) Carefully disconnect the Tygon tubing from the pump ports.
- 10) Use the can of compressed air to blow the excess alcohol from the pump. The thin tube that comes with the can of air may be helpful in directing the air stream into the pump ports. The pump should make an audible whir as it spins.
- 11) Re-attach the pump tubing to the INLET (long) and OUTLET (short) ports.
- 12) Place the pump assembly into the enclosure with the ports positioned over top of one another. The INLET port should be higher than the OUTLET port. Verify the wires are routed on top of the assembly as shown in [Figure 5-8](#).

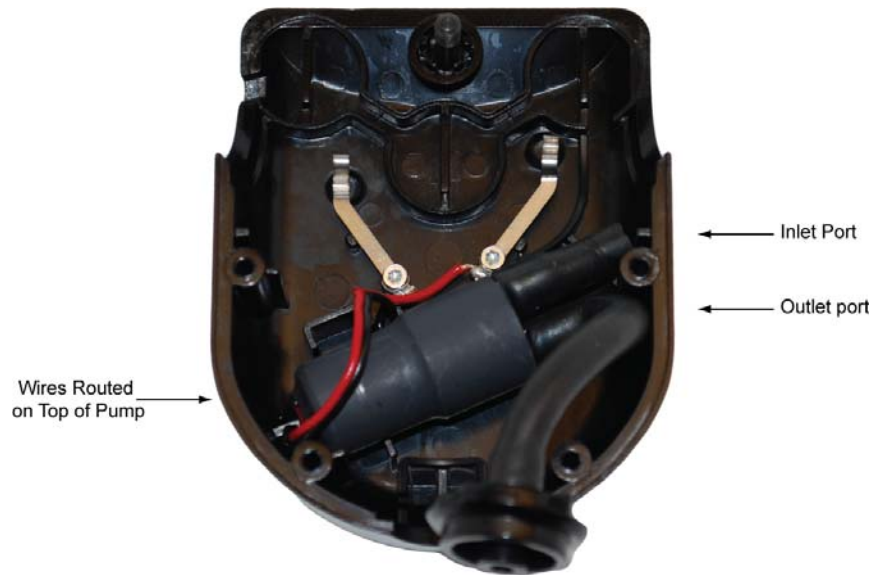


Figure 5-8. Pump Wiring

13) Insert the pump retaining plate.

14) Place the pump inlet barb into the pump enclosure groove.

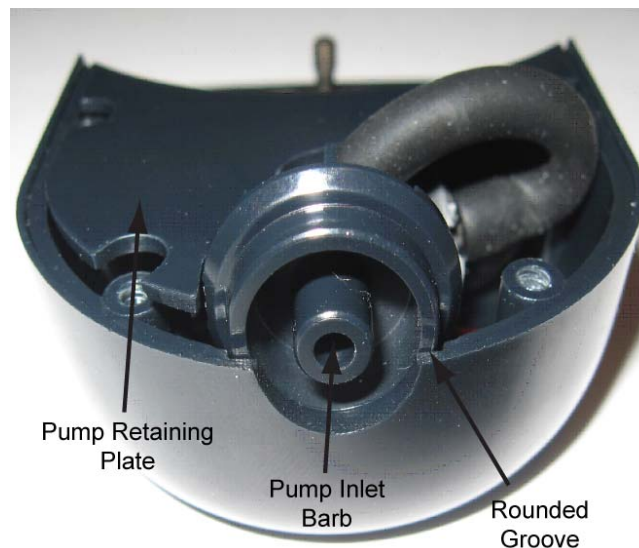


Figure 5-9. Pump Reassembly

15) Gently place the back cover onto the pump enclosure and install the four (4) Torx head screws. Follow an X pattern to ensure that the enclosure halves are seated together evenly.

CAUTION

DO NOT OVER TIGHTEN THE SCREWS. OVER TIGHTENING THE SCREWS WILL STRIP THE HOLES IN THE ENCLOSURE.

16) Install pump onto an operational Protégé and verify proper flow rate is achieved.

5.5. Parts and Accessories List

<u>Description</u>	<u>Part#</u>
Combustible Sensor	093-0231
Oxygen Sensor	093-0232
CO/H ₂ S sensor	093-0230
CO sensor	093-0470
H ₂ S sensor	093-0471
Combustible sensor (E2V)	093-0524
Filter Replacement Pack	096-3249
Foam pads - battery	023-0022
O-ring	009-0050
Foam Pad-LCD	023-0024
LCD Replacement Assembly	096-3247
Pump	096-3259
Calibration Cup	074-0547
Torx Tool #8	073-0324
Dummy Plug	074-0558
Portable Gas Detection CD	096-3366
Quick Guide	062-0026
Pump Kit	096-3271
Alligator Clip and screw	096-3278
Multi-Charger	096-3283

5.6. Scott Repairs

For quick and effective service of your instrumentation, and to reduce time spent on repairs, the SCOTT Instruments Service Department requires a Return Maintenance Authorization number be issued prior to any product being shipped for service repairs.

Appendix

Combustible Sensor K-Factors

The table lists K-factors referenced to methane calibration. The factors are the typical ratios of the response to the listed gases relative to the response to methane. The values are typical, but will vary from sensor to sensor and over the lifetime of a given sensor. When a gas other than the calibration gas is detected, divide the reading by the corresponding factor to estimate the actual gas concentration. For example, propane may be detected by a Protégé calibrated with methane. If the reading is 32% LEL: 32% LEL Methane indicated/0.65 = 49% LEL of propane, estimated. Generally, if there is a potential for methane in the operating environment, the instrument should be calibrated with methane. If there also is a potential for other gases in the operating environment, the LEL alarm level should be adjusted according to the lowest K-factor of the expected gases. For example, if either methane or propane may be present, and the desired alarm is 25% LEL, calibrate the instrument with methane and set the alarm level at (25% x 0.65 = 16% LEL). For best accuracy, calibrate the Protégé with a gas similar to the monitored target gas.

<u>Known Gas Present</u>	<u>K-Factor</u>
n-Butane	0.6
Methanol	1.04
Ethane	0.8
Hydrogen	1.1
Methane	1
Propane	0.65
n-Pentane	0.5
n-Hexane	0.45
n-Octane	0.4
Ethanol	0.8
Isopropanol	0.69
Acetone	0.7
Ammonia	1.3
Toluene	0.35
Gasoline	0.6
Isobutanol	0.53
Xylene	0.49
Styrene	0.46



Thank you for reading this data sheet.

For pricing or for further information, please contact us at our UK Office, using the details below.



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Please note - Product designs and specifications are subject to change without notice. The user is responsible for determining the suitability of this product.