



# DOCKING STATION PC CONTROLLER PROGRAM MODEL CS460

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OPERATOR'S MANUAL

P/N 6011737, REVISION A  
DECEMBER 2018



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# Warranty

**Part Number**

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**Address**

TSI Incorporated / 500 Cardigan Road / Shoreview, MN 55126 / USA

**E-mail Address**

[answers@tsi.com](mailto:answers@tsi.com)

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# Safety



## WARNING

Read and understand this manual before using the CS460. Also read and understand the GM460 Operator's Manual.

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## Cautions and Safety Information

- Use only polyurethane sample tubing with the Model CS460. Consult TSI Incorporated for other materials.
- **DO NOT** subject the Model CS460 to infrared or intense light. This may cause communication errors.
- **DO NOT** expose the Model CS460 to water.
- **DO NOT** subject the Model CS460 to any hard impact.

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# About this Manual

This manual uses the following conventions for notes, cautions, and warnings.

	<b>Note</b>
	Describes additional or critical information.
	<b>Caution</b>
	Describes potential damage to equipment.
	<b>WARNING</b>
	Describes potential danger that can result in injury or death.

The manual is organized as follows:

[Chapter 1: Introduction](#)

[Chapter 2: Description](#)

[Chapter 3: Hardware Setup](#)

[Chapter 4: Program Setup](#)

[Chapter 5: Operation](#)

[Chapter 6: Viewing Data in the Logs Window](#)

[Chapter 7: Instrument Function Menu](#)

[Chapter 8: Contacting Customer Service](#)

[Appendix A: Specifications](#)

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# CHAPTER 1

## Introduction

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### Overview

This chapter briefly describes the CS460 Docking Station and the CS460 PC Controller Program.

Specifications are listed in [Appendix A](#).

The CS460 Docking Station is an advanced, reliable system that can charge, bump test, calibrate, alarm check, and provide test records for up to ten GM460 portable gas monitors at once.

It is designed to save the test records to an SDHC card (standalone functionality) or to be connected directly to a computer (PC controlled functionality).

If test records are stored to an SDHC card while operating in the standalone configuration, the PC Controller Program can then be used with a Windows®-based operating system personal computer to retrieve test data files from the SDHC card or from the computer's hard drive if the files have been transferred to the hard drive from the SDHC card.

When using the PC Controller Program while operating in the PC Controlled configuration, you may retrieve instrument data, bump test, calibrate, and alarm check instruments. Instrument information and data for each instrument can be viewed directly using the PC Controller Program and can be printed from the PC Controller Program. For instructions on how to use the CS460 in the Standalone configuration, see the *CS460 Docking Station Standalone Configuration Operator's Manual*.

The purpose of this manual is to explain how to set up and use the CS460 in PC Controlled configuration. It also explains how to use the CS460 PC Controller Program. You will learn how to:

- Install and launch the CS460 PC Controller Program.
- Setup the CS460 PC Controller Program for use with the CS460.
- Prepare the CS460 for use.
- Bump test and calibrate up to ten GM460s using the PC Controlled configuration.
- Use the CS460 to charge a GM460.
- View, print, and export calibration, bump test, and alarm check records.

- View instrument information and data using the PC Controller Program.
- Update instrument parameters using the PC Controller Program.



### Cautions

- The GM460 detects oxygen deficiency and elevated levels of oxygen, combustible gases, carbon monoxide, and hydrogen sulfide, all of which can be dangerous or life threatening. When using the GM460, you must follow the instructions and warnings in the GM460 Operator's Manual to assure proper and safe operation of the GM460 and to minimize the risk of personal injury.
- The operator of this instrument is advised that if the equipment is used in a manner not specified in this manual, the protection provided by the equipment may be impaired.

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## System Requirements

To use the CS460 PC Controller Program, your personal computer must meet the following requirements:

<b>Operating Systems</b>	Windows® 7, 8, or 10 operating system
<b>Processor</b>	PC running Pentium® 2 processor or equivalent minimum
<b>Memory</b>	Minimum 32 MB RAM
<b>Hard Disk Space</b>	Minimum 32 MB
<b>Available USB Port</b>	

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## How to Build a System

Various accessories are included with the Model CS460 depending on what CS460 bundle is ordered. See the table below for what is included with each basic bundle.

Other bundles are available that include different calibration gas cylinders than the four-gas mix included in the 81-CS460-04. The accessories are described in more detail in [Chapter 2: Description](#).

Every installation needs only one each of the starred (\*) items in table below. There are two AC adapters listed. If you have a single-station system, you only need the single-station AC adapter (indicated by \*<sup>a</sup>). If you have multi-station system, you only need the multi- station AC adapter (indicated by \*<sup>b</sup>).

For example, if you have five separate single-station systems where none of the five stations are connected together, each system will need one each of the starred items which means you will have a total of five each of the starred items. For this system, you would need to order five 81-CS460-01 bundles, five 81-CS460-03 bundles, or five 81-CS460-04 bundles depending on additional accessories desired.

If you have one multi-station system with five CS460s connected together, you will only need one each of the starred items in Table 1 below in order to operate all five CS460s. For this system, you would need to order one 81-CS460-02 bundle and four 81-CS460 bundles. Any additional accessories would need to be ordered separately.

**Table 1-1: CS460 Bundle Options**

<b>Bundle Part Numbers</b>	<b>Included Items</b>	<b>81-CS460</b>	<b>81-CS460-01</b>	<b>81-CS460-02</b>	<b>81-CS460-03</b>	<b>81-CS460-04</b>
Docking Station		X	X	X	X	X
Exhaust Tube, 10 ft. Length		X	X	X	X	X
USB Cable*			X	X	X	X
Ethernet Cable, 5 ft. Length*			X	X	X	X
Single-Station AC Adapter <sup>a</sup>			X		X	X
Multi-Station AC Adapter <sup>b</sup>				X		
SDHC Card with SD to USB Reader*			X	X	X	X
Demand Flow Regulator					X	X
Calibration Tubing, 3 ft. Length					X	X
Calibration Cylinder Holder						X
Calibration Cylinder**						X
<p>* Each system needs only one each of these.</p> <p><sup>a</sup> Used only for single-station systems.</p> <p><sup>b</sup> Used only for multi-station systems.</p> <p>** Type of calibration cylinder depends on bundle ordered.</p>						

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## CHAPTER 2

# Description

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## Overview

This section describes:

- [CS460 Components](#)
- [Accessories included in Various Bundles](#)
- [Optional Accessories \(not included in any bundles\)](#)

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## CS460 Components

The CS460 consists of:

- Touch screen
- Status LED
- Instrument cradle
- Gas in/gas out cover
- Left panel
- Gas and electrical connections
- Exhaust fitting
- Air filter
- Exhaust tubing
- Connection brackets

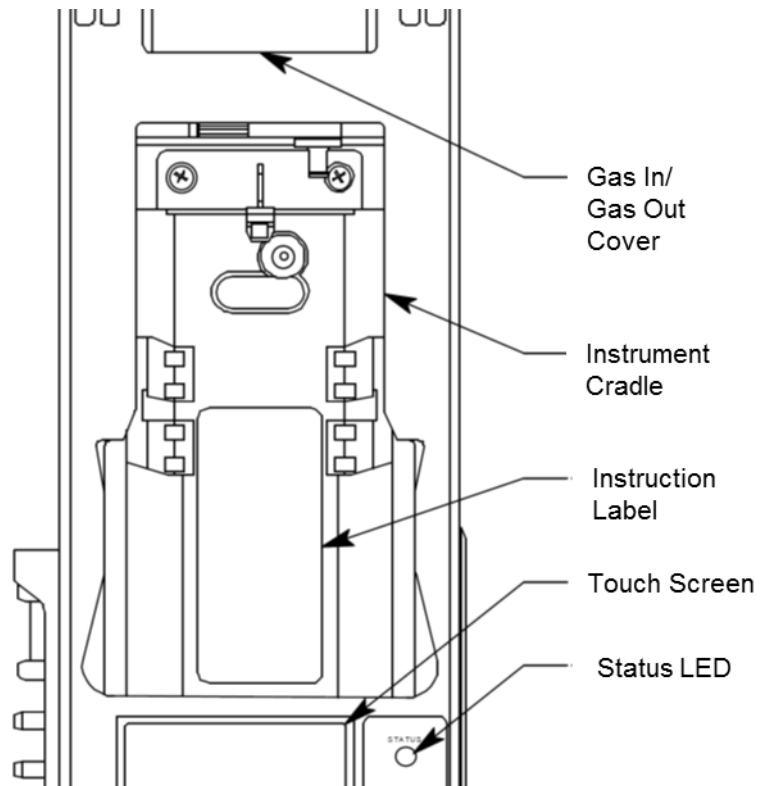


Figure 2-1: CS460 Component Location

## Touch Screen

The LCD touch screen is located at the bottom front of the CS460. Its appearance depends on whether the CS460 is a single-station system or part of a multi-station system. In either type of system, it shows the gas combination of a connected GM460 along with autocalibration values and the pass/fail status of any tests. The text field at the top of the screen shows instrument or station status. The **Detector On/**  
**Detector Off** button in the lower left turns the GM460 on and off.

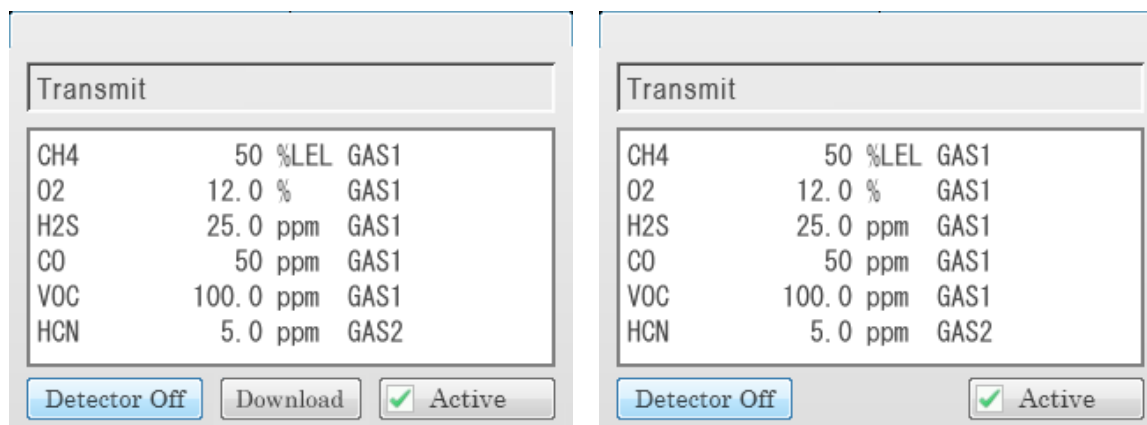
In a single-station system, the **Auto Bump** selection box appears at the bottom middle of the screen. The **Auto Bump** selection box cannot be selected or deselected using the CS460 screen if the CS460 is connected to the PC Controller Program but the parameter can be changed in the **Bump & Cal 1** tab of the CS460 window. If selected, a bump test will automatically begin as soon as an instrument is connected. If deselected, a bump test will not automatically begin when an instrument is connected. The **Download** button appears in the lower-right corner of the screen. In PC controlled operation, the **Download** button is grayed out and has no function.

Transmit		
CH4	50 %LEL	GAS1
O2	12.0 %	GAS1
H2S	25.0 ppm	GAS1
CO	50 ppm	GAS1
VOC	100.0 ppm	GAS1
HCN	5.0 ppm	GAS2

Detector Off   ☐ Auto Bump   Download

**Figure 2-2: Single CS460 System Touch Screen**

In a multi-station system, the **Auto Bump** selection box does not appear on the CS460 screen or in the **Bump & Cal 1** tab of the CS460 window. The first CS460 in the system has the **Download** button at the bottom middle of the screen and the **Active** selection box in the bottom-right corner of the screen. Additional CS460s look the same as the first one with the exception that they do not include the **Download** button. The **Active** selection box cannot be deselected in PC Controlled operation. The area around it is grayed out and the box has a green check indicating the CS460 is active.



**Figure 2-3: Multi-CS460 System Touch Screens**

## Status LED

The Status LED is located to the right of the touch screen. The table below summarizes the meaning of the LED's different colors.

**Table 2-1: Status LED Colors**

Status LED Color	Meaning
Solid <b>Green</b>	No GM460 installed.
Blinking <b>Green</b>	GM460 installed and IrDA communication established.
Blinking <b>Orange</b>	Charging.
Solid <b>Orange</b>	Charging complete OR CS460 starting up.
Solid <b>Red</b>	CS460 problem detected.

## Instrument Cradle

The instrument cradle is a recessed area in the middle of the CS460 that is designed to accept the GM460. Insert the GM460 in the instrument cradle with the belt clip facing out before you perform a bump test, calibration, alarm check or charge a GM460. Follow the instructions in this manual and at the center of the instrument cradle for installing the GM460. An infrared (IR) port at the back of the panel lines up with the GM460's IR port when it is inserted in the cradle and is used to communicate with the GM460. Charging contacts in the bottom of the cradle line up with the GM460's charging contacts.

## Gas In/Gas Out Cover

The red gas in/gas out cover attaches to the GM460's inlet and exhaust fittings and routes calibration gas to and from the GM460. The cover is spring loaded. To connect the cover to the GM460, push it down until it touches the GM460 and then release it. It should lock into place. To release the cover, push it toward the GM460 and then release it. It should return to its unconnected position at the top of the CS460.

## Left Panel Components

The CS460's left panel includes:

- SD card slot
- USB PC connector
- USB printer connector
- LAN connector
- On/off switch
- Power jack
- Electrical connector
- Sample fittings

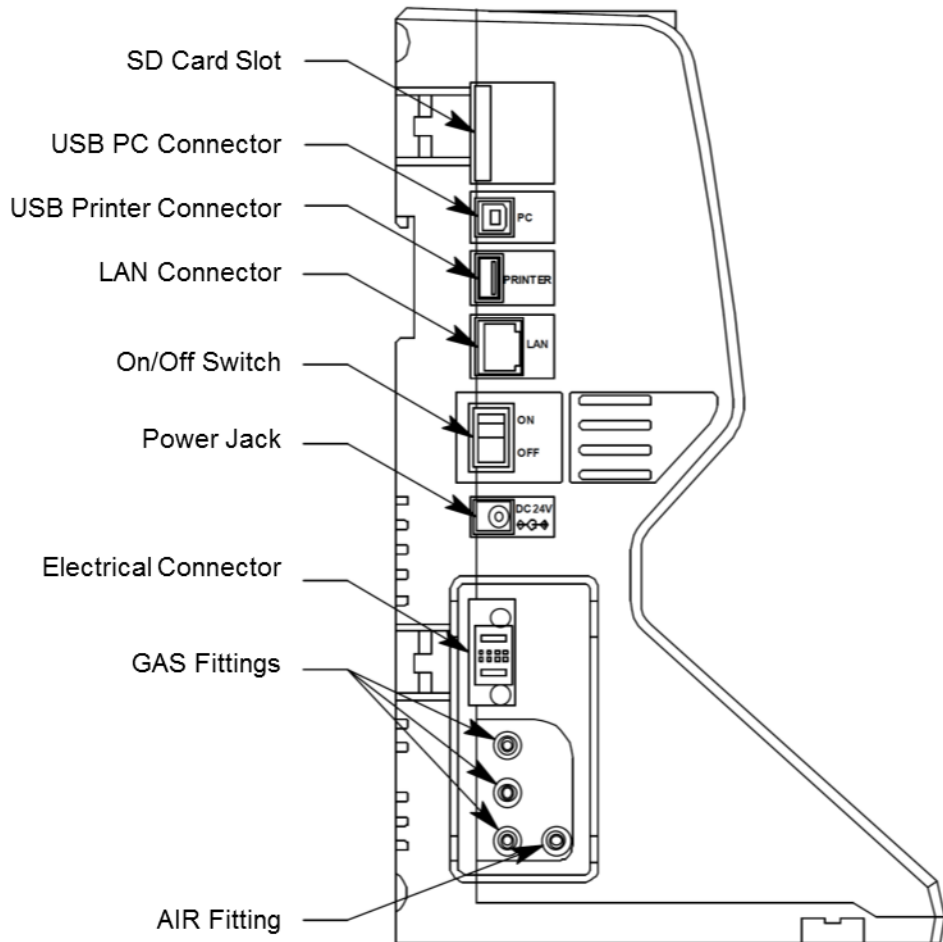


Figure 2-4: Left Panel Component Location

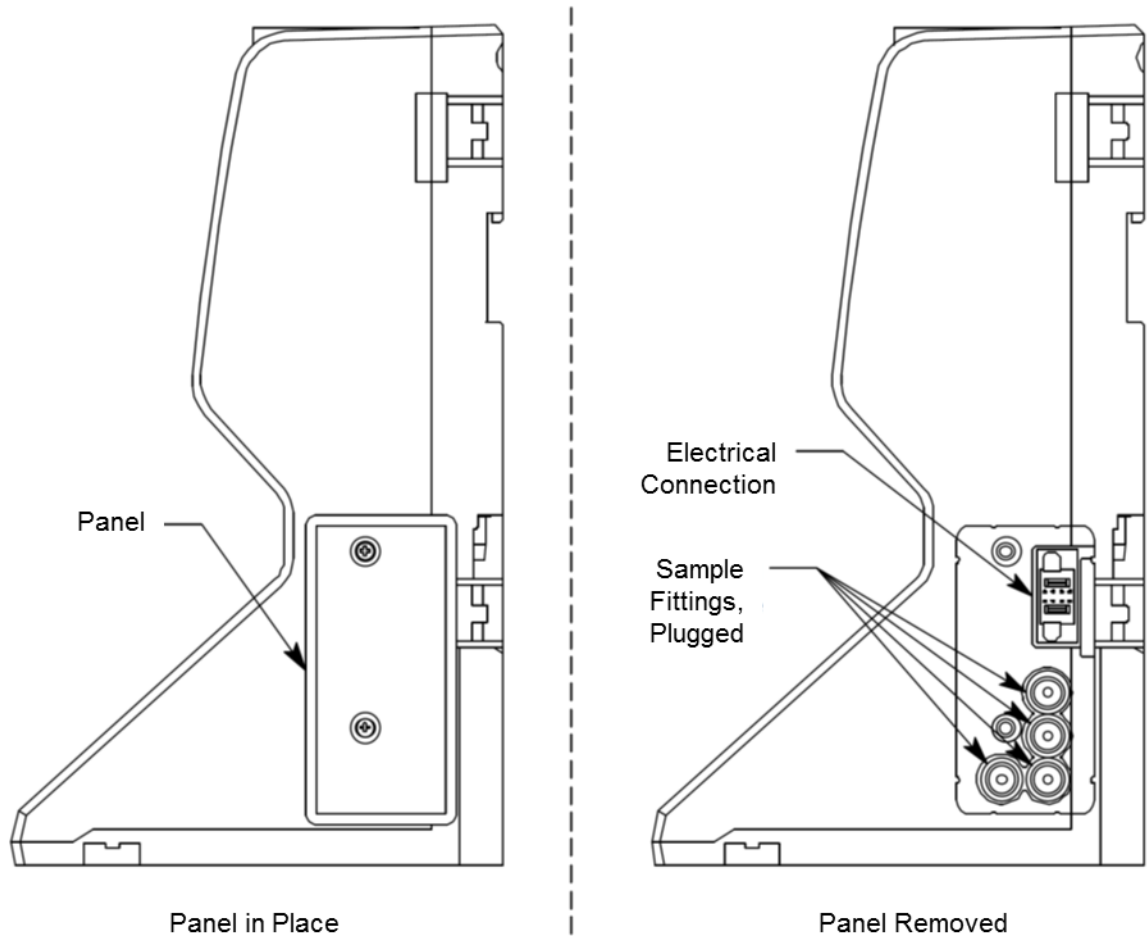
Component	Description
<b>SD Card Slot</b>	The SD card slot at the top of the left side of the CS460 allows for the installation of an SDHC card. When used in the PC Controlled Mode, bump test, calibration, and alarm check test data is saved to the PC Controller Program. If an SD card is installed in the SD card slot, that test data will also be saved to the SD card. If a <b>Download Logs</b> operation is performed in PC Controlled Mode, that data (interval trend, alarm trend, etc.) <b>will not</b> be saved to an installed SD card.
<b>USB PC Connector</b>	A <b>Type B</b> USB connection allows for the CS460 to be connected to a PC using a <b>Type A to Type B</b> USB cable.



Component	Description	
USB Printer Connector	The USB printer connector allows for the optional printer accessory to be connected to the CS460.	
	<table><tr><th>Note</th></tr><tr><td>The CS460 only supports the Seiko Instruments, Inc. DPU-S245 USB printer. See <a href="#">"Printer"</a> in Chapter 2 for more information.</td></tr></table>	Note
Note		
The CS460 only supports the Seiko Instruments, Inc. DPU-S245 USB printer. See <a href="#">"Printer"</a> in Chapter 2 for more information.		
LAN Connector	The LAN connector allows for the CS460 to be connected to a building's network using an Ethernet cable. This function allows for the SD card's data to be downloaded to a computer connected to the same network.	
On/Off Switch	The white on/off switch turns the station on or off. Push the top of the switch toward the station to turn it on. Push the bottom of the switch toward the station to turn it off.	
Power Jack	The round power jack is located below the on/off switch. The plug on the end of the AC adapter cable connects to it.	
Electrical Connector	The black electrical connector allows for an electrical connection to another CS460 or to an SV-3.	
Sample Fittings	Four sample fittings are located on the left-side of the CS460. The <b>AIR</b> fitting is the right-most fitting and the <b>GAS</b> fittings are arranged in a column to the left of the <b>AIR</b> fitting. The bottom to top order is <b>GAS 1</b> , <b>GAS 2</b> , and <b>GAS 3</b> . All four fittings accept 3/16 inch ID tubing.	

## Secondary Connections

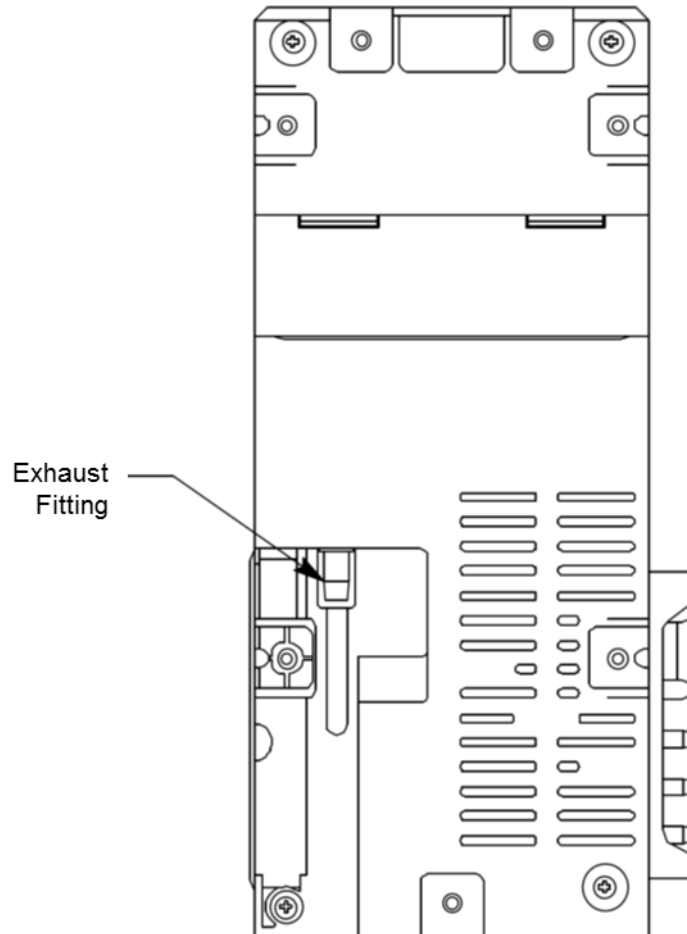
The right side of the CS460 is shipped from the factory with a small panel attached to it with two screws. That panel should remain in place if the CS460 is being used alone or if it is the right-most station in a bank of connected stations. The panel needs to be removed in order to connect another CS460 to it. Beneath the panel is an electrical connection and plugged sample fitting for calibration gas connections.



**Figure 2-5: Right Panel Component Location**

## Exhaust Fitting

An exhaust fitting is located on the CS460's back panel. It allows routing of the exhausted calibration gas to a convenient location. This fitting accepts 5/16 inch ID tubing. Even though the exhaust gas can be routed to an area to be safely dispersed, the docking station should still be installed in a well-ventilated area.



**Figure 2-6: Back Panel Component Location**

## Air Filter and Exhaust Tubing

A cylindrical particle filter with a short length of tubing is supplied with the CS460 for installation to the **AIR** fitting on the left panel. The filter keeps particulate contamination out of the docking station.

A 10-foot length of 5/16 inch ID polyurethane tubing is provided for connection to the exhaust fitting on the back panel to allow routing of the exhaust to a location such as an open window where the exhaust can disperse.

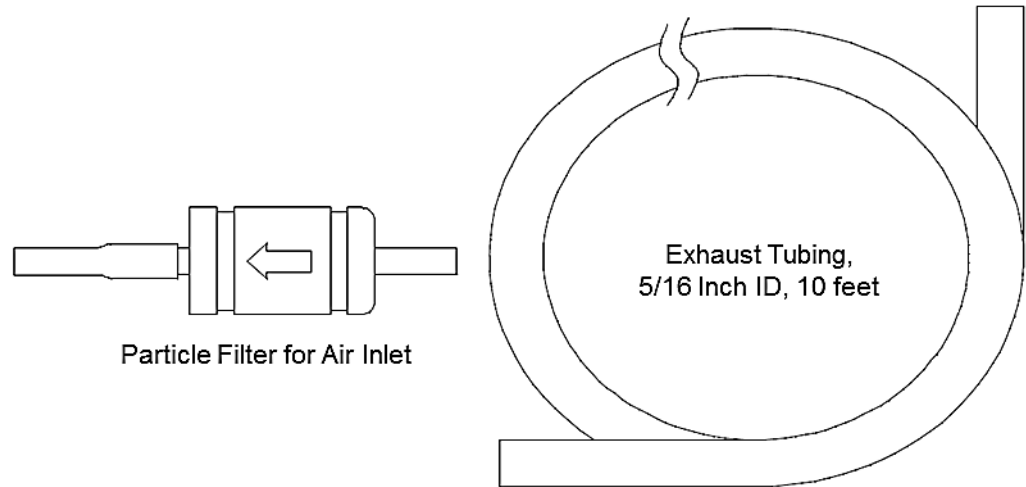


Figure 2-7: Air Filter & Exhaust Tubing



### WARNING

**DO NOT** use an exhaust tube that is longer than 15 feet. The increased flow restriction caused by a longer tube may affect gas response and cause inaccurate calibration and bump test results.

## Connection Brackets

Each CS460 is provided with three connection brackets that are used to mechanically connect one CS460 to another.

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## Accessories Included in Various Bundles

This section describes all of the accessories that are included as standard with the CS460, depending on the CS460 bundle purchased. These include:

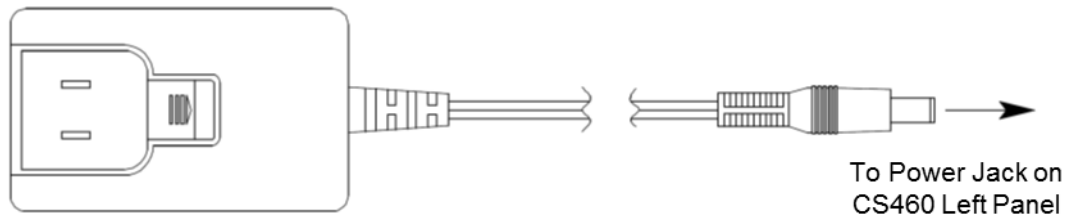
- AC adapter
- Type A to Type B USB cable
- Ethernet cable
- SD card
- SD to USB reader
- Demand flow regulator
- Calibration tubing
- Calibration cylinder

You do not need one of each of these accessories for every CS460 in your installation but every installation needs one of each accessory. See ["How to Build a System" in Chapter 1](#) for information about what CS460 bundles include these items.

## AC Adapter

### Single-Station AC Adapter

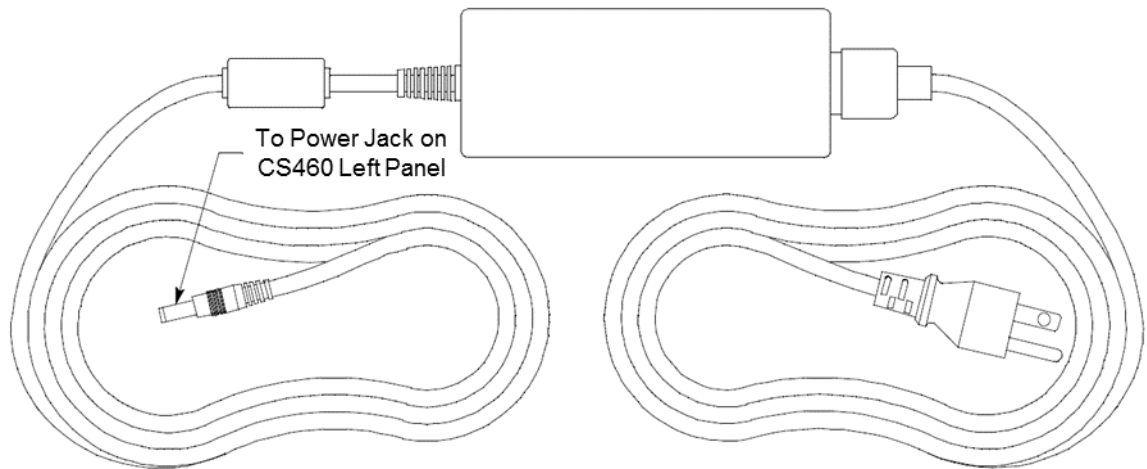
The single-station AC adapter is a wall plug style adapter with a 5-foot cable. The end of the cable has a plug that connects to the CS460's power jack. The AC adapter is rated 100 to 240 VAC input, 24 VDC 0.63 A output.



**Figure 2-8: Single-Station AC Adapter**

### Multi-Station AC Adapter

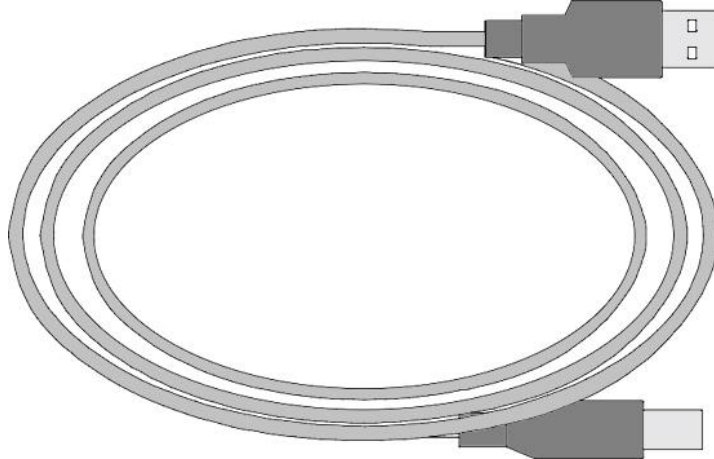
The multi-station AC adapter is a larger adapter with a separate power cord and a plug that connects to the CS460's power jack. The adapter is intended to be used when more than one CS460 are connected together. Only the primary CS460 needs to be plugged into power. The AC adapter is rated 100 to 240 VAC input, 24 VDC 4.17 A output.



**Figure 2-9: Multi-Station AC Adapter**

## USB Cable

A **Type A to Type B** USB cable is used to connect the CS460 to a PC which is required for using the CS460 in the PC Controlled configuration. If you have a multi-station system, the USB cable only needs to be plugged into the primary (left-most) station.



**Figure 2-10: USB Cable**

## Ethernet Cable

A 5-foot length of black Ethernet cable allows for the LAN connectivity function of the CS460 to be used. One end of the cable is plugged into the LAN port on the left side of the CS460 and the other end is plugged into one of the building's network ports. If you have a multi-station system, the Ethernet cable only needs to be plugged into the primary (left-most) station.

## SD Card and SD to USB Reader

### Note

Since data is saved to the PC Controller Program when the CS460 is used in PC Controlled Mode, the SD card provided with the CS460 is not necessary. If it is installed, data will be saved to the PC Controller Program and to the SD card.

If the SDHC card is installed in the SD card slot, data will be saved to it in addition to being saved to the PC Controller Program. If you have a multi-station system, the SD card only needs to be inserted into the primary (left-most) station's SD card slot.

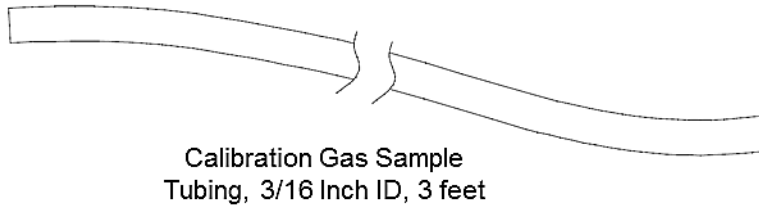
The SDHC card can be directly inserted into a computer's SD card slot if the computer is equipped with one. If the computer does not have an SD card slot, the provided SD to USB reader must be used.

## Demand Flow Regulator

The demand flow regulator is screwed into the calibration gas cylinder and allows the CS460 to draw gas from the cylinder when the regulator is connected to the CS460 using the 3 feet of calibration tubing.

## Calibration Tubing

A 3-foot length of 3/16 inch ID polyurethane tubing is provided with bundles that include a demand flow regulator. This calibration tubing is used to connect the regulator to gas fitting on the left side of the CS460 or on the left side of the SV-3.



**Figure 2-11: Calibration Tubing**

## Calibration Cylinder

The calibration gas cylinder must be used to calibrate the applicable sensors in a GM460. The particular calibration gas cylinder provided depends on which bundle is ordered.

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## Optional Accessories *(not included in any bundles)*

### SV-3

The SV-3 increases the number of calibration cylinders that can be used with the CS460 from 3 to 6. It connects to the sample fittings and electrical connector on the left side of the CS460. If you have multiple CS460s connected together, the SV-3 will be installed on the left-most CS460.

The SV-3 comes with two connection brackets that are used to mechanically connect the SV-3 to the left-most CS460.

## Printer

The printer supported by the CS460 is the Seiko Instruments, Inc. DPU-S245 USB printer. It allows for quick printing of bump test or calibration results. The printer comes with an AC adapter and power cord, a battery pack, a USB cable, and a roll of paper. It is connected to the CS460 via the USB Printer connection on the left side of the CS460.

### Note

For questions about the printer, contact Seiko Instruments, Inc. at <http://www.sii.co.jp/sps/eg/contact.html>.

## Wall Mounting Brackets

The CS460 can be mounted to the wall, if desired, using three mounting brackets. See "[Wall Mounting the CS460 \(optional\)](#)" in Chapter 3 for a description of how many wall mounting brackets are needed depending on how many CS460s are in your system.



## CHAPTER 3

# Hardware Setup

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## Overview

Setting up the CS460 for use in its PC Controlled Mode includes:

- [Connecting Multiple CS460s Together \(optional\)](#)
- [Connecting the AC Adapter, Air Filter, and Exhaust Tubing](#)
- [Connecting the SV-3 \(optional\)](#)
- [Wall Mounting the Station \(optional\)](#)
- [Connecting the Printer \(optional\)](#)
- [Connecting Calibration Gas](#)

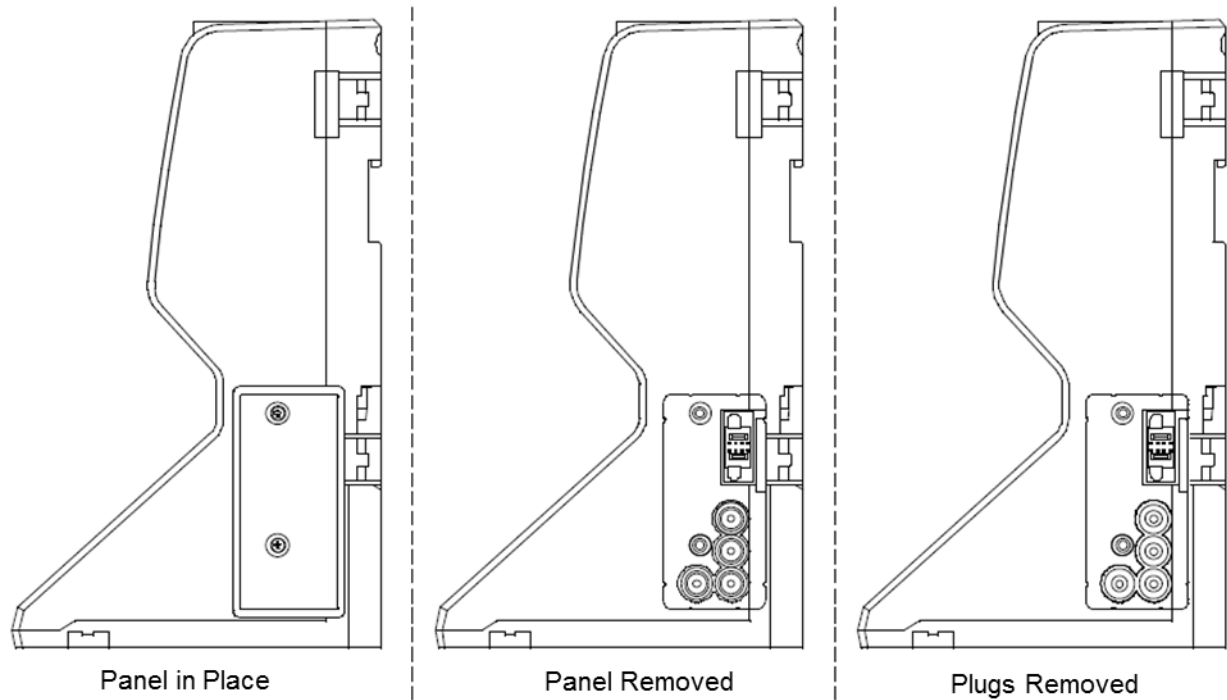
Instructions to complete each of these tasks is in this chapter.

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## Connecting Multiple CS460s Together

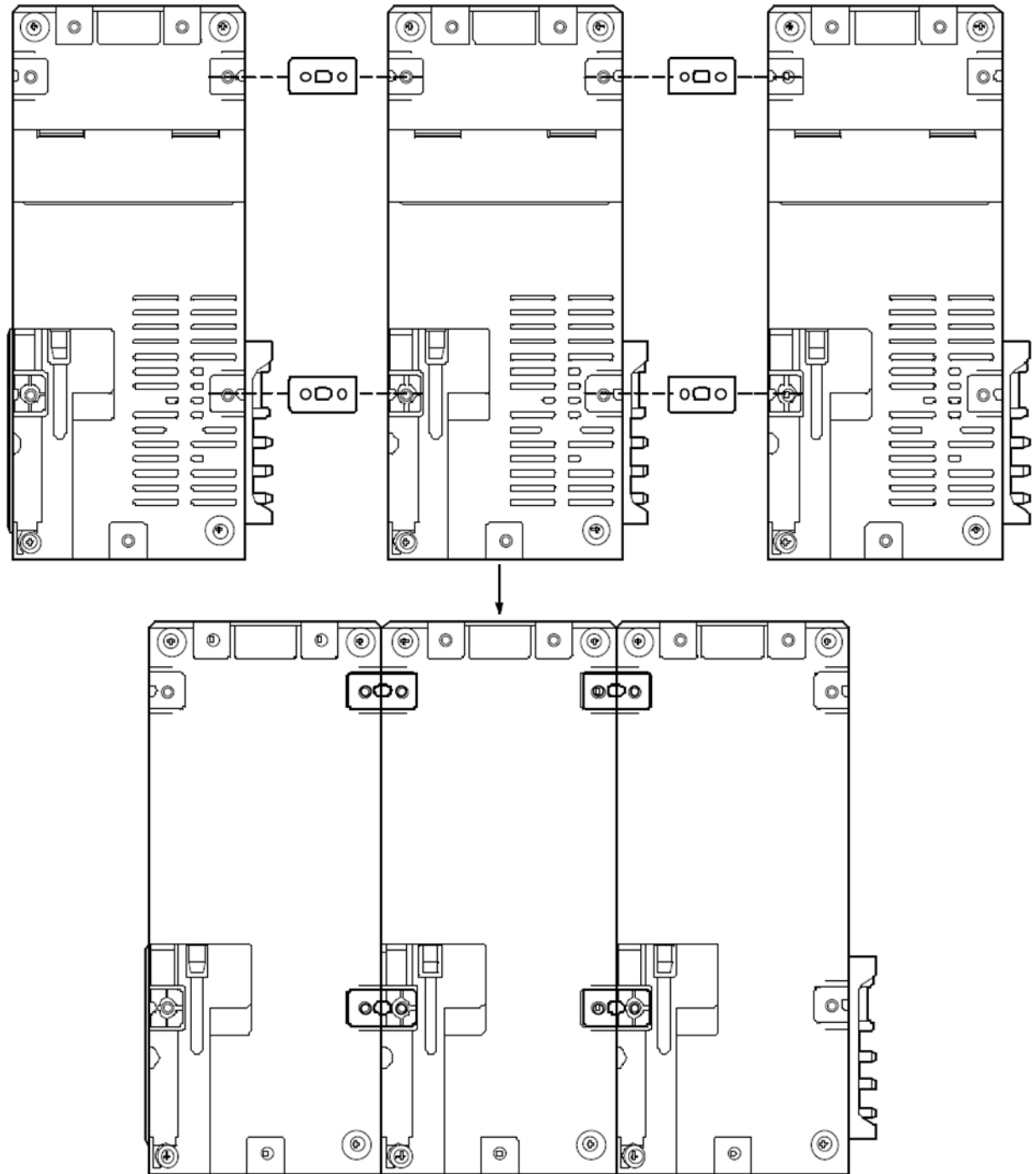
Up to ten CS460s can be connected together. The left-most CS460 is the primary station and the remaining stations are secondary stations. If you remove the left-most CS460 from the setup, the station that is now the left-most station becomes the primary but does not retain any of the settings that the old primary had.

1. Make sure that the CS460s **are not** connected to power.
2. For every station **except** the one that will be located on the far-right side of the bank:
  - a. Unscrew the two screws that retain the panel on the right side of the station. Be careful not to lose the screws.
  - b. Pull the panel away from the CS460.
  - c. Use needle nosed pliers to remove the clear plugs that are installed in the four sample fittings.
  - d. Save the panel, the screws, and the four plugs in a safe place.

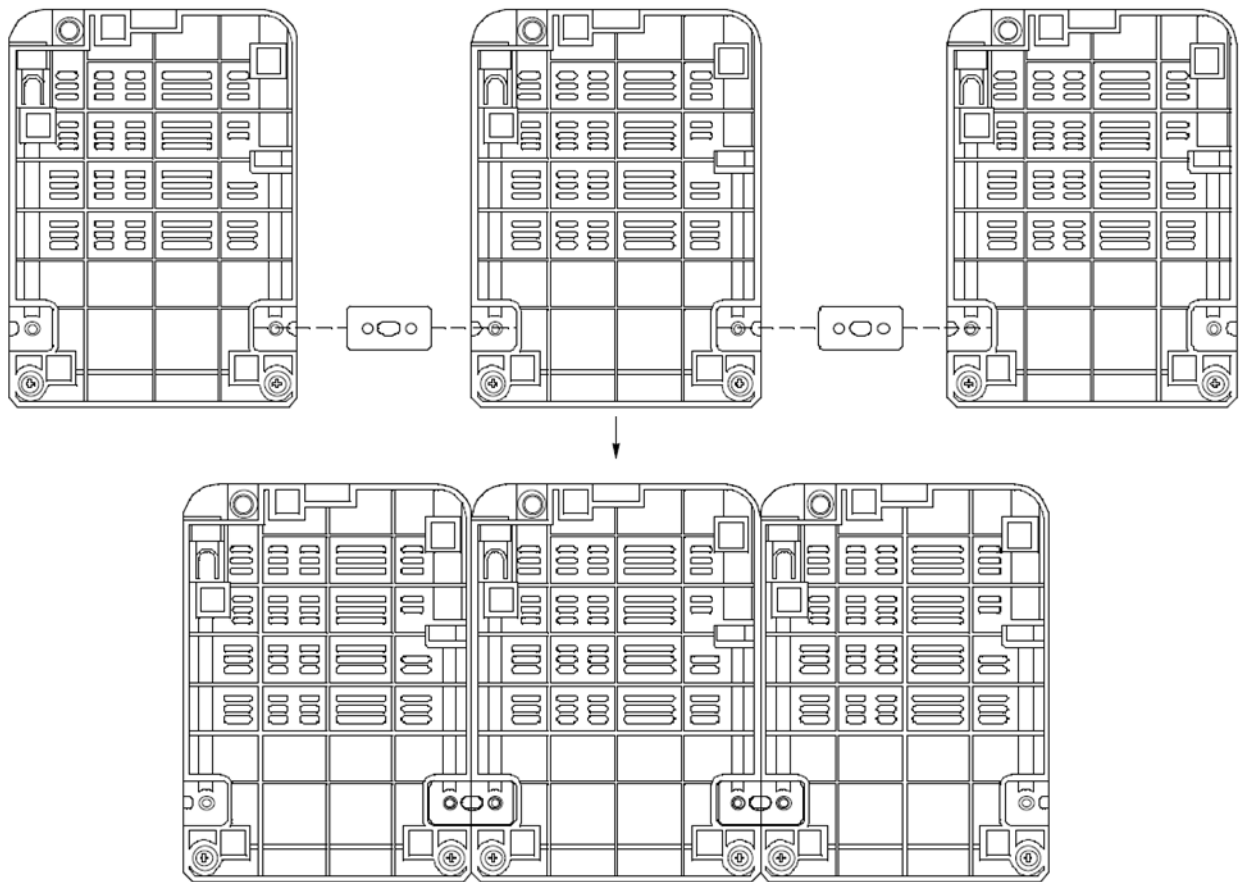


**Figure 3-1: Panel and Plug Removal**

3. Starting with the two left-most stations, line up the electrical connections and sample fitting connections and push the two stations together until the housings are touching.
4. Add stations to the right side of the bank using the same procedure. The last station installed should be the one that still has a panel on the right side.
5. Use the provided metal connection brackets and screws to secure the two connection points on each side of the CS460's back panel and on the bottom of the CS460 to each other.



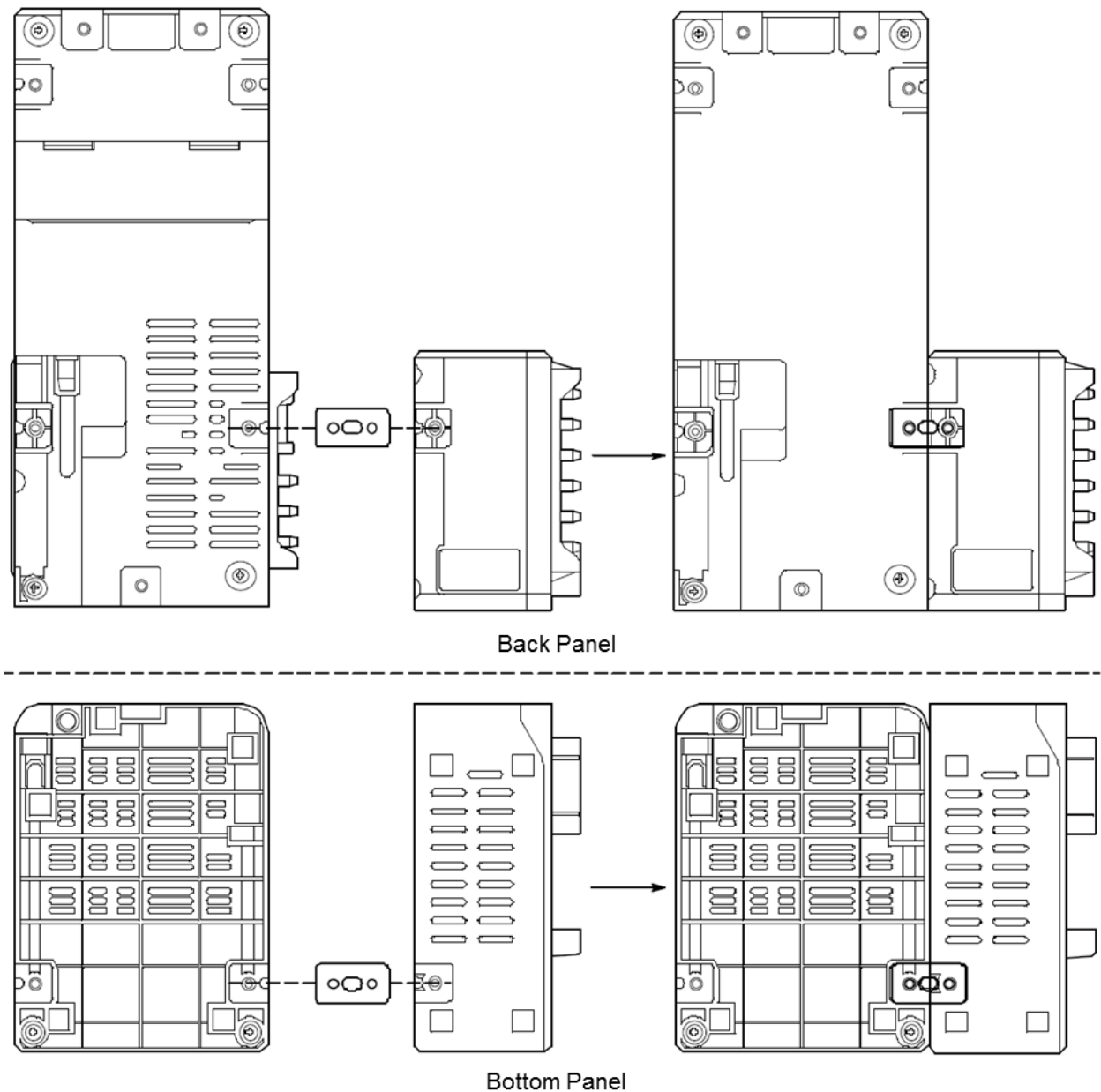
**Figure 3-2: Connecting CS460s together, back panel**



**Figure 3-3: Connecting Multiple CS460s together, bottom panel**

## Connecting the **SV-3** (*optional*)

1. Make sure that the CS460(s) **are not** connected to power.
2. Line up the electrical connection and sample fitting connections on the SV-3 with the electrical connector and sample fittings on the left side of the left-most CS460.
3. Push the SV-3 toward the CS460 until the housings are touching.
4. Use the provided metal connection brackets and screws to secure the back and bottom of the SV-3 to the CS460.



**Figure 3-4: Connecting the SV-3**

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## Connecting the Printer *(optional)*

1. To power the printer with the battery pack, install the battery pack.
2. To power the printer with AC power, plug the printer AC adapter's wall plug into a wall AC socket.
3. Connect the AC adapter to the printer's power jack using the provided cord.

4. Connect one end of the printer's USB cable into the printer's USB connection. Plug the other end of the printer's USB cable into the USB printer connector on the left side of the CS460. Be sure to use the USB cable provided with the printer. The USB cable provided with the CS460 does not have appropriately sized USB connections for the printer.

#### Note

If you have any problems setting up the printer, contact Seiko Instruments, Inc. at <http://www.sii.co.jp/sps/eg/contact.html>.

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## Connecting the AC Adapter, Air Filter, and Exhaust Tubing

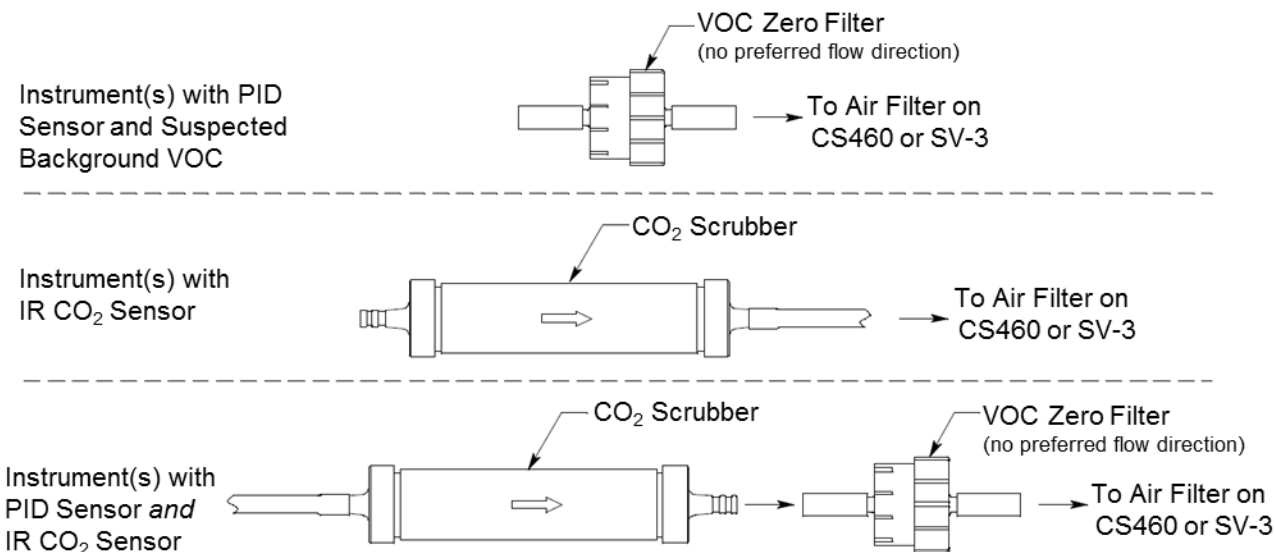
Perform the following to:

- Connect the AC adapter
  - Install the air filter
  - Connect the exhaust tubing
1. Place the CS460(s) on a convenient table top near an AC wall socket in a well-ventilated area. A location near a window that can be opened is best so that the exhaust can be routed to the window.
  2. Connect the AC adapter's wall plug into a wall AC socket.
  3. Insert the round plug on the end of the AC adapter's output cable into the power jack on the left side of the CS460.

#### Note

If multiple CS460s are connected to each other, be sure to plug the multi-station AC adapter into the primary station.

4. Install the air filter so that the arrow on the filter that indicates direction of flow is pointing towards the **AIR** fitting.
  - a. To install the air filter on a CS460, put the green tubing stub that comes with it on the end with the arrow pointing to it and install the other end of the green tubing stub on the CS460's **AIR** fitting.
  - b. To install the air filter on an SV-3, the green tubing stub does not need to be used. Orient the air filter with the arrow pointing toward the SV-3 and insert the air filter into the **AIR** recess at the front of the SV-3's left side and push it in until the SV-3's latch secures it in place.
  - c. To test any instruments that need a special filter, attach them appropriately as shown in the figure below.



**Figure 3-5: Air Inlet Filters**

5. Install the 10-foot long 5/16 inch ID flexible tube that is included with the CS460 on the exhaust fitting. Route the tube to an area where the exhaust can be safely dispersed, such as an open window.

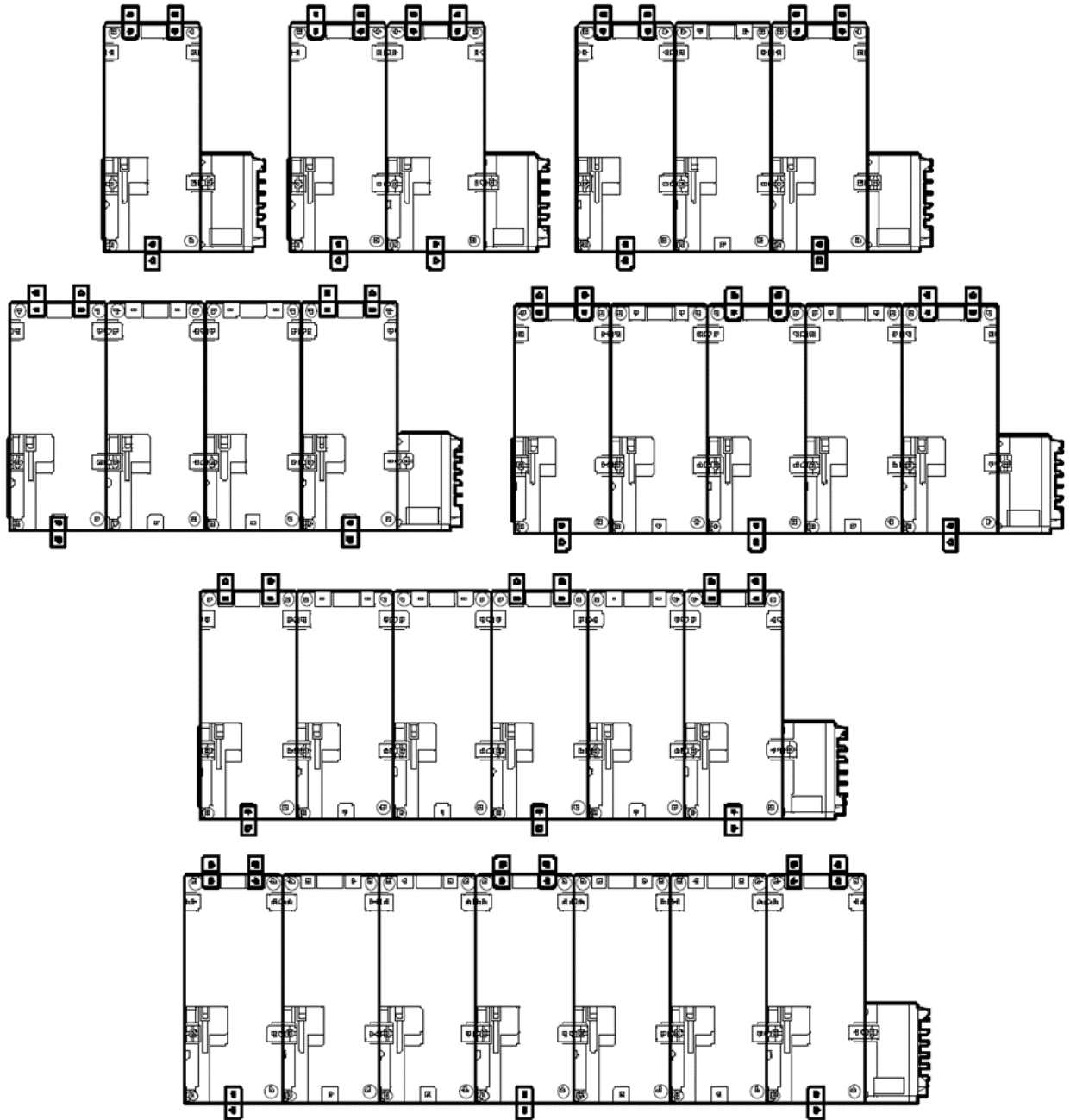


### Caution

The maximum recommended length for the exhaust tube is 15 feet. **DO NOT** use more than 15 feet of tubing or tubing with an ID of less than 5/16 inch for the exhaust tube or the bump test and calibration accuracy may be adversely affected. The tube that is shipped with the CS460 has an ID of 5/16 inch and is 10 feet long.

## Wall Mounting the CS460 *(optional)*

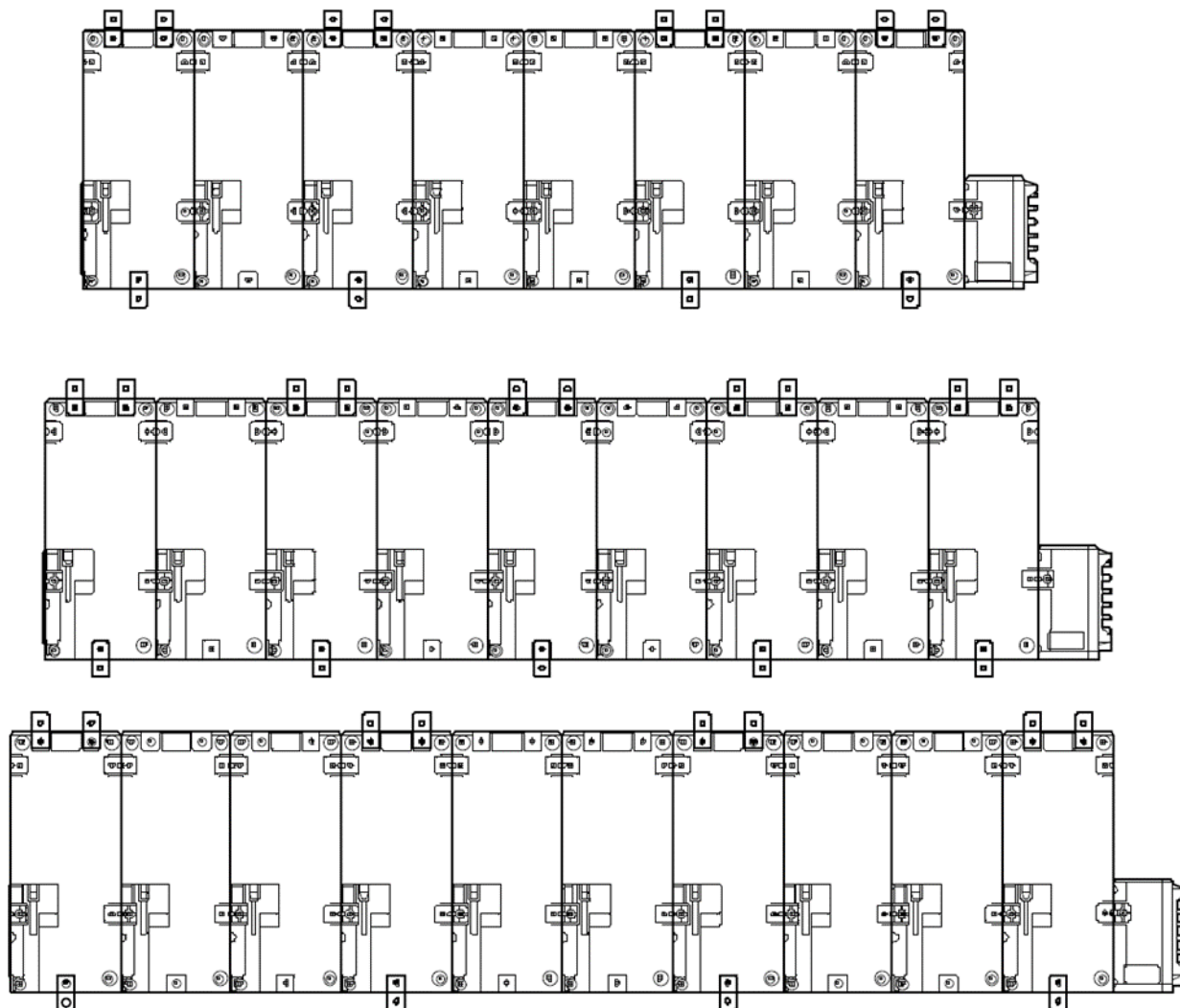
Single CS460s or multiple CS460s connected together as described in ["Connecting Multiple CS460s Together" \(in this chapter\)](#) can be mounted to the wall using mounting brackets. The wall mounting brackets are not supplied as standard with the CS460. To wall mount a bank of CS460s, not every CS460 will need wall mounting brackets but each CS460 that will use wall mounting brackets needs three. See the figure below to determine how many wall mounting brackets you need to order.



# of CS460s with SV-3 or w/o SV-3	Total # of wall mounting brackets necessary
1 CS460	3 wall mounting brackets
2 to 4 CS460s	6 wall mounting brackets
5 to 7 CS460s	9 wall mounting brackets

**Figure 3-6: Wall Mounting 1 to 7 CS460s**





# of CS460s with SV-3 or w/o SV-3	Total # of wall mounting brackets necessary
8 to 10 CS460s	12 wall mounting brackets

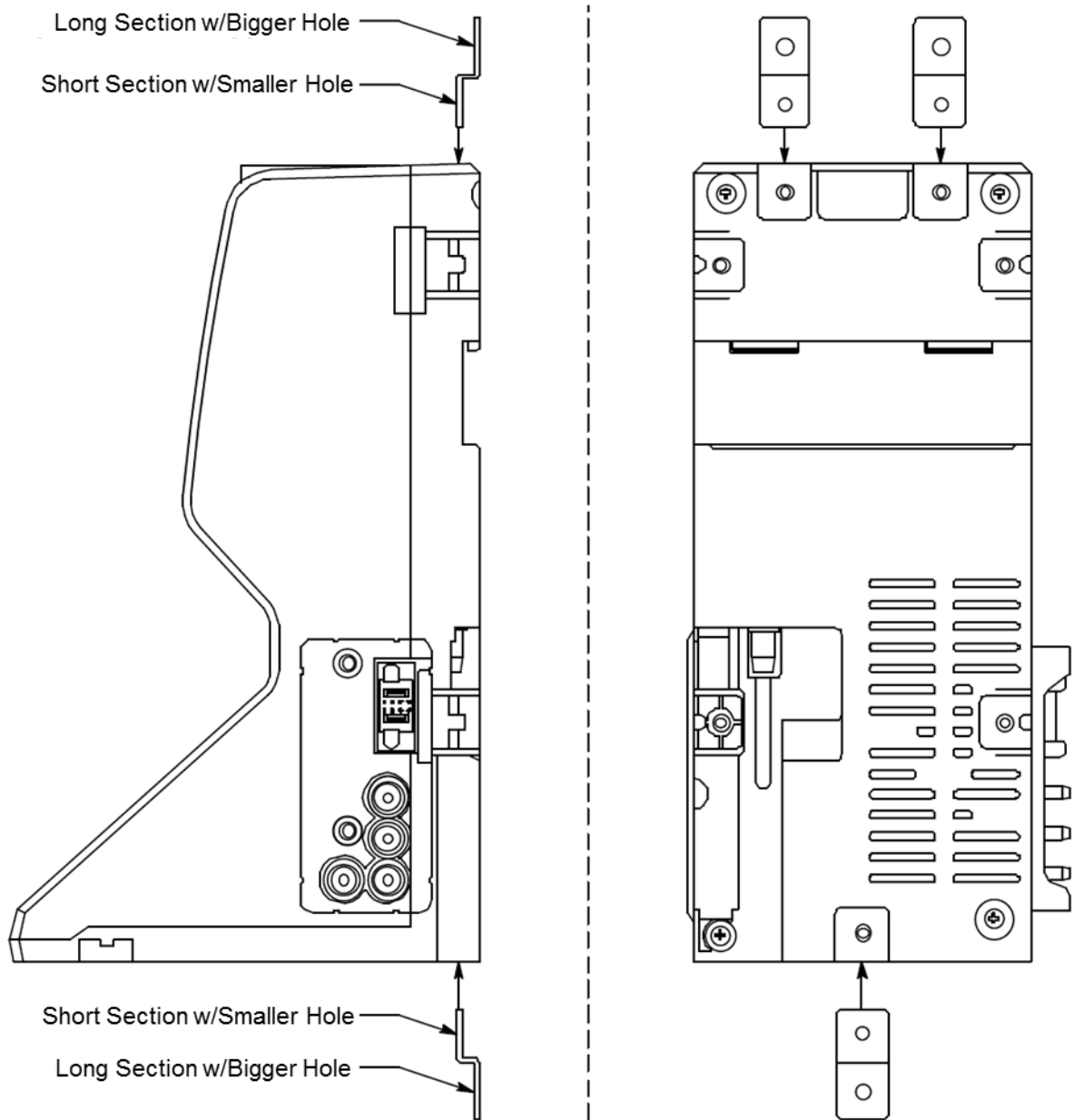
**Figure 3-7: Wall Mounting 8 to 10 CS460s**

### Note

Make sure that you have installed an exhaust line for each CS460 you intend to wall mount since access to the exhaust fitting will be very limited once the CS460 is mounted to the wall.

1. To mount multiple CS460s, make sure your CS460s are properly connected and secured to each other. When using an SV-3, make sure that it is connected and secured to the left-most CS460.
2. Connect the wall mounting brackets to the CS460(s) using the provided screws. The wall mounting brackets are not straight. They have a short section and a long section. The short section has a smaller hole than the long section. Screw the short section into the

CS460 making sure that the long section goes away from the station and is flush with the back of the CS460.



**Figure 3-8: Wall Mounting Bracket Installation**

3. Position the CS460(s) on the wall where you intend to mount them.
4. Screw the wall mounting brackets into the wall. Make sure the mounting screws and the material they are screwed into are appropriate to support the weight of the system.

## Connecting Calibration Gas *(No SV-3 attached)*

### Note

Chlorine (Cl<sub>2</sub>) channels cannot be bump tested or calibrated using the CS460. If your instrument has a chlorine channel, you may test all other channels using the CS460 but must test the chlorine channel separately, using the GM460's Calibration Mode.

The **GAS 1**, **GAS 2**, and **GAS 3** fittings on the left side of the docking station are designed to be used with a calibration gas cylinder that is fitted with a demand flow regulator. The **AIR** fitting may be used with a demand flow regulator and a cylinder of zero emissions air, but this is not normally necessary since the docking station will generally be in a fresh air area.

The type of calibration gas cylinder used for the **GAS 1** fitting depends on the gas sensors installed in the GM460. A four-gas mix, **LEL/Oxygen/CO/H<sub>2</sub>S**, is used for the **GAS 1** fitting if the instrument being used with the docking station contains the standard four sensors or is a version that has less than the four standard sensors but still has an H<sub>2</sub>S sensor. If the instrument does not have an H<sub>2</sub>S sensor, a three-gas mix, **LEL/Oxygen/CO**, should be used for the **GAS 1** fitting in order to protect the CO sensor's charcoal filter.

The **GAS 2** and **GAS 3** fittings are normally used for smart sensors (i.e., PID, ESS-03, etc.). If a smart sensor is installed (i.e., PID, ESS-03, etc.), a special cylinder for the target gas of that sensor needs to be used for calibration. See the tables below for examples of needed cylinders for various instrument combinations. Keep in mind when using a five-gas cylinder to calibrate one of the smart sensors, make sure that the special sensor is assigned to **GAS 1** (see "[Chapter 4, \"Setting Up Cylinders in the Cylinders Window\"](#)"). See [Chapter 7, \"Spare Parts List\"](#) for part numbers of available cylinders.

If your instrument has no standard sensors then the **GAS 1** fitting may be used for gas to test a smart sensor.

**Table 3-1: Recommended Gas Cylinders and Gas Ports for Single-Station Use**

Instrument Types	Recommended Calibration Gas Cylinder and Gas Inlet Selection
3-gas (LEL/Oxy/CO) + low range PID	<b>GAS 1:</b> 3-gas mix with LEL/Oxy/CO <b>GAS 2:</b> 10 ppm IBL
3-gas (LEL/Oxy/CO) + high range PID	<b>GAS 1:</b> 3-gas mix with LEL/Oxy/CO <b>GAS 2:</b> 100 ppm IBL
Standard 4-gas (LEL/Oxy/H <sub>2</sub> S/CO) + low range PID	<b>GAS 1:</b> 4-gas mix with LEL/Oxy/H <sub>2</sub> S/CO <b>GAS 2:</b> 10 ppm IBL
Standard 4-gas + high range PID	<b>GAS 1:</b> 5-gas mix with LEL/Oxy/CO/H <sub>2</sub> S/IBL
Standard 4-gas + NH <sub>3</sub>	<b>GAS 1:</b> 4-gas mix with LEL/Oxy/H <sub>2</sub> S/CO <b>GAS 2:</b> NH <sub>3</sub>

Instrument Types	Recommended Calibration Gas Cylinder and Gas Inlet Selection
Standard 4-gas + low range PID + NH <sub>3</sub>	<b>GAS 1:</b> 4-gas mix with LEL/Oxy/H <sub>2</sub> S/CO <b>GAS 2:</b> 10 ppm IBL <b>GAS 3:</b> NH <sub>3</sub>
Standard 4-gas + high range PID + NH <sub>3</sub>	<b>GAS 1:</b> 5-gas mix with LEL/Oxy/CO/H <sub>2</sub> S/IBL <b>GAS 2:</b> NH <sub>3</sub>
Standard 4-gas + SO <sub>2</sub>	<b>GAS 1:</b> 5-gas mix with LEL/Oxy/CO/H <sub>2</sub> S/SO <sub>2</sub>

When connecting multiple CS460s together, it is possible to test instruments with different gas combinations at the same time. In order to completely calibrate all instruments, you cannot use more than three cylinders since the CS460 only has three gas ports on its left side. To test different instrument combinations at once requires more than three cylinders, you will have to test instruments one at a time and reassign the gas inlets when you change gases or test the gases common to all instruments at once and then test additional gases separately. The table below shows some examples of instrument combinations that could be tested together when multiple CS460s connected together. Up to ten CS460s can be connected together. The table below only uses two GM460s as examples.

**Table 3-2: Recommended Gas Cylinders and Gas Ports for Multi-Station Use**

Instrument Types	Recommended Calibration Gas Cylinder and Gas Inlet Selection
<b>Instrument 1:</b> 3-gas + low range PID <b>Instrument 2:</b> 3-gas + high range PID	<b>GAS 1:</b> 3-gas mix with LEL/Oxy/ CO <b>GAS 2:</b> 10 ppm IBL <b>GAS 3:</b> 100 ppm IBL
<b>Instrument 1:</b> 3-gas + high range PID <b>Instrument 2:</b> 3-gas + NH <sub>3</sub>	<b>GAS 1:</b> 3-gas mix with LEL/Oxy/ CO <b>GAS 2:</b> 100 ppm IBL <b>GAS 3:</b> NH <sub>3</sub>
<b>Instrument 1:</b> Standard 4-gas + low range PID <b>Instrument 2:</b> Standard 4-gas + high range PID	<b>GAS 1:</b> 4-gas mix with LEL/Oxy/ H <sub>2</sub> S/CO <b>GAS 2:</b> 10 ppm IBL <b>GAS 3:</b> 100 ppm IBL
<b>Instrument 1:</b> Standard 4-gas + high range PID <b>Instrument 2:</b> Standard 4-gas + high range PID + NH <sub>3</sub>	<b>GAS 1:</b> 5-gas mix with LEL/Oxy/ CO/H <sub>2</sub> S/IBL <b>GAS 2:</b> NH <sub>3</sub>
<b>Instrument 1:</b> Standard 4-gas + NH <sub>3</sub> <b>Instrument 2:</b> Standard 4-gas + SO <sub>2</sub>	<b>GAS 1:</b> 4-gas mix with LEL/Oxy/ H <sub>2</sub> S/CO <b>GAS 2:</b> NH <sub>3</sub> <b>GAS 3:</b> SO <sub>2</sub>
<b>Instrument 1:</b> Standard 4-gas + SO <sub>2</sub> <b>Instrument 2:</b> Standard 4-gas + SO <sub>2</sub> + NH <sub>3</sub>	<b>GAS 1:</b> 5-gas mix with LEL/Oxy/ CO/H <sub>2</sub> S/SO <sub>2</sub> <b>GAS 2:</b> NH <sub>3</sub>
<b>Instrument 1 and 2:</b> Standard 4-gas + low range PID + NH <sub>3</sub>	<b>GAS 1:</b> 4-gas mix with LEL/Oxy/ H <sub>2</sub> S/CO <b>GAS 2:</b> IBL <b>GAS 3:</b> NH <sub>3</sub>
<b>Instrument 1 and 2:</b> Standard 4-gas + high range PID + NH <sub>3</sub>	<b>GAS 1:</b> 5-gas mix with LEL/Oxy/ CO/H <sub>2</sub> S/IBL <b>GAS 2:</b> NH <sub>3</sub>

Instrument Types	Recommended Calibration Gas Cylinder and Gas Inlet Selection
<b>Instrument 1:</b> 3-gas + low range PID <b>Instrument 2:</b> 3-gas + high range PID	<b>GAS 1:</b> 3-gas mix with LEL/Oxy/CO <b>GAS 2:</b> 10 ppm IBL <b>GAS 3:</b> 100 ppm IBL
<b>Instrument 1:</b> 3-gas + high range PID <b>Instrument 2:</b> 3-gas + NH <sub>3</sub>	<b>GAS 1:</b> 3-gas mix with LEL/Oxy/CO <b>GAS 2:</b> 100 ppm IBL <b>GAS 3:</b> NH <sub>3</sub>

To connect calibration gas to the CS460, do the following:

1. If the area around the docking station is not considered a fresh air area (an area free of combustible and toxic gases and of normal oxygen content, 20.9%), install a tube no longer than 10 feet on the filter attached to the **AIR** fitting on the left side of the docking station and route it to a fresh air area or connect a cylinder of zero air with a demand flow regulator to the **AIR** fitting.

#### Note

If any filters are needed for the fresh air adjustment (i.e., for PID sensors and IR CO<sub>2</sub> sensors), they will need to be installed somewhere in the air line (see Figure 3-5).

2. Install the demand flow regulator(s) on the calibration gas cylinder(s).

#### Note

**DO NOT** connect pressurized gas directly to the CS460. Be sure to install a demand flow regulator on the cylinder before connecting it to the CS460.

3. Connect the demand flow regulator to the appropriate inlet fitting using 3/16 inch ID sample tubing.

## Connecting Calibration Gas, SV-3 Attached

#### Note

Chlorine (Cl<sub>2</sub>) channels **cannot** be bump tested or calibrated using the CS460. If your instrument has a chlorine channel, you may test all other channels using the CS460 but **must** test the chlorine channel separately, using the GM460's Calibration Mode.

The **GAS 1**, **GAS 2**, **GAS 3**, **GAS 4**, **GAS 5**, and **GAS 6** fittings on the left side of the SV-3 are designed to be used with a calibration gas cylinder that is fitted with a demand flow regulator. The **AIR** fitting may be used with a demand flow regulator and a cylinder of zero emissions air, but this is not normally necessary since the docking station will generally be in a fresh air area.

The type of calibration gas cylinder used for the **GAS 1** fitting depends on the gas sensors installed in the GM460. A four-gas mix, **LEL/Oxygen/CO/H<sub>2</sub>S**, is used for the **GAS 1** fitting if the GM460 being used with the docking station contains the standard four sensors or is a version that has less than the four standard sensors but still has an H<sub>2</sub>S sensor. If the GM460 does not have an H<sub>2</sub>S sensor then a three-gas mix, **LEL/Oxygen/CO**, should be used for the **GAS 1** fitting in order to protect the CO sensor's charcoal filter.

The **GAS 2**, **GAS 3**, **GAS 4**, **GAS 5**, and **GAS 6** fittings are normally used for smart sensors (i.e. PID, ESS-03, etc.). If you have a smart sensor installed (i.e., PID, ESS- 03, etc.), a special cylinder for the target gas of that sensor needs to be used for calibration. See the table below for examples of needed cylinders for various GM460 combinations. Keep in mind that if you use a five-gas cylinder to calibrate one of the smart sensors, make sure that the special sensor is assigned to **GAS 1** (see [Chapter 4, "Setting up Cylinders in the Cylinders Window"](#)). See [Chapter 7, "Spare Parts List"](#) for part numbers of available cylinders.

If your instrument has no standard sensors, the **GAS 1** fitting may be used for gas to test a smart sensor.

The SV-3 is useful for single-station use or multi-station use. If you have multiple GM460 configurations, instead of having to re-assign **GAS 2** or **GAS 3** every time you test a different configuration, like you would have to do if an SV-3 was not installed, you can assign the different gases to **GAS 4**, **GAS 5**, or **GAS 6**.

The gas inlets can be assigned as desired. The table below provides recommendations.

**Table 3-3: Recommended Gas Cylinders and Gas Ports for Single- and Multi-Station Use**

<b>Instrument Types</b>	<b>Recommended Calibration Gas Cylinder and Gas Inlet Selection</b>
<b>Instrument 1:</b> 3-gas + low range PID <b>Instrument 2:</b> 3-gas + high range PID <b>Instrument 3:</b> 3-gas + NH <sub>3</sub>	<b>GAS 1:</b> 3-gas mix with LEL/Oxy/CO <b>GAS 2:</b> 10 ppm IBL <b>GAS 3:</b> 100 ppm IBL <b>GAS 4:</b> NH <sub>3</sub>
<b>Instrument 1:</b> 3-gas + high range PID <b>Instrument 2:</b> 3-gas + NH <sub>3</sub> <b>Instrument 3:</b> 3-gas + SO <sub>2</sub>	<b>GAS 1:</b> 3-gas mix with LEL/Oxy/CO <b>GAS 2:</b> 100 ppm IBL <b>GAS 3:</b> NH <sub>3</sub> <b>GAS 4:</b> SO <sub>2</sub>
<b>Instrument 1:</b> Standard 4-gas + low range PID <b>Instrument 2:</b> Standard 4-gas + high range PID <b>Instrument 3:</b> Standard 4-gas + high range PID + NH <sub>3</sub>	<b>GAS 1:</b> 4-gas mix with LEL/Oxy/H <sub>2</sub> S/CO <b>GAS 2:</b> 10 ppm IBL <b>GAS 3:</b> 100 ppm IBL <b>GAS 4:</b> NH <sub>3</sub>
<b>Instrument 1:</b> Standard 4-gas + high range PID <b>Instrument 2:</b> Standard 4-gas + high range PID + NH <sub>3</sub> <b>Instrument 3:</b> Standard 4-gas + SO <sub>2</sub> + NO <sub>2</sub>	<b>GAS 1:</b> 5-gas mix with LEL/Oxy/CO/H <sub>2</sub> S/IBL <b>GAS 2:</b> NH <sub>3</sub> <b>GAS 3:</b> SO <sub>2</sub> <b>GAS 4:</b> NO <sub>2</sub>

Instrument Types	Recommended Calibration Gas Cylinder and Gas Inlet Selection
<b>Instrument 1:</b> Standard 4-gas + NH <sub>3</sub> <b>Instrument 2:</b> Standard 4-gas + SO <sub>2</sub> <b>Instrument 3:</b> High range PID + NO <sub>2</sub>	<b>GAS 1:</b> 4-gas mix with LEL/Oxy/H <sub>2</sub> S/CO <b>GAS 2:</b> NH <sub>3</sub> <b>GAS 3:</b> SO <sub>2</sub> <b>GAS 4:</b> 100 ppm IBL <b>GAS 5:</b> NO <sub>2</sub>
<b>Instrument 1:</b> Standard 4-gas + SO <sub>2</sub> <b>Instrument 2:</b> Standard 4-gas + SO <sub>2</sub> + NH <sub>3</sub> <b>Instrument 3:</b> Low range PID + NO <sub>2</sub>	<b>GAS 1:</b> 5-gas mix with LEL/Oxy/CO/H <sub>2</sub> S/SO <sub>2</sub> <b>GAS 2:</b> NH <sub>3</sub> <b>GAS 3:</b> 10 ppm IBL <b>GAS 4:</b> NO <sub>2</sub>
<b>Instrument 1 and 2:</b> Standard 4-gas + low range PID + NH <sub>3</sub>	<b>GAS 1:</b> 4-gas mix with LEL/Oxy/ H <sub>2</sub> S/CO <b>GAS 2:</b> IBL <b>GAS 3:</b> NH <sub>3</sub>
<b>Instrument 1 and 2:</b> Standard 4-gas + high range PID + NH <sub>3</sub>	<b>GAS 1:</b> 5-gas mix with LEL/Oxy/ CO/H <sub>2</sub> S/IBL <b>GAS 2:</b> NH <sub>3</sub>

To connect calibration gas to the CS460, do the following:

1. If the area around the docking station is not considered a fresh air area (an area free of combustible and toxic gases and of normal oxygen content, 20.9%), install a tube no longer than 10 feet on the SV-3's particle filter and route it to a fresh air area or connect a cylinder of zero air with a demand flow regulator to the SV-3's particle filter.

#### Note

If any filters are needed for the fresh air adjustment (i.e., for PID sensors and IR CO<sub>2</sub> sensors) they will need to be installed somewhere in the air line (see Figure 3-5).

2. Install the demand flow regulator(s) on the calibration gas cylinder(s).

#### Note

**DO NOT** connect pressurized gas directly to the CS460. Be sure to install a demand flow regulator on the cylinder before connecting it to the CS460.

3. Connect the demand flow regulator to the appropriate inlet fitting using 3/16 inch ID sample tubing.

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## CHAPTER 4

# Program Setup

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### Overview

This chapter describes the following:

- [Installing the CS460 PC Controller Program](#)
- [Connecting the SV-3 \(optional\)](#)
- [Setting Parameters in the CS460 Window](#)
- [Setting Up Cylinders in the Cylinders Window](#)
- [Making Parameter, Database, and Password Changes in the Configuration Window](#)

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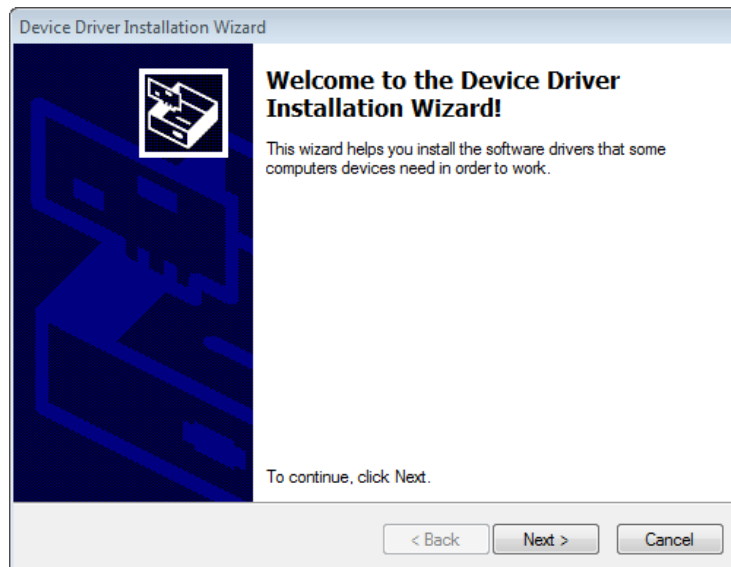
### Installing the CS460 PC Controller Program

1. Launch Windows® operating system.
2. Exit from all applications and open windows.
3. Go to [www.tsi.com](http://www.tsi.com) and select **Support | TSI Software and Firmware Wizard**.
4. Follow instructions on website to download software. A .zip file will begin to download.
5. After the file has downloaded, save the .zip file to your computer.
6. Extract the contents of the .zip file.
7. Double-click the **setup.exe** file.
8. The CS460 Docking Station PC Controller InstallShield Wizard comes up to guide you through installation. Click **Next** to proceed to the License Agreement window.
9. Read the license agreement and click the agreement acceptance selection box then click **Next** to proceed to the Customer Information window.
10. Enter a user name and organization and select to install the program for all users on the computer or just for your user account.
11. Click **Next** to proceed to the Destination Folder window.
12. The default installation folder (C:\Program Files (x86)\CS460\ ) is displayed. To install the software in the default folder, continue with step 11. To install the software in a different location, click **Change** and choose a new installation folder and then continue with step 11.

13. Click **Next** to proceed to the **Ready to Install the Program** window.
14. Review the installation settings. If the settings are correct, click **Install** and the installation process will begin. To change installation settings, click **Back** and change the settings.
15. During software installation, the installation program may find newer versions of Windows® operating system files on your computer than those in the downloaded .zip file. If this happens, the installation software will ask if you want to keep the newer files. Click **Yes** to do so.
16. A Device Driver Window will appear prompting you to install necessary drivers.

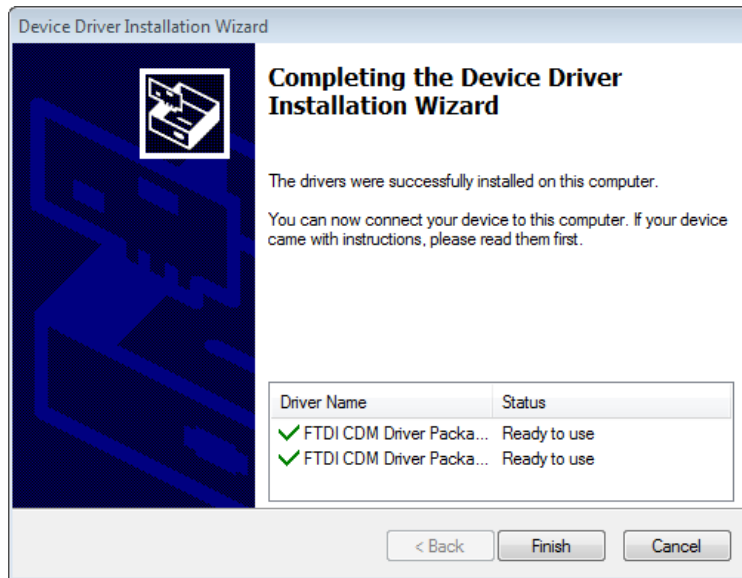
**Note**

You cannot continue the installation without installing the drivers.



**Figure 4-1: Device Driver Installation**

17. Click **Next** to install the drivers. The Wizard will find the appropriate drivers.
18. Click **Finish** once the drivers are successfully installed.



**Figure 4-2: Finish Device Driver Installation**

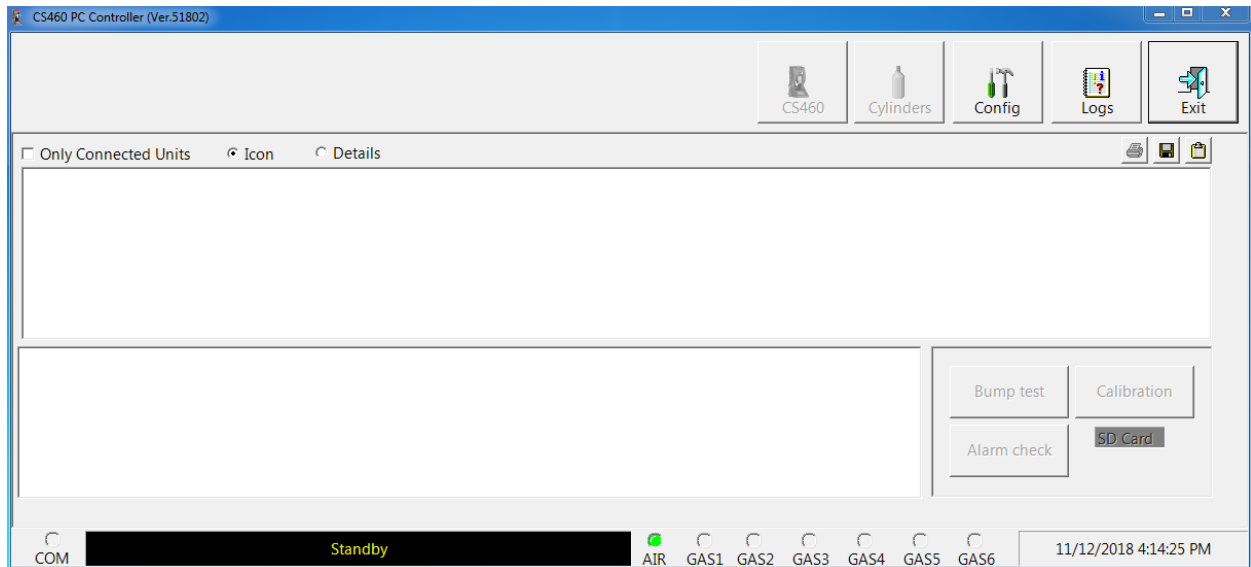
The installation will continue.

1. Follow the on-screen instructions to complete software installation.
2. To complete the driver installation, ensure that your docking station (or the primary docking station if you plan to have a bank of stations) are connected to your computer.
3. Turn on the docking station by flipping the power switch to the **ON** position.
4. The first time a CS460 is turned on, after being connected to the computer, the CS460 needs some time to be recognized by the computer. The status bar will indicate that the drivers are being configured and will alert you when the CS460 is ready to use.

---

## Launching the CS460 PC Controller Program

1. Click **Start** on the Windows® Icon tray then select **Programs/CS460**. You can also double-click the shortcut created on your desktop. The CS460 PC Controller Program is launched and the main program window appears as shown below.



**Figure 4-3: Main Program Window**

2. When starting the software for the first time, a message window appears informing you that a database has been created. Click **OK** in that window. When starting the software for the first time, or to change the software setup, proceed to ["Setting Parameters in the CS460 Window" \(in this chapter\)](#).
3. If you have already performed the software setup, proceed to ["Connecting GM460s to the PC Controller Program" in Chapter 5](#).

---

## Setting Parameters in the CS460 Window

The parameters available for editing in the CS460 Window are parameters that are saved in the CS460. With the exception of the **Auto bump if due** and **Auto cal if due** parameters that are located on the **Bump & Cal 1** tab, the parameters in the CS460 Window affect both PC Controller Program operation and Standalone Mode operation.

See ["Parameter Tab" in Chapter 7](#) for a description of parameters that affect *only* operation of the PC Controller Program.

The CS460 Window has four tabs:

- Bump & Cal 1
- Internal
- Bump & Cal 2
- Automatic

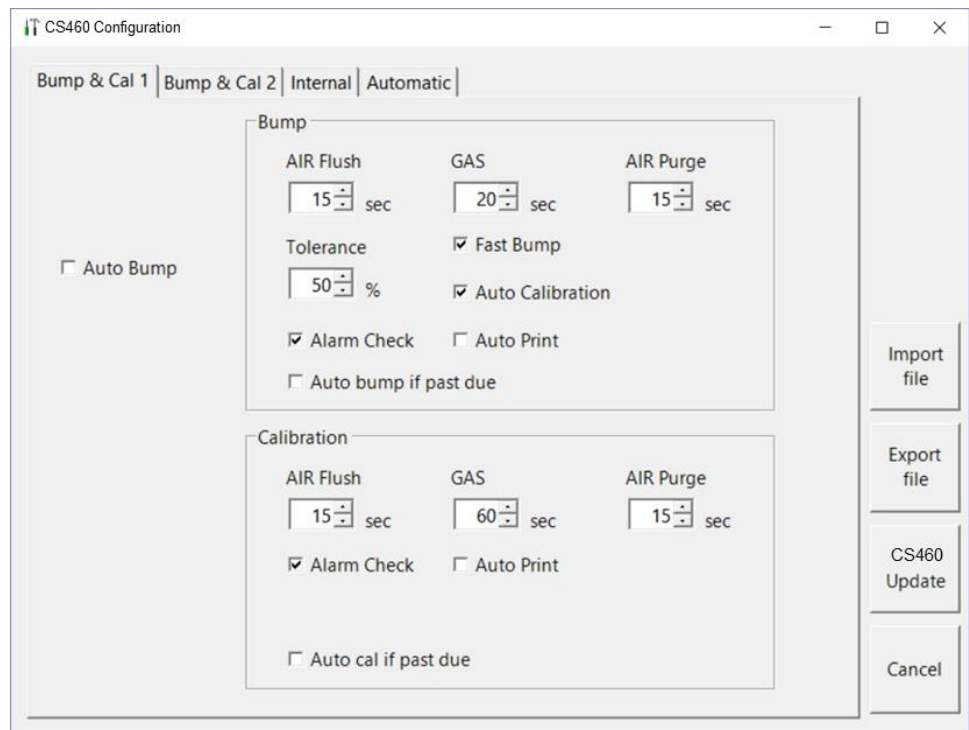
A station's settings can be saved to a file and a saved settings file can be imported using this window.

## Entering the CS460 Window

1. Launch the program as described in "[Launching the CS460 PC Controller Program](#)" (in this chapter).
2. Confirm that the AC adapter is connected to the CS460 and to an AC wall socket. If multiple CS460s are connected together, only the left-most CS460 should be connected to power.
3. Connect the **Type A to Type B** USB cable to the CS460 and to an available USB port on your computer. If multiple CS460s are connected together, only the left-most CS460 should be connected to the computer with the USB cable.
4. Flip the CS460's power switch so that it is in the **ON** position. If multiple CS460s are connected together, only the power switch of the left-most CS460 needs to be flipped.
5. Click the **CS460** button at the top of the screen.



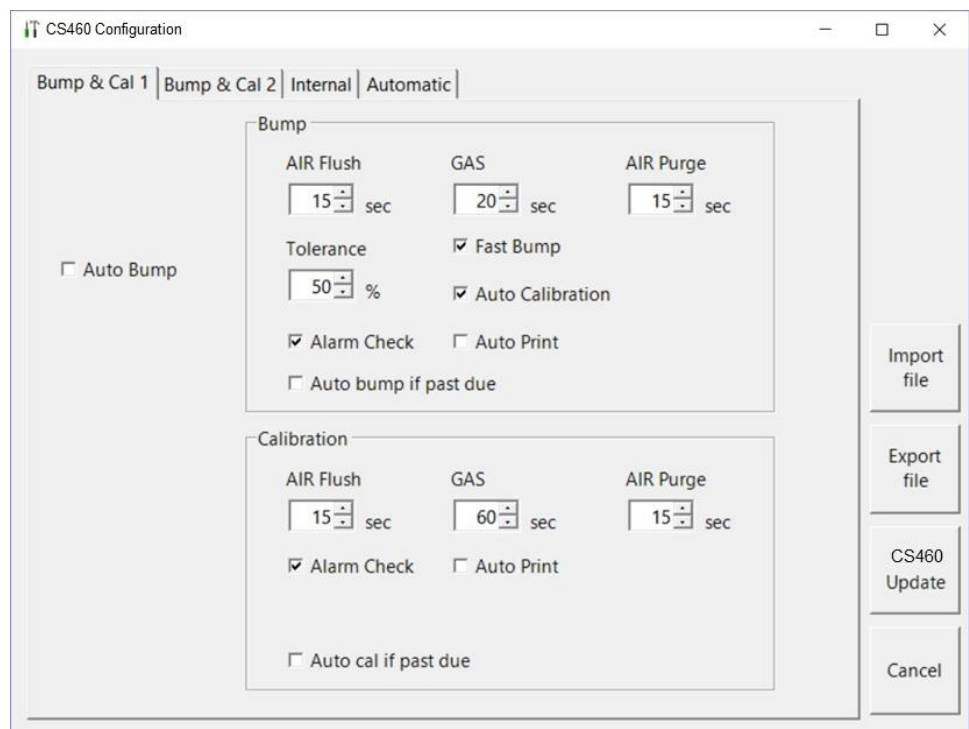
6. If the Password parameter in the **Bump & Cal 2** tab of the CS460 Window is set to **ON**, the program will prompt you for a password to enter the CS460 Window. Enter the password and click **OK**.
7. The CS460 Window will open and the **Bump & Cal 1** tab will be displayed. Each tab in the CS460 Window is described in the sections that follow.



**Figure 4-4: CS460 Window**

## Bump & Cal 1 Tab

This section describes the **Bump & Cal 1** tab of the CS460 Window.



**Figure 4-5: Bump & Cal 1 Tab**

The parameters available for editing are shown below along with their available options and factory settings.

**Table 4-1: Bump & Cal 1 Tab Parameters**

Parameter	Available Choices	Factory Setting	Operation Affected
<a href="#">Auto Bump</a>	<ul style="list-style-type: none"> <li>Selected (On)</li> <li>Deselected (Off)</li> </ul>	Deselected (Off)	<ul style="list-style-type: none"> <li>Standalone</li> <li>PC Controller</li> </ul>
<a href="#">AIR Flush (bump)</a>	15 to 120 seconds	15 seconds	<ul style="list-style-type: none"> <li>Standalone</li> <li>PC Controller</li> </ul>
<a href="#">GAS (bump)</a>	20 to 120 seconds	20 seconds	<ul style="list-style-type: none"> <li>Standalone</li> <li>PC Controller</li> </ul>
<a href="#">AIR Purge (bump)</a>	5 to 120 seconds	15 seconds	<ul style="list-style-type: none"> <li>Standalone</li> <li>PC Controller</li> </ul>
<a href="#">Tolerance (bump)</a>	10 to 50%	50%	<ul style="list-style-type: none"> <li>Standalone</li> <li>PC Controller</li> </ul>
<a href="#">Fast Bump (bump)</a>	<ul style="list-style-type: none"> <li>Selected (On)</li> <li>Deselected (Off)</li> </ul>	Selected (On)	<ul style="list-style-type: none"> <li>Standalone</li> <li>PC Controller</li> </ul>
<a href="#">Auto Calibration (bump)</a>	<ul style="list-style-type: none"> <li>Selected (On)</li> <li>Deselected (Off)</li> </ul>	Selected (On)	<ul style="list-style-type: none"> <li>Standalone</li> <li>PC Controller</li> </ul>
<a href="#">Alarm Check (bump)</a>	<ul style="list-style-type: none"> <li>Selected (On)</li> <li>Deselected (Off)</li> </ul>	Selected (On)	<ul style="list-style-type: none"> <li>Standalone</li> <li>PC Controller</li> </ul>
<a href="#">Auto Print (bump)</a>	<ul style="list-style-type: none"> <li>Selected (On)</li> <li>Deselected (Off)</li> </ul>	Deselected (Off)	<ul style="list-style-type: none"> <li>Standalone</li> <li>PC Controller</li> </ul>
<a href="#">Auto bump if past due (bump only)</a>	<ul style="list-style-type: none"> <li>Selected (On)</li> <li>Deselected (Off)</li> </ul>	Deselected (Off)	PC Controller
<a href="#">AIR Flush (calibration)</a>	15 to 120 seconds	15 seconds	<ul style="list-style-type: none"> <li>Standalone</li> <li>PC Controller</li> </ul>
<a href="#">GAS (calibration)</a>	20 to 120 seconds	60 seconds	<ul style="list-style-type: none"> <li>Standalone</li> <li>PC Controller</li> </ul>
<a href="#">AIR Purge (calibration)</a>	5 to 120 seconds	15 seconds	<ul style="list-style-type: none"> <li>Standalone</li> <li>PC Controller</li> </ul>
<a href="#">Alarm Check (calibration)</a>	<ul style="list-style-type: none"> <li>Selected (On)</li> <li>Deselected (Off)</li> </ul>	Selected (On)	<ul style="list-style-type: none"> <li>Standalone</li> <li>PC Controller</li> </ul>
<a href="#">Auto Print (calibration)</a>	<ul style="list-style-type: none"> <li>Selected (On)</li> <li>Deselected (Off)</li> </ul>	Deselected (Off)	<ul style="list-style-type: none"> <li>Standalone</li> <li>PC Controller</li> </ul>
<a href="#">Auto Cal if past due (calibration)</a>	<ul style="list-style-type: none"> <li>Selected (On)</li> <li>Deselected (Off)</li> </ul>	Deselected (Off)	PC Controller

## Auto Bump

If **Auto Bump** is selected, a bump test will automatically begin whenever a GM460 is connected to the CS460, whether the instrument is due for a bump test or not. This parameter will only appear if a single CS460 is being used. If multiple stations are connected together, the **Auto Bump** selection box will disappear.

## AIR Flush (Bump and Calibration)

The pre-sample flush time is the length of time that the CS460 will draw air through the **AIR** fitting before performing an air adjust operation.

## GAS (Bump and Calibration)

The gas sample time is the length of time that the CS460 will draw calibration gas through each of the gas fittings.

## AIR Purge (Bump and Calibration)

The post-sample purge time is the length of time that the CS460 will draw air through the **AIR** fitting to purge calibration gas from the system.

## Tolerance (Bump Only)

The bump test check tolerance determines how close the GM460 gas reading must be to the calibration gas concentration for each channel during a bump test in order to pass the bump test. It is defined as a percentage of the calibration gas concentration. The amount that the GM460 gas reading differs from the calibration gas concentration must be equal to or less than this percentage of the calibration gas concentration. For example, if the tolerance is set to 50%, and the %LEL calibration gas concentration is 50% LEL then the bump test gas reading for the LEL channel on the GM460 must be 50% LEL  $\pm$  25% LEL.

## Fast Bump (Bump Only)

If **Fast Bump** is not selected, the gas application during a bump test will continue for the time period defined by the **GAS** bump test parameter regardless of the sensor reading(s).

If **Fast Bump** is selected and the gas reading for the sensor(s) being tested is above the lower tolerance and below the upper tolerance within 10 seconds, the sensor(s) pass bump testing, the gas application will be stopped, and the test will move on to the next sensor(s) or to the fresh air purge. If the gas reading on any of the tested channels is below the lower tolerance or above the upper tolerance within 10 seconds, the gas application will continue for the time period defined by the **GAS** bump test parameter, and the pass/fail status of the sensor(s) will be determined at that point. Turning **Fast Bump** on allows calibration gas to be saved when the tested sensors respond quickly and accurately.



Consider the following scenario as an example.

- 50% LEL methane used for bump testing the combustible gas channel
- **GAS** bump test parameter set to 20 seconds
- **Tolerance** set to  $\pm 50\%$  LEL, which means that the acceptable reading range is 25% LEL - 75% LEL
- **Fast** selected

The table below shows possible readings at 10 seconds and the effect on the gas application.

**Table 4-2: Example Fast Bump Scenarios**

Gas Reading 10 Seconds Into Fast Bump	Outcome
15% LEL (-70% of 50% LEL)	<ul style="list-style-type: none"><li>• Gas application continues for the full 20 seconds</li><li>• Pass/fail determined at end of 20 seconds</li></ul>
30% LEL (-40% of 50% LEL)	<ul style="list-style-type: none"><li>• Gas application stops</li><li>• Sensor passes bump testing</li></ul>
60% LEL (+20% of 50% LEL)	<ul style="list-style-type: none"><li>• Gas application stops</li><li>• Sensor passes bump testing</li></ul>
80% LEL (+60% of 50% LEL)	<ul style="list-style-type: none"><li>• Gas application continues for the full 20 seconds</li><li>• Pass/fail determined at end of 20 seconds</li></ul>

### Auto Calibration (Bump Only)

**Auto Calibration** only applies to bump testing. It can be set to **On** or **Off**. If it is set to **On** then the docking station will automatically perform a calibration if a bump test fails.

### Alarm Check (Bump and Calibration)

If **Alarm Check** is selected, a vibrator, LED, and buzzer test is done on the GM460 at the end of the bump test or calibration. The vibrator will vibrate, the LEDs will turn on for a few seconds, the buzzer will sound, and the CS460 will determine if these actions were completed successfully.

### Auto Print (Bump and Calibration)

The printer must be connected for the **Auto Print** parameter to have any function. If **Auto Print** is selected, the CS460 will automatically print test results at the end of a bump test or calibration. If **Auto Print** is not selected, the CS460 will not automatically print test results but the results can still be printed by pressing the **Print** button at the end of a bump test or calibration.

## Auto bump if past due (Bump Only)

### Note

This parameter only affects CS460 operation and does not affect PC Controller Program operation. See ["Parameter Tab" in Chapter 7](#) for instructions to update an equivalent setting for PC Controller Program operation.

If the **Auto bump if past due** parameter is selected *and* if the connected GM460 is due for a bump test, the CS460 will automatically perform a bump test 60 seconds after the GM460 is connected. The number of gases used for this bump test depends on the instrument's **B--CHECK** setting. If **B--CHECK** is set to **4GAS**, only the standard four sensors will be automatically bump tested. If **B--CHECK** is set to **ALL**, all sensors will be automatically bump tested.

If the **Auto bump if past due** parameter is deselected, an automatic bump test will not be performed, even if the GM460 is due for one.

## Auto Cal if past due (Calibration Only)

### Note

This parameter only affects CS460 operation and does not affect PC Controller Program operation. See ["Parameter Tab" in Chapter 7](#) for instructions to update an equivalent setting for PC Controller Program operation.

If the **Auto Cal if past due** parameter is selected *and* if the connected GM460 is due for a calibration, the CS460 will automatically perform a calibration 60 seconds after the GM460 is connected. The number of gases used for this calibration depends on the instrument's **C--CHECK** setting. If **C--CHECK** is set to **4GAS**, only the standard four sensors will be automatically calibrated. If **C--CHECK** is set to **ALL**, all sensors will be automatically calibrated.

If the **Auto Cal if past due** parameter is deselected, an automatic calibration will not be performed, even if the GM460 is due for one.

## Bump & Cal 2 Tab

This section describes the **Bump & Cal 2** tab of the CS460 Window.

The screenshot shows the 'Bump & Cal 2' tab in the CS460 Configuration window. The window has a blue title bar and a tabbed interface with 'Bump & Cal 1', 'Bump & Cal 2', 'Internal', and 'Automatic' tabs. The 'Bump & Cal 2' tab is active. The settings are organized into several groups: 'Date Format' with a dropdown set to 'MM-DD-YYYY' and a checked '24H' option; 'Language' with a dropdown set to 'English'; 'Data Logger' with 'Auto Download' set to 'OFF', an 'Interval' of '1' day, and 'Manual Download' with 'ON' selected; 'Expiration Date' with 'Calibration expiration notice' and 'Cylinder expiration notice' both set to '10' days; 'Power Saving' with 'Power Off After Pass' set to '15' seconds and 'Auto Power Off' set to '600' seconds; and 'Password' with 'ON' selected and the password '0000'. On the right side, there are four buttons: 'Import file', 'Export file', 'CS460 Update', and 'Cancel'.

**Figure 4-6: Bump & Cal 2 Tab**

The parameters available for editing are shown in the table below along with their available options and factory settings.

**Table 4-3: Bump & Cal 2 Tab Parameters**

Parameter	Available Choices	Factory Setting
<a href="#">Date Format</a>	<ul style="list-style-type: none"> <li>DD-MM-YYYY (day/month/year)</li> <li>YYYY-MM-DD (year/month/day)</li> <li>MM-DD-YYYY (month/day/year)</li> <li>24H selected</li> <li>24H deselected</li> </ul>	<ul style="list-style-type: none"> <li>MM-DD-YYYY</li> <li>24H selected</li> </ul>
<a href="#">Data Logger Auto Download</a>	<ul style="list-style-type: none"> <li>OFF</li> <li>Every Time</li> <li>Interval</li> </ul>	OFF
<a href="#">Data Logger Interval</a> <b>Note:</b> Only active if "Interval" is selected for Data Logger Auto Download.	1 to 60 days	1 day
<a href="#">Manual Download</a>	<ul style="list-style-type: none"> <li>ON</li> <li>OFF</li> </ul>	ON
<a href="#">Power Off After Pass</a>	0 to 99,999 seconds	15 seconds

Parameter	Available Choices	Factory Setting
<a href="#">Auto Power Off</a>	0 to 99,999 seconds	600 seconds
<a href="#">Language</a>	<ul style="list-style-type: none"> <li>English</li> <li>French</li> <li>German</li> <li>Italian</li> <li>Japanese</li> <li>Korean</li> <li>Portuguese</li> <li>Russian</li> <li>Spanish</li> </ul>	English
<a href="#">Calibration Expiration Notice</a>	0 to 180 days	10 days
<a href="#">Cylinder Expiration Notice</a>	1 to 180 days	10 days
<a href="#">Password</a>	<ul style="list-style-type: none"> <li>Selected (On)</li> <li>Deselected (Off)</li> </ul>	Deselected (Off) (0000)

## Date Format

Use this parameter to change how the date and time are displayed on the CS460. Use the drop-down menu to select the date format. Select **24H** to use a 24-hour clock or deselect to use a 12-hour clock.

## Data Logger Auto Download

Use this parameter to turn on an automatic download of a connected GM460's saved data. A manual data download can be performed using the PC Controller Program but if a data download is desired in Standalone Mode, it must be set up using this setting.

<b>OFF</b>	No data download to the PC Controller Program or to the SD card, depending on how the CS460 is being used, will be performed when a GM460 is connected to the CS460.
<b>Every Time</b>	A data download to the PC Controller Program or to the SD card, depending on how the CS460 is being used, will automatically occur every time a GM460 is connected to the CS460.
<b>Interval</b>	A data download to the PC Controller Program or to the SD card, depending on how the CS460 is being used, is performed once per interval. If this option is selected, the <b>Auto Download Interval</b> parameter becomes active and needs to be set. The <b>Interval</b> parameter is described below.

## Data Logger Interval

The **Data Logger Interval** is the length of time, in days, that will pass before data is automatically downloaded from a GM460 if **Data Logger Auto Download** is set to **Interval**. If the GM460 is connected to a CS460 before the interval has passed, a data download will not automatically occur. The **Data Logger Interval** can be set anywhere from **1** to **60** days. The factory setting is **1** day. Use the arrows to the

right of the current setting to change the interval or highlight the current setting and type in the desired value.

## Manual Download

Use the **Manual Download** setting to activate the ability to download data manually from a connected GM460 to the system's SD card in Standalone Operation. When set to **ON** (default value), the **Download** button on the CS460 touch screen becomes active and a manual download in Standalone Mode of the GM460's logger data to the SD card can be performed. When set to **OFF**, the **Download** button is not active and a manual download of the GM460's logger data to the SD card cannot be performed in Standalone Mode. This setting has no effect on PC Controlled Operation.

## Power Off After Pass

This is the length of time that will pass after a successful bump test, calibration, or alarm check before the program will automatically shut off the GM460. Use the arrows to the right of the current setting to change the value or highlight the current setting and type in the desired value. It is defined in seconds with a maximum setting of **99,999** seconds. The factory setting is **15** seconds.

## Auto Power Off

This is the length of time that will pass after the last operation is finished before the program will automatically shut off the GM460. If a successful bump test, calibration, or alarm check is performed, the program will automatically shut off the GM460 in the time defined in **Power Off After Pass** regardless of the **Auto Power Off** setting. Use the arrows to the right of the current setting to change the value or highlight the current setting and type in the desired value. It is defined in seconds with a maximum setting of **99,999** seconds. The factory setting is **600** seconds.

## Language

Use this item to change the language of the CS460. Changing this parameter does not change the GM460's language or the PC Controller Program's language. Click the arrow to the right of the current setting and use the drop-down menu to select the desired language.

## Calibration Expiration Notice

This is the length of time, in days, before a GM460 is due for calibration that the CS460 and PC Controller Program will give an indication that the GM460's calibration due date is approaching. So if calibration is due on 12/20/18 and the **Calibration Expiration Notice** is set to **10** days, the impending-calibration indication will begin appearing on 12/10/18. If the GM460 is connected to the PC Controller Program within this time period, the GM460's information will be highlighted in orange. If the GM460 is connected to the CS460 within this time period, "**Cal Limit Soon**" will display in the gray bar at the top of the Function and Unit tabs (Standalone operation only).

## Cylinder Expiration Notice

This is the length of time, in days, before a cylinder's expiration date that the CS460 and PC Controller Program will give an indication that the cylinder's expiration date is approaching. So if the cylinder expires on 12/20/18 and the **Cylinder Expiration Notice** is set to **10** days, the cylinder-expiring indication will begin appearing on 12/10/18. The PC Controller Program will show a message in the message window and the cylinder will be highlighted in orange if you open the Cylinders Window. The cylinder icon in the bottom left corner of the CS460's **Function** tab will change from green to orange (Standalone operation only).

## Password

Turning the password on adds password protection to the CS460 Window and to the Configuration Menu if the CS460 is used in Standalone Mode. The factory set password is "0000" but a user selected password can be entered in the space to the right of the **ON** selection box.

## Internal Tab

The **Internal** tab is used for setting up a LAN connection on a non-DHCP network and does not have any function in the CS460's PC Controlled Configuration. Instructions for using the **Internal** tab can be found in the CS460 Docking Station Standalone Configuration Manual.

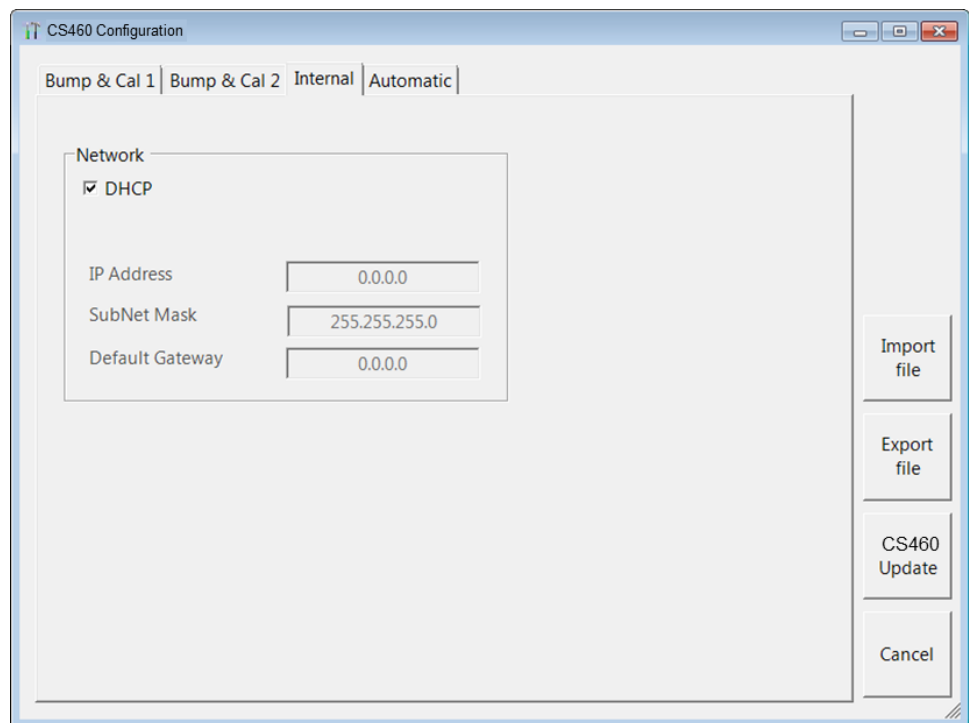
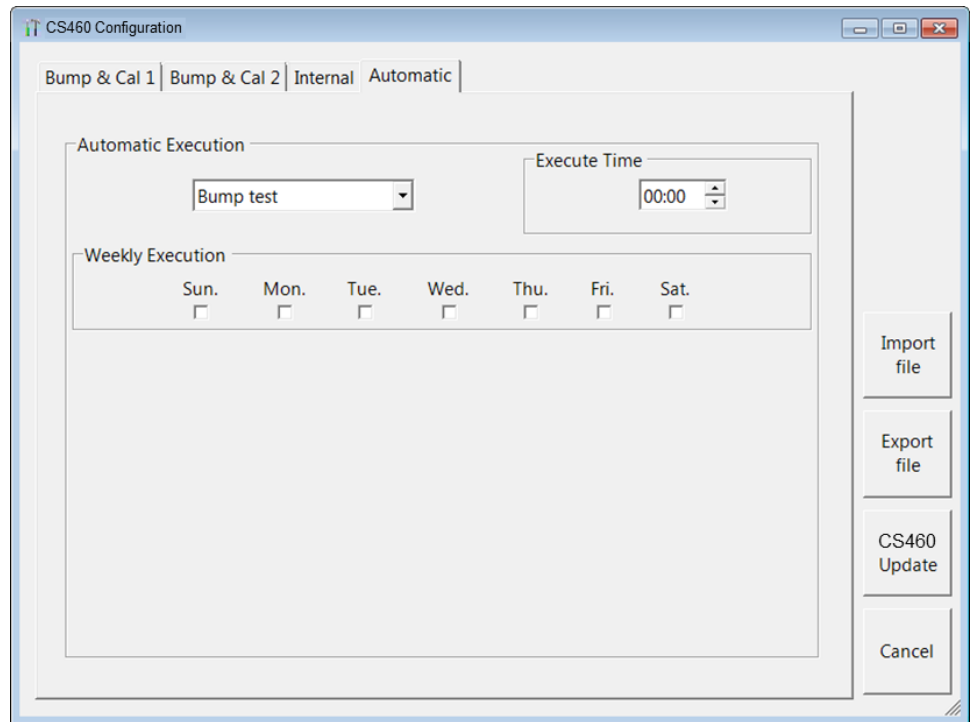


Figure 4-7: Internal Tab

## Automatic Tab

This section describes the **Automatic** tab of the CS460 Window.



**Figure 4-8: Automatic Tab**

The **Automatic** tab allows you to set up a bump test, calibration, or alarm check to automatically occur at a specific time on the desired day(s). If a GM460 is installed in a CS460 at the specified day/time, the CS460 will turn the GM460 on, perform the test then turn the GM460 off.

1. Use the drop-down menu to select **Bump Test**, **Calibration**, or **Alarm Check**. Only one test can be selected. Multiple tests cannot be done automatically.
2. Highlight the hours or minutes portion of the **Execute Time** and then use the arrows to change the selection or type in the desired value.
3. Select what day(s) you would like the test to be done.

## Exporting an CS460 File

Use the **Export File** button on the right side of the CS460 Window to save a parameter configuration file based on a connected CS460's parameter settings. The file can then be uploaded at a later time to another CS460 to make its parameter settings match the original CS460's parameter settings or to restore the parameter settings of the original CS460 if they have been changed.

The parameter configuration files that are created have an .sdm file extension. These files can only be used by the PC Controller Program. When you use **Export File**, you can save the created files to any accessible location on your hard drive. Make sure to define a convenient location on your hard drive for these files if you use this feature so that you can conveniently find them when you want to upload a file to a CS460. When you select names for these files, you may want to structure the filenames so you can identify from which CS460 the file was saved or so that you can identify a particular parameter configuration. Structure the filenames so that you can easily identify the files as containing the information that is important to you.

1. Be sure that all of the parameters in the **Bump & Cal 1**, **Bump & Cal 2**, and **Automatic** tabs are appropriately set for your application.
2. Click **Export File**.
3. Choose a destination for the file and type in a filename.
4. Click **Save**.

## Importing an CS460 File

Use the **Import File** button on the right side of the CS460 Window to load a parameter configuration file that can be uploaded to the CS460. The parameter configuration files have an .sdm extension and are only readable by the PC Controller Program. The parameter configuration files are user-created by using the **Export File** button to save a file based on a connected docking station's parameter settings. See ["Exporting a CS460 File" \(in this chapter\)](#) for a description of how to create and save a parameter configuration file.

When you upload a parameter configuration file, you are uploading CS460 parameters to the CS460. GM460 parameters are not affected.

1. Click **Import File**.
2. Navigate to the location of your stored .sdm file.
3. Click **Open**.
4. The parameters in the CS460 Window's tabs will automatically be changed, if necessary, to agree with the parameters in the imported .sdm file.



## Returning to the Main Window

When you are finished making changes, click **CS460 Update**.

To save the changes:

- Click **Yes** in the window that pops up to save the changes.
- Click **No** in the window that pops up to not save the changes.

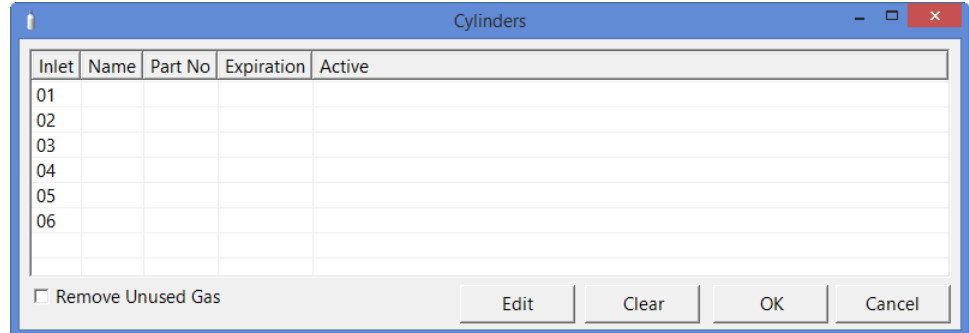
To exit the CS460 Window and return to the main program window without saving any changes:

- Click **Cancel** in the CS460 Window.
- Click **OK** in the confirmation screen that comes up.

---

## Setting Up Cylinders in the Cylinders Window

The **Cylinders** window allows you to assign cylinders to the CS460 or SV-3's gas inlets. If desired, the window will keep track of those cylinders' expiration dates. If a cylinder's expiration date is nearing or has passed, the PC Controller Program will alert you in the message area of the main program window as soon as the program is started. The **Cylinders** window comes with a list of predefined cylinders that are fairly common. If a cylinder that you need to use is not on this list, you can define your own cylinder.



**Figure 4-9: Cylinders Window**

The **Cylinders** window shows the cylinder name, part number, expiration date, and active status for each cylinder.

The settings in the **Cylinders** window correlate to the inlet parameter settings done in the CS460's Config Menu. If any settings have been made to the inlet parameters at the CS460, those settings will appear in the **Cylinders** window.

## Selecting a Cylinder from the Predefined List

The **Cylinders** window comes with several predefined cylinders that you can choose from.

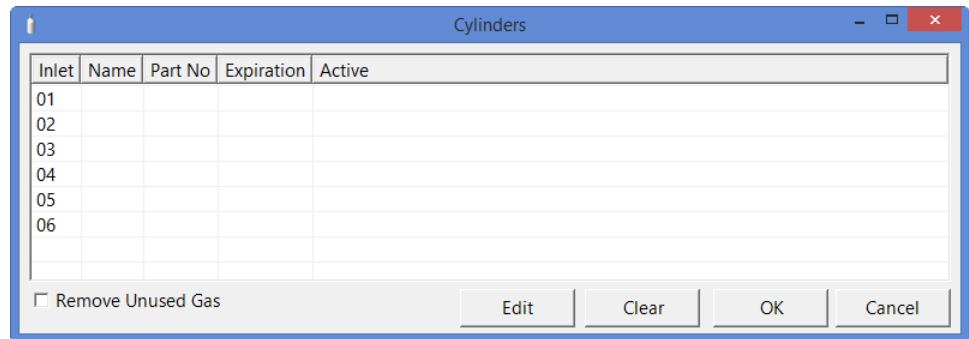
### Note

Even though chlorine ( $\text{Cl}_2$ ) appears as a predefined cylinder, chlorine channels cannot be bump tested or calibrated using the CS460. If your instrument has a chlorine channel, you may test all other channels using the CS460 but must test the chlorine channel separately, using the GM460's Calibration Mode.

1. To access the **Cylinders** window, click the **Cylinders** button along the top of the main program window.



2. The **Cylinders** window will appear.

A screenshot of the "Cylinders" window. The window has a blue title bar with the text "Cylinders" and standard window control buttons (minimize, maximize, close). Inside the window is a table with five columns: "Inlet", "Name", "Part No", "Expiration", and "Active". The "Inlet" column contains a list of numbers from 01 to 06. The other columns are empty. Below the table is a checkbox labeled "Remove Unused Gas". At the bottom right of the window are four buttons: "Edit", "Clear", "OK", and "Cancel".

Inlet	Name	Part No	Expiration	Active
01				
02				
03				
04				
05				
06				

☐ Remove Unused Gas

Edit Clear OK Cancel

**Figure 4-10: Cylinders Window**

3. Double-click the line (or single-click the line and click **Edit**) that corresponds with the gas inlet you would like to set up. For example, double-click line 3 (or single-click line 3 and click **Edit**) to set up a cylinder for the **GAS 3** inlet on the CS460 or SV-3. The **Cylinder Detail** window will display.

The screenshot shows the 'CylinderDetail' window. It has a blue title bar. Inside, there are several input fields: 'Name' (a text box), 'Part No' (a text box), 'Inlet' (a dropdown menu showing 'Gas3'), and 'Expiration' (a checkbox). Below these is a table with three columns: 'Symbol', 'Unit', and 'Concentration'. The table has several empty rows. To the right of the table is a grey vertical bar. Below the table is a 'Pre-define Cylinder' dropdown menu. At the bottom right are 'OK' and 'Cancel' buttons.

Symbol	Unit	Concentration

Figure 4-11: Cylinder Detail Window

- The pre-defined cylinders list is located in a drop-down menu at the bottom of the window. Click the drop-down arrow to view the pre-defined cylinders list. Scroll down to view additional cylinders.

The screenshot shows a software window titled "CylinderDetail". It contains several input fields: "Name", "Part No", "Inlet" (set to "Gas3"), and a checkbox for "Expiration" (unchecked) and "Active" (checked). Below these is a table with three columns: "Symbol", "Unit", and "Concentration". The table is currently empty. At the bottom, there is a section labeled "Pre-define Cylinder" with a drop-down menu. The menu is open, showing a list of predefined cylinders with their symbols and descriptions.

Symbol	Unit	Concentration

Pre-define Cylinder

- 81-0016RK-05 : CH4(100vol%)
- 81-0154RK-02 : CH4(50%LEL)/O2(12%)/H2S(25ppm)/CO(50ppm)
- 81-0143RK-02 : CH4(50%LEL)/O2(12%)/H2S(25ppm)/CO(50ppm)/IBL(100ppm)
- 81-0142RK-02 : CH4(50%LEL)/O2(12%)/H2S(25ppm)/CO(50ppm)/SO2(5ppm)
- 81-0090RK-03 : CH4(50%LEL)/O2(12%)CO(50ppm)
- 81-0190RK-02 : Cl2(5 ppm)
- 81-0073RK-03 : CO2(15vol%)

**Figure 4-12: Pre-Defined Cylinders List**

**Note**

Even though chlorine (Cl<sub>2</sub>) appears as a predefined cylinder, chlorine channels **cannot** be bump tested or calibrated using the CS460. If your instrument has a chlorine channel, you may test all other channels using the CS460 but must test the chlorine channel separately, using the GM460's Calibration Mode.

- Click the cylinder you want to use. In this example, HCN has been selected. The **Name**, **Part No.**, **Symbol**, **Unit**, and **Concentration** fields will automatically be filled in.

CylinderDetail

Name

Part No

Inlet

☐ Expiration ☒ Active

Symbol	Unit	Concentration
HCN	ppm	10

Pre-define Cylinder

**Figure 4-13: Cylinder Detail Window Filled In with Pre-Defined Info**

- If you would like to set an expiration date for the cylinder, select the box next to **Expiration**.

CylinderDetail

Name

Part No

Inlet

☒ Expiration  ☒ Active

Symbol	Unit	Concentration
HCN	ppm	10

Pre-define Cylinder

**Figure 4-14: Expiration Date**

- Set the expiration date by clicking the drop-down menu arrow and selecting a date from the calendar that appears. If the number of days left before the cylinder expires is less than the time defined in the **Cylinder Expiration Notice** parameter in the CS460 window, the line in the **Cylinders** window that corresponds to this cylinder will

turn orange. The line in the **Cylinders** window that corresponds to this cylinder will turn red if the expiration date has passed.

8. Select or deselect the **Active** box for each cylinder. If the cylinder is active, the PC Controller Program will alert you at start up if the cylinder has passed its expiration date and will include the associated inlet in testing. If it is not active, the program will not alert you if the cylinder has passed its expiration date and will not include the associated inlet in testing.

If the **Active** box is deselected, the program will not consider it as a cylinder being used and will give you an inlet error if you connect an instrument that requires that cylinder for bump testing or calibration.

9. To return to the **Cylinders** window and save your changes, click **OK** in the **Cylinder Detail** window.

To return to the **Cylinders** window without saving your changes, click **Cancel**.

10. Make any necessary updates to other inlets.

11. To return to the **Main** window and save your changes, click **OK** and then click **Yes** in the window that pops up.

To return to the **Main** window without saving your changes, click **Cancel** and then click **OK** in the window that pops up.

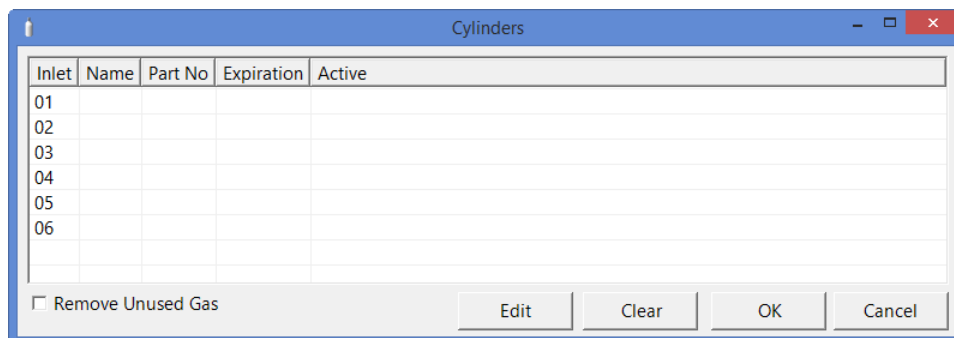
## Defining New Cylinders

If your GM460 configuration requires the use of a cylinder that is not in the predefined list, you can add that cylinder by either typing in the information for the cylinder or by editing the information for an existing cylinder.

1. To access the **Cylinders** window, click the **Cylinders** button along the top of the main program window.



2. The **Cylinders** window will appear.



**Figure 4-15: Cylinders Window**

3. Double-click the line (or single-click the line and click **Edit**) that corresponds with the gas inlet you want to set up. For example, double-click line 3 (or single-click line 3 and click **Edit**) to set up a cylinder for the **GAS 3** inlet on the CS460 or SV-3. The **Cylinder Detail** window will display.

The screenshot shows the 'CylinderDetail' window. It has a title bar 'CylinderDetail'. Inside, there are several input fields: 'Name' (empty), 'Part No' (empty), 'Inlet' (set to 'Gas3'), and 'Active' (checked). There is also an 'Expiration' checkbox which is unchecked. Below these fields is a table with three columns: 'Symbol', 'Unit', and 'Concentration'. The table has several empty rows. At the bottom of the window, there is a 'Pre-define Cylinder' dropdown menu and two buttons: 'OK' and 'Cancel'.

**Figure 4-16: Cylinder Detail Window**

4. Click in the **Name** field and type in a name for the cylinder. Use something descriptive that will help you distinguish it from other cylinders. You can also select a pre-defined cylinder and then edit the name that is automatically generated.
5. To enter a part number for the cylinder, click in the **Part No** field and type in a part number. This field is normally used for a TSI part number.

6. Enter a gas symbol for each cylinder component you want to identify. Click in the **Symbol** field of the desired line and type in characters or click the drop-down arrow and select a symbol from the list.

CylinderDetail

Name

Part No

Inlet

☐ Expiration ☒ Active

Symbol	Unit	Concentration
<input type="text"/>		
CH4		
CO		
CO2		
H2S		
HCN		
O2		
VOC		

Pre-define Cylinder

OK Cancel

**Figure 4-17: Symbol List**

7. Enter the units for the cylinder by clicking in the **Unit** field, clicking the drop-down arrow, and selecting units from the list.

CylinderDetail

Name

Part No

Inlet

☐ Expiration ☒ Active

Symbol	Unit	Concentration
<input type="text"/>	<input type="text"/>	
	vol%	
	%LEL	
	ppm	
	ppb	
	%	

Pre-define Cylinder

OK Cancel

**Figure 4-18: Unit List**

8. Enter the gas concentration for each cylinder's component by clicking in the **Concentration** field and typing in the characters.
9. Set the expiration date by clicking the drop-down menu arrow and selecting a date from the calendar that appears. If the number of



days left before the cylinder expires is less than the time defined in the **Cylinder Expiration Notice** parameter in the CS460 window, the line in the **Cylinders** window that corresponds to this cylinder will turn orange. The line in the **Cylinders** window that corresponds to this cylinder will turn red if the expiration date has passed.

10. Select or deselect the **Active** box for each cylinder. If the cylinder is active, the PC Controller Program will alert you at start up if the cylinder has passed its expiration date and will include the associated inlet in testing. If it is not active, the program will not alert you if the cylinder has passed its expiration date and will not include the associated inlet in testing.

If the **Active** box is deselected, the program will not consider it a cylinder being used and will give you an inlet error if you connect an instrument that requires that cylinder for bump testing or calibration.

11. To return to the **Cylinders** window and save your changes, click **OK** in the **Cylinder Detail** window.

To return to the **Cylinders** window without saving your changes, click **Cancel**.

12. Make any necessary updates to other inlets.

13. To return to the **Main** window and save your changes, click **OK** from the **Cylinders** window and then click **Yes** in the window that pops up.

To return to the **Main** window without saving your changes, click **Cancel** from the **Cylinders** window and then click **OK** in the window that pops up.

## Clearing Cylinders

Cylinders can be cleared from the **Cylinders** window list if they are no longer needed or to clear the old cylinder before defining a new cylinder.

1. Click the **Cylinders** button along the top of the main program window.



2. The **Cylinders** window will appear.

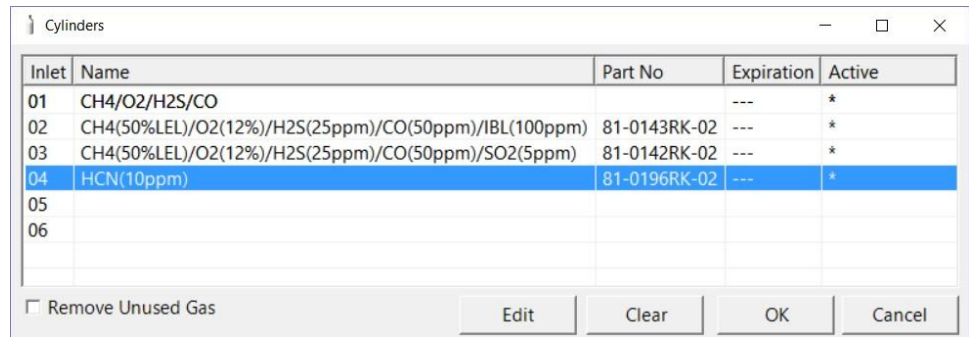
Inlet	Name	Part No	Expiration	Active
01	CH4/O2/H2S/CO		---	*
02	CH4(50%LEL)/O2(12%)/H2S(25ppm)/CO(50ppm)/IBL(100ppm)	81-0143RK-02	---	*
03	CH4(50%LEL)/O2(12%)/H2S(25ppm)/CO(50ppm)/SO2(5ppm)	81-0142RK-02	---	*
04	HCN(10ppm)	81-0196RK-02	---	*
05				
06				

☐ Remove Unused Gas

Edit Clear OK Cancel

**Figure 4-19: Cylinders Window**

3. Single-click the line you want to clear.



**Figure 4-20: Cylinder Selected**

4. Click the **Clear** button at the bottom of the screen.
5. Click **OK** in the window that pops up to clear the cylinder. The cylinder will disappear from the **Cylinders** window.

## Removing Unused Gases

As you enter cylinder information for the inlets, the **Symbol** drop-down menu in the **Cylinder Detail** window will populate with those gas names. If you then clear the cylinders from the **Cylinders** window, those gas names will still remain in the **Symbol** drop-down menu. Selecting **Remove Unused Gas** in the **Cylinders** window and then clicking **OK** removes those unused gas names from the **Symbol** drop-down menu.

1. Make the desired changes to the **Cylinders** window as described in the previous three sections.
2. Select the **Remove Unused Gas** box in the bottom left corner of the screen.
3. Click **OK** and then click **Yes** in the window that appears.

# Making Parameter, Database, and Password Changes in the Configuration Window

The **Configuration** window allows you to update parameters that only affect PC Controller Program operation, view database information, and change the password to enter the **Configuration** window.

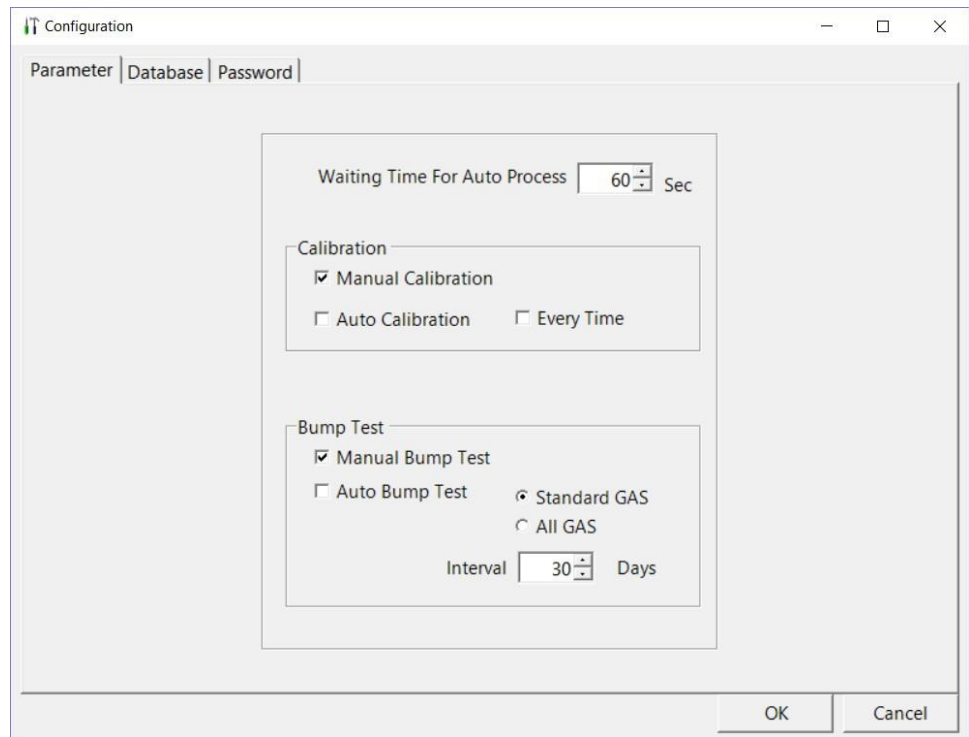
## Entering the Configuration Window

1. Click the **Config** button.
2. The program will prompt you for a password. The default password is ABCDE. Enter the password and click **OK** keeping in mind that the password is case-sensitive. The password can be changed once you enter the **Configuration** window.

3. The **Parameter** tab of the **Configuration** window will be displayed.

## Parameter Tab

The **Parameter** tab allows you to view or change bump test and calibration settings that only apply to the PC Controller Program operation. Changing anything in the **Parameter** tab of the **Config** window does not change any settings in the CS460 and; therefore, does not affect Standalone Mode operation.



**Figure 4-21: Config Window Parameter Tab**

1. Set the **Waiting Time** for Auto Process value.

The **Waiting Time for Auto Process** parameter defines the time delay of an automatic calibration or automatic bump test after an instrument is connected to the docking station. You can set the delay from 0 seconds to 3600 seconds (factory setting is 60 seconds).

2. Select the Calibration options.

In the **Calibration** section of the **Parameter** tab, you can select **Manual Calibration** or **Auto Calibration**.

- If **Manual Calibration** is selected, you have to manually select an instrument or instruments in the main program window and click **Calibration** in the lower-right corner of the window in order to perform a calibration.
- If **Auto Calibration** is selected and **Every Time** is not, if an instrument is due for calibration, a calibration will automatically begin in the time defined by the **Waiting Time for Auto Process** parameter after that instrument successfully connects to the

program and its instrument parameters are retrieved by the program.

- If **Auto Calibration** and **Every Time** are selected, a calibration will automatically begin in the time defined by the **Waiting Time for Auto Process** parameter after that instrument successfully connects to the program and its instrument parameters are retrieved by the program regardless of whether a calibration is due.
- If neither **Manual Calibration** nor **Auto Calibration** is selected, you will not be able to perform a calibration. The factory setting is **Manual Calibration** selected and **Auto Calibration** deselected. Select the box for the desired operation.

3. Select the Bump Test options.

You can select **Manual Bump Test** or **Auto Bump Test**.

- If **Manual Bump Test** is selected, you must manually select an instrument or instruments in the main program window and click **Bump Test** in the lower-right corner of the window in order to perform a bump test.
- If **Auto Bump Test** is selected, and an instrument is due for bump testing, a bump test will automatically begin in the time defined by the **Waiting Time for Auto Process** parameter after that instrument successfully connects to the program and its instrument parameters are retrieved by the program.

#### Note

If the instrument's **Bump Test Function** is set to **On**, the instrument's information is used to determine if a bump test is needed.

If the instrument's **Bump Test Function** is set to **Off**, the PC Controller's Bump Test **Interval** parameter and last successful bump test date are used to determine if a bump test is needed. If a bump test has never been done using the PC Controller Program, an auto bump will be initiated.

If neither box is selected, you will not be able to perform a bump test. The factory setting is **Manual Bump Test** selected and **Auto Bump Test** deselected. Select the box for the desired operation.

### Standard GAS/All GAS

The **Auto Bump Test** selection also has a **Standard GAS** and an **All GAS** selection. If **Standard GAS** is selected, only the standard sensors (catalytic LEL, O<sub>2</sub>, CO, and H<sub>2</sub>S) will be bump tested during an automatic bump test. If **All GAS** is selected, all installed sensors will be bump tested during an automatic bump test.

This parameter only affects the operation of the PC Controller Program when used with GM460s whose Bump Test Function is set to **Off**. If the GM460's Bump Test Function is set to **On**, the instrument's **B--CHECK**

setting is used to determine what gases are included in the automatic bump test.

## Interval

The **Interval** can be set anywhere between 1 and 30 days and is the length of time that can pass before the program will prompt you to perform a bump test. The factory setting is 30 days.

Use the arrows to the right of the current interval or highlight the current setting and type in the desired value. The value you type in must be valid (between 1 and 30 days).

This parameter only affects the operation of the PC Controller Program when used with GM460s whose Bump Test Function is set to **Off**. If the GM460's Bump Test Function is set to **On**, the instrument's bump test interval is used to determine if a bump test is due.

## Database Tab

Use the **Database** tab to view or change where the data from your CS460 docking stations is saved. It also allows you to create a brand new database, import data from another database, or export saved data.

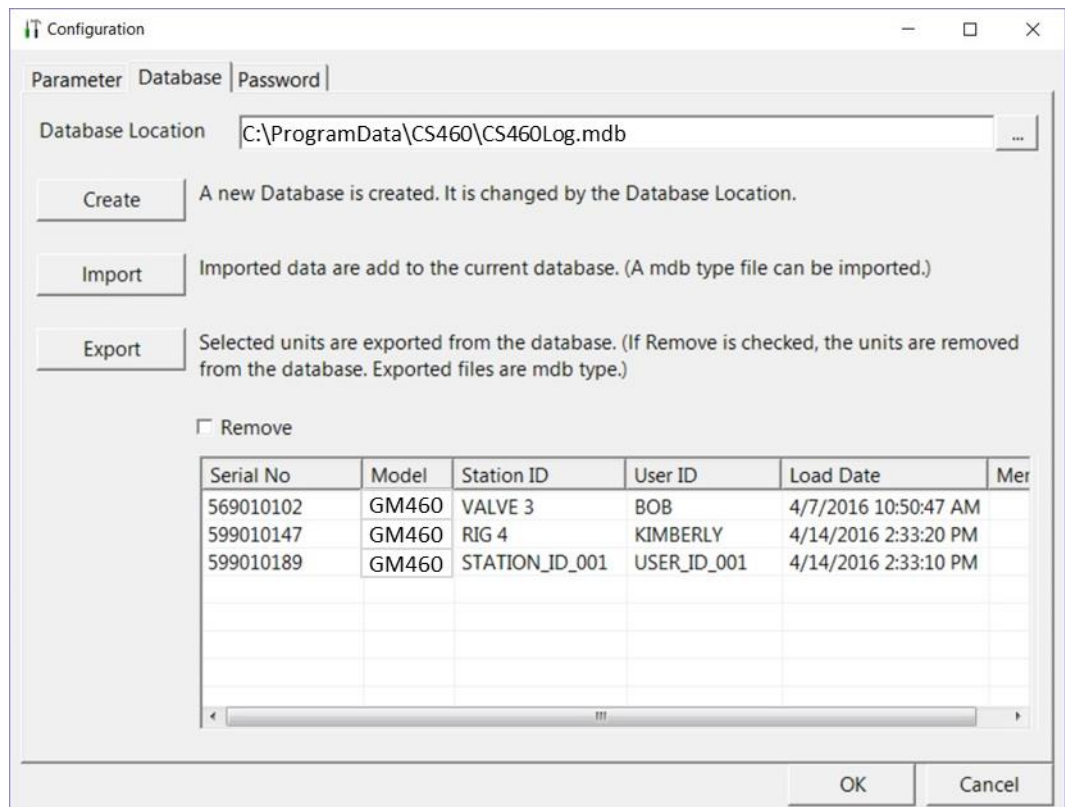


Figure 4-22: Config Window Database Tab

## Changing the Database Location

1. Click the button to the right of the current location. It has three dots on it.
2. Navigate to a new location where a database exists, click on the database to select it, and click **Open**. The new database location will be displayed in the **Database Location** field.
3. A window will appear telling you to restart the PC Controller Program. Click **OK**.
4. Click **OK** in the **Database** tab.
5. Click the **Exit** control button in the upper-right corner of the main program window.
6. Reopen the PC Controller Program.

## Creating a New Database

1. Click the **Create** button located along the left-side of the **Database** tab window.
2. Choose where you want the new database to be stored, enter a name for it, and click **Save**. You should include the “.mdb” file extension in the name; but if you do not, the program will add it automatically when you save it. The new database will be created but data will not be stored there until you change the file path as described above.

## Importing a .mdb File Into the Database

1. Click the **Import** button located along the left-side of the **Database** tab window.
2. Select an existing .mdb file that you want to import. You can import an .mdb file that was created on another computer and moved to your computer, you can select a file that was generated on your computer using the **Create** button, or you can navigate to another network computer's .mdb file. If you navigate to another computer's files, the location for the default .mdb file is in the Program Files folder (i.e., **C:\Program Data\CS460**). It is named CS460Log.mdb. Hidden folders must be visible on the computer in order to locate the .mdb file. To import a different .mdb file, it will have a different name and may be in a different location.
3. Once you have selected an .mdb file, click **Open**. The program will indicate that the file is being imported. Once the import is finished, the data from the .mdb file will be added to your current data. New serial numbers/station IDs/user IDs will appear in the Data frame of the Logs window. Instrument information associated with those new GM460s will also be available in the Logs window.

## Exporting Data to an .mdb File

1. Select the desired GM460s from the list on the bottom of the **Database** tab.
2. Click **Export**. Select where you want to save the file and click **Save**. The program will indicate that it is exporting the data and will confirm that it has finished. Click **OK** in the window that pops up.
3. To remove a GM460's information after it has been exported, select **Remove** before selecting **Export**. You *cannot* remove a GM460's information while it is connected to the computer so be sure to turn off the GM460 before removing data.

## Password Tab

Use the **Password** tab to change the **Configuration** window password to something other than the factory set ABCDE. The password can be up to 12 characters long and contain any letter, number, or symbol. It is case-sensitive.

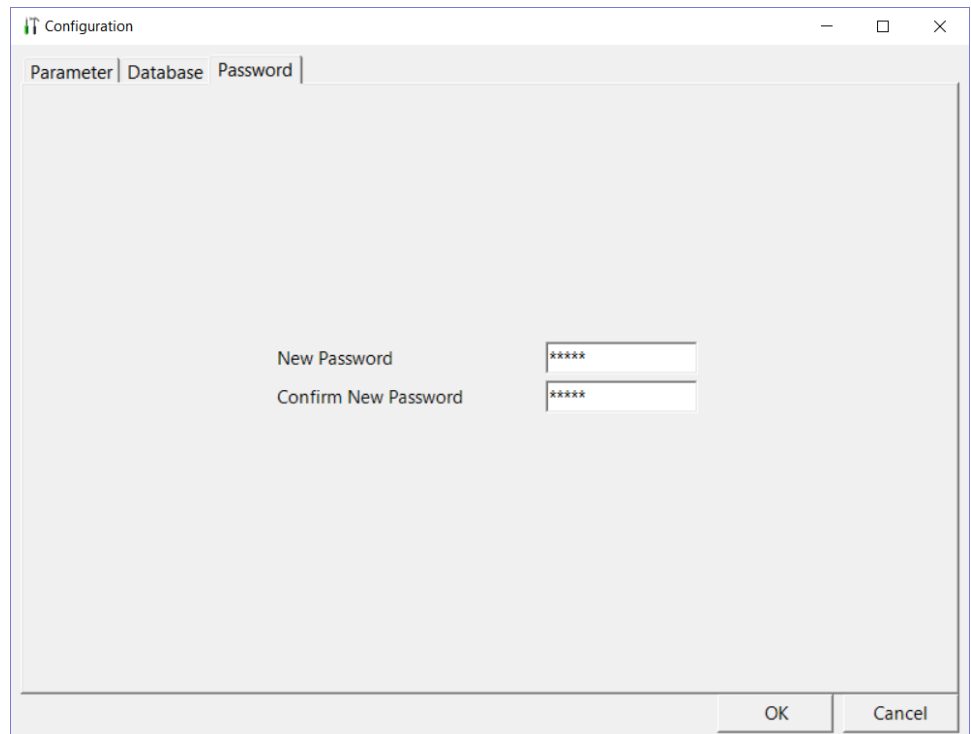
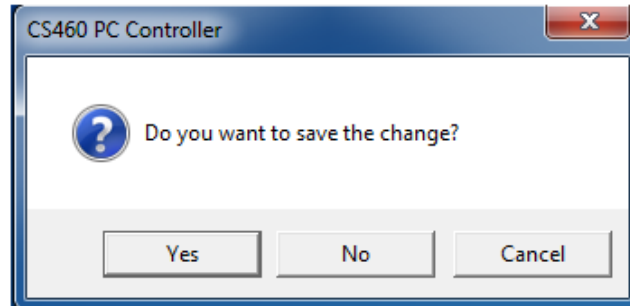
The image shows a screenshot of a software window titled "Configuration". At the top, there are three tabs: "Parameter", "Database", and "Password". The "Password" tab is currently selected. The main area of the window contains two labels, "New Password" and "Confirm New Password", each followed by a text input field. Both input fields contain six asterisks (\*\*\*\*\*) to represent masked characters. At the bottom right of the window, there are two buttons: "OK" and "Cancel".

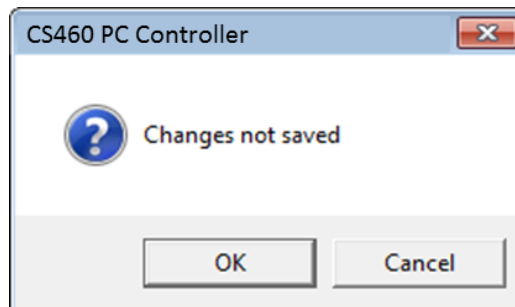
Figure 4-23: Configuration Window Password Tab

To change the password:

1. While in the **Configuration** window, click on the **Password** tab.
2. Enter the new password in the top box and confirm it in the bottom. Click **OK**. A window will pop up asking you to confirm the change.



- To confirm, click **Yes**.
  - To exit out of **Configuration** window without saving the changes, click **No**.
  - To stay in the **Password** tab and enter a different password, click **Cancel**.
3. To cancel any changes you have made at any time, click **Cancel** in the main **Password** tab. The program will tell you that changes will not be saved. To continue to exit, click **OK**. To return to the **Password** tab, click **Cancel**.





## CHAPTER 5

# Operation

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### Overview

This chapter provides a brief overview of the PC Controller Program and describes how to perform a bump test, calibration, and alarm check. It also contains troubleshooting information and instructions for instrument charging.

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### Overview of the CS460 PC Controller Program

This section provides a brief overview of the program and a description of the main program window. Instructions for using the program are given in other parts of this manual. Use this section to become familiar with the main program window, but before attempting to use the program, make sure to perform the program setup as described in ["Setting Parameters in the CS460 Window" \(in Chapter 4\)](#) and ["Making Parameter, Database, and Password Changes in the Configuration Window" \(in Chapter 4\)](#).

The PC Controller Program is designed to provide manual or automated data downloading, bump testing, calibration, and alarm checking of the GM460. It also provides the capability to update GM460 parameters such as alarm points. The program compiles a database of the GM460s that have been connected to the program which consists of bump test, calibration, and alarm check history, logged data (if a GM460's data is downloaded), and memos that record user entered information about a GM460 at a particular time.

The GM460 is a gas monitoring device for combustible gas, O<sub>2</sub>, H<sub>2</sub>S, CO, and toxic gases. It stores logged data and calibration information in its internal memory. See the GM460 Operator's Manual for a complete description of the GM460.

### PC Controller Program Functions

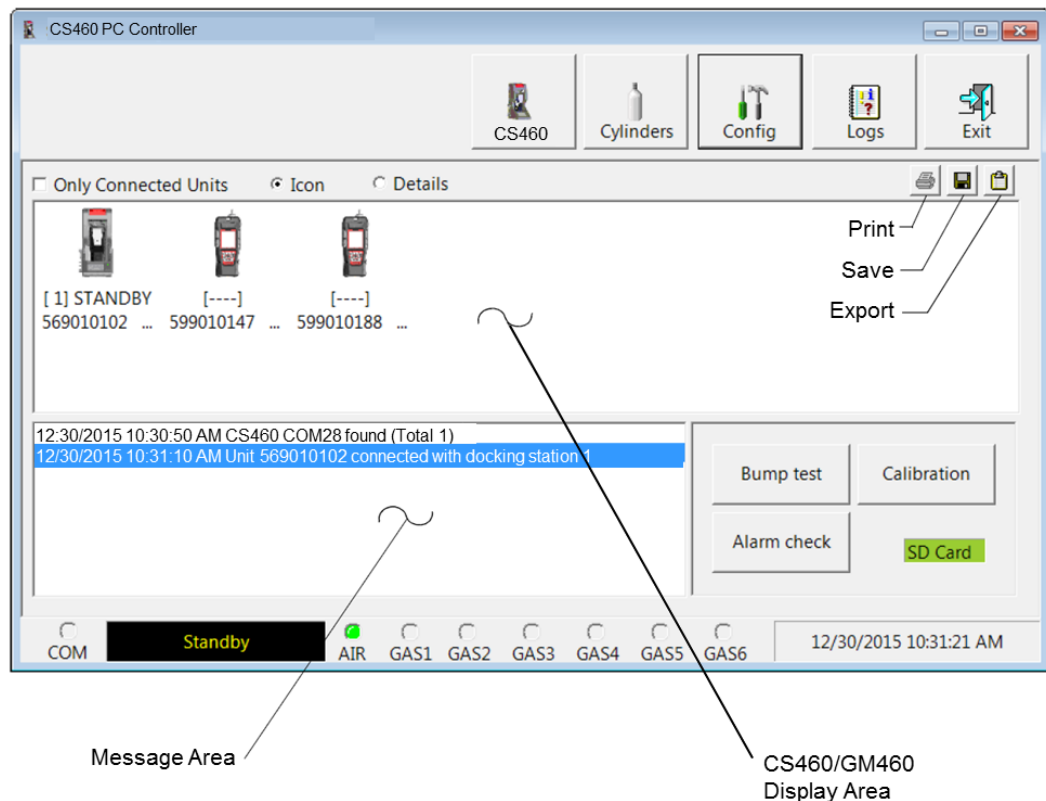
The PC Controller Program has the following basic functions accessed or controlled by buttons in the main program screen.

- Operational setup accessed by the **CS460** control button.
- Gas cylinder setup accessed by the **Cylinders** control button.
- Program and system configuration accessed by the **Config** control button (this function is password protected).

- Data viewing accessed by the **Logs** control button.
- GM460 bump testing controlled by the **Bump test** control button.
- GM460 calibration controlled by the **Calibration** control button.
- GM460 alarm checking controlled by the **Alarm check** control button.

## Main Program Window

The Main Program window is where the current status of the program operation is shown. Any CS460s and GM460s that are currently connected to it and any GM460s that have previously been but are not currently connected to it are also shown. The program's various functions are initiated or accessed from this screen. The current date and time are always displayed in the lower-right corner of the main program window.



**Figure 5-1: Parts of the Main Program Window**

### Control Buttons

The **CS460**, **Cylinders**, **Config**, **Logs**, and **Exit** control buttons are located along the top-right of the window. The **Bump test**, **Calibration**, and **Alarm check** control buttons are located in the lower-right of the window. These control buttons are described in other parts of this manual.

## SD Card Indicator

The SD card indicator is located in the lower-right corner of the main program window below the **Calibration** control button and shows the status of an inserted SD card.

**Table 5-1: SD Card Indicator Colors**

SD Card Indicator Color	Meaning
Gray	No SD card inserted.
Green	More than 20% of the SD card's memory is available.
Yellow	Less than 20% but more than 1 MB (approximately 946 tests) of the SD card's memory is available.
Red	Less than 1 MB (approximately 946 tests) of the SD card's memory is available.

## CS460/GM460 Display Area

The large middle portion of the main program window displays CS460s and GM460s that are currently connected to the PC Controller Program and GM460s that are in the database. The CS460s are identified by a number. The GM460s are identified by their serial number. By selecting either the **Icon** radio button or the **Details** radio button, the CS460s and GM460s can be displayed either as icons or in a table format that shows various GM460 parameter details such as station ID, user ID, the next scheduled bump test date, and the next scheduled calibration date among others. If the **Only Connected Units** box is checked then only GM460s that are currently connected to the PC Controller Program will be shown.

## Program Status

Three areas of the main program window indicate the program status. The smaller area in the lower-left below the CS460/GM460 display area is the message area. It displays messages that indicate actions and status of the program.

Below this area is the communications port indicator which shows when the program is communicating with the docking station(s).

To the right of the communications port indicator is the status field. It displays the current status of the program. It can indicate if the software is in standby mode or if it is downloading data among other indications.

## Fitting Indicators

To the right of the status field are seven round fitting indicators. They correspond to the **AIR** and **GAS** fittings on the left side of the CS460 and the SV-3. They indicate whether the corresponding solenoid is activated so it can allow gas to flow through the fitting it controls. When the indicator is green, the fitting is active. When the indicator is blank, the fitting is not active.

# Connecting GM460s to the PC Controller Program

To turn on the CS460s and establish a connection with the GM460s in your system:

1. Confirm that the AC adapter is connected to the CS460 and to an AC wall socket. For a multi-station system, only the left-most CS460 should be connected to power.
2. Connect the **Type A to Type B** USB cable to the CS460 and to an available USB port on your computer. For a multi-station system, only the left-most CS460 should be connected to the computer with the USB cable.
3. Launch the CS460 PC Controller Program as described in ["Launching the CS460 PC Controller Program" \(in Chapter 4\)](#).
4. Flip the CS460's power switch so that it is in the **ON** position. For a multi-station system, only the power switch of the left-most CS460 needs to be flipped.
5. The CS460's Status LED will be solid green if it is operating properly or solid red if there is a system failure.
6. When a connection has been established between the CS460 PC Controller Program and all of the CS460s, the main program window will appear as shown below.

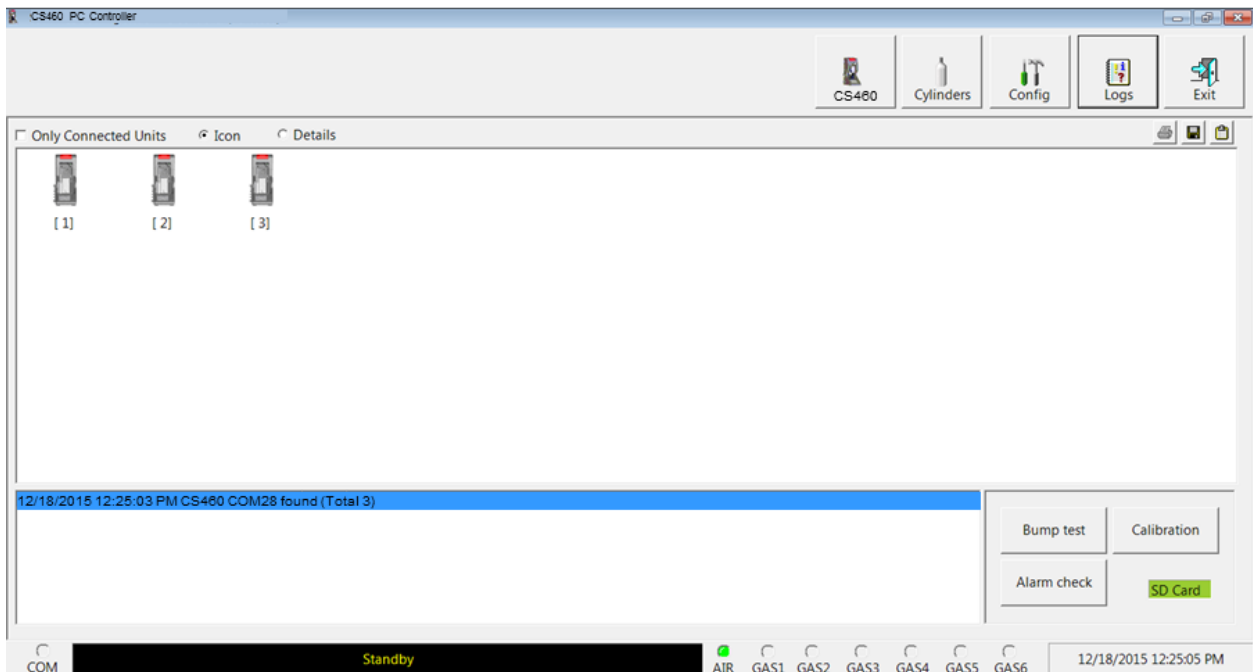
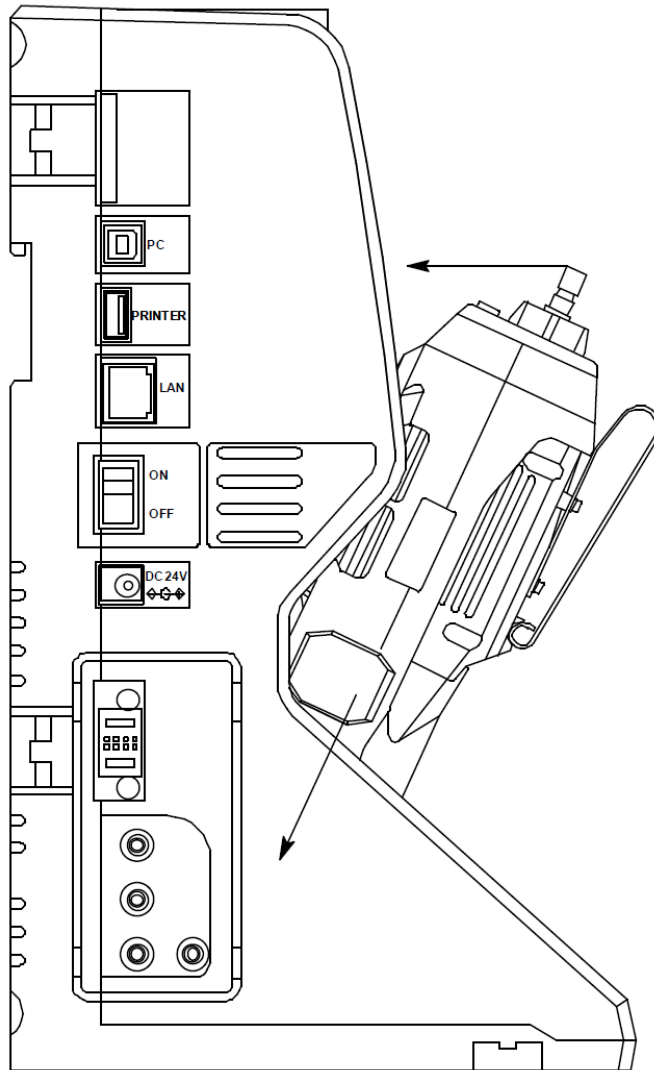


Figure 5-2: CS460 Connection

7. Install a GM460 in the instrument cradle. Orient the GM460 so the belt clip is facing away from the CS460. Set the bottom of the GM460 in the bottom of the instrument cradle and push the top of the GM460 toward the CS460.



**Figure 5-3: Inserting the GM460**

8. If the GM460 is equipped with a Li-ion battery pack that needs to be charged, the Status LED will begin to flash orange. If the battery pack is fully charged, the Status LED will be solid orange. See ["Charging a GM460 in a CS460" in Chapter 5](#) for a complete description of charging the GM460.
9. Push the red gas in/gas out cover down until it touches the GM460 and then release it. It should lock into place against the top of the GM460. If it returns to its original position, attempt to lock it in place again.
10. The GM460 will turn on once the gas in/gas out cover is in place. Any instrument charging that was taking place will stop.

11. Repeat steps 7 to 10 for any additional CS460s and GM460s.
12. The GM460 will begin its power up sequence. If a successful connection between the GM460 and the CS460 occurs, the screens of all connected CS460(s) will indicate the instrument's active channels and the auto calibration value for each channel. For a single-station system, the touch screen will look as shown below.

Transmit		
CH4	50 %LEL	GAS1
O2	12.0 %	GAS1
H2S	25.0 ppm	GAS1
CO	50 ppm	GAS1
VOC	100.0 ppm	GAS1
HCN	5.0 ppm	GAS2

☐ Auto Bump

**Single-Station System Touch Screen**

For a multi-station system, the touch screens will look as shown below.

Transmit		
CH4	50 %LEL	GAS1
O2	12.0 %	GAS1
H2S	25.0 ppm	GAS1
CO	50 ppm	GAS1
VOC	100.0 ppm	GAS1
HCN	5.0 ppm	GAS2

☒ Active

First Station

Additional Stations

**Multi-Station System Touch Screens**

### Note

The screens shown above show a four-gas + high range PID + HCN GM460. If you have a different instrument combination, your screens will appear differently.

13. For each GM460, the CS460 PC Controller Program will indicate that a GM460 was found and it will download the instrument's basic parameters. When all GM460s have been turned on, connected, and downloaded, the main program window will appear as shown below. When the GM460 is connected to the PC Controller Program, the date and time of the instrument are automatically updated to the current date and time on the PC Controller Program's screen.

### Note

Turn each GM460 on 10 to 15 seconds after the previous instrument to minimize the possibility of the GM460 not connecting to the PC Controller Program. If a GM460 does not connect, use the instrument's **POWER/ENTER** button to turn it off and turn it back on again.

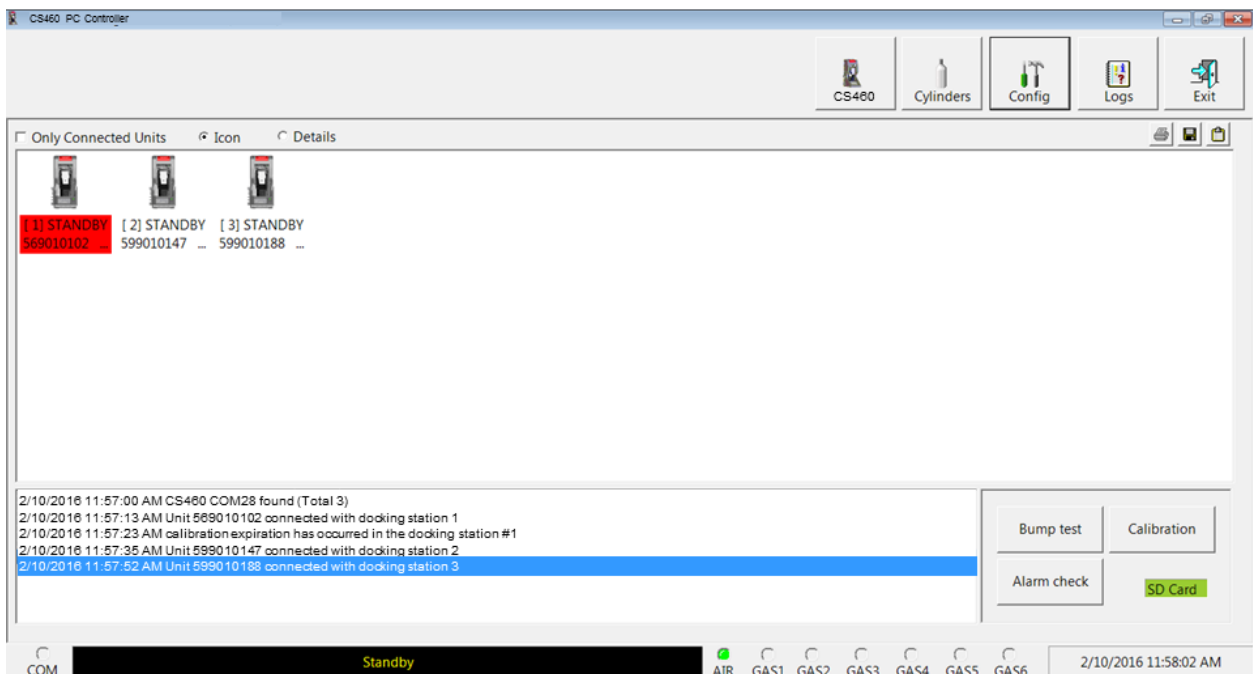


Figure 5-4: GM460s Connected and Downloaded

- If a GM460 is due for calibration, the docking station number and instrument serial number will be highlighted in red.
- If a GM460 is due for calibration within the number of days defined in **Calibration Expiration Notice**, the docking station number and instrument serial number will be highlighted in orange.
- If a GM460's basic parameters could not be downloaded properly, a red triangle will appear over the GM460 and CS460 picture.

## Icon View vs. Details View

GM460s that are currently connected or have been previously connected can be viewed in either **Icon View** or **Details View**. Choose **Icon** or **Details View** by clicking the **Icon** or **Details** radio button below the control buttons. Icon View allows you to view connected GM460s and previously connected GM460s in an icon configuration. Connected GM460s are shown as a GM460 inserted in a CS460 icon. Previously connected GM460s are shown as GM460 icons. Right-clicking a GM460 causes the Instrument Function Menu to appear.

Details View allows you to view connected GM460s and previously connected GM460s in a table format. Scrolling to the right in Details View allows you to view existing GM460 parameters. For a description of these parameters and instructions to change them, see ["Edit Function" \(in Chapter 7\)](#).

SDM No	Serial No	Connection	Model	Status	Station ID	User ID	Date Time	Next Test Date	Next Cal Date	Cal Interval(Day)	OXY Alar
1	569010102	COM28	GM460	STANDBY	VALVE 3	BOB	2/10/2016 11:57:23 AM	2/8/2016 12:04:15 PM	12/23/2015 3:54:59 PM	90	-
2	599010147		GM460	STANDBY	RIG 4	KIMBERLY	2/10/2016 11:57:44 AM	2/14/2016 12:28:52 PM	4/14/2016 12:28:52 PM	90	-
3	599010188		GM460	STANDBY	FLANGE 9	KATIE	2/10/2016 11:58:00 AM	1/27/2016 1:23:08 PM	3/27/2016 1:23:08 PM	90	-

2/10/2016 11:57:00 AM CS460 COM28 found (Total 3)  
 2/10/2016 11:57:13 AM Unit 569010102 connected with docking station 1  
 2/10/2016 11:57:23 AM calibration expiration has occurred in the docking station #1  
 2/10/2016 11:57:35 AM Unit 599010147 connected with docking station 2  
 2/10/2016 11:57:52 AM Unit 599010188 connected with docking station 3

COM Standby AIR GAS1 GAS2 GAS3 GAS4 GAS5 GAS6 2/10/2016 11:59:26 AM

**Figure 5-5: Main Program Window, Details View**

Unless otherwise noted, all following figures that show the main program window in this manual are shown in Icon View.



## Printing and Exporting an Instrument List from the Main Program Window

You can print, save, or add to clipboard the instrument list in the main program window. You can only print the list if it is viewed in Details format. The list cannot be printed when viewed in Icon format.

To print the instrument list:

1. Ensure that the main program window is being viewed in Details format. The print icon will not be active if the main program window is viewed in Icon format.

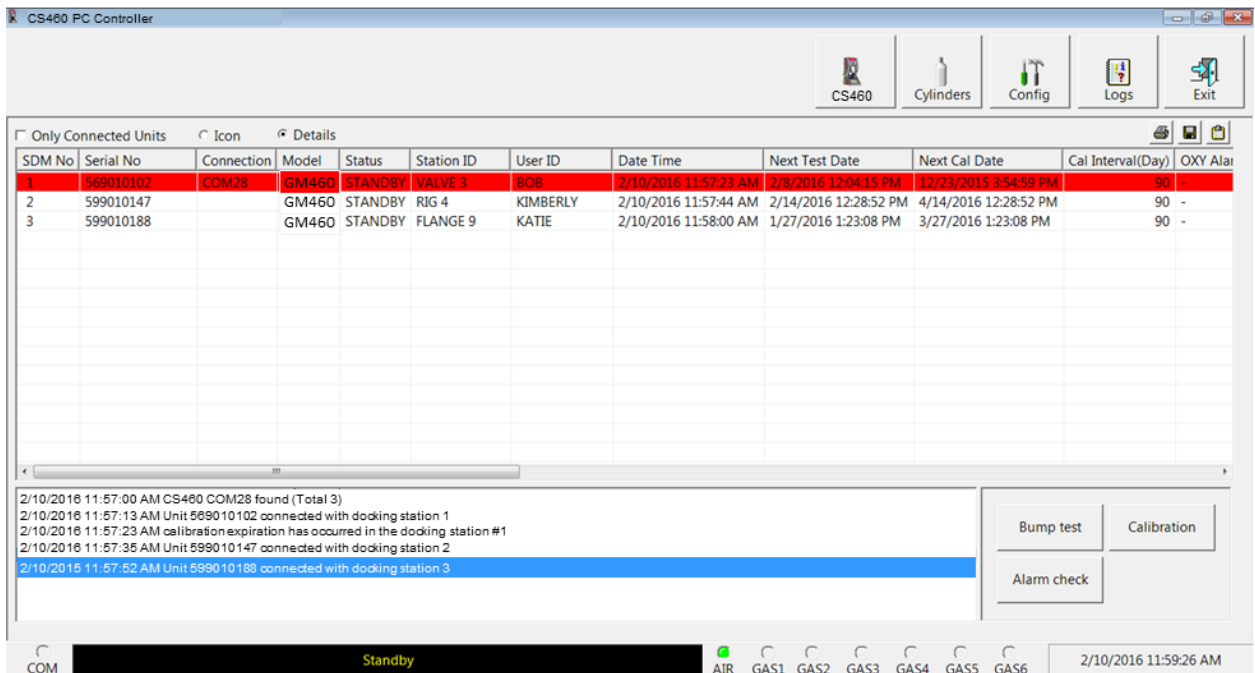
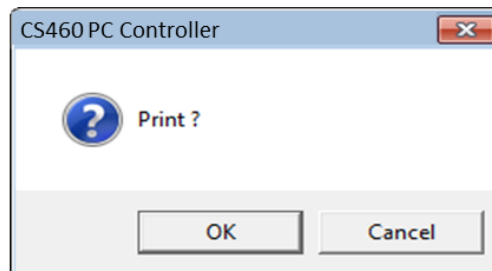


Figure 5-6: Details View

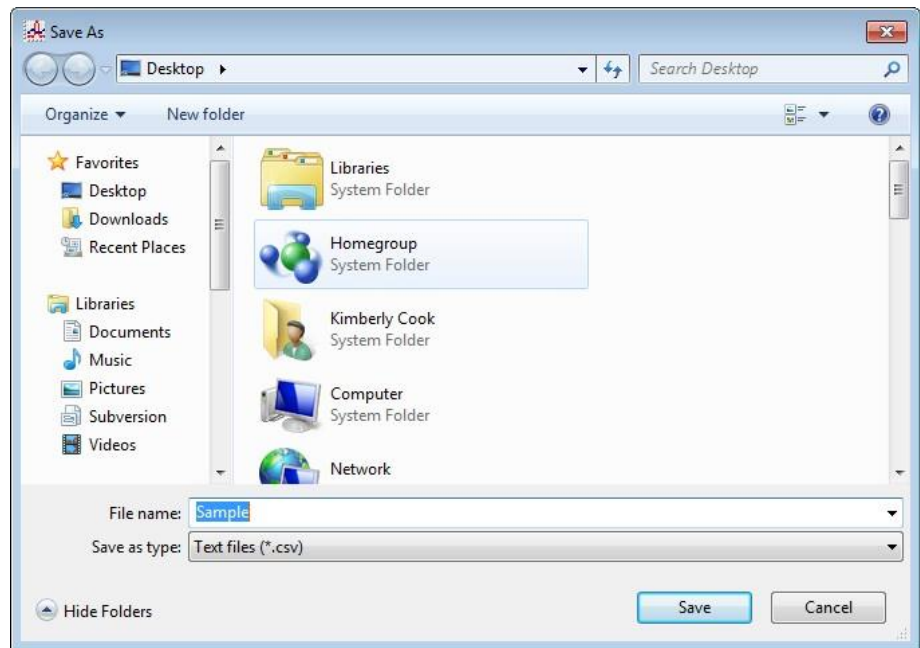
2. Click the **Print** icon located just below the **Exit** button.
3. A print confirmation screen will appear.



4. To print the instrument list, click **OK**. To cancel the print job, click **Cancel**.

To save the instrument list as a .csv file:

1. Click the **Save** icon located just below the **Exit** button.
2. Choose a file path and enter a filename and click **Save**.



**Figure 5-7: Save As Screen**

To save the instrument list to the clipboard:

1. Click the **Clipboard** button located just below the **Exit** button. The serial number, model, station ID, user ID, next bump test date, next calibration date, the calibration interval, and the data logging interval time for each GM460 in the main program window will be saved to the clipboard in a table format.
2. Open a spreadsheet program such as Excel® spreadsheet program or such as Microsoft® Word® processing program and paste the clipboard data into it.

---

## Automatic Procedures

This section briefly describes the automatic procedures that may begin once the GM460 is turned on and connected to the PC Controller Program.

The PC Controller Program will automatically start a download of the instrument's logged data if the **Data Logger Auto Download** parameter in the **Bump & Cal 2** tab of the CS460 window is set up. The download will begin as soon as the instrument is connected to the PC Controller Program and the basic parameters have been downloaded. An automatic data download will occur first before any other setup automatic process such as an automatic bump test.

If **Auto Bump** is selected in the **Bump & Cal 1** tab of the CS460 window, the PC Controller Program will automatically perform a bump test on a connected GM460. See ["Bump & Cal 1 Tab" \(in Chapter 4\)](#) for a description of this parameter. This feature is only active if one CS460 is connected to the PC Controller Program. If multiple CS460s are connected, this feature is not active. The use of this feature allows you to launch the PC Controller Program, turn on the GM460 and walk away. No oversight of the bump test is needed. For this reason, the calibration cylinders need to already be in place and the Cylinders window needs to be set up appropriately. The bump test will begin as soon as the instrument is connected to the PC Controller Program and the basic parameters have been downloaded.

If **Auto Bump Test** or **Auto Calibration** is selected in the **Parameter** tab of the **Configuration** window, the PC Controller Program will automatically bump test or calibrate a connected GM460 as long as a bump test or calibration is due on that instrument. See ["Parameter Tab" \(in Chapter 7\)](#) for a description of these parameters. The use of this feature allows you to launch the PC Controller Program, turn on the GM460 and walk away. No oversight of the bump test or calibration is needed. For this reason, the calibration cylinders need to already be in place and the Cylinders window needs to be set up appropriately. The bump test or calibration will begin in the time defined by the **Waiting Time for Auto Process** parameter in the Parameter tab of the Configuration window after the instrument is connected to the PC Controller Program and the basic parameters have been downloaded.

If configured for automatic bump testing, calibration, or alarm checking at a specific date/time in the Automatic tab of the CS460 window, the GM460(s) will be automatically turned on, tested, and then turned off. For bump testing and calibration, the calibration cylinders need to be connected to the appropriate fittings and the **Cylinders** window needs to be set up appropriately.

---

## Performing a Bump Test

The PC Controller Program is capable of performing a bump test both manually and automatically when a GM460 is connected to it. When a bump test is performed, the PC Controller Program performs an air adjust operation on a GM460 and then applies calibration gas to the instrument. The program analyzes the response results based on predefined criteria and determines if the GM460 passed the bump test.

The criteria that the PC Controller Program uses to determine if the GM460 passes a bump test and whether or not the PC Controller Program automatically performs a bump test on a connected GM460 is defined in the CS460 window and in the **Parameter** tab of the **Configuration** window. See ["Setting Parameters in the CS460 Window"](#) and ["Parameter Tab"](#) in Chapter 4 for a description of the bump test configuration setup.

### Note

Chlorine ( $\text{Cl}_2$ ) channels **cannot** be bump tested or calibrated using the CS460. If your instrument has a chlorine channel, you may test all other channels using the CS460 but must test the chlorine channel separately, using the GM460's Calibration Mode.

To manually bump test one or more GM460s:

1. Establish a connection between the CS460, GM460 and the PC Controller Program as described in ["Connecting GM460s to the PC Controller Program" \(in this chapter\)](#).
2. Verify that all of the bump test parameters are set correctly. See ["Setting Parameters in the CS460 Window" in Chapter 4](#) for instructions.
3. Verify that the appropriate calibration gas cylinders are connected to the gas fittings on the left side of the CS460 or to the gas fittings on the SV-3. See ["Connecting Calibration Gas \(No SV-3 attached\)"](#) or ["Connecting Calibration Gas, SV-3 Attached"](#) in Chapter 3 for calibration gas cylinder options and calibration gas connection procedures.
4. Confirm that the appropriate filters are connected to the **AIR** inlet fitting (if necessary) as shown below.

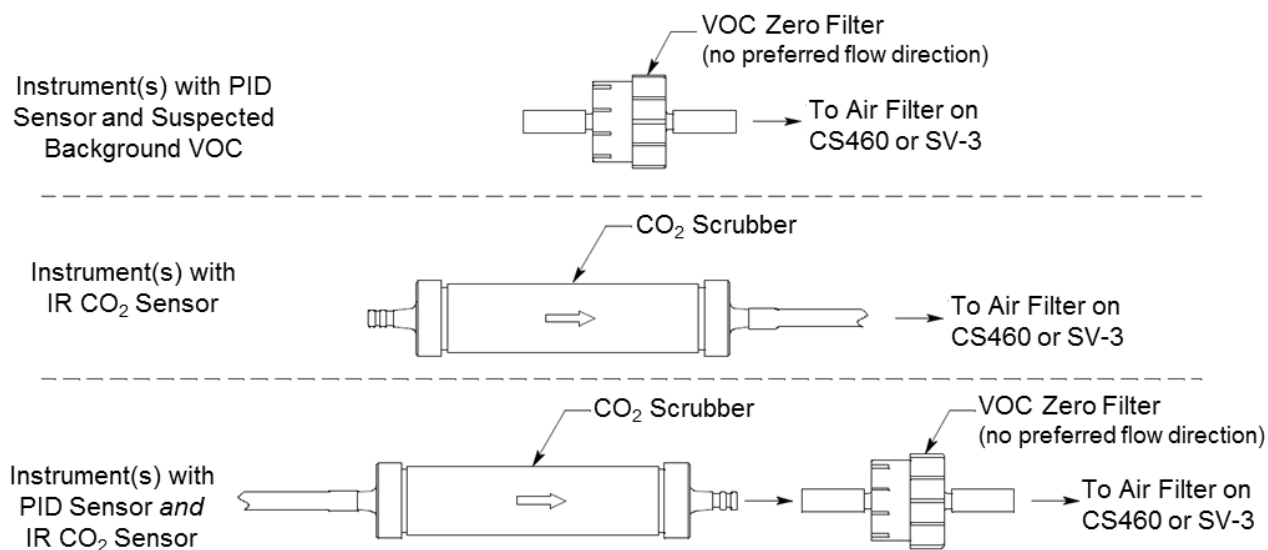
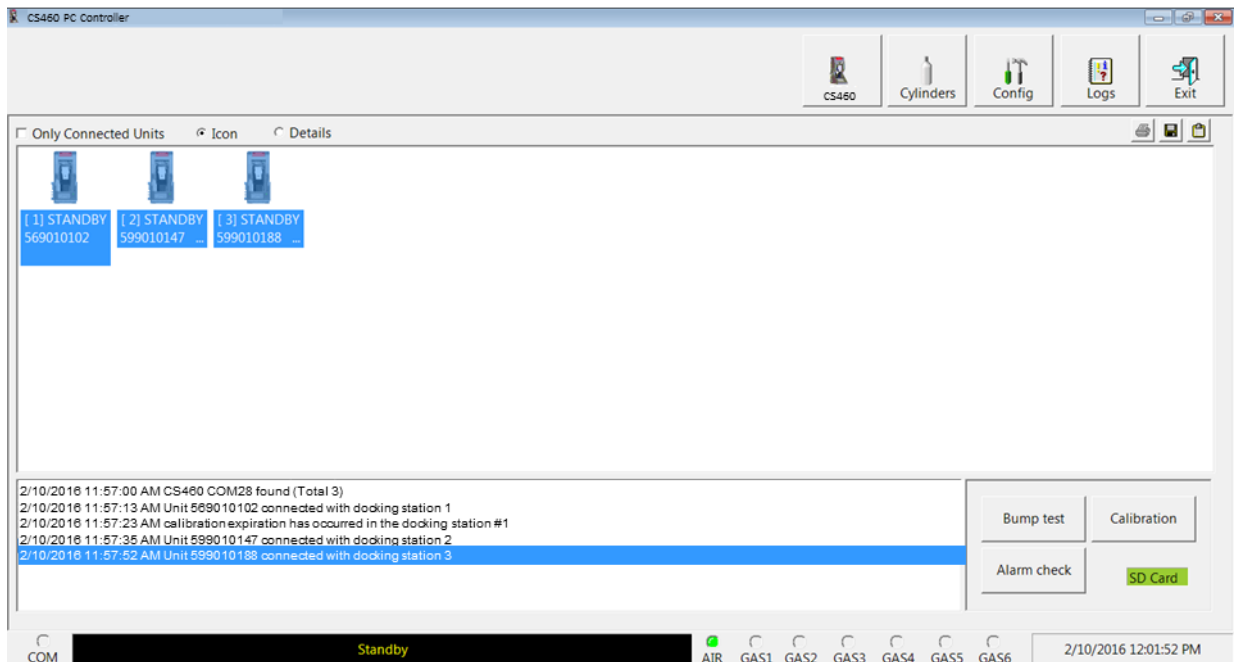


Figure 5-8: Air Inlet Filters

5. Select the GM460(s) you want to bump test and click on them to highlight them as shown below. To select multiple GM460s for bump testing, hold down the **Control** button on the keyboard as you click them. You can also hold down the **Shift** button while you click the first and last instruments in the series of instruments you want to bump test.



**Figure 5-9: Instrument Selection**

6. Click the **Bump test** button in the lower-right corner of the main program window.
7. If an SD card is not inserted in the CS460, a warning will appear. Results for testing done without an SD card inserted will only be saved to the PC Controller Program and will not be saved anywhere else. Click **Yes** to proceed without the SD card inserted or **No** to return to the main window.



8. You will be asked to confirm what instruments you want to test and what gases you want to include in the test. Select or deselect instruments and gases as appropriate for the test you want to perform. The example below shows three instruments:

- 4-gas + high range PID + HCN
- 4-gas + NO<sub>2</sub>
- 4-gas + SO<sub>2</sub>

All instruments and gases are selected. Deselecting the HCN (**GAS 2**), NO<sub>2</sub> (**GAS 3**), and SO<sub>2</sub> (**GAS 4**) gases would cause a bump test to be performed on the standard four sensors in all three instruments along with the high range PID sensor in the first instrument.

The screenshot shows a window titled "Gas Mapping" with a table for selecting instruments and gases. The table has columns for "Select", "Serial No", "GAS1", "GAS2", "GAS3", and "GAS4".

Select	Serial No	GAS1	GAS2	GAS3	GAS4
<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
		CH4(50%LEL)	HCN(10ppm)	NO2(5ppm)	SO2(5ppm)
		O2(12%)			
		H2S(25ppm)			
		CO(50ppm)			
		VOC(100ppm)			
<input checked="" type="checkbox"/>	569010102	CH4/O2/H2S/CO/VOC	HCN		
<input checked="" type="checkbox"/>	599010147	CH4/O2/H2S/CO		NO2	
<input checked="" type="checkbox"/>	599010188	CH4/O2/H2S/CO			SO2

At the bottom right of the window are "OK" and "Cancel" buttons.

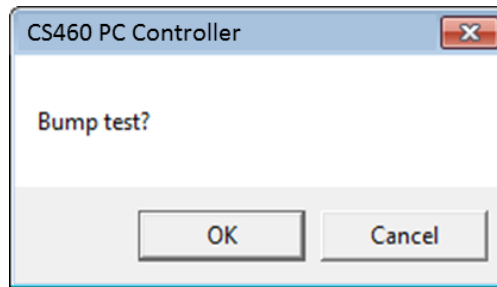
**Figure 5-10: Instrument/Gas Confirmation Screen**

#### Note

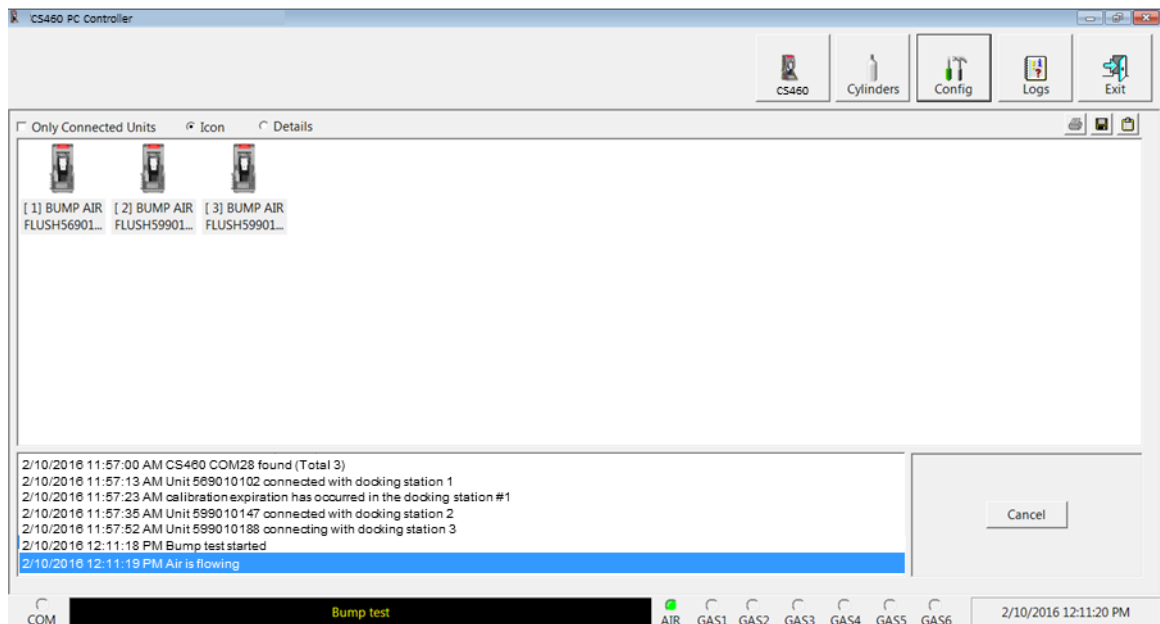
Selecting or deselecting a gas cylinder in this window also selects or deselects that cylinder's **Active** selection box in the **Cylinders** window. The setting will remain in place until you change it.

When all of the desired instruments and gases are selected, click **OK** to proceed or click **Cancel** to abort the bump test.

9. You will be asked if you want to bump test the instrument(s). Click **OK** to proceed or click **Cancel** to return to the main program window.



10. The instrument pumps will start and the program will indicate that air is flowing. The **AIR** indicator on the program screen will be solid green and air will be applied to the GM460(s) for the time defined by the **AIR Flush** bump test parameter in the CS460 window.

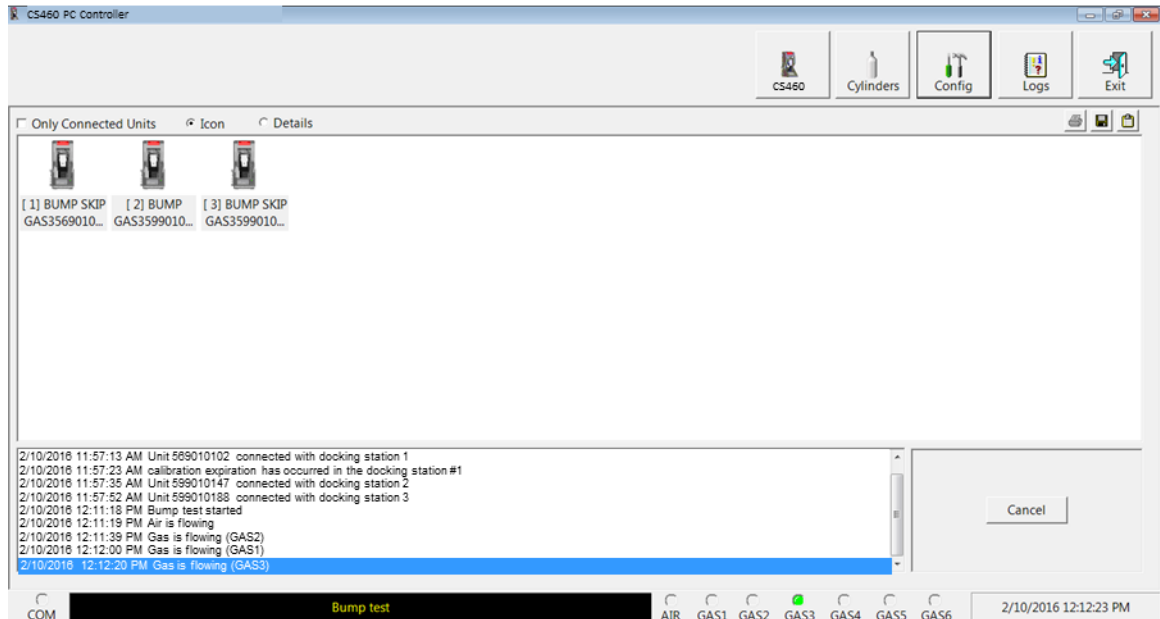


**Figure 5-11: Air Flowing**

The PC Controller Program will analyze the zero adjustment results. If any sensors failed the zero adjustment, the bump test for that instrument will be aborted.

11. The CS460 will then apply calibration gas in the order of the instrument's sensors for the length of time defined in the **GAS** bump test parameter. For example, to bump test a four-gas + low range PID instrument, gas will be applied to the four-gas sensors and then gas will be applied to the low range PID sensor regardless of what CS460 inlet fitting those gas cylinders are assigned to. The only exception is that HCN will always be applied before any other gas. The CS460 will analyze the results after the end of each gas application. If the bump test fails and **Auto Calibration** is selected in the CS460 window, the gas will keep flowing and a calibration will automatically begin. Calibration gas will continue to be applied so that the total gas application time is the time defined by the **GAS**

calibration parameter. This time includes the time that the GM460 was being bump tested. If the **GAS calibration parameter** is set to **90** seconds and the **GAS bump test parameter** is set to **30** seconds, the GM460 will sample gas for an additional 60 seconds to bring the total exposure time to 90 seconds.

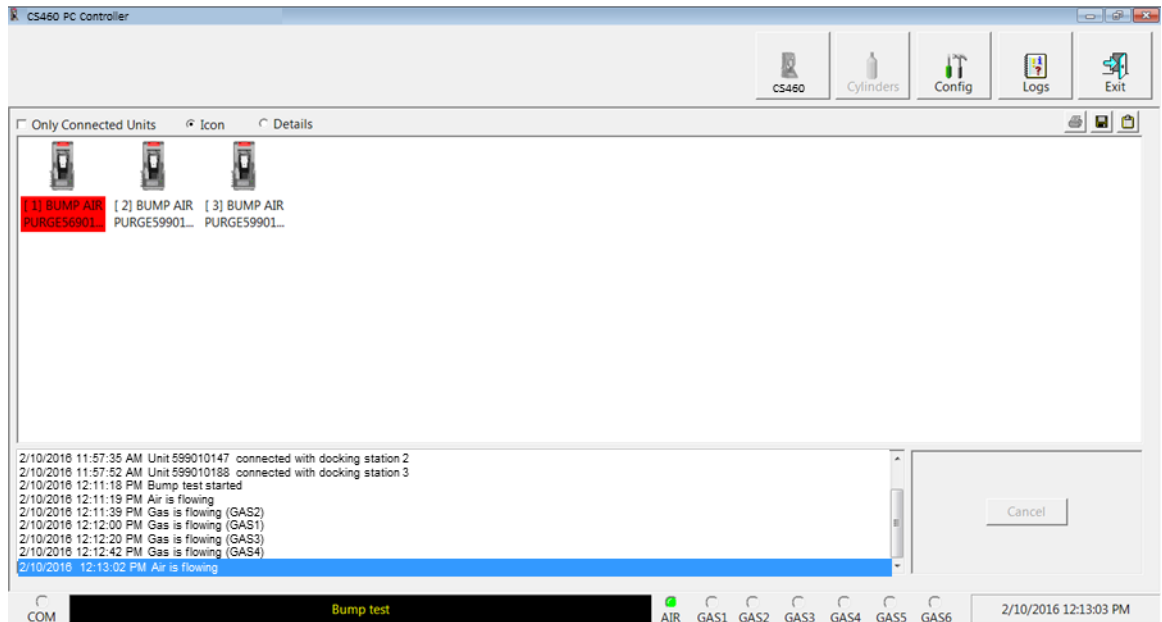


**Figure 5-12: Calibration Gas Flowing**

Once the calibration is over, the CS460 will continue with the next gas application or with the post-sample purge, whichever is appropriate.

12. After calibration gas is applied, the docking station will purge with fresh air for the time period defined by the **AIR Purge** bump test parameter in the CS460 window.

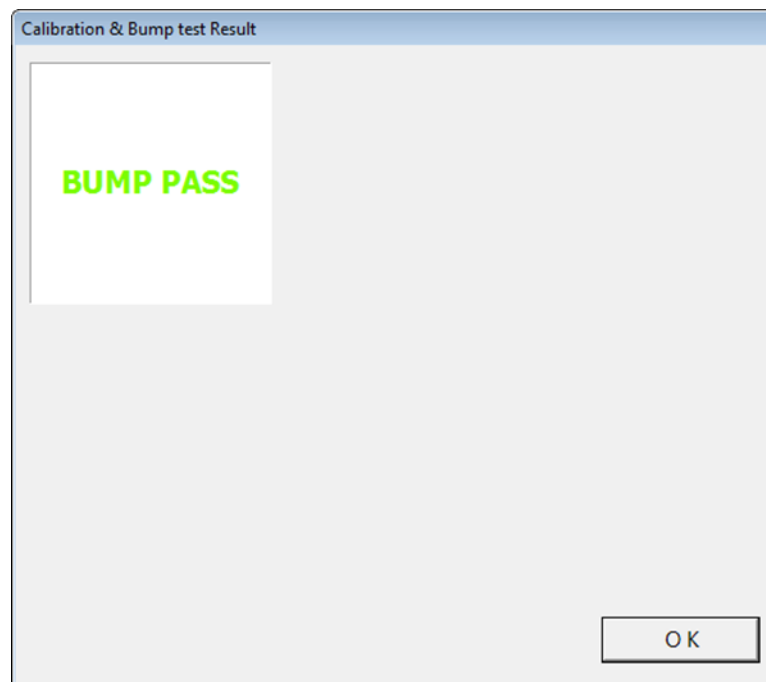




**Figure 5-13: Fresh Air Purge**

13. After the fresh air purge is complete,

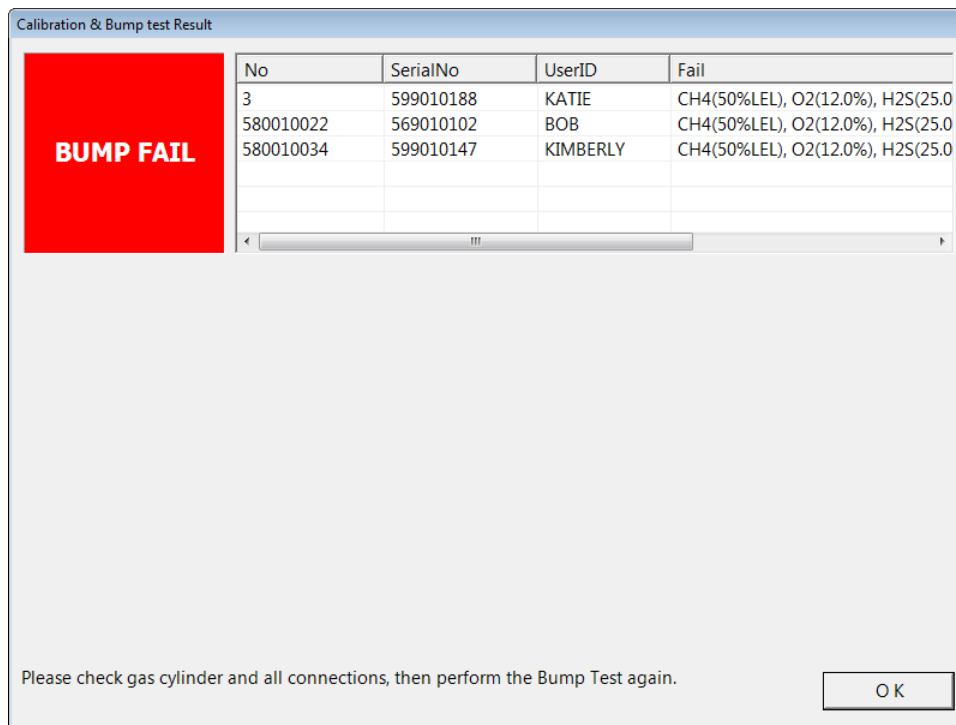
- If the bump test passes, the following window will open indicating that. Click **OK** to return to the main program window.



**Figure 5-14: Bump Test Passed**

- After a successful bump test, the GM460 will automatically be shut off in the time period defined by the **Power Off After Pass** parameter in the CS460 window.

- If the bump test fails and the **Auto Calibration** box in the CS460 window was not selected, the following window will open indicating which channels failed the bump test. Click **OK** to return to the main program window or double-click the instrument information line to view the bump test results in the **Logs** window.



**Figure 5-15: Bump Test Failed**

- If the bump test fails and the **Auto Calibration** box in the CS460 window was selected, the CS460 automatically performs a calibration immediately after the failed bump test. The results screen will indicate the results of both the bump test and calibration. Click **OK** to return to the main program window or double-click an instrument information line to view the bump test or calibration results in the **Logs** window.

BUMP FAIL

No	SerialNo	UserID	Fail
3	599010188	KATIE	CH4(50%LEL), O2(12.0%), H2S(25.0
580010022	569010102	BOB	CH4(50%LEL), O2(12.0%), H2S(25.0
580010034	599010147	KIMBERLY	CH4(50%LEL), O2(12.0%), H2S(25.0

CAL. FAIL

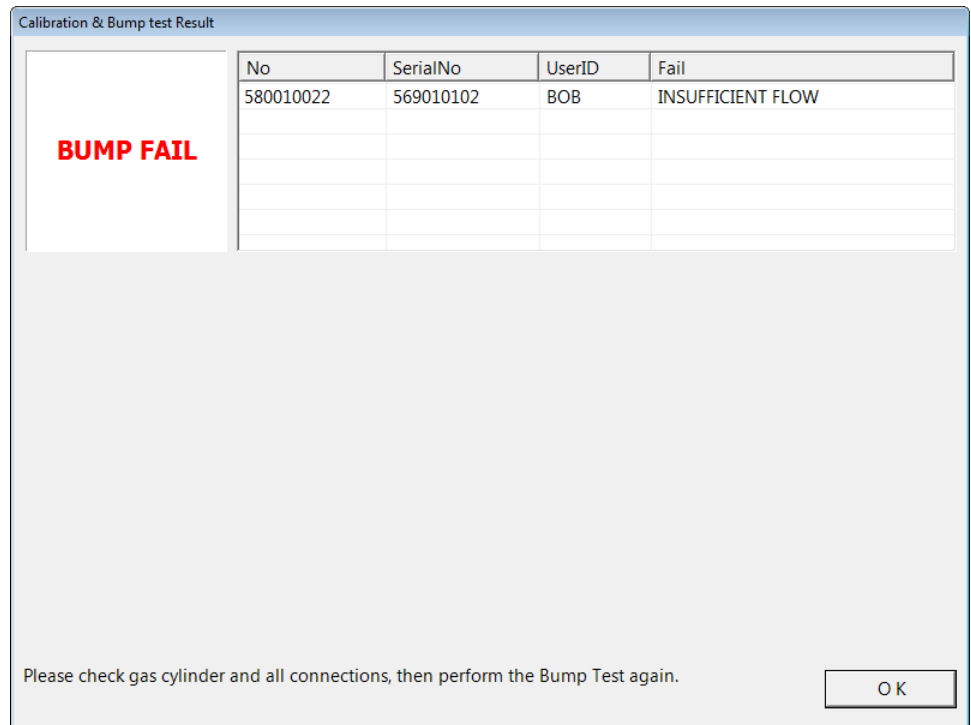
No	SerialNo	UserID	Fail
3	599010188	KATIE	CH4(50%LEL), O2(12.0%), H2S(25.0
580010022	569010102	BOB	CH4(50%LEL), O2(12.0%), H2S(25.0
580010034	599010147	KIMBERLY	CH4(50%LEL), O2(12.0%), H2S(25.0

Please check gas cylinder and all connections, then perform the Calibration again.

OK

**Figure 5-16: Bump Test Failed/Calibration Failed**

- If at any point during the bump test the flow rate to the GM460 becomes too low, the PC Controller Program will abort the bump test and display a failed bump test screen. Click **OK** to return to the main program window or double-click the instrument information line to view the bump test results in the **Logs** window. Confirm all tubing connections are correct and that all lines are clear.



**Figure 5-17: Low Flow Bump Test Failure**

14. For all bump test result outcomes, the GM460s will be displayed in the main program window in **Details View**. To return the main program window to **Icons View**, click the **Icons** radio button.
15. All bump test results can be viewed in the **Logs** window. See ["Bump Test Data" in Chapter 6](#) for instructions for viewing bump test data.

# Performing a Calibration

The PC Controller Program is capable of performing a calibration both manually and automatically on a GM460. When a calibration is performed, the PC Controller Program performs an air adjust operation on a GM460 and then applies calibration gas to the GM460. The PC Controller Program analyzes the calibration results and determines if the GM460 passed the calibration.

## Note

Chlorine ( $\text{Cl}_2$ ) channels **cannot** be bump tested or calibrated using the CS460. If your instrument has a chlorine channel, you may test all other channels using the CS460 but must test the chlorine channel separately, using the GM460's Calibration Mode.

To manually calibrate one or more GM460s:

1. Establish a connection between the CS460, GM460 and the PC Controller Program as described in ["Connecting GM460s to the PC Controller Program" \(in this chapter\)](#).
2. Verify that all of the calibration parameters are set correctly. See ["Setting Parameters in the CS460 Window" in Chapter 4](#) for instructions.
3. Verify that the appropriate calibration gas cylinders are connected to the gas fittings on the left-side of the CS460 or to the gas fittings on the SV-3. See ["Connecting Calibration Gas \(No SV-3 attached\)"](#) or ["Connecting Calibration Gas, SV-3 Attached"](#) in Chapter 3 for calibration gas cylinder options and calibration gas connection procedures.
4. Confirm that the appropriate filters are connected to the **AIR** inlet fitting (if necessary) as shown below.

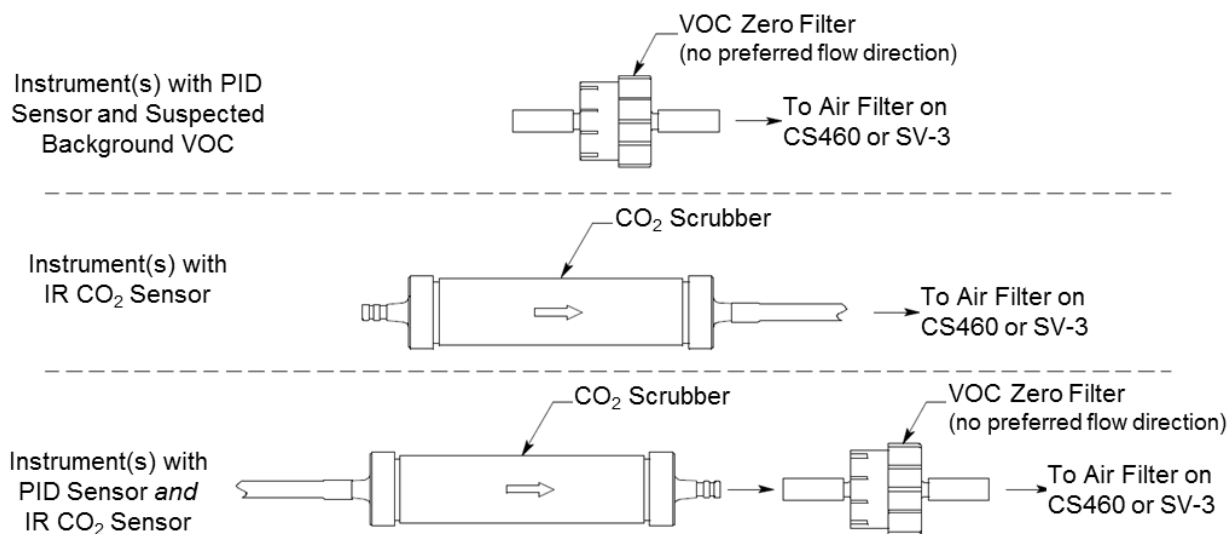


Figure 5-18: Air Inlet Filters

5. Select the GM460(s) you want to calibrate and click on them to highlight them as shown below. To select more than one GM460 for calibration, hold down the **Control** button on the keyboard as you click them. You can also hold down the **Shift** button while you click the first and last instruments in the series of instruments you want to calibrate.

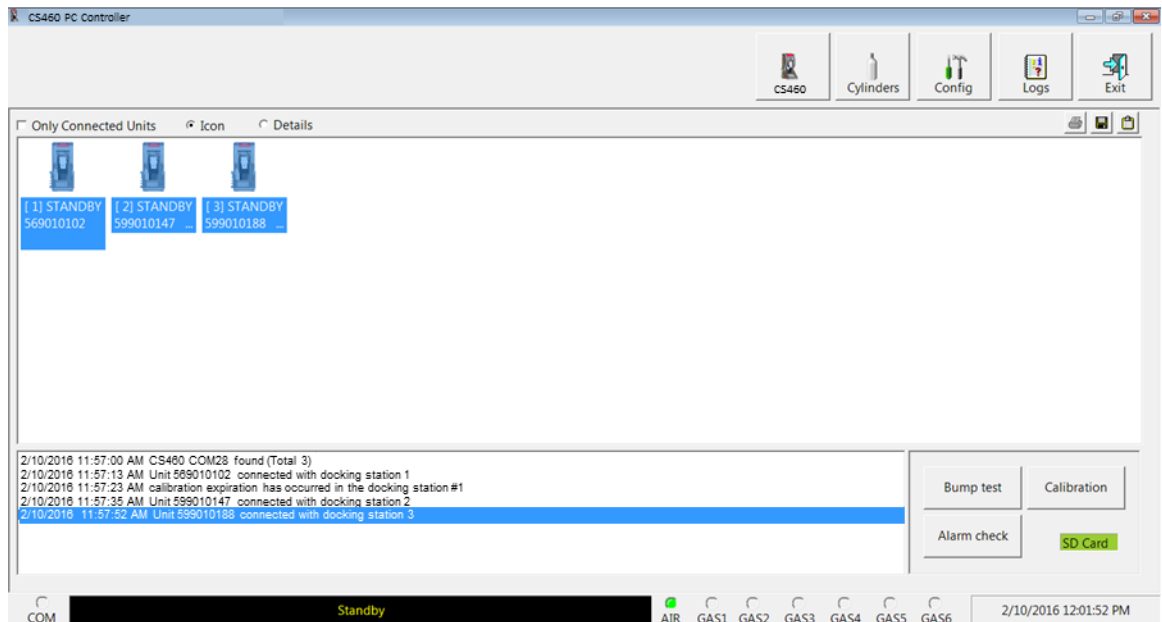
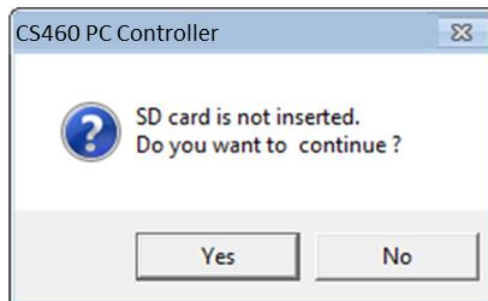


Figure 5-19: Instrument Selection

6. Click the **Calibration** button in the lower-right corner of the main program window.
7. If an SD card is not inserted in the CS460, a warning will appear. Results for testing done without an SD card inserted will only be saved to the PC Controller Program and will not be saved anywhere else. Click **Yes** to proceed without the SD card inserted or **No** to return to the main window.



8. You will be asked to confirm what instruments you want to calibrate and what gases you would like to include in the calibration. Select or deselect instruments and gases as appropriate for the calibration you would like to perform. The example below shows three instruments:

- 4-gas + high range PID + HCN
- 4-gas + NO<sub>2</sub>
- 4-gas + SO<sub>2</sub>

All instruments and gases are selected. Deselecting the HCN (**GAS 2**), NO<sub>2</sub> (**GAS 3**), and SO<sub>2</sub> (**GAS 4**) gases would cause a calibration to be performed on the standard four sensors in all three instruments along with the high range PID sensor in the first instrument.

The screenshot shows a window titled "Gas Mapping" with a table containing instrument configurations. The table has columns for "Select", "Serial No", "GAS1", "GAS2", "GAS3", and "GAS4". The first four rows show gas types (CH4, O2, H2S, CO, VOC) with checkboxes in the GAS1-GAS4 columns. The next three rows show specific instrument serial numbers (569010102, 599010147, 599010188) with their respective gas selections.

Select	Serial No	GAS1	GAS2	GAS3	GAS4
<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
		CH4(50%LEL)	HCN(10ppm)	NO2(5ppm)	SO2(5ppm)
		O2(12%)			
		H2S(25ppm)			
		CO(50ppm)			
		VOC(100ppm)			
<input checked="" type="checkbox"/>	569010102	CH4/O2/H2S/CO/VOC	HCN		
<input checked="" type="checkbox"/>	599010147	CH4/O2/H2S/CO		NO2	
<input checked="" type="checkbox"/>	599010188	CH4/O2/H2S/CO			SO2

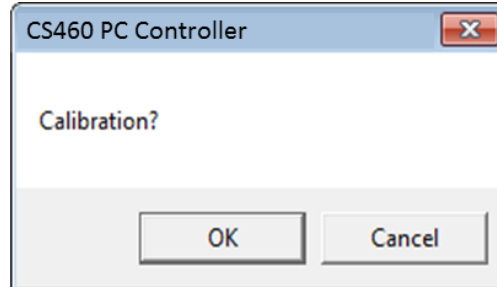
At the bottom right of the window are "OK" and "Cancel" buttons.

**Figure 5-20: Instrument/Gas Confirmation Screen**

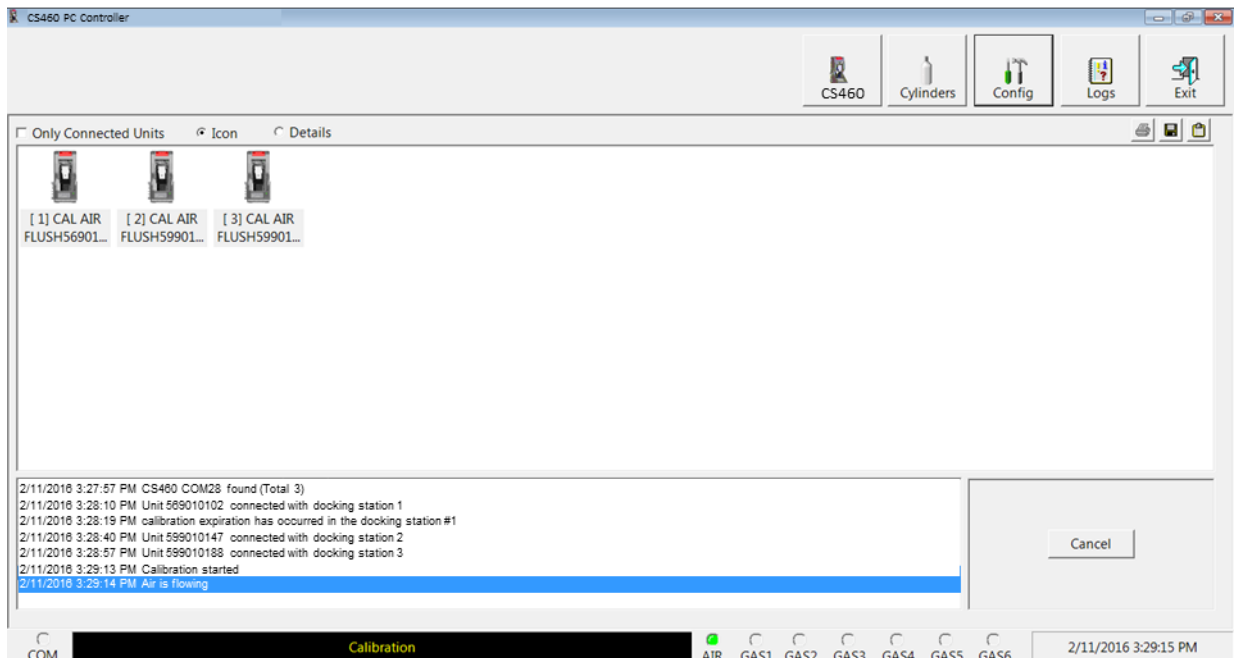
#### Note

Selecting or deselecting a gas cylinder in this window also selects or deselects that cylinder's **Active** selection box in the **Cylinders** window. The setting will remain in place until you change it.

9. When all of the desired channels are selected, click **OK** to proceed with the calibration or click **Cancel** to abort the calibration.
10. You will be asked if you want to calibrate the GM460(s). Click **OK** to proceed with the calibration or click **Cancel** to return to the main program window.



11. The instrument pumps will start and the program will indicate that air is flowing. The **AIR** indicator on the program screen will be solid green and air will be applied to the GM460(s) for the time defined by the **AIR Flush** calibration parameter in the CS460 window.

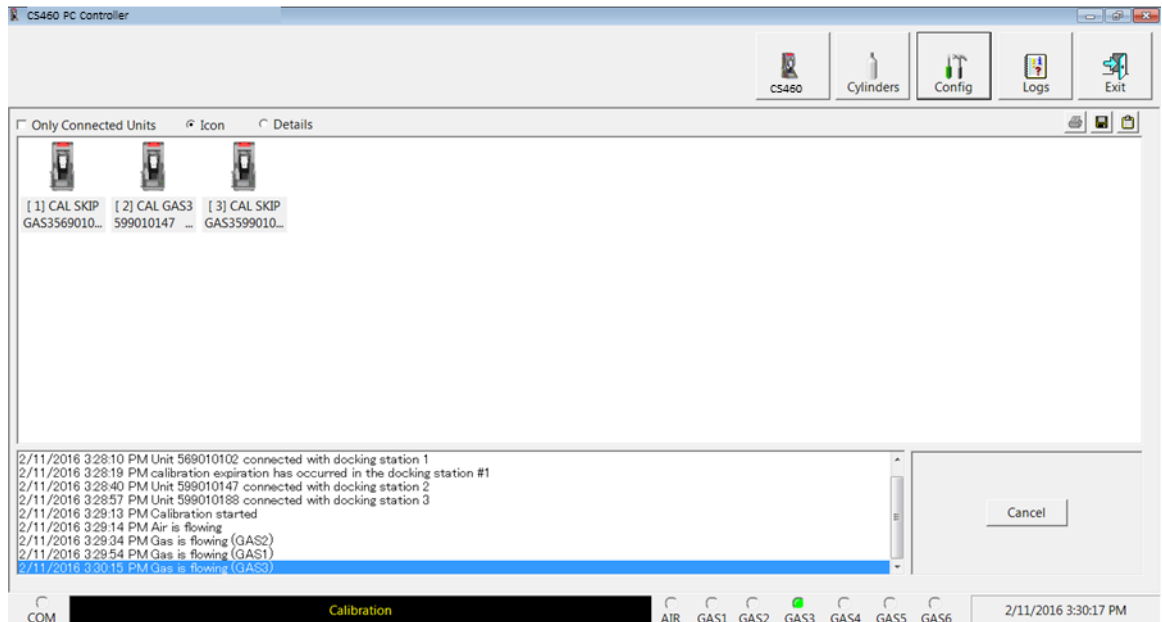


**Figure 5-21: Air Flowing**

The PC Controller Program will analyze the zero adjustment results. If any sensors failed the zero adjustment, the calibration for that instrument will be aborted.

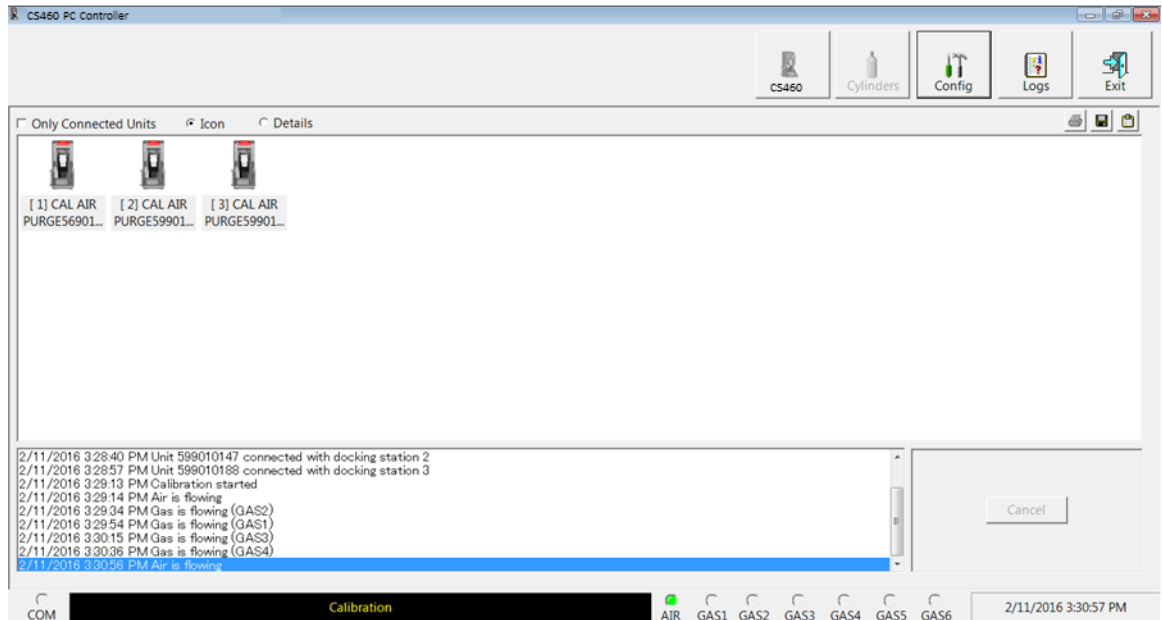


12. The CS460 will then apply calibration gas in the order of the instrument's sensors for the length of time defined in the **GAS** calibration parameter. For example, to calibrate a four-gas + low range PID instrument, gas will be applied to the four-gas sensors and then gas will be applied to the low range PID sensor regardless of what CS460 inlet fitting those gas cylinders are assigned to. The only exception is that HCN will always be applied before any other gas. The CS460 will analyze the results after the end of each gas application.



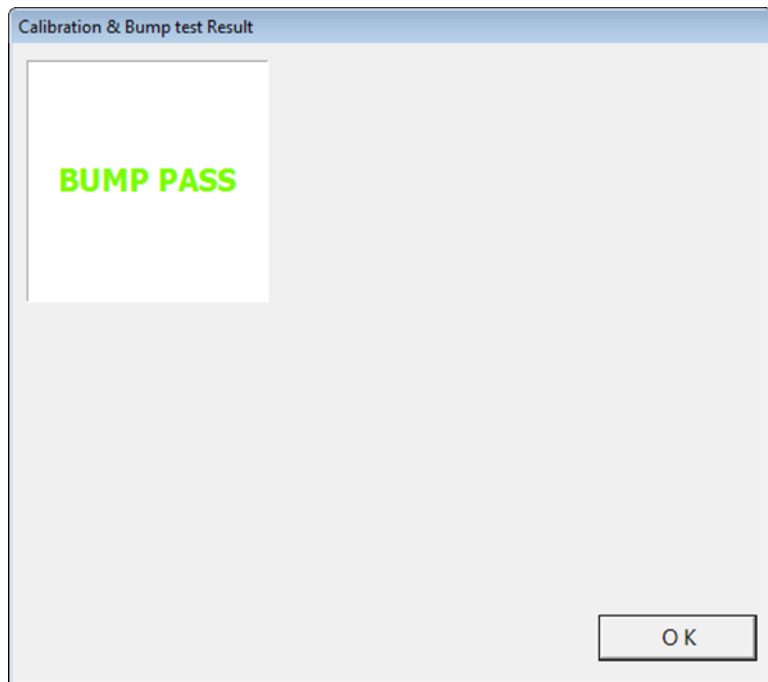
**Figure 5-22: Calibration Gas Flowing**

13. After calibration gas is applied, the docking station will purge with fresh air for the time defined by the **AIR Purge** calibration parameter in the CS460 window.



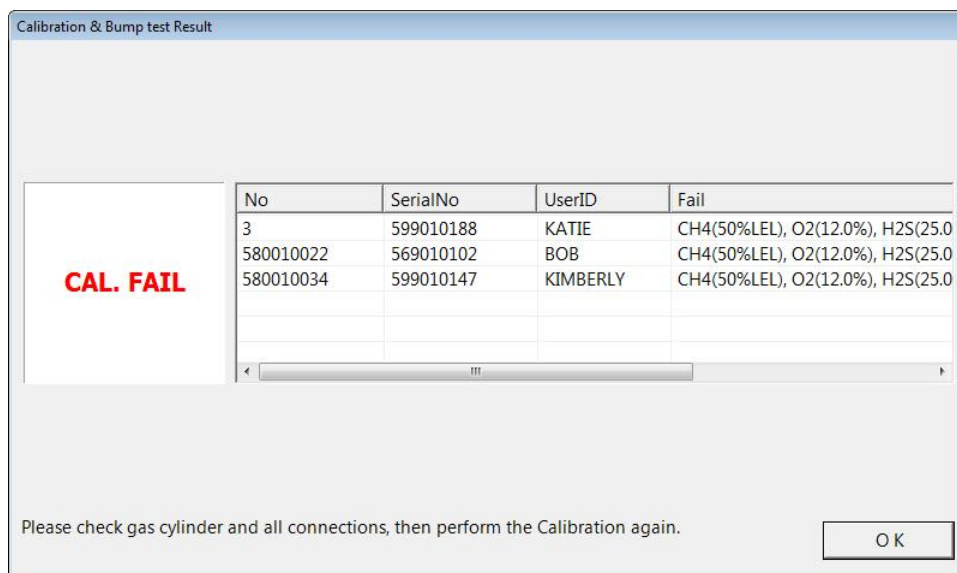
**Figure 5-23: Fresh Air Purge**

14. After the fresh air purge is complete,
- If the calibration passes, the following window will open indicating that. Click **OK** to return to the main program window.



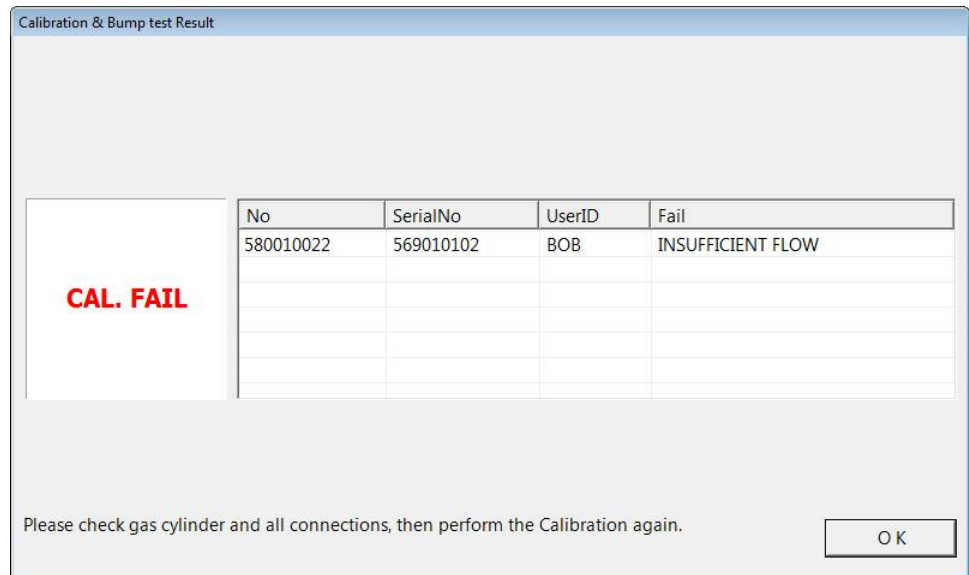
**Figure 5-24: Calibration Passed**

- After a successful calibration, the GM460 will automatically be shut off in the time period defined by the **Power Off After Pass** parameter in the CS460 window.
- If the calibration fails, the following window will open indicating which channels failed to calibrate. Click **OK** to return to the main program window or double-click the instrument information line to view the calibration results in the **Logs** window.



**Figure 5-25: Calibration Failed**

- If at any point during the calibration the flow rate to the GM460 becomes too low, the PC Controller Program will abort the calibration and display a failed calibration screen. Click **OK** to return to the main program window or double-click the instrument information line to view the calibration results in the **Logs** window. Confirm all tubing connections are correct and that all lines are clear.



**Figure 5-26: Low Flow Calibration Failure**

15. For all calibration result outcomes, the GM460(s) will be displayed in the main program window in **Details View**. To return to **Icons View**, click the **Icons** radio button.
16. All calibration results can be viewed in the **Logs** window. See ["Calibration Data" in Chapter 6](#) for instructions for viewing calibration data.

# Performing an Alarm Check

The PC Controller Program is capable of performing an alarm check both manually and automatically on a GM460. When an alarm check is performed, the PC Controller Program checks the operation of the instrument's vibrator, LEDs, and buzzer. The PC Controller Program analyzes the alarm check results and determines if the GM460 passed the alarm check.

To manually alarm check one or more GM460s:

1. Establish a connection between the CS460, GM460 and the PC Controller Program as described in ["Connecting GM460s to the PC Controller Program" \(in this chapter\)](#).
2. Select the GM460(s) you want to alarm check and click on them to highlight them as shown below. To select more than one GM460 for alarm checking, hold down the **Control** button on the keyboard as you click them. You can also hold down the **Shift** button while you click the first and last instruments in the series of instruments you want to alarm check.

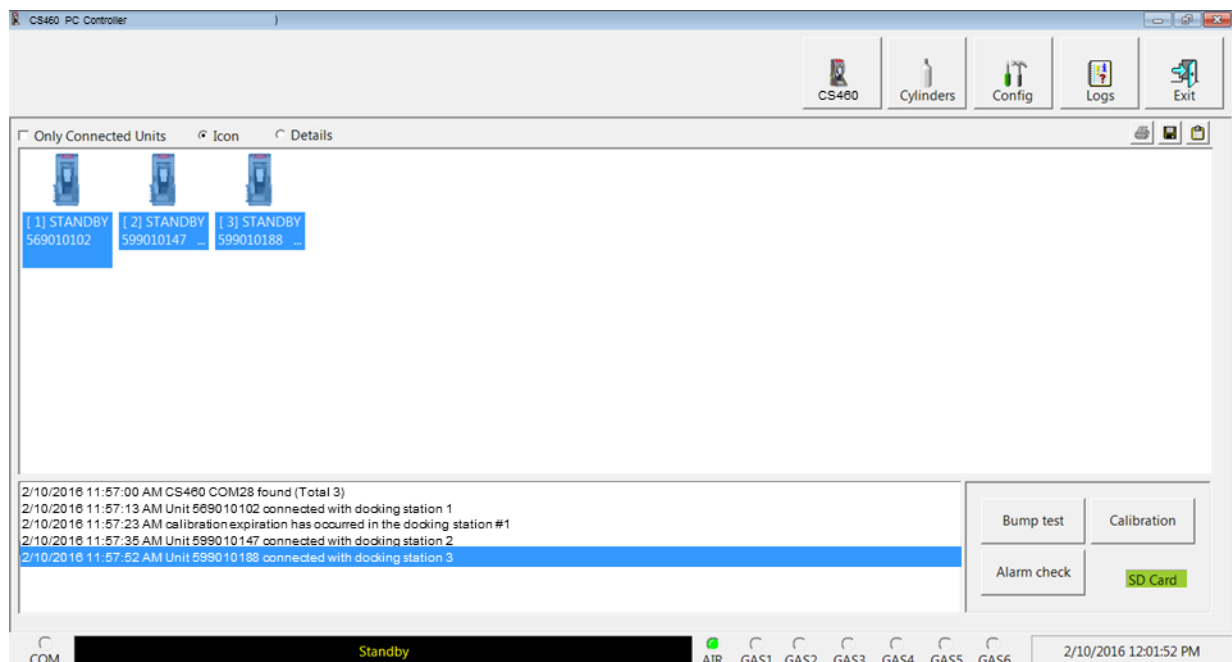
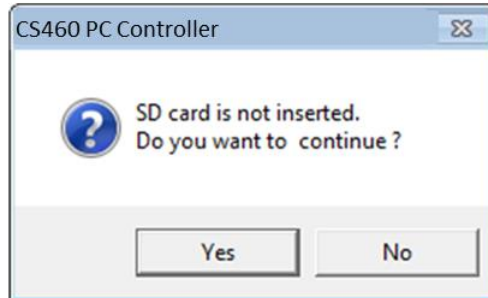


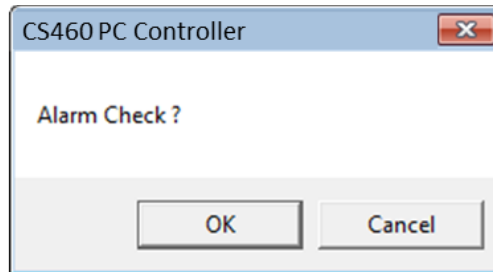
Figure 5-27: Instrument Selection

3. Click the **Alarm Check** button in the lower-right corner of the main program window.

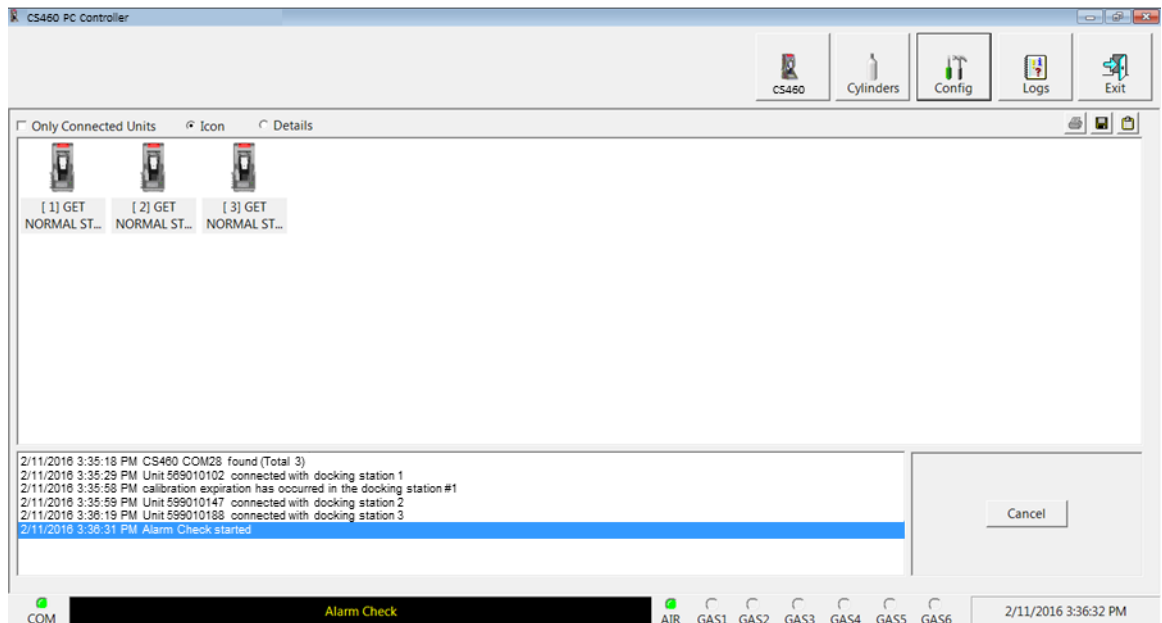
4. If an SD card is not inserted in the CS460, a warning will appear. Results for testing done without an SD card inserted will only be saved to the PC Controller Program and will not be saved anywhere else. Click **Yes** to proceed without the SD card inserted or **No** to return to the main window.



5. You will be asked if you want to alarm check the GM460(s). Click **OK** to proceed with the alarm check or click **Cancel** to return to the main program window.

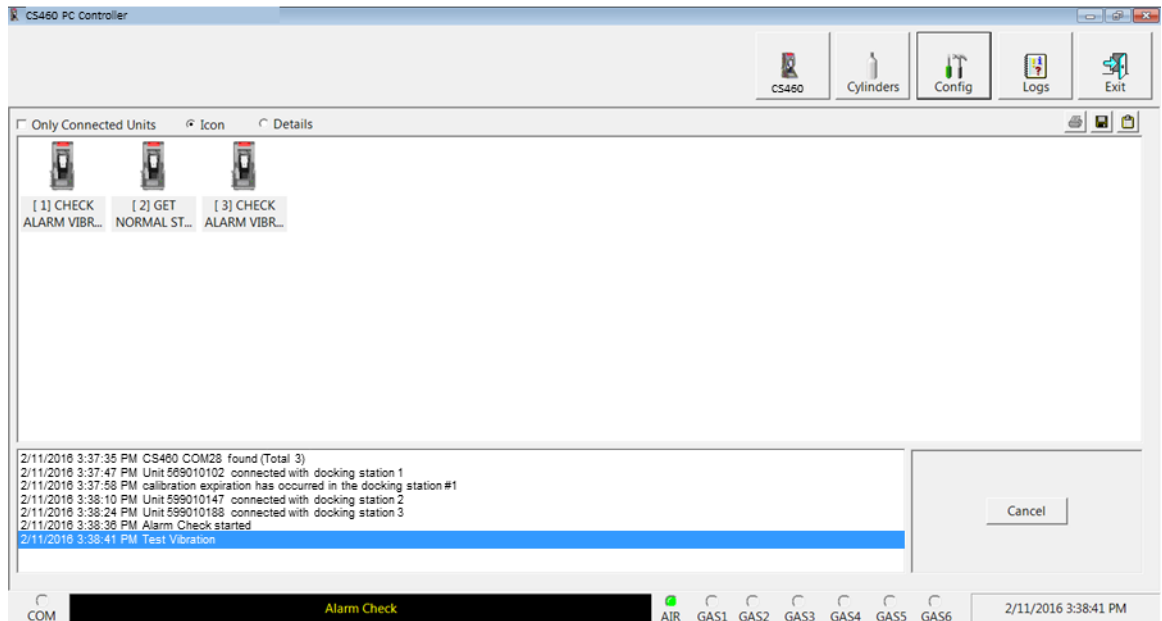


6. The alarm check will begin and the program will determine the instrument's normal state as a baseline.



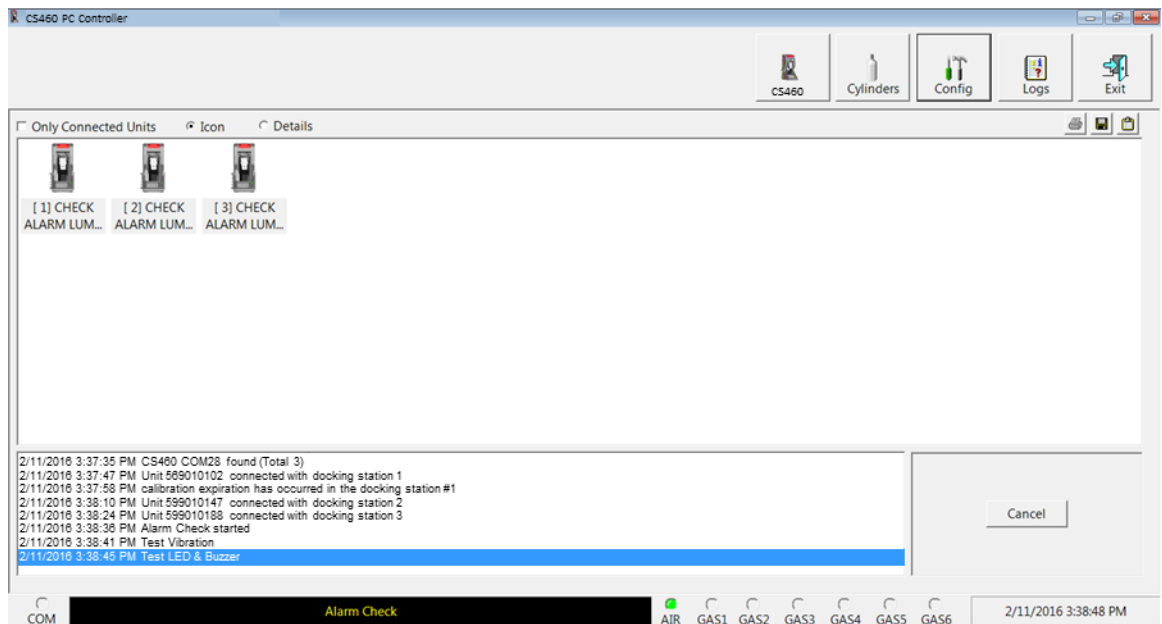
**Figure 5-28: Normal State**

7. The instrument's vibrator will be checked.



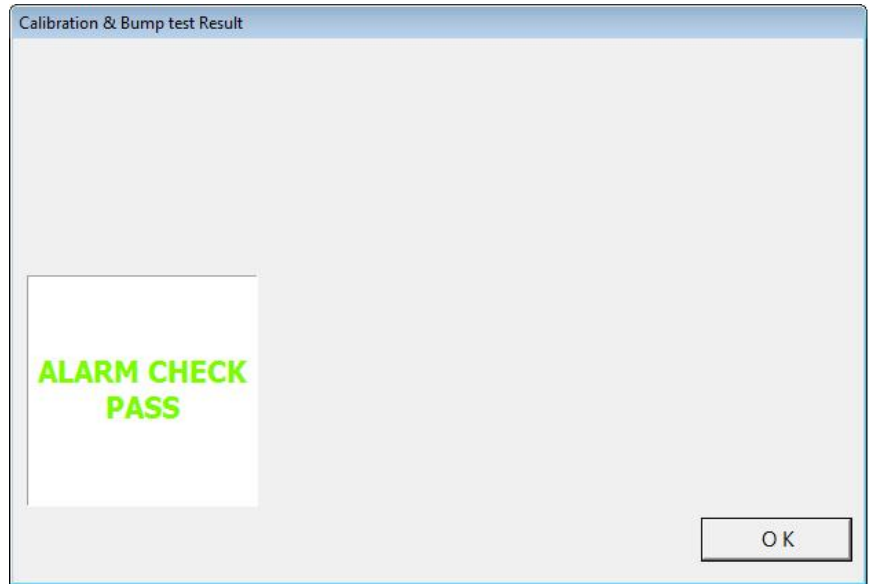
**Figure 5-29: Vibrator Check**

8. The instrument's LEDs and buzzer will be checked.



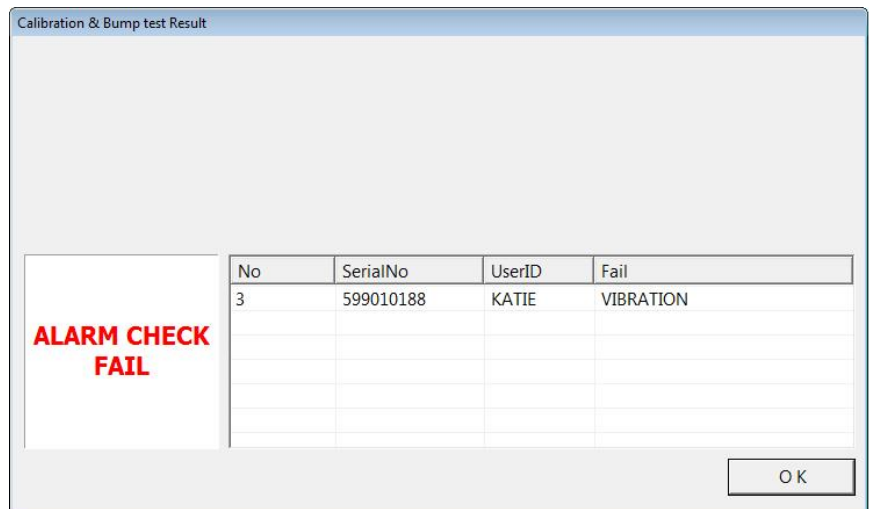
**Figure 5-30: LED and Buzzer Check**

9. After the LED and buzzer have been tested,
- If the alarm check passes, the following window will open indicating that. Click **OK** to return to the main program window.



**Figure 5-31: Alarm Check Passed**

- After a successful alarm check, the GM460 will automatically be shut off in the time period defined by the **Power Off After Pass** parameter in the CS460 window.
- If the alarm check fails, the following window will open indicating which operation failed. Click **OK** to return to the main program window or double-click the instrument information line to view the alarm check results in the **Logs** window.



**Figure 5-32: Alarm Check Failed**



10. For all alarm check result outcomes, the GM460(s) will be displayed in the main program window in **Details View**. To return to **Icons View**, click the **Icons** radio button.
11. All alarm check results can be viewed in the **Logs** window. See ["Alarm Check Data" in Chapter 6](#) for instructions for viewing alarm check data.

## Troubleshooting

### Note

This troubleshooting section describes CS460 problems only. See the GM460 Operator's Manual for problems you may encounter with the GM460.

**Table 5-2: Troubleshooting the CS460**

Symptoms	Probable Causes	Recommended Action
Fresh air adjustment fails	<ul style="list-style-type: none"> <li>• The CS460 is not in a fresh air environment or the cylinder connected to the <b>AIR</b> fitting is not a zero air cylinder.</li> <li>• If a zero air cylinder is used, the calibration cylinder is out of gas.</li> <li>• If a zero air cylinder is used, the red gas in/gas out cover is not pushed down and engaged with the GM460.</li> <li>• If a PID or IR CO<sub>2</sub> sensor is installed in the instrument, appropriate filters are not being used.</li> </ul>	<ol style="list-style-type: none"> <li>1. Confirm that the CS460 is in a fresh air environment or that a zero air cylinder is attached to the <b>AIR</b> fitting.</li> <li>2. If a zero air cylinder is used, verify that it contains an adequate supply of test sample.</li> <li>3. Check to make sure the red gas in/gas out cover is pushed down and engaged with the GM460.</li> <li>4. If a zero air cylinder is used, check all calibration tubing for leaks or for any bad connections.</li> <li>5. If a PID or IR CO<sub>2</sub> sensor is installed, confirm that all necessary filters are installed according to Figure 3-5.</li> <li>6. If the fail condition continues, replace the sensor(s) in the GM460.</li> <li>7. If the difficulties continue, contact TSI Incorporated for further instruction.</li> </ol>

Symptoms	Probable Causes	Recommended Action
Calibration fails	<ul style="list-style-type: none"> <li>• The auto calibration values do not match the cylinder gas concentrations.</li> <li>• The calibration cylinder is out of gas or is outdated.</li> <li>• The calibration cylinder is not connected to the appropriate gas inlet fitting.</li> <li>• The red gas in/gas out cover is not pushed down and engaged with the GM460.</li> <li>• The tubing from the regulator to the gas inlet fitting is not connected.</li> </ul>	<ol style="list-style-type: none"> <li>1. Confirm that the auto calibration values match the concentrations listed on the gas cylinder.</li> <li>2. Verify that the calibration cylinder contains an adequate supply of fresh test sample.</li> <li>3. Verify that the calibration cylinder is connected to the appropriate gas inlet fitting.</li> <li>4. Check to make sure the red gas in/gas out cover is pushed down and engaged with the GM460.</li> <li>5. Check all calibration tubing for leaks or for any bad connections.</li> <li>6. If the fail condition continues, replace the sensor(s) in the GM460.</li> <li>7. If the difficulties continue, contact TSI Incorporated for further instruction.</li> </ol>
No connection between GM460 and PC Controller Program	<ul style="list-style-type: none"> <li>• CS460 is not turned on.</li> <li>• The GM460 is not correctly inserted into the instrument cradle.</li> <li>• The IR window is dirty.</li> <li>• The USB cable is not properly plugged into the CS460 or the PC.</li> </ul>	<ol style="list-style-type: none"> <li>1. Turn on the CS460. If it does not turn on, check that the AC adapter is plugged into an AC socket and to the jack on the left side of the CS460.</li> <li>2. Check to make sure the GM460 is inserted properly.</li> <li>3. Clean the IR window on the CS460 and GM460.</li> <li>4. Check to make sure the USB cable is plugged into the left side of the CS460 and to a USB port on your PC.</li> <li>5. If the difficulties continue, contact TSI Incorporated for further instruction.</li> </ol>
The Li-ion battery pack in the GM460 is not charging	<ul style="list-style-type: none"> <li>• The GM460 has an alkaline battery pack installed.</li> <li>• The Li-ion battery pack is faulty.</li> <li>• The GM460 is not fully inserted in the instrument cradle.</li> <li>• The charger is malfunctioning.</li> </ul>	<ol style="list-style-type: none"> <li>1. Check to make sure your GM460 does not have an alkaline battery pack installed.</li> <li>2. Replace the Li-ion battery pack and attempt to charge it.</li> <li>3. Be sure that the GM460 is fully inserted in the instrument cradle.</li> <li>4. If the difficulties continue, contact TSI Incorporated for further instruction.</li> </ol>
The message window indicates that a GM460 has a cap error	<ul style="list-style-type: none"> <li>• The red gas in/gas out cover is not pushed down and engaged with the GM460.</li> </ul>	<ol style="list-style-type: none"> <li>1. Check to make sure the red gas in/gas out cover is pushed down and engaged with the GM460.</li> </ol>

Symptoms	Probable Causes	Recommended Action
The message window indicates that a GM460's inlet is not set	<ul style="list-style-type: none"> <li>The gas inlets are not set appropriately for the installed GM460.</li> </ul>	<ol style="list-style-type: none"> <li>Check to make sure that all gases in the GM460 have a corresponding inlet setting in the <b>Cylinders</b> window.</li> <li>Be sure that all appropriate inlets are selected as <b>Active</b> in the <b>Cylinders</b> window.</li> </ol>

## Charging a GM460 in a CS460

The CS460 can be used to charge the rechargeable batteries in a GM460. To maximize the GM460's run time and the battery life, make sure the batteries' charge is as low as possible before recharging them.

### Recharging a Battery Pack after Performing a Test

To recharge the battery pack in a GM460 after performing a bump test or calibration:

- Perform a bump test, calibration, or alarm check on a GM460 as described in ["Performing a Bump Test"](#) or ["Performing an Alarm Check"](#) in this chapter.
- After the bump test, calibration, or alarm check has been completed, turn off the GM460(s) by selecting the GM460(s), right-clicking on them, and selecting **Power Off**. The **Detector Off** button on the CS460's touch screen can also be used to turn off the GM460. If the bump test, calibration, or alarm check was successful, the docking station will automatically turn the GM460(s) off in the time period defined by the **Power Off After Pass** parameter in the CS460 window. The docking station will also turn the GM460(s) off if there is no activity for the time period defined by **Auto Power Off** in the CS460 window.
- Before the GM460 is turned off, the Status LED will be blinking green. Once the GM460 is turned off, the Status LED will blink orange if the GM460 needs to be charged. The Status LED will be solid orange if the GM460 is already fully charged.

#### Note

The CS460 does not start charging the batteries until the GM460 is off.

- If the battery pack is drained enough for the docking station to charge it, the Status LED will continue to blink orange while charging is taking place. The CS460 will take approximately three hours to charge a fully discharged GM460.

If you are attempting to charge an alkaline battery pack, the Status LED will be solid green and no charging will occur.

If the charging process encounters a fail condition, the Status LED will turn steadily red. A fail condition could indicate that there is something wrong with the Li-ion battery pack, or that there is something wrong with the charger.

5. When the charge is complete, the Status LED will turn solid orange.

## **Recharging a Battery Pack without Performing Any Operations**

To recharge the batteries in a GM460 without performing any other operations:

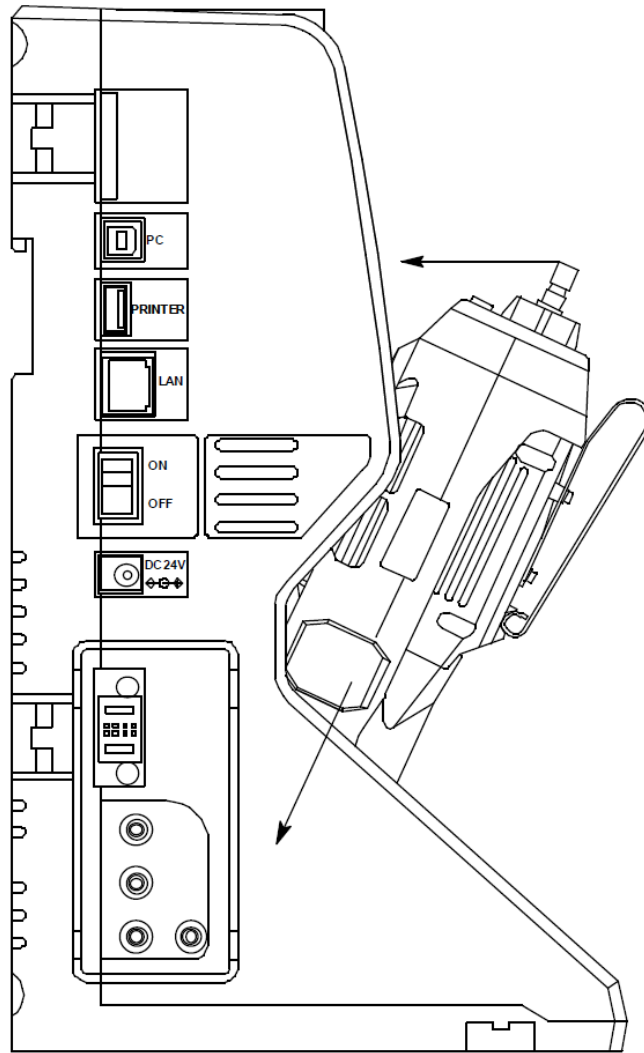
1. Confirm that the AC adapter is connected to an AC wall socket and that the power jack is plugged into the left side of the CS460. If multiple CS460s are connected together, only the left-most CS460 should be connected to power.
2. Flip the CS460's power switch so that it is in the **ON** position. If you have multiple CS460s connected together, only the power switch of the left-most CS460 needs to be flipped.
3. The CS460's Status LED will be solid green if it is operating properly or solid red if there is a system failure.
4. Install a GM460 in the instrument cradle (see Figure 5-33). Orient the GM460 so the belt clip is facing away from the CS460. Set the bottom of the GM460 in the bottom of the instrument cradle and push the top of the GM460 toward the CS460.
5. If the battery pack is fully charged, the Status LED will be solid orange.

If the battery pack is drained enough for the CS460 to charge it, the Status LED will blink orange while charging is taking place. The CS460 will take approximately three hours to charge a fully discharged GM460.

If you are attempting to charge an alkaline battery pack, the Status LED will be solid green and no charging will occur.

If the charging process encounters a fail condition, the Status LED will turn steadily red. A fail condition could indicate that there is something wrong with the Li-ion battery pack, or that there is something wrong with the charger.

6. When the charge is complete, the Status LED will turn solid orange.



**Figure 5-33: Inserting the GM460**

## Batteries Too Drained for PC Controlled Operation

If the batteries in the GM460 do not have enough power to keep the GM460 on during operations with the CS460, the GM460 will turn off and the CS460 will go into a 5-minute charge cycle and indicate it is charging the instrument. The following screen occurs on a single-station system. The screens on a multi-station system will be similar.

The screenshot shows a software interface for a docking station. At the top, a status bar indicates 'Charging 4:59'. Below this is a table displaying gas concentrations for four different gases. The table has three columns: the gas name, its concentration and unit, and the gas type. Below the table are two dashed lines. At the bottom of the interface are three buttons: 'Detector Off', 'Auto Bump' (which includes an unchecked checkbox), and 'Download'.

Gas	Concentration	Unit	Gas Type
CH4	50	%LEL	GAS1
O2	12.0	%	GAS1
H2S	25.0	ppm	GAS1
CO	50	ppm	GAS1

-----

-----

Detector Off   ☐ Auto Bump   Download

The GM460 will not connect to the CS460. The GM460 cannot be bump tested, calibrated, or alarm checked in the charge cycle. Once the 5-minute charge cycle has ended, the GM460 will automatically turn back on and connect to the CS460. The GM460 can now be bump tested, calibrated, or alarm checked.

## CHAPTER 6

# Viewing Data in the Logs Window

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## Logs Button Overview

The **Logs** window contains saved data from GM460s in addition to records of bump tests, calibrations, and alarm checks performed while the GM460 is connected to the PC Controller Program. If you perform a complete download by right-clicking a selected GM460 and clicking **Download Logs** or if you import downloaded log data using the **SD Import** or **Net Import** buttons, the **Logs** window will contain alarm trend data, calibration data, event data, interval trend data, memo data, bump test data, normal operation snap log data, and leak check snap log data. If you do not perform a complete download and do not import downloaded log data, the **Logs** window will only have memo files and files for any bump tests, calibrations, or alarm checks completed while the GM460 was connected to the PC Controller Program or bump test, calibration, and alarm check files that are imported using the **SD Import** or **Net Import** buttons.

The use of the **SD Import** or **Net Import** buttons applies to using the CS460 in Standalone Mode and is described in the CS460 Standalone Mode Operator's Manual.

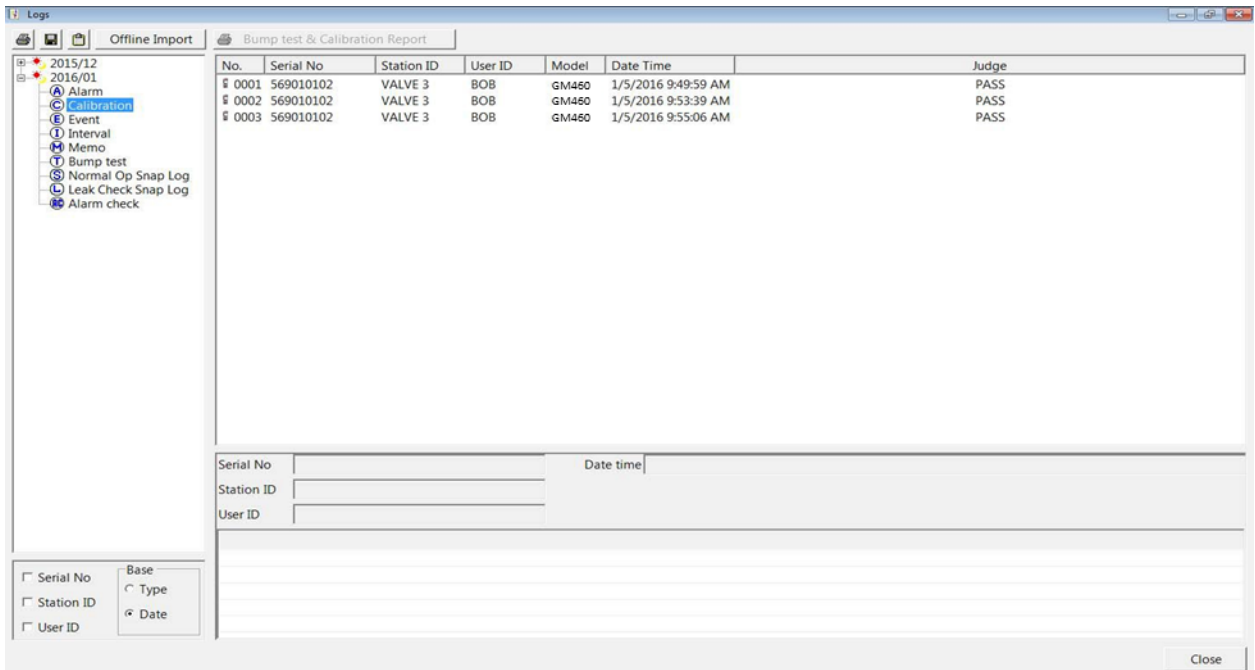
The **Logs** window is divided into four frames. The upper-left frame is the **Data Frame** and displays all the data folders. If no data has been saved then no folders will appear in the **Data Frame**.

The upper-right frame shows the contents of a data folder that is selected in the **Data Frame**. If applicable, the lower-right frame shows the summary information for a data file that is selected in the upper-right frame. Not all types of data files have summary information to display.

The lower-left frame contains three selection boxes for organizing data. When viewing the data, it can be organized in two ways as described below.

## Base View Format

If you do not select **Serial No**, **Station ID**, or **User ID**, the **Base View** box appears next to the selection boxes. The data can be organized by either data type or by the year and month of the saved data.

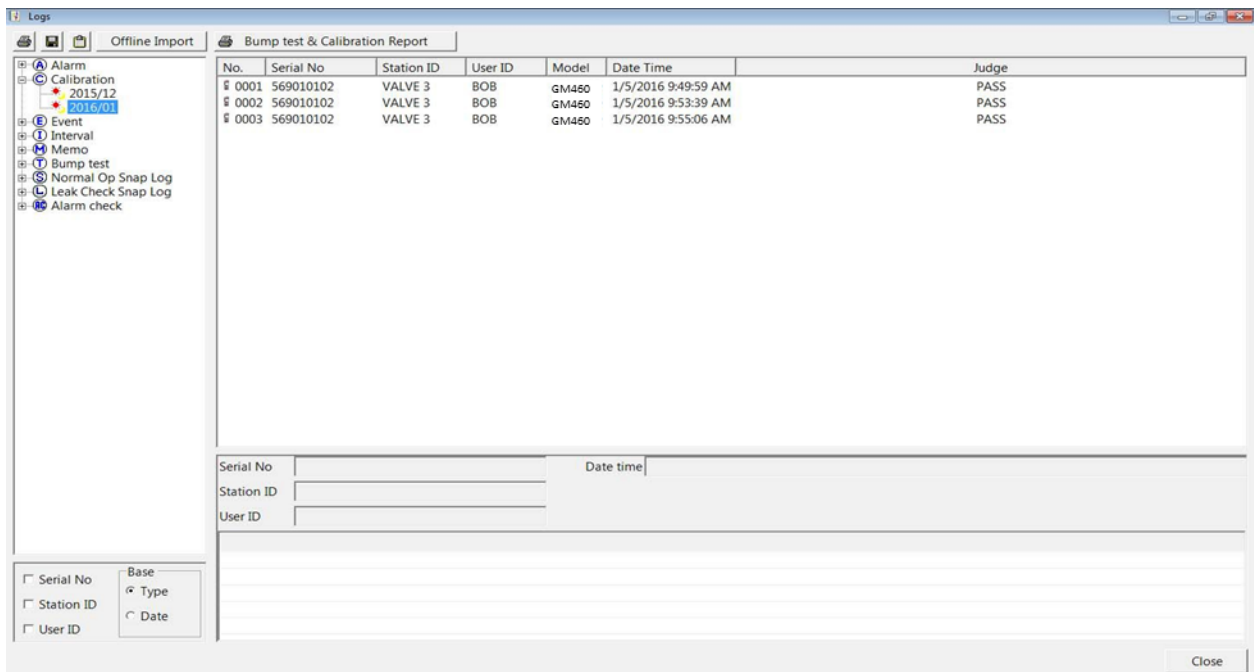


**Figure 6-1: Logs Window in Base View Format, Date**

To view data in the Date Base View Format:

1. Select **Date** in the Base view box.
2. Click the expanded view symbol (+) next to a date folder in the Data frame of the **Logs** window or double-click the folder to view the contents below it.
3. Single-click on the data type folder (Alarm, Calibration, etc.). All of the files in that data type folder will appear in the upper-right frame of the **Logs** window.
4. If an item is expanded and you want to close it, click the (-) symbol next to the item or double-click it.





**Figure 6-2: Logs Window in Base View Format, Type**

To view data in the Type Base View Format:

1. Select **Type** in the Base view box.
2. Click the expanded view symbol (+) next to a data type folder (Alarm, Calibration, etc.) in the Data frame of the **Logs** window or double-click the folder to view the contents below it.
3. Single-click on a date folder. The dates are displayed in year/month format. All of the files in that date folder will appear in the upper-right frame of the **Logs** window.
4. If an item is expanded and you want to close it, click the (–) symbol next to the item or double-click it.

## ID View Format

The data may be organized by one or more of the following parameters:

- Serial Number
- Station ID
- User ID

If any of these boxes are selected, the Base view box disappears. Click the selection box or boxes in the lower-left frame to organize the data as desired.

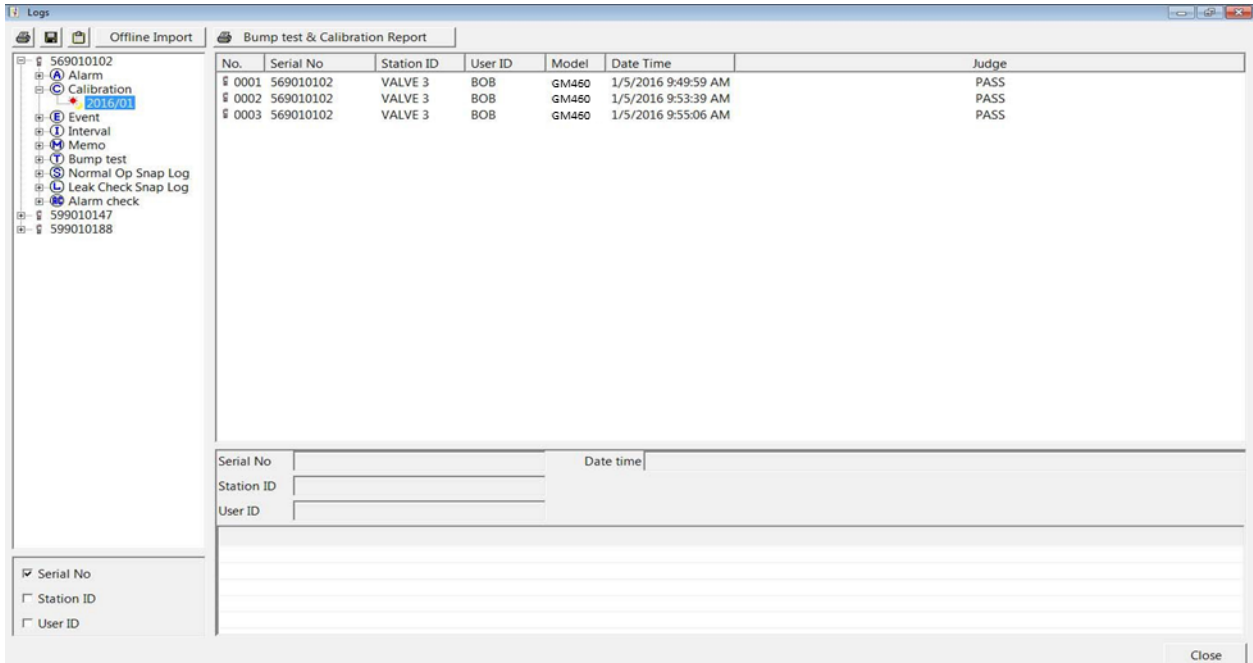


Figure 6-3: Logs Window in ID View Format

To view data in the ID View Format:

1. Select one or more of the ID view choices: **Serial No.**, **Station ID**, or **User ID**.
2. Click the expanded view symbol (+) next to an ID folder (**Serial No.**, **Station ID**, or **User ID**) in the **Data** frame of the **Logs** window or double-click the folder to view the contents below it. Depending on which ID parameters are selected, there may be up to three levels of ID folders.
3. Click the expanded view symbol (+) next to the data type folder (Alarm, Calibration, etc.) you want to view or double-click the folder to view the contents below it.
4. Single-click on a date folder. The dates are displayed in year/month format. All of the files in that date folder will appear in the upper-right frame of the **Logs** window.
5. If an item is expanded and you want to close it, click the (–) symbol next to the item or double-click it.

When viewing data by Serial No., no two GM460s should have the same serial number. However, if two GM460s do have the same serial number and have data for the same year/month, they will be distinguished by their different Station ID or User ID. When viewing data by Station ID or by User ID, if two GM460s have the same Station ID and/or User ID and have data for the same year/month, they will be distinguished by their different serial numbers.

#### Note

In the examples that follow, the data will be shown organized by serial number. If you do not select any of the organization boxes or select the **Station ID** or **User ID** boxes instead of or in addition to the **Serial No.** box, your **Logs** window will look slightly different.

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## Alarm Trend Data

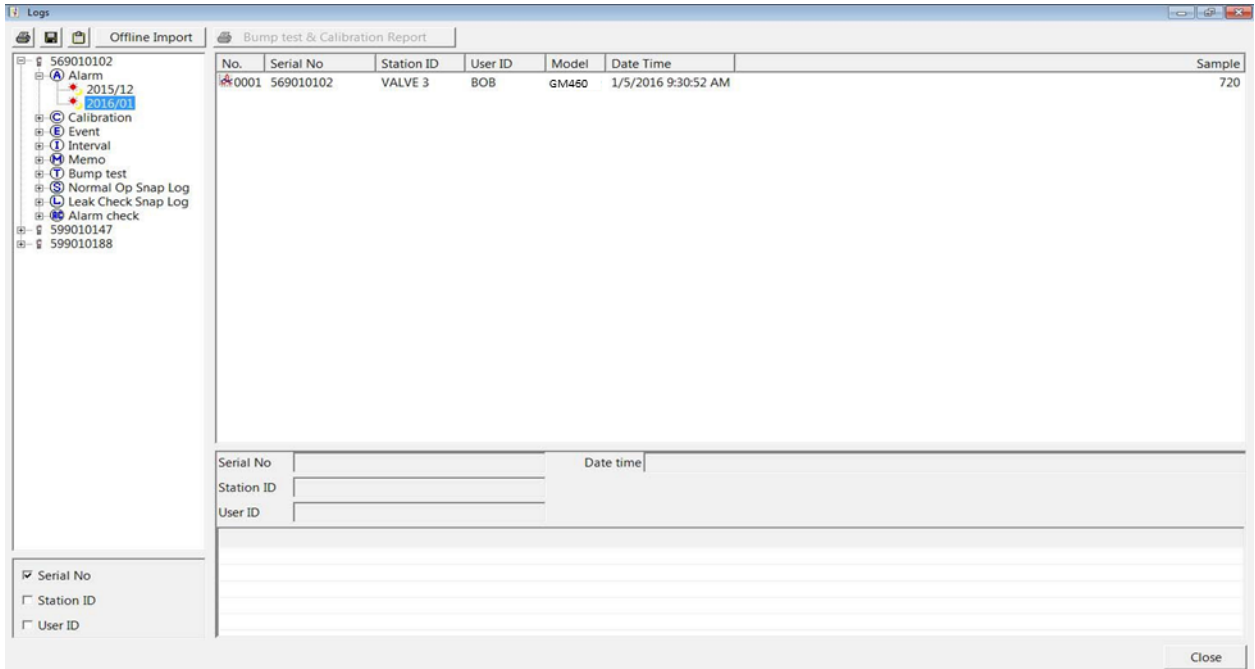
The GM460 saves files that describe the most recent gas alarm events. If a gas alarm event occurs then an alarm trend file that is centered around the event is saved. It shows the readings up to 30 minutes before and 30 minutes after the event, with readings recorded every 5 seconds. The readings that are saved are the peak (minimum for oxygen) readings for the previous 5 seconds. If the GM460 was operating in **Inert Mode** at the time of the alarm, the maximum oxygen readings will be saved. If the GM460 had not been on for the 30 minutes before the alarm event occurred, the data during this time is left blank. If the GM460 is turned off less than 30 minutes after an alarm event occurs, the data file will only have logged data until the GM460 was turned off.

The GM460 saves up to eight alarm trend files. When an alarm event triggers an alarm trend file to be saved, subsequent alarm events must occur 15 minutes after the previous triggering event in order to trigger the saving of another alarm trend file. If eight alarm trend files are already saved in the GM460's memory, the oldest alarm trend file is overwritten when a new alarm trend file is saved.

Alarm trend data is downloaded from a GM460 when a complete download is performed. It can also be imported using the **SD Import** or **Net Import** buttons. To view and perform desired operations with the alarm trend files:

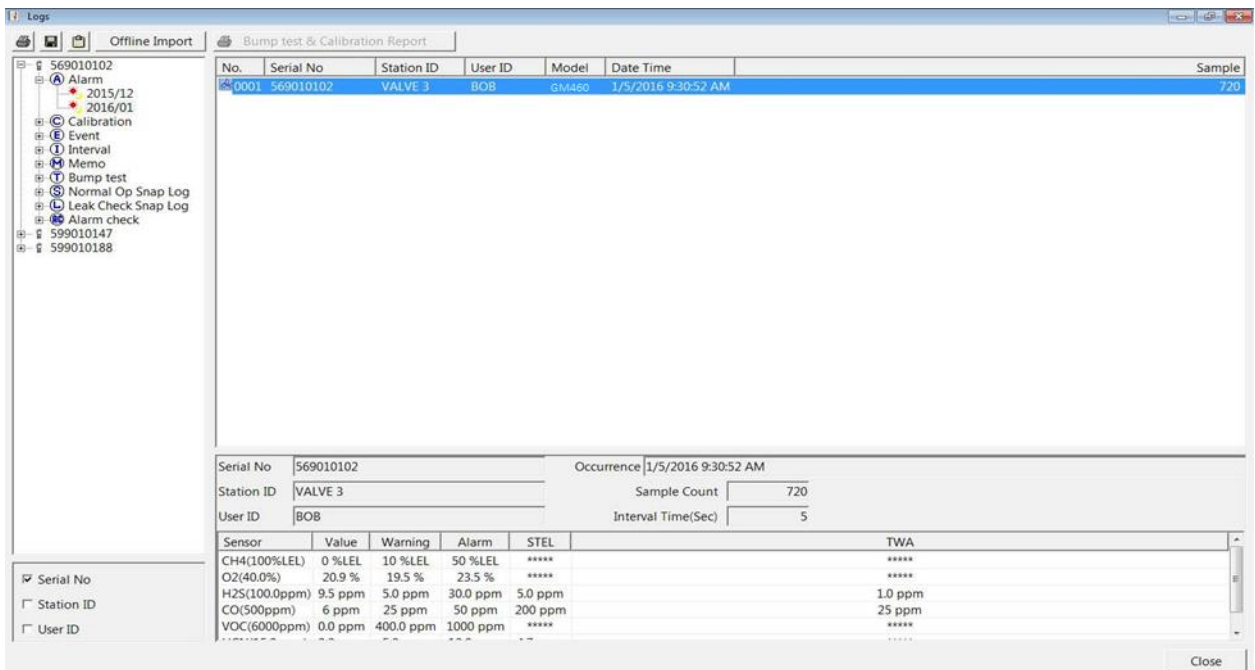
1. While in the **Logs** window, find your GM460 by serial number then click the expanded view symbol (+) or double-click the serial number folder to view the contents.
2. Click the expanded view symbol (+) or double-click the **Alarm** folder to view the contents. Alarm trend data folders are arranged by year/month.

- Click the year/month folder you want to view. All alarm trend data files for that GM460 in that particular year/month will appear in the upper-right frame. The file number, serial number, station ID, user ID, model, date/time, and sample count of the alarm trend file appear in the same line.



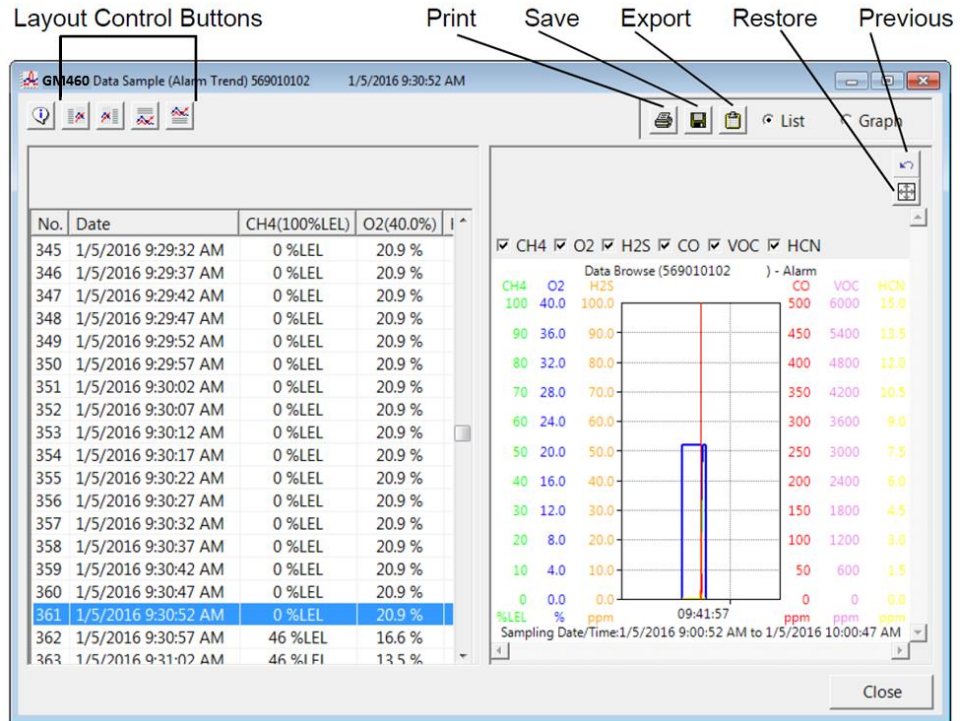
**Figure 6-4: Viewing Alarm Trend Files**

- Click a file to see the GM460 information, gas readings at the time of the event, and the alarm set points in the lower-right frame.



**Figure 6-5: Alarm Trend Data**

5. To view the alarm trend data, double-click the desired file.



**Figure 6-6: Alarm Trend Data**

Each data point will be displayed in the left-half of the screen along with the peak readings (minimum for oxygen) over the previous 5 seconds. A graph of the data will appear on the right-half of the screen.

To change the layout of the table and chart in relation to each other, click any of the four layout control buttons in the upper-left corner of the screen.

To change the proportions of the table to the graph, click the divider between the two and move it.

To display instrument information along with the data table and graph, click the "i" control button in the upper-left corner.

6. In the table part of the screen:

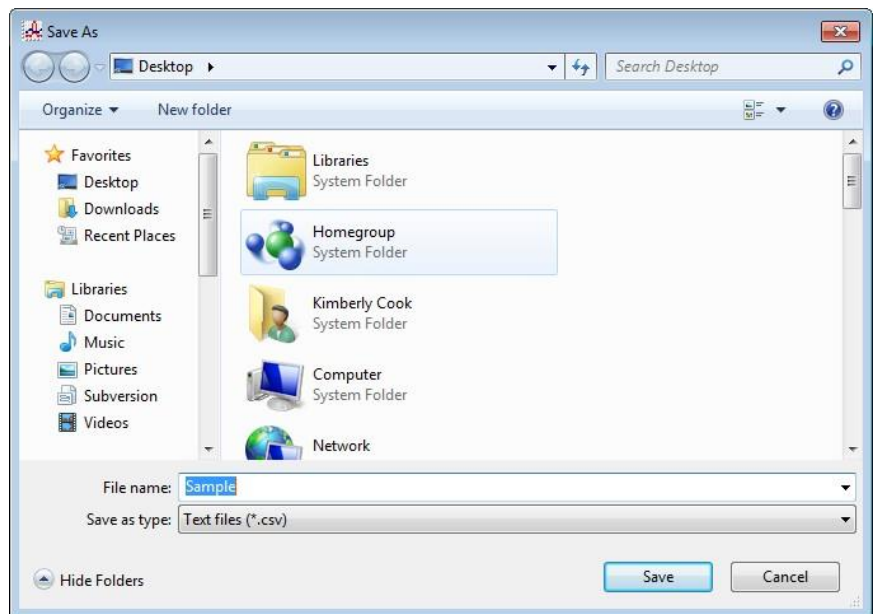
- The gas readings at the time of the alarm event around which the logged data is centered are highlighted in red and are the instantaneous readings at that time.

7. In the graph part of the screen:

- Choose which gas(es) you want to graph by selecting or deselecting the boxes next to each gas name.
- To zoom in on a particular part of the graph, drag a box around that area so that it is highlighted in gray. The graph will zoom in. To return to a previous zoom, click the **Previous** control button

in the upper-right corner of the graph section. To return to the original zoom, click the **Restore** control button in the upper-right corner of the graph section.

- A vertical red line appears on the graph at the point that created the alarm trend file. Clicking anywhere on the graph will move that red line and highlight that data point in the table. Clicking a data point in the table will move the red line in the graph to that data point.
8. To print the data, select either **List** or **Graph** in the upper-right corner of the window and then click the **Print** control button in the upper-right corner of the window. The **Print** control button has a printer icon on it. A dialog box will appear confirming you want to print. Click **OK**. If **Graph** is selected, the data will print as a graph. If **List** is selected, the data will print as a table.
  9. To save the data to a file which can be imported into another program, select either **List** or **Graph** in the upper-right corner of the window and then click the **Save to File** control button. The **Save to File** control button has a floppy disk icon on it. A dialog box will appear for you to specify the filename, file location, and file type.



**Figure 6-7: Save As Dialog Box**

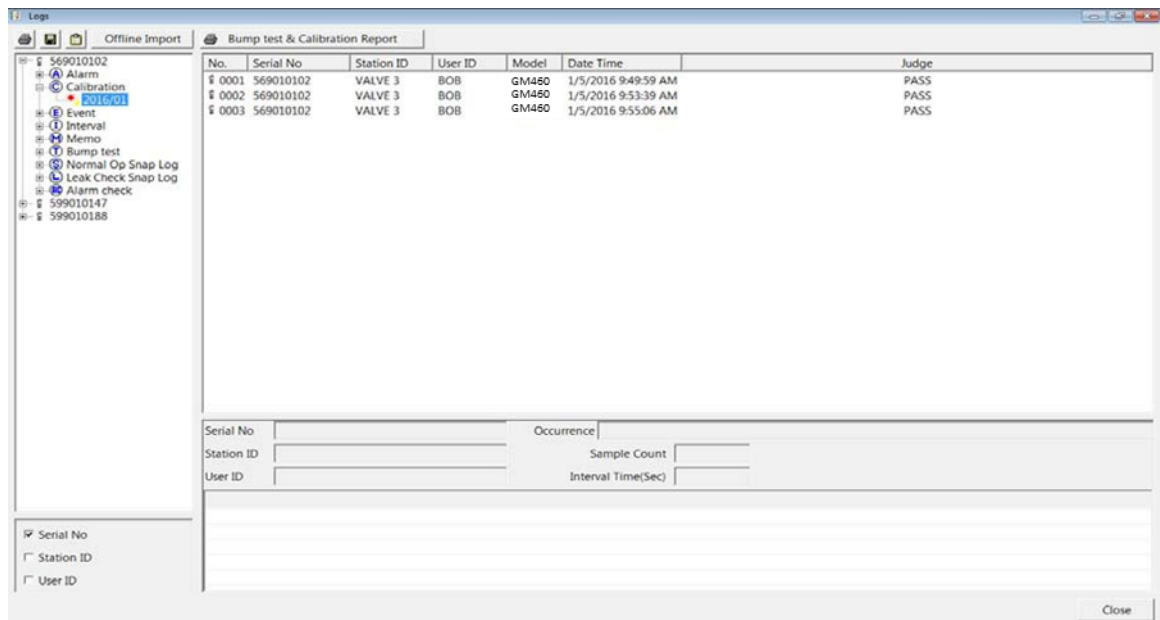
10. If **List** is selected, the file type is “.csv” (comma-separated values). If **Graph** is selected, the file type is “.bmp” (Windows® operating system bitmap). After specifying the filename and file location, click **Save** to save the file to the specified location.
11. To save the data to the clipboard, select either **List** or **Graph** in the upper-right corner of the window and then click the **Copy to Clipboard** control button. The **Copy to Clipboard** control button has a clipboard icon on it. The table or graph will be saved to the clipboard. It can then be pasted into a document by using the **Paste** command in an application.
12. To go back and view other data, click **Close** to return to the **Logs** window.

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## Calibration Data

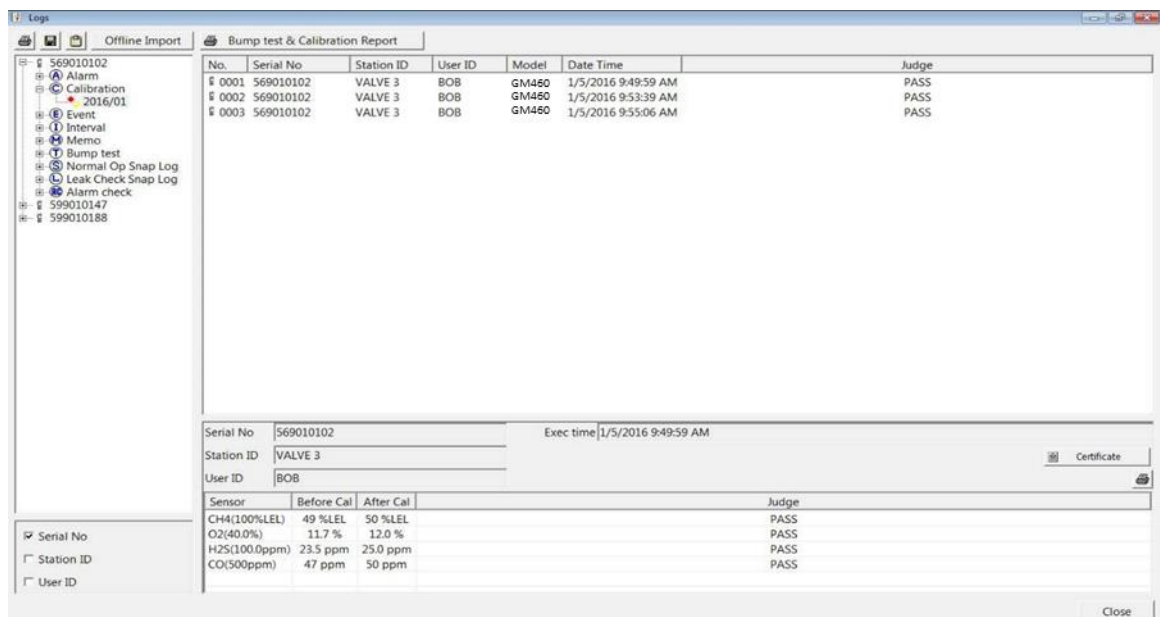
The GM460 is capable of saving information for up to the 100 most recent bump tests and calibrations combined. When a GM460 is connected to the PC Controller Program and a complete download is performed, the calibration files are retrieved and stored by the program. In addition, all calibrations performed by the PC Controller Program are stored by the program. Calibration data can also be imported using the **SD Import** or **Net Import** buttons. To view and perform desired operations with the calibration files:

1. While in the **Logs** window, find your GM460 by serial number then click the expanded view symbol (+) or double-click the serial number folder to view the contents.
2. Click the expanded view symbol (+) or double-click the **Calibration** folder to view the contents. Calibration data folders are arranged by year/month.
3. Click the year/month folder you want to view. All calibration data files for that GM460 in that particular year/month will appear in the upper-right frame. The file number, serial number, station ID, user ID, model, date/time, and result of the calibration appear in the same line. If calibrations were performed prior to connecting the GM460 with the PC Controller Program, data for those calibrations will not appear until a complete download is performed.



**Figure 6-8: Viewing Calibration Log Files**

- Click one of the calibration data files. The fields in the bottom-right frame will fill in. The instrument information will be displayed along with the calibration information. The tested sensors will be displayed along with the final gas concentration, the calibration gas values, and the result of the calibration. A **Certificate** button will also appear along the right-side of the screen. This button is only active if the selected calibration passed.

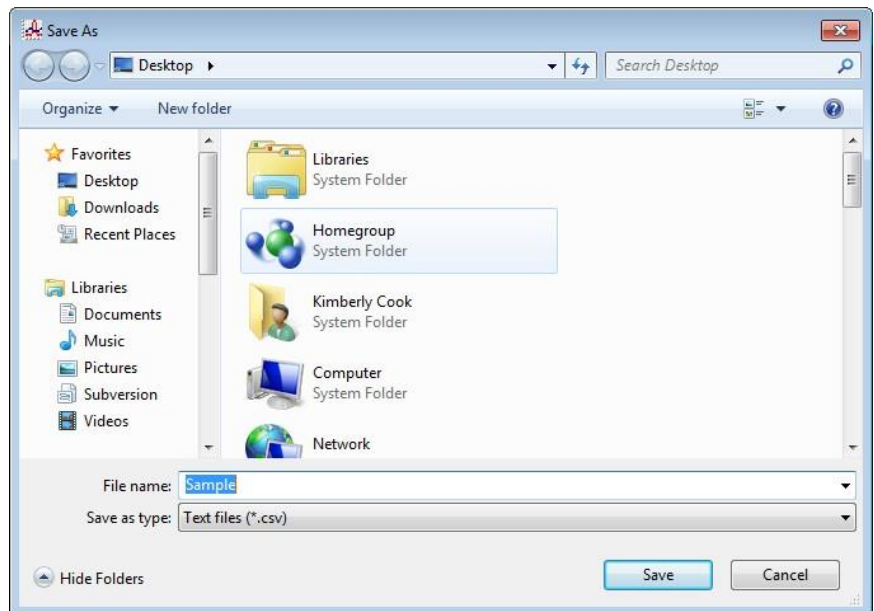


**Figure 6-9: Viewing Calibration Data**

- Files that record a failed calibration on all channels are highlighted in red. Files that record a calibration where not all channels passed are highlighted in orange.



6. Calibrations that required more than one calibration cylinder will have separate calibration files for each cylinder. For example, a calibration performed on a GM460 that contained the standard four sensors plus an HCN ESS-03 sensor would result in one calibration file for the standard four sensors if a four-gas mix was used and one calibration file for the HCN ESS-03 sensor.
7. To print the calibration data (everything in the lower-right frame of the screen), click the **Print** control button located just above the calibration judge column. A dialog box will appear confirming you want to print. Click **OK**.
8. To print the basic calibration results from a date folder (everything in the upper-right frame), be sure that the desired date folder is selected and click the **Print** control button in the upper-left corner of the Logs window. A dialog box will appear confirming you want to print. Click **OK**.
9. To print detailed calibration data for each calibration file in a date folder, be sure that the desired date folder is selected and click the **Bump Test & Calibration Report** control button along the top of the **Logs** window. A dialog box will appear confirming you want to print. Click **OK**.
10. To print detailed calibration and bump test data (if available) for each calibration and bump test file for a specific serial number, be sure that the desired serial number is selected in the upper-left frame and click the **Bump Test & Calibration Report** control button along the top of the **Logs** window. A dialog box will appear confirming you want to print. Click **OK**.
11. To save calibration data from a specific date folder, be sure the desired date folder is highlighted and click the **Save** control button in the upper-left corner of the **Logs** window. A “**Save As**” dialog box will appear for you to specify the filename and file location.



**Figure 6-10: Save As Dialog Box**

The file type will be “.csv” (comma separated values).

Specify the filename and location and click **Save**.

12. To copy calibration data in a date folder to the clipboard, be sure the desired date folder is selected and click the **Save to Clipboard** control button. The data will be saved to the clipboard. It can then be pasted into a document by using the **Paste** command in an application.
13. To view or print a calibration certificate for a passed calibration, click the **Certificate** button along the right-side of the window. The calibration certificate will appear.

CALIBRATION CERTIFICATE								
Language		<input checked="" type="radio"/> English (United States) <input type="radio"/> Português (Brasil)		Align		<input checked="" type="radio"/> Left <input type="radio"/> Center		
ISSUE DATE		11/21/2017						
LABORATORY NAME								
LABORATORY ADDRESS								
CERTIFICATE NUMBER		b5aa9038-edfb-4d51-a8b5-c8b1146af2c7-1						
GAS DETECTOR DATA		Serial	ou812					
		Manufacturer	RIKEN KEIKI					
		Model	GM460					
		Station ID	STATION_ID_001					
		User ID	USER_ID_002					
STANDARD OR REGULATION USED								
TRACEABILITY								
CALIBRATION RESULT		GAS	CH4(%LEL)	O2(%)	H2S(ppm)	CO(ppm)	VOC(ppm)	CO2(vol%)
		Range	0-100%LEL	0-40.0%	0-100.0ppm	0-500ppm	0-6000ppm	0-5.00vol%
		Gas concentration	50 %LEL	12.0 %	25.0 ppm	50 ppm	100 ppm	2.50 vol%
		Reading before calibration	50 %LEL	12.0 %	25.0 ppm	50 ppm	100 ppm	2.50 vol%
		Reading after calibration	50 %LEL	12.0 %	25.0 ppm	50 ppm	100 ppm	2.50 vol%
ENVIRONMENTAL CONDITIONS								
OBSERVATIONS								
EXECUTOR								

**Figure 6-11: Calibration Certificate**

The calibration date, instrument information, and calibration gas concentration information will be displayed. Laboratory name, laboratory address, standard or regulation used, traceability, environmental conditions, observations, and executor fields are all available for user-entered information. To enter information into any of these fields, click in the field, and type in the desired information.

Use the **English** and **Portuguese** selection dots in the **Language** section at the top of the screen to choose the language you want the information displayed in.

Use the **Left** and **Center** selection dots in the **Align** section at the top of the certificate to change the alignment of the information that is manually typed in.

To print a certificate, enter the desired information and click the **Print** button in the top-right corner of the screen. Printing the certificate saves any information that was added to the open fields.

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## Event Data

The GM460 saves the 100 most recent alarm events and the 100 most recent trouble events. When a GM460 is connected to the PC Controller Program and a complete download is performed, the alarm and trouble event files are retrieved and saved in the program. They can also be imported using the **SD Import** or **Net Import** buttons.

Alarm event files save the time, instrument channel, gas, and alarm type of every gas alarm event that occurs on a particular GM460. Warning (low alarm), Alarm (high alarm), STEL, TWA, and over-scale events are saved.

Trouble event files note the time, instrument channel, whether the event is an instrument system failure or sensor failure, and the specific type of failure. Calibration failures, dead battery alarms, and sensor failures are among the trouble events that are saved.

Even though two types of files are saved, the PC Controller Program does not distinguish between the two and shows them together and with the same lightning bolt symbol. To view and perform desired operations with the event files:

1. While in the **Logs** window, find your GM460 by serial number then click the expanded view symbol (+) or double-click the serial number folder to view the contents.
2. Click the expanded view symbol (+) or double-click the **Event** folder to view the contents. Event data folders are arranged by year/month.
3. Click the year/month folder you want to view. All event data files for that GM460 in that particular year/month will appear in the upper-right frame. The file number, serial number, station ID, user ID, model, date/time, channel number, sensor, and event type appear in the same line.

No.	Serial No.	Station ID	User ID	Model	Date Time	Ch	Sensor	Event
0001	569010102	VALVE 3	BOB	GM460	1/5/2016 9:30:52 AM	3	H2S(100.0ppm)	WARNING
0002	569010102	VALVE 3	BOB	GM460	1/5/2016 9:30:53 AM	4	CO(500ppm)	WARNING
0003	569010102	VALVE 3	BOB	GM460	1/5/2016 9:30:54 AM	2	O2(40.0%)	WARNING
0004	569010102	VALVE 3	BOB	GM460	1/5/2016 9:30:56 AM	1	CH4(100%LEL)	WARNING
0005	569010102	VALVE 3	BOB	GM460	1/5/2016 1:24:52 PM	1	CH4(100%LEL)	Fail(BUMP)
0006	569010102	VALVE 3	BOB	GM460	1/5/2016 1:24:53 PM	4	CO(500ppm)	Fail(BUMP)
0007	569010102	VALVE 3	BOB	GM460	1/5/2016 1:24:53 PM	2	O2(40.0%)	Fail(BUMP)
0008	569010102	VALVE 3	BOB	GM460	1/5/2016 1:24:53 PM	3	H2S(100.0ppm)	Fail(BUMP)
0009	569010102	VALVE 3	BOB	GM460	1/5/2016 1:25:52 PM	4	CO(500ppm)	Fail(Span)
0010	569010102	VALVE 3	BOB	GM460	1/5/2016 1:25:52 PM	3	H2S(100.0ppm)	Fail(Span)
0011	569010102	VALVE 3	BOB	GM460	1/5/2016 1:25:52 PM	1	CH4(100%LEL)	Fail(Span)
0012	569010102	VALVE 3	BOB	GM460	1/5/2016 1:25:52 PM	2	O2(40.0%)	Fail(Span)
0013	569010102	VALVE 3	BOB	GM460	1/5/2016 1:26:29 PM	5	VOC(6000ppm)	Fail(BUMP)
0014	569010102	VALVE 3	BOB	GM460	1/5/2016 1:27:29 PM	5	VOC(6000ppm)	Fail(Span)
0015	569010102	VALVE 3	BOB	GM460	1/5/2016 1:28:02 PM	6	HCN(15.0ppm)	Fail(BUMP)
0016	569010102	VALVE 3	BOB	GM460	1/5/2016 1:29:02 PM	6	HCN(15.0ppm)	Fail(Span)
0017	569010102	VALVE 3	BOB	GM460	1/5/2016 3:24:17 PM	6	HCN(15.0ppm)	Fail(Sens)
0018	569010102	VALVE 3	BOB	GM460	1/5/2016 3:24:20 PM	6	HCN(15.0ppm)	Fail(Sens)
0019	569010102	VALVE 3	BOB	GM460	1/5/2016 3:24:58 PM	6	HCN(15.0ppm)	Fail(Sens)
0020	569010102	VALVE 3	BOB	GM460	1/5/2016 3:25:00 PM	6	HCN(15.0ppm)	Fail(Sens)
0021	569010102	VALVE 3	BOB	GM460	1/5/2016 3:25:37 PM	6	HCN(15.0ppm)	Fail(Sens)
0022	569010102	VALVE 3	BOB	GM460	1/5/2016 3:26:20 PM	4	CO(500ppm)	Fail(BUMP)
0023	569010102	VALVE 3	BOB	GM460	1/5/2016 3:26:20 PM	1	CH4(100%LEL)	Fail(BUMP)
0024	569010102	VALVE 3	BOB	GM460	1/5/2016 3:26:20 PM	2	O2(40.0%)	Fail(BUMP)
0025	569010102	VALVE 3	BOB	GM460	1/5/2016 3:26:20 PM	3	H2S(100.0ppm)	Fail(BUMP)
0026	569010102	VALVE 3	BOB	GM460	1/5/2016 3:27:20 PM	3	H2S(100.0ppm)	Fail(Span)
0027	569010102	VALVE 3	BOB	GM460	1/5/2016 3:27:20 PM	1	CH4(100%LEL)	Fail(Span)
0028	569010102	VALVE 3	BOB	GM460	1/5/2016 3:27:20 PM	2	O2(40.0%)	Fail(Span)
0029	569010102	VALVE 3	BOB	GM460	1/5/2016 3:27:52 PM	5	VOC(6000ppm)	Fail(BUMP)
0030	569010102	VALVE 3	BOB	GM460	1/5/2016 3:28:52 PM	5	VOC(6000ppm)	Fail(Span)
0031	569010102	VALVE 3	BOB	GM460	1/6/2016 8:00:58 AM	1	CH4(100%LEL)	Fail(BUMP)
0032	569010102	VALVE 3	BOB	GM460	1/6/2016 8:01:31 AM	5	VOC(6000ppm)	Fail(BUMP)
0033	569010102	VALVE 3	BOB	GM460	1/6/2016 8:02:03 AM	6	SO2(6.00ppm)	Fail(BUMP)

Figure 6-12: Viewing Event Data

- To print event data from a date folder, be sure the desired date folder is selected and click the **Print** control button in the upper-left corner of the **Logs** window. A dialog box will appear confirming you want to print. Click **OK**.
- To save event data from a date folder, be sure the desired date folder is selected and click the **Save** control button in the upper-left corner of the **Logs** window. A **“Save As”** dialog box will appear for you to specify the filename and file location.

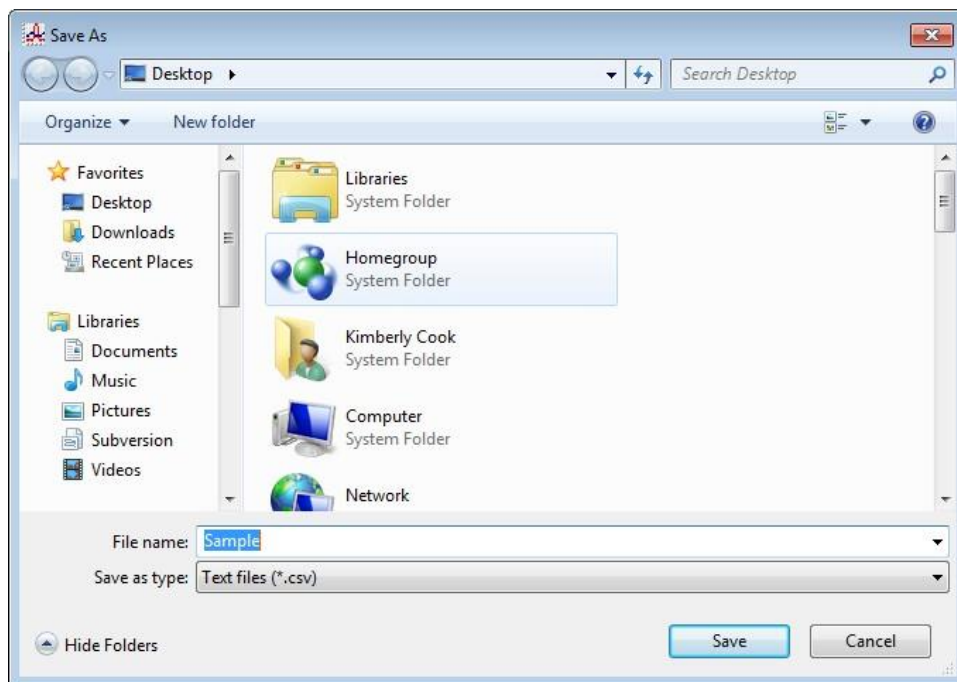


Figure 6-13: Save As Dialog Box

The file type will be “.csv” (comma separated values).

Specify the filename and location and click **Save**.

6. To copy event data from a date folder to the clipboard, be sure the desired date folder is selected and click the **Save to Clipboard** control button. The data will be saved to the clipboard. It can then be pasted into a document by using the **Paste** command in an application.

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## Interval Trend Data

Average gas concentrations over the user-defined interval trend time are logged in the interval trend data files. The interval trend time is set using either the **Interval Time** menu item in the **Edit Function** screen or in the GM460 Setup Mode. See ["Edit Function" in Chapter 7](#) or the *GM460 Operator's Manual* for instructions to set the interval trend time. Events such as gas alarms or sensor failures are saved in the interval trend data file when they occur.

An interval trend data file is created and saved in the GM460 when the instrument is turned *off* or when a user ID, or station ID is changed during operation. The serial number, user ID, and station ID that are entered in the instrument when it is turned *on* or that are updated during operation are saved for the corresponding interval trend file. If the instrument's user ID or station ID are changed during operation, any interval trend files that result from subsequent operating sessions will have the new user ID or station ID saved in them.

The data may be viewed in both table format and graph format if at least five scheduled data points have been logged at the programmed interval trend time. This does not include events. If an interval data file has fewer than five scheduled data points, the graph controls are not functional and the data is shown only in table format.

Interval trend data will not appear unless a complete download is performed or if an import is done using the **SD Import** or **Net Import** buttons. To view and perform desired operations with the interval trend files:

1. While in the **Logs** window, find your GM460 by serial number then click the expanded view symbol (+) or double-click the serial number folder to view the contents.
2. Click the expanded view symbol (+) or double-click the Interval folder to view the contents. Interval data folders are arranged by year/month.

- Click the year/month folder you want to view. All interval trend data files for that GM460 in that particular year/month will appear in the upper-right frame. The file number, serial number, station ID, user ID, model, date/time, and sample count of the interval trend appear in the same line.

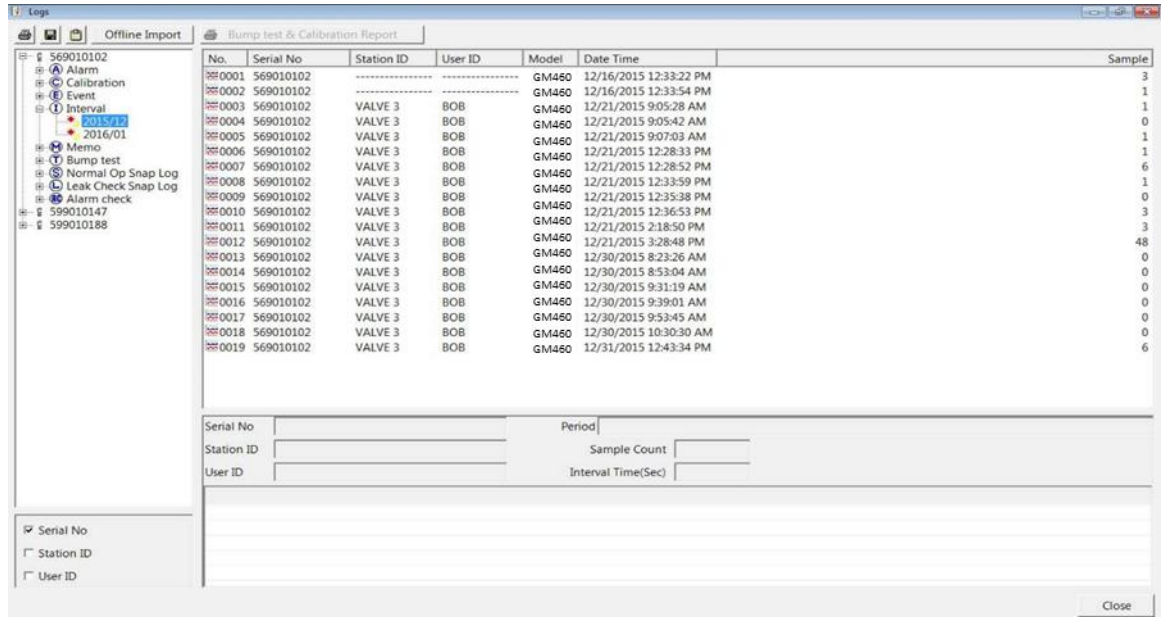


Figure 6-14: Viewing Interval Trend Files

- Click one of the interval trend data files. The fields in the bottom-right frame will fill in. The instrument information will be displayed along with the average, minimum, and maximum gas readings for the operating session. Also displayed are the minimum date, the maximum date, and the warning, alarm, STEL, and TWA set points.

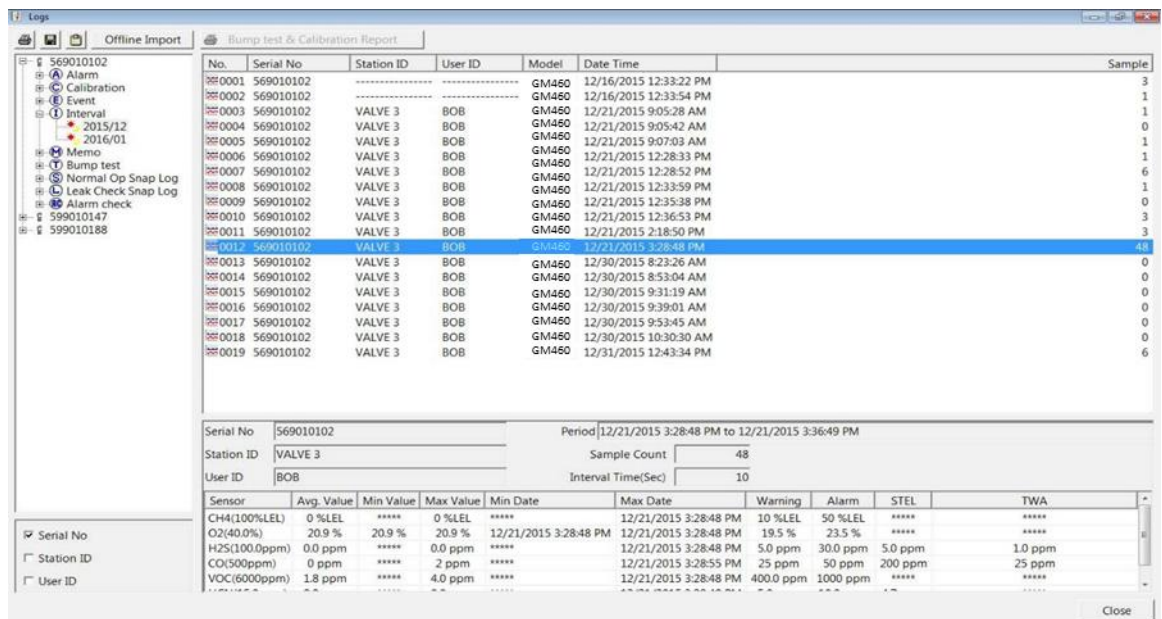
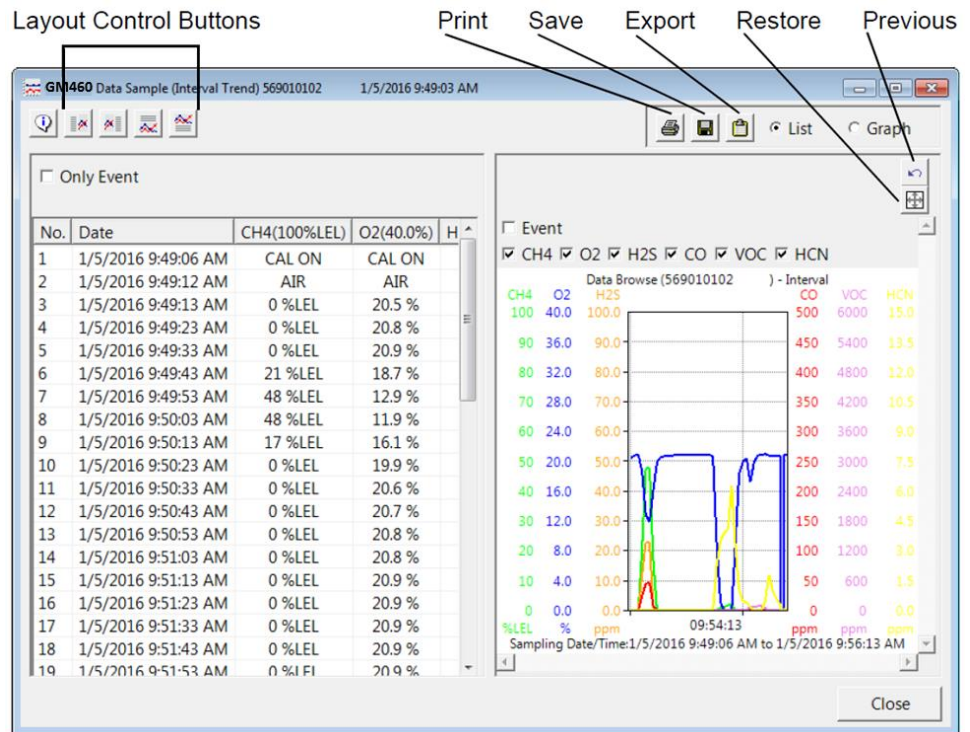


Figure 6-15: Interval Trend Data



5. To view the interval trend data, double-click the desired file.



**Figure 6-16: Interval Trend Data**

6. In table format on the left-half of the screen, the interval trend data is shown as the average gas readings over the user-defined interval trend time. So if the data logging session started at 4:13:38 PM and the interval time is set to one (1) minute then the readings logged at 4:14:38 PM are the average reading for each channel over that one minute period. If a channel went into Warning or Alarm, it will be indicated. A graph of the data will appear on the right-half of the screen.
7. Events are displayed on the screen under the channel in which they occur and with the time of the event. Events are displayed whether they occurred at scheduled log times or in between them. Events include gas alarms such as a warning condition, trouble conditions such as a sensor failure, and an indication that the GM460 is returning to "normal" condition after an alarm has been reset using the RESET button.
8. To change the layout of the table and chart, click any of the four layout control buttons in the upper-left corner of the screen.
9. To change the proportions of the table to the graph, click the divider between the two and move it.
10. To display instrument information along with the data and graph, click the "i" control button in the upper-left corner.

11. In the table part of the screen:

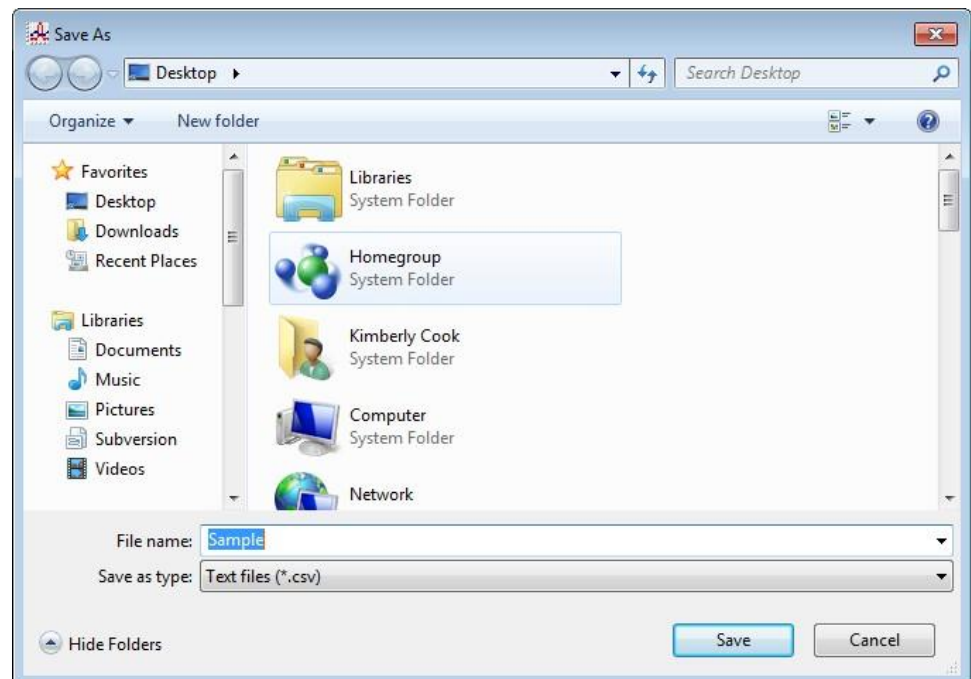
- To view only events in the interval trend data file, click the **Only Event** selection box.

12. In the graph part of the screen:

- You can choose which gas(es) you want to graph by selecting or deselecting the boxes next to each gas name.
- To zoom in on a particular part of the graph, drag a box around that area so that it is highlighted in gray. The graph will zoom in. To return to a previous zoom, click the **Previous** control button in the upper-right corner of the graph section. To return to the original zoom, click the **Restore** control button in the upper-right corner of the graph section.
- Clicking anywhere on the graph will cause a vertical red line to appear and the corresponding data point will be highlighted in the table. Clicking a data point in the table will move the red line in the graph to that data point.

13. To print the data, select either **List** or **Graph** in the upper-right corner of the window and then click the **Print** control button in the upper-right corner of the window. The **Print** control button has a printer icon on it. A dialog box will appear confirming you want to print. Click **OK**. If **Graph** is selected, the data will print as a graph. If **List** is selected, the data will print as a table.

14. To save the data to a file which can be imported into another program, select either **List** or **Graph** in the upper-right corner of the window and then click the **Save to File** control button. The **Save to File** control button has a floppy disk icon on it. A dialog box will appear for you to specify the filename, file location, and file type.



**Figure 6-17: Save As Dialog Box**



If **List** is selected, the file type is “.csv” (comma-separated values). If **Graph** is selected, the file type is “.bmp” (Windows® bitmap). After specifying the filename and file location, click **Save** to save the file to the specified location.

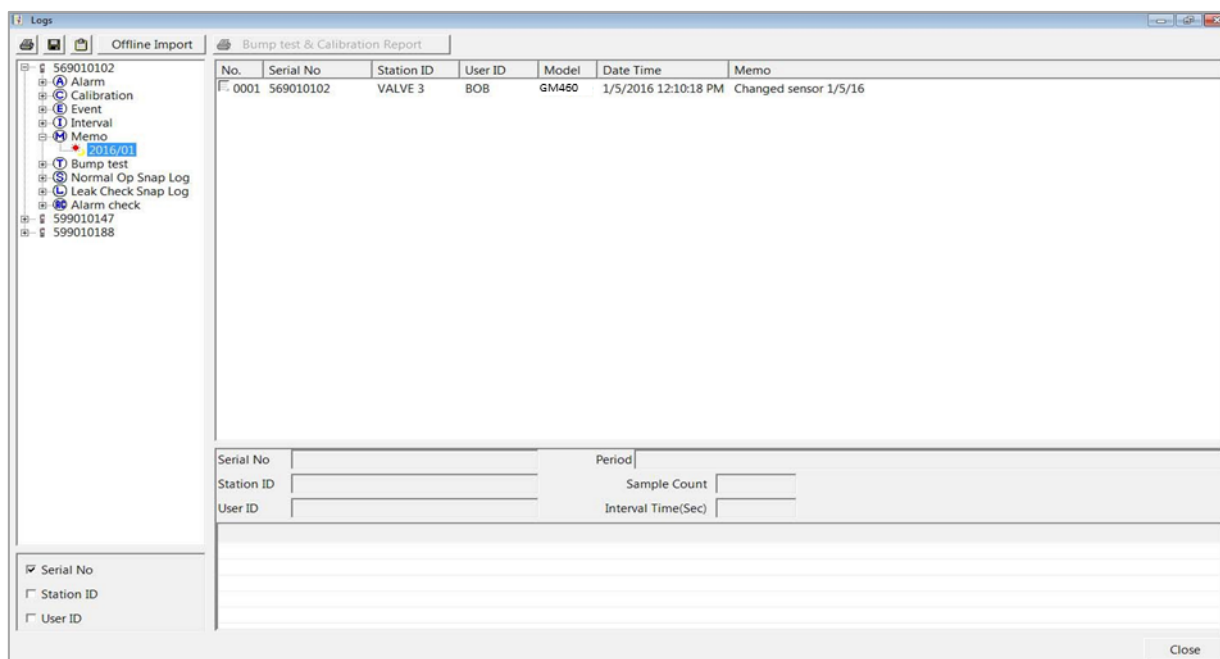
15. To save the data to the clipboard, select either **List** or **Graph** in the upper-right corner of the window and then click the **Copy to Clipboard** control button. The **Copy to Clipboard** control button has a clipboard icon on it. The table or graph will be saved to the clipboard. It can then be pasted into a document by using the **Paste** command in an application.
16. To go back and view other data, click **Close** to return to the **Logs** window.

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## Memo Data

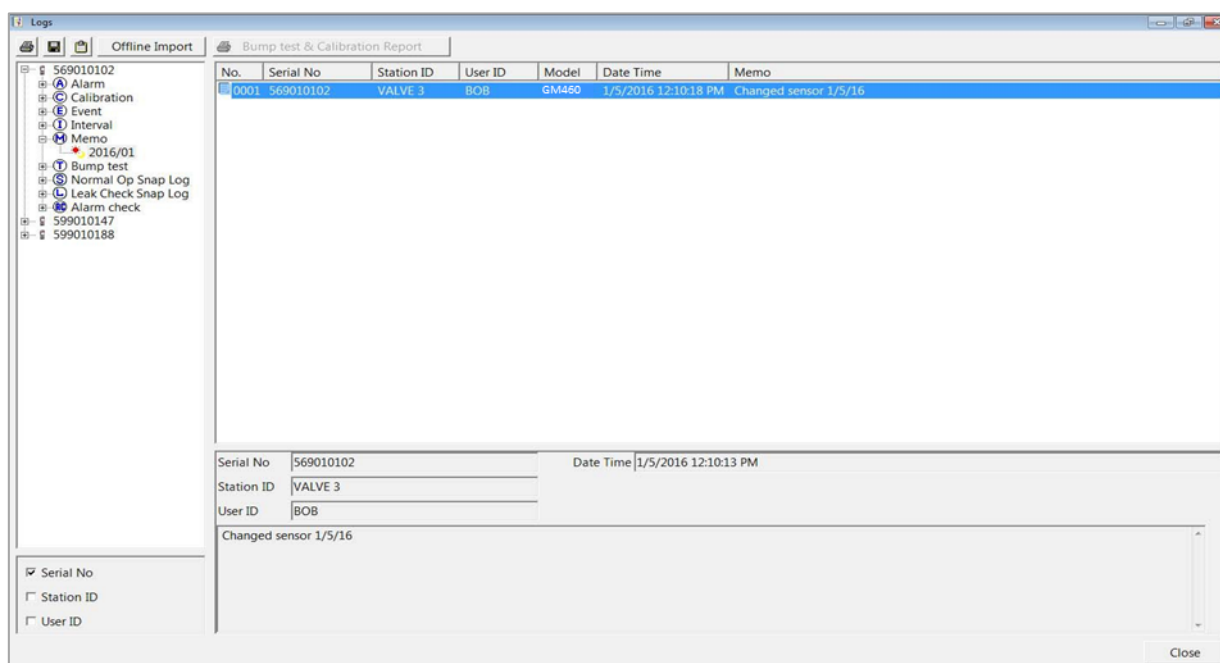
Any information entered into the **Memo** field in the **Edit** window is saved in a file in the **Logs** window. If there is text in the **Memo** field, a new file is created every time a GM460 is connected to the PC Controller Program. If a change is made to the Memo, the change is saved in the **Memo** file for that operating session. See ["Parameter Tab" in Chapter 7](#) for instructions to use the **Memo** field. To view and perform desired operations with the memo files:

1. While in the **Logs** window, find your GM460 by serial number then click the expanded view symbol (+) or double-click the serial number folder to view the contents.
2. Click the expanded view symbol (+) or double-click the **Memo** folder to view the contents. Memo data folders are arranged by year/month.
3. Click the year/month folder you want to view. All memo files for that GM460 in that particular year/month will appear in the upper-right frame. The file number, serial number, station ID, user ID, model, date/time, and the first few words of the memo appear in the same line.



**Figure 6-18: Viewing Memo Files**

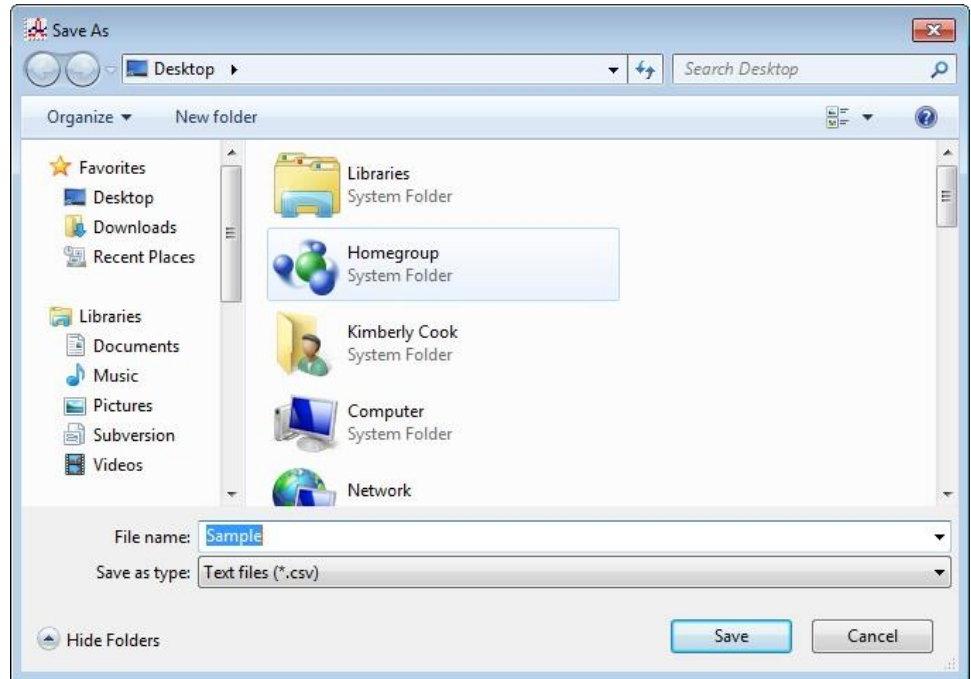
4. Click on one of the memo files. The fields in the bottom-right screen will fill in. The instrument information will be displayed along with the memo information.



**Figure 6-19: Viewing Memo File Data**

5. To print memo data, click the **Print** control button in the upper-left corner of the **Logs** window. A dialog box will appear confirming you want to print. Click **OK**.

6. To save memo data, click the **Save** control button in the upper-left corner of the **Logs** window. A “**Save As**” dialog box will appear for you to specify the filename and file location.



**Figure 6-20: Save As Dialog Box**

7. Specify the filename and location and click **Save**.
8. To copy memo data to the clipboard, click the **Save to Clipboard** control button. The data will be saved to the clipboard. It can then be pasted into a document by using the **Paste** command in an application.

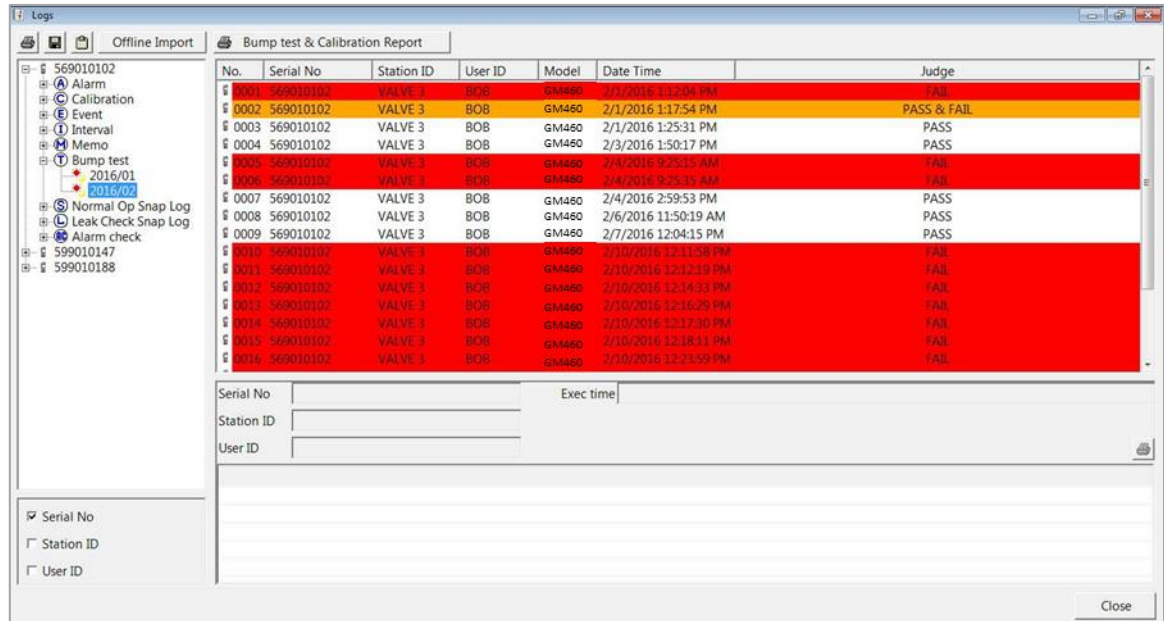
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## Bump Test Data

The GM460 is capable of saving information for up to the 100 most recent bump tests and calibrations combined. When a GM460 is connected to the PC Controller Program and a complete download is performed, the bump test files are retrieved and stored by the program. In addition, all bump tests performed by the PC Controller Program are stored by the program. Bump test data can also be imported using the **SD Import** or **Net Import** buttons. To view and perform desired operations with the bump test files:

1. While in the **Logs** window, find your GM460 by serial number then click the expanded view symbol (+) or double-click the serial number folder to view the contents.
2. Click the expanded view symbol (+) or double-click the **Bump Test** folder to view the contents. Bump test data folders are arranged by year/month.

- Click the year/month folder you want to view. All bump test data files for that GM460 in that particular year/month will appear in the upper-right frame. The file number, serial number, station ID, user ID, model, date/time of the bump test, and the results appear in the same line. If bump tests were performed prior to connecting the GM460 with the PC Controller Program, data for those bump tests will not appear until a complete download is performed.



**Figure 6-21: Viewing Bump Test Log Files**

- Click on one of the bump test data files. The fields in the bottom-right screen will fill in. The instrument information will be displayed along with the bump test information. The tested sensors will be displayed along with the bump test gas reading, the bump test gas values, and the result of the bump test.

No.	Serial No	Station ID	User ID	Model	Date Time	Judge
0001	569010102	VALVE 3	BOB	GM460	2/1/2016 1:12:04 PM	FAIL
0002	569010102	VALVE 3	BOB	GM460	2/1/2016 1:17:54 PM	PASS & FAIL
0003	569010102	VALVE 3	BOB	GM460	2/1/2016 1:25:31 PM	PASS
0004	569010102	VALVE 3	BOB	GM460	2/3/2016 1:50:17 PM	PASS
0005	569010102	VALVE 3	BOB	GM460	2/4/2016 9:25:13 AM	FAIL
0006	569010102	VALVE 3	BOB	GM460	2/4/2016 9:25:35 AM	FAIL
0007	569010102	VALVE 3	BOB	GM460	2/4/2016 2:59:53 PM	PASS
0008	569010102	VALVE 3	BOB	GM460	2/6/2016 11:50:19 AM	PASS
0009	569010102	VALVE 3	BOB	GM460	2/7/2016 12:04:15 PM	PASS
0010	569010102	VALVE 3	BOB	GM460	2/10/2016 12:11:58 PM	FAIL
0011	569010102	VALVE 3	BOB	GM460	2/10/2016 12:12:19 PM	FAIL
0012	569010102	VALVE 3	BOB	GM460	2/10/2016 12:14:11 PM	FAIL
0013	569010102	VALVE 3	BOB	GM460	2/10/2016 12:16:29 PM	FAIL
0014	569010102	VALVE 3	BOB	GM460	2/10/2016 12:17:30 PM	FAIL
0015	569010102	VALVE 3	BOB	GM460	2/10/2016 12:18:11 PM	FAIL
0016	569010102	VALVE 3	BOB	GM460	2/10/2016 12:23:59 PM	FAIL

Serial No	569010102	Exec time	2/4/2016 2:59:53 PM
Station ID	VALVE 3		
User ID	BOB		

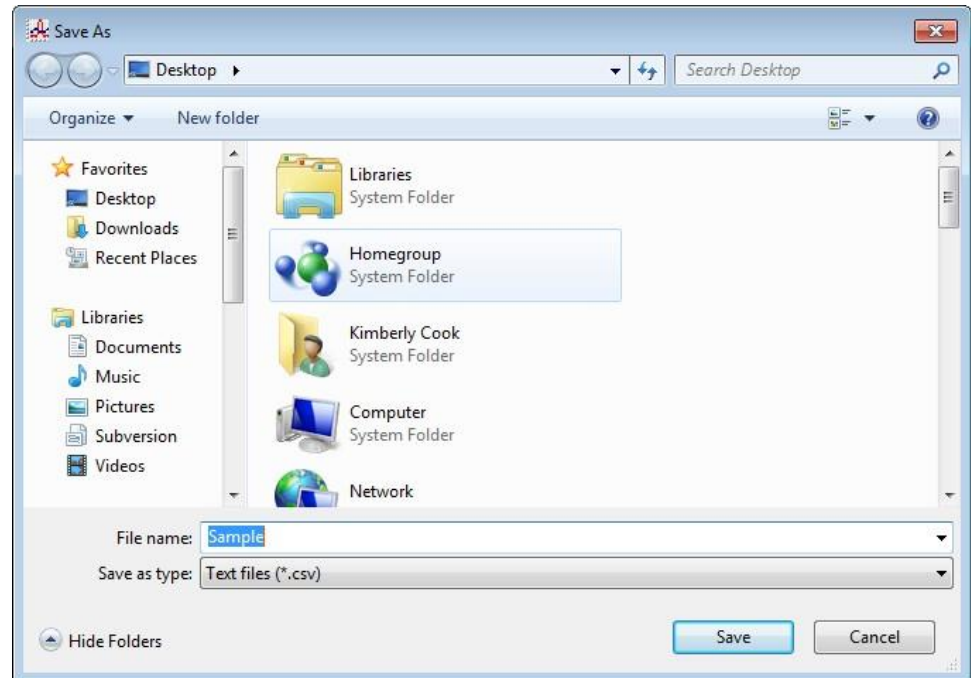
  

Sensor	Test Result	Concentration	Judge
CH4(100%LEL)	49 %LEL	50 %LEL	PASS
O2(40.0%)	12.2 %	12.0 %	PASS
H2S(100.0ppm)	27.0 ppm	25.0 ppm	PASS
CO(500ppm)	52 ppm	50 ppm	PASS

**Figure 6-22: Viewing Bump Test Data**

- Files that record a failed bump test on all channels are highlighted in red. Files that record a bump test where not all channels passed are highlighted in orange.
- Bump tests that required more than one calibration cylinder will have separate bump test files for each cylinder. For example, a bump test performed on a GM460 that contained the standard four sensors plus an HCN ESS-03 sensor would result in one bump test file for the standard four sensors if a four-gas mix was used and one bump test file for the HCN ESS-03 sensor.
- To print the bump test data (everything in the lower-right frame of the screen), click the **Print** control button located just above the bump test judge column. A dialog box will appear confirming you want to print. Click **OK**.
- To print the basic bump test results from a date folder (everything in the upper-right frame), be sure that the desired date folder is selected and click the **Print** control button in the upper-left corner of the **Logs** window. A dialog box will appear confirming you want to print. Click **OK**.
- To print detailed bump test data for each bump test file in a date folder, be sure that the desired date folder is selected and click the **Bump Test & Calibration Report** control button along the top of the **Logs** window. A dialog box will appear confirming you want to print. Click **OK**.

10. To print detailed calibration (if available) and bump test data for each calibration and bump test file for a specific serial number, be sure that the desired serial number is selected in the upper-left frame and click the **Bump Test & Calibration Report** control button along the top of the **Logs** window. A dialog box will appear confirming you want to print. Click **OK**.
11. To save bump test data from a specific date folder, be sure the desired date folder is highlighted and click the **Save** control button in the upper-left corner of the **Logs** window. A “**Save As**” dialog box will appear for you to specify the filename and file location.



**Figure 6-23: Save As Dialog Box**

12. Specify the filename and location and click **Save**.
13. To copy bump test data in a date folder to the clipboard, be sure the desired date folder is selected and click the **Save to Clipboard** control button. The data will be saved to the clipboard. It can then be pasted into a document by using the **Paste** command in an application.

# Normal Operation Snap Log Data

The GM460's Snap Log Mode in normal operation allows you to record normal operation data at a specific time and have it saved to the data logger. When a GM460 is connected to the PC Controller Program and a complete download is performed, the normal operation snap log files are retrieved and stored by the program. Normal operation snap log data can also be imported using the **SD Import** or **Net Import** buttons. To view and perform desired operations with the normal operation snap log files:

1. While in the **Logs** window, find your GM460 by serial number then click the expanded view symbol (+) or double-click the serial number folder to view the contents.
2. Click the expanded view symbol (+) or double-click the **Normal Op Snap Log** folder to view the contents. Normal operation snap log data folders are arranged by year/month.
3. Click the year/month folder you want to view. All normal operation snap log data files for that GM460 in that particular year/month will appear in the upper-right frame. One snap log file is generated for all normal operation snap logs taken during an operating session. If you turn the instrument off and turn it back on, a new snap log file will be created. The file number, serial number, model, start date/time, and end date/time appear in the same line. The start date/time corresponds to the date and time that the instrument was turned on. The end date/time corresponds to the date and time that the instrument was turned off.

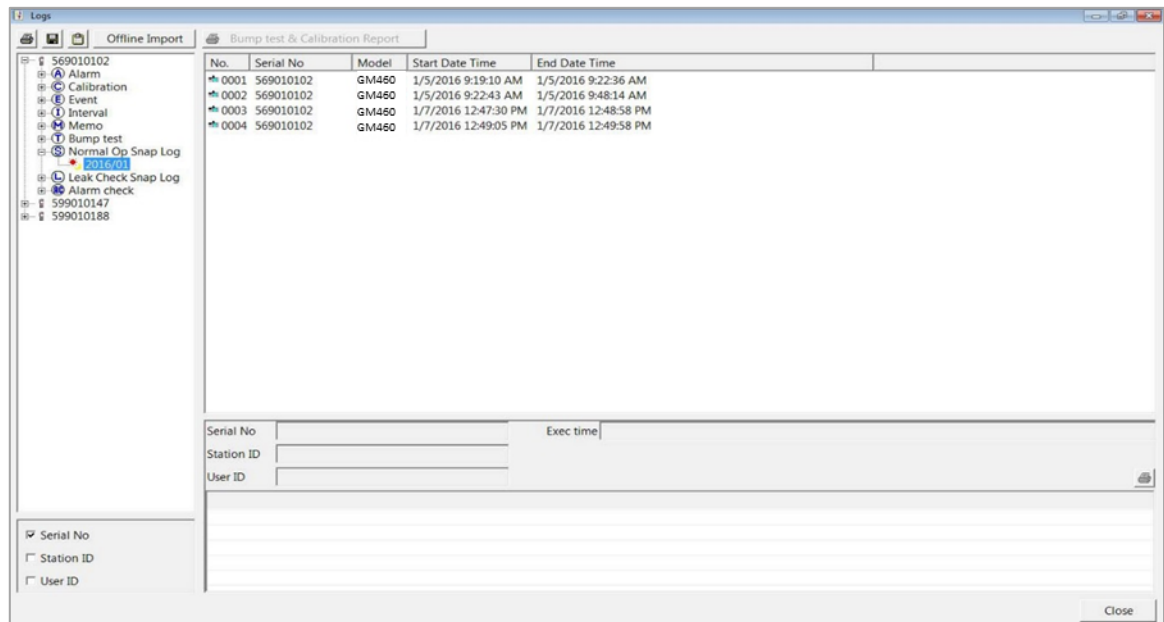


Figure 6-24: Viewing Normal Op Snap Log Files

- Click one of the snap log data filenames. A summary will appear in the bottom-right frame with instrument information. It will also show the gas reading that was saved for the first snap log in that snap log file. If a gas concentration increases above a warning or alarm point during the first snap log, it will be displayed.

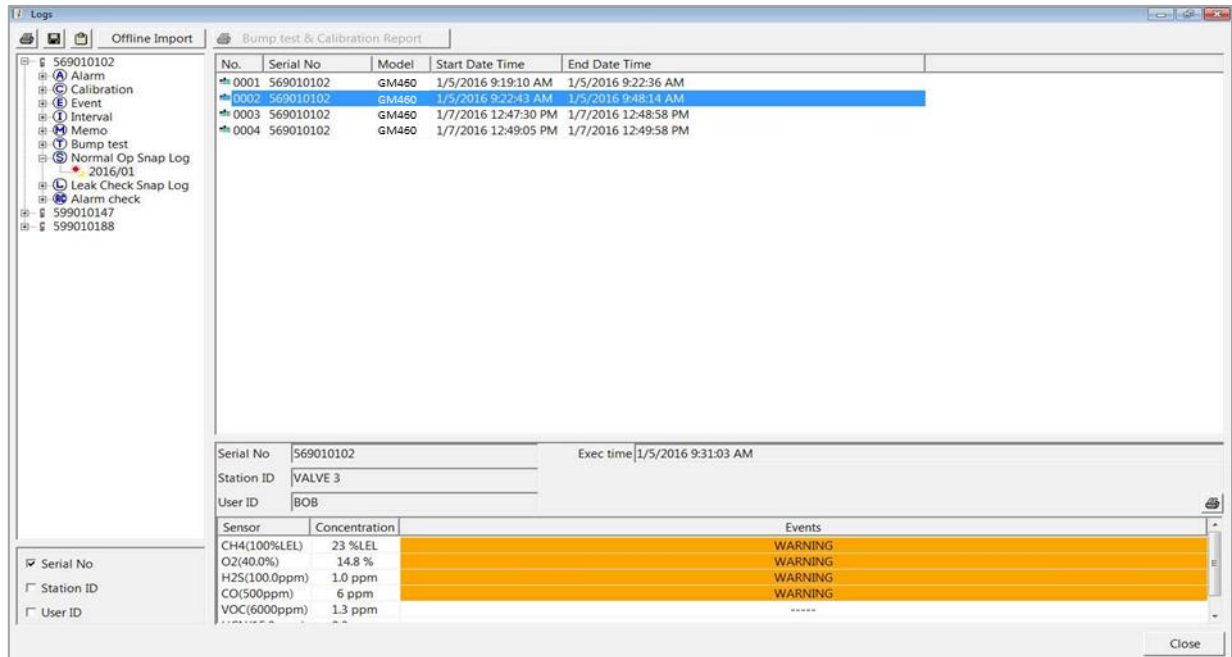
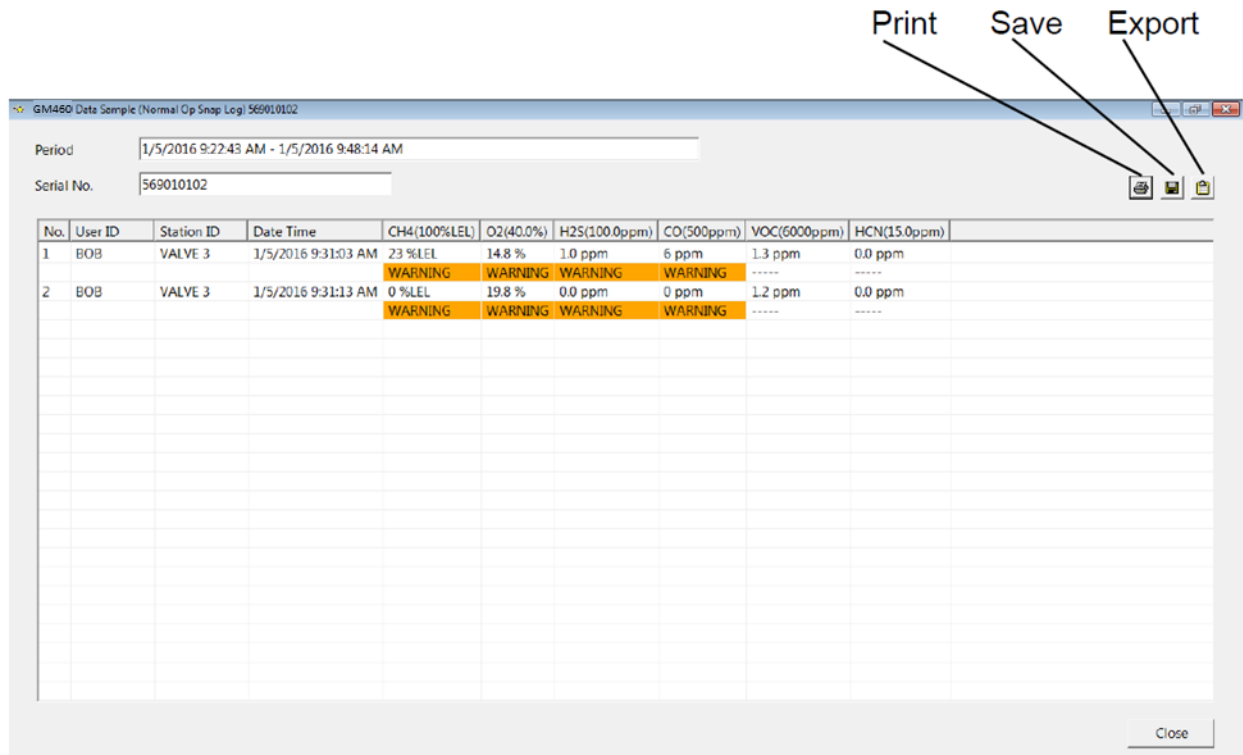


Figure 6-25: Viewing Normal Op Snap Log Data



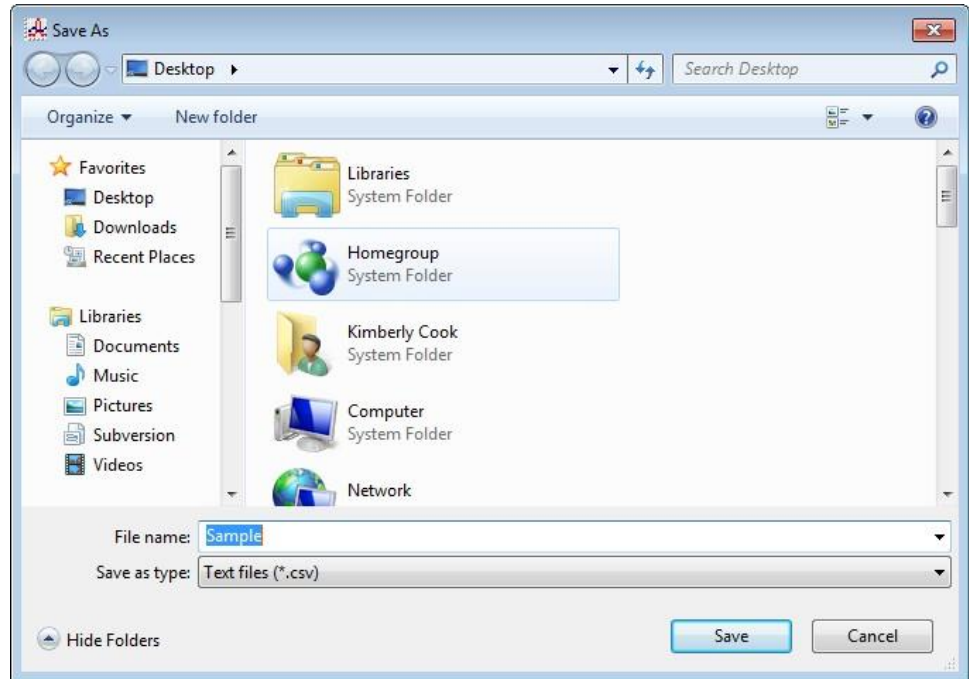
- To view all of the data in the snap log file, double-click the filename. All of the snap logs taken during the operating session will be displayed. The gas reading and alarm condition (if applicable) can be viewed along with the user ID, station ID, and date/time that the snap log was taken.



**Figure 6-26: Data View - Normal Op Snap Log**

- To print the detailed normal operation snap log data, click the **Print** control button in the upper-right corner of the screen. A dialog box will appear confirming you want to print. Click **OK**.

7. To save the detailed normal operation snap log data, click the **Save** control button in the upper-right corner. A “**Save As**” dialog box will appear for you to specify the filename and file location.



**Figure 6-27: Save As Dialog Box**

8. Specify the filename and location and click **Save**.
9. To copy detailed normal operation snap log data to the clipboard, be sure the desired date folder is selected and click the **Save to Clipboard** control button. The data will be saved to the clipboard. It can then be pasted into a document by using the **Paste** command in an application.

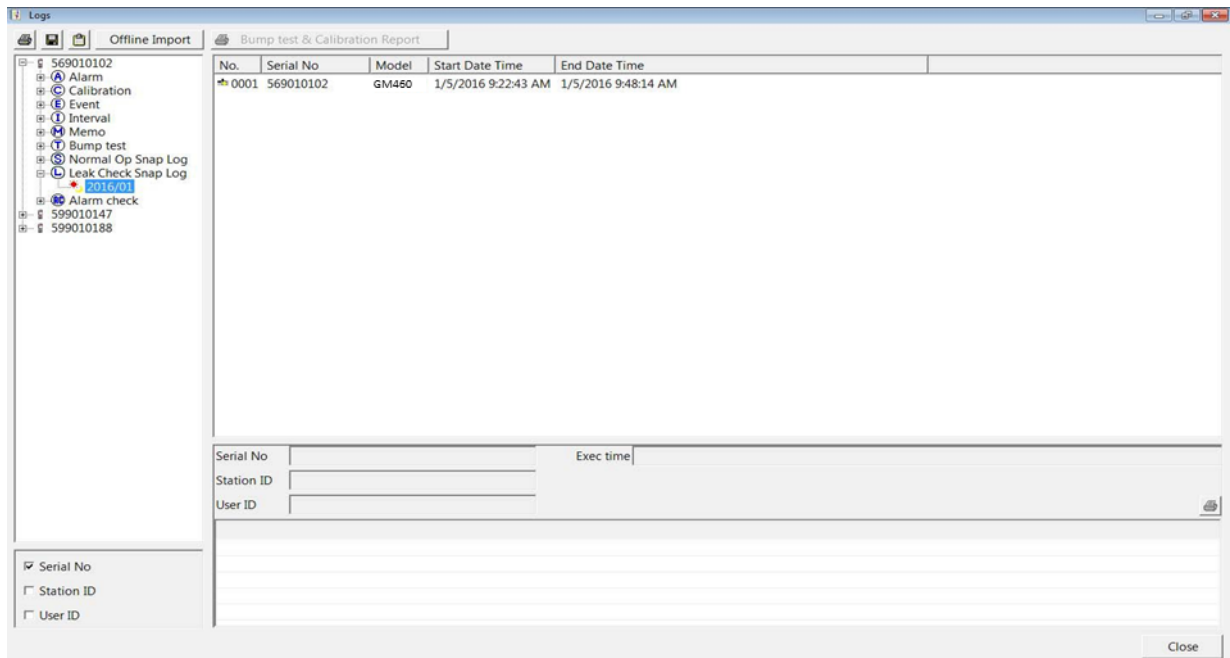
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## Leak Check Snap Log Data

The GM460's **Snap Log Mode** in **Leak Check Mode** allows you to record leak check data at a specific time and have it saved to the data logger. When a GM460 is connected to the PC Controller Program and a complete download is performed, the leak check snap log files are retrieved and stored by the program. Leak check snap log data can also be imported using the **SD Import** or **Net Import** buttons. To view and perform desired operations with the leak check snap log files:

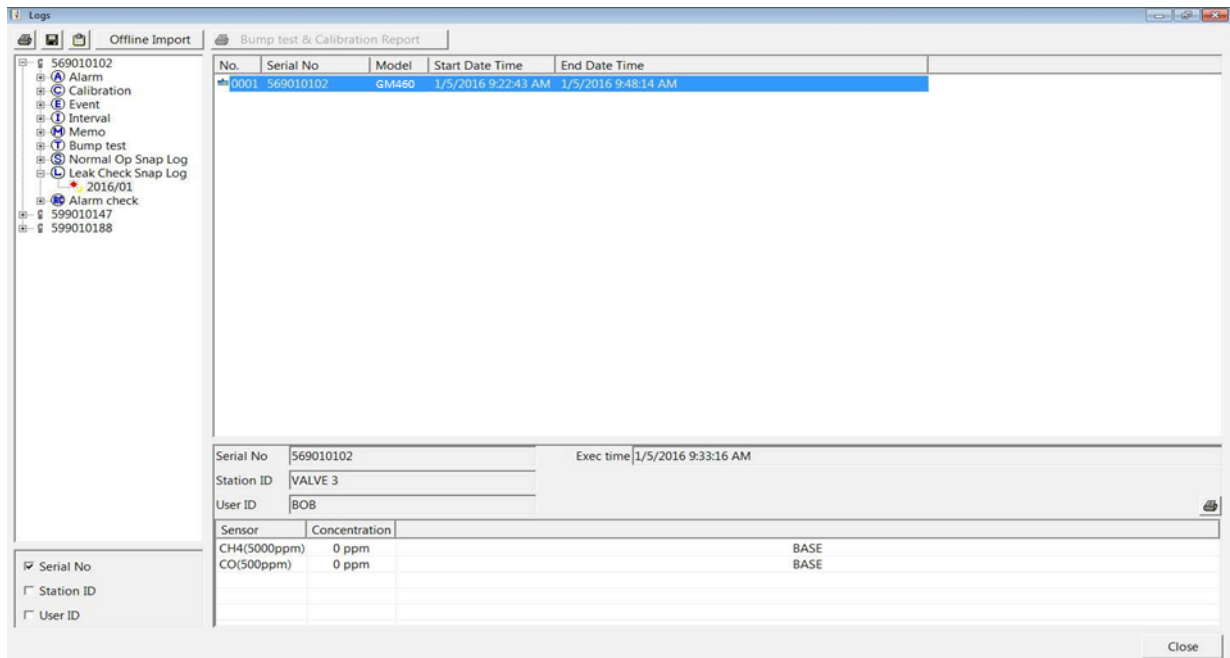
1. While in the **Logs** window, find your GM460 by serial number then click the expanded view symbol (+) or double-click the serial number folder to view the contents.
2. Click the expanded view symbol (+) or double-click the **Leak Check Snap Log** folder to view the contents. Leak check snap log data folders are arranged by year/month.

- Click the year/month folder you want to view. All leak check snap log data files for that GM460 in that particular year/month will appear in the upper-right frame. One snap log file is generated for all leak check snap logs taken during an operating session. If you turn the instrument off and turn it back on, a new snap log file will be created. The file number, serial number, model, start date/ time, and end date/time appear in the same line. The start date/time corresponds to the date and time that the instrument was turned on. The end date/time corresponds to the date and time that the instrument was turned off.



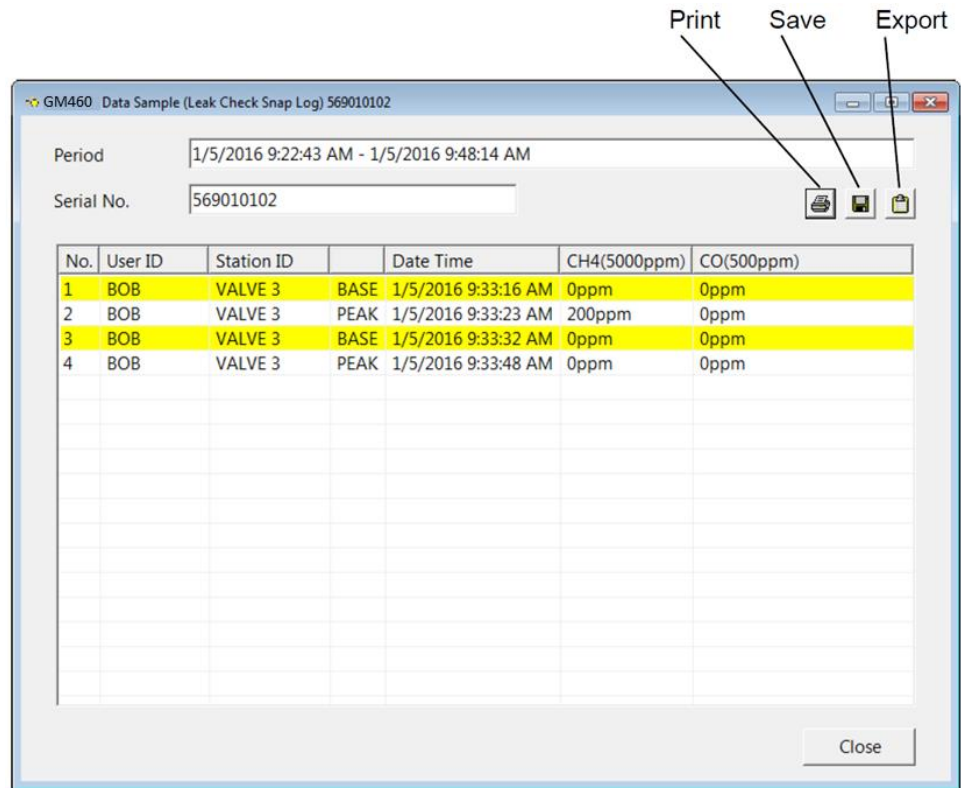
**Figure 6-28: Viewing Leak Check Snap Log Files**

- Click one of the snap log data filenames. A summary will appear in the bottom-right frame with instrument information. It will also show the base gas reading for the snap logs taken during the operating session.



**Figure 6-29: Viewing Leak Check Snap Log Data**

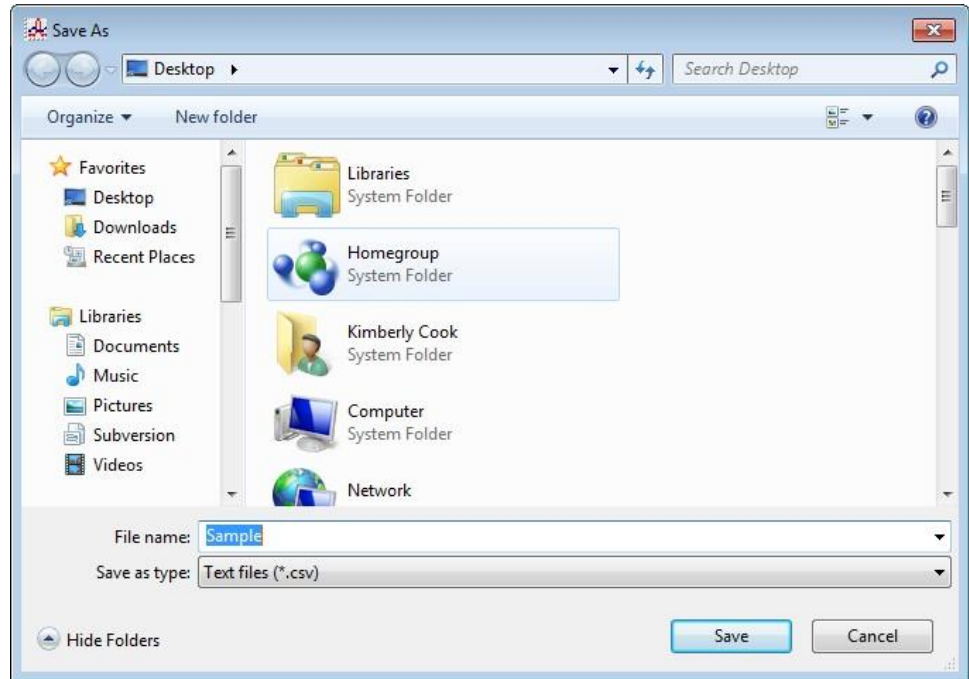
5. To view all of the data in the snap log file, double-click the filename. All of the snap logs taken during the operating session will be displayed. The base and peak readings can be viewed along with the user ID, station ID, and date/time that the snap log was taken.



**Figure 6-30: Data View - Leak Check Snap Log**

6. If **CO DISPLAY** was set to **ON** when the leak check snap log data was saved then CO readings can be viewed in this screen.
7. To print the detailed leak check snap log data, click the **Print** control button in the upper-right corner of the screen. A dialog box will appear confirming you want to print. Click **OK**.

8. To save the detailed leak check snap log data, click the **Save** control button in the upper-right corner. A “**Save As**” dialog box will appear for you to specify the filename and file location.



**Figure 6-31: Save As Dialog Box**

9. Specify the filename and location and click **Save**.
10. To copy detailed leak check snap log data to the clipboard, be sure the desired date folder is selected and click the **Save to Clipboard** control button. The data will be saved to the clipboard. It can then be pasted into a document by using the **Paste** command in an application.

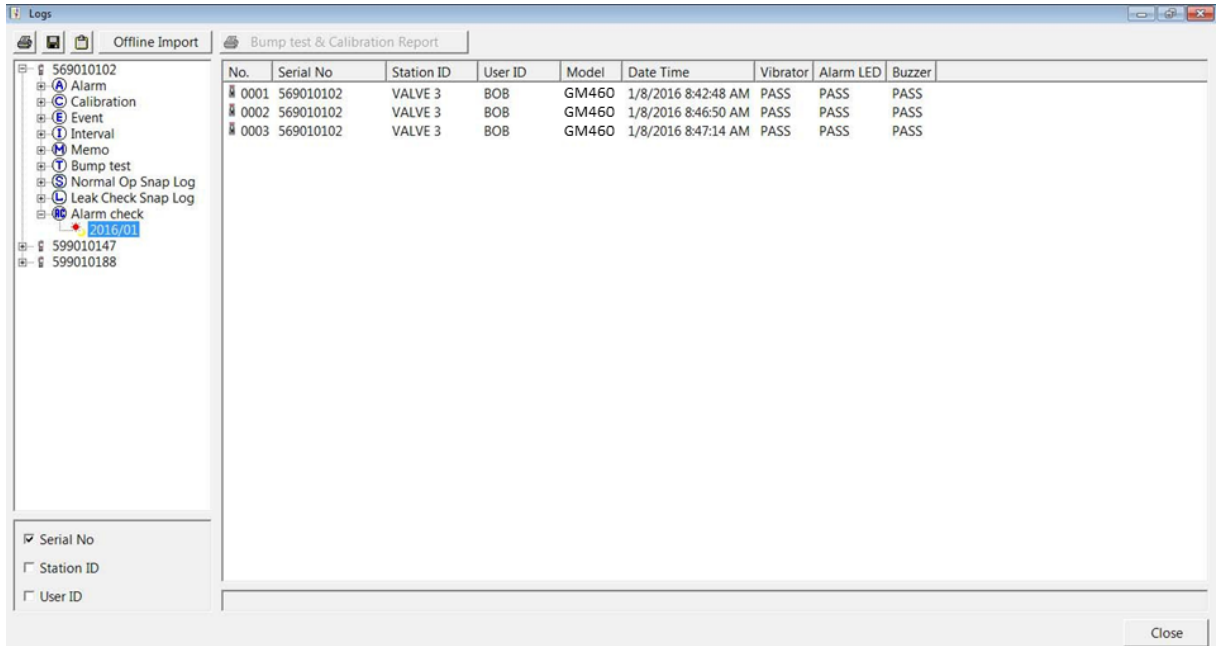
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## Alarm Check Data

All alarm checks performed by the PC Controller Program are stored by the program. Alarm check data can also be imported using the **SD Import** or **Net Import** buttons. To view and perform desired operations with the alarm check files:

1. While in the **Logs** window, find your GM460 by serial number then click the expanded view symbol (+) or double-click the serial number folder to view the contents.
2. Click the expanded view symbol (+) or double-click the **Alarm Check** folder to view the contents. Alarm check data folders are arranged by year/month.

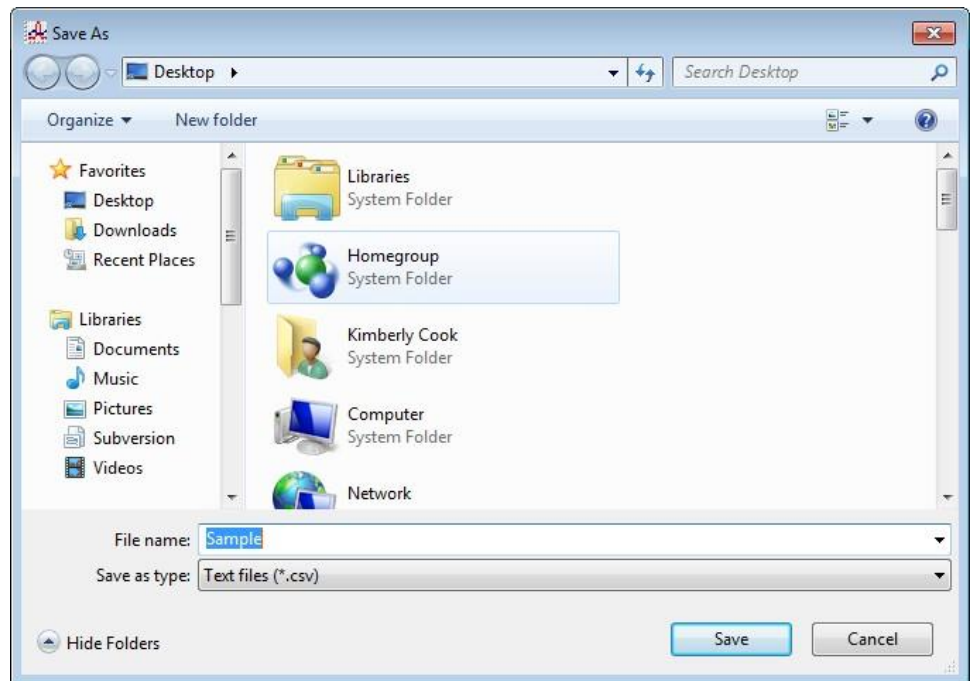
- Click the year/month folder you want to view. All alarm check data files for that GM460 in that particular year/month will appear in the upper-right frame. The file number, serial number, station ID, user ID, model, date/time of the alarm check, and the results appear in the same line.



**Figure 6-32: Viewing Alarm Check Log Files**

- Files that record a failed alarm check on all tests are highlighted in red. Files that record an alarm check where not all tests passed are highlighted in orange.
- To print alarm check data from a date folder, be sure the desired date folder is selected and click the **Print** control button in the upper-left corner of the **Logs** window. A dialog box will appear confirming you want to print. Click **OK**.

6. To save alarm check data from a specific date folder, be sure the desired date folder is highlighted and click the **Save** control button in the upper-left corner of the **Logs** window. A “**Save As**” dialog box will appear for you to specify the filename and file location.



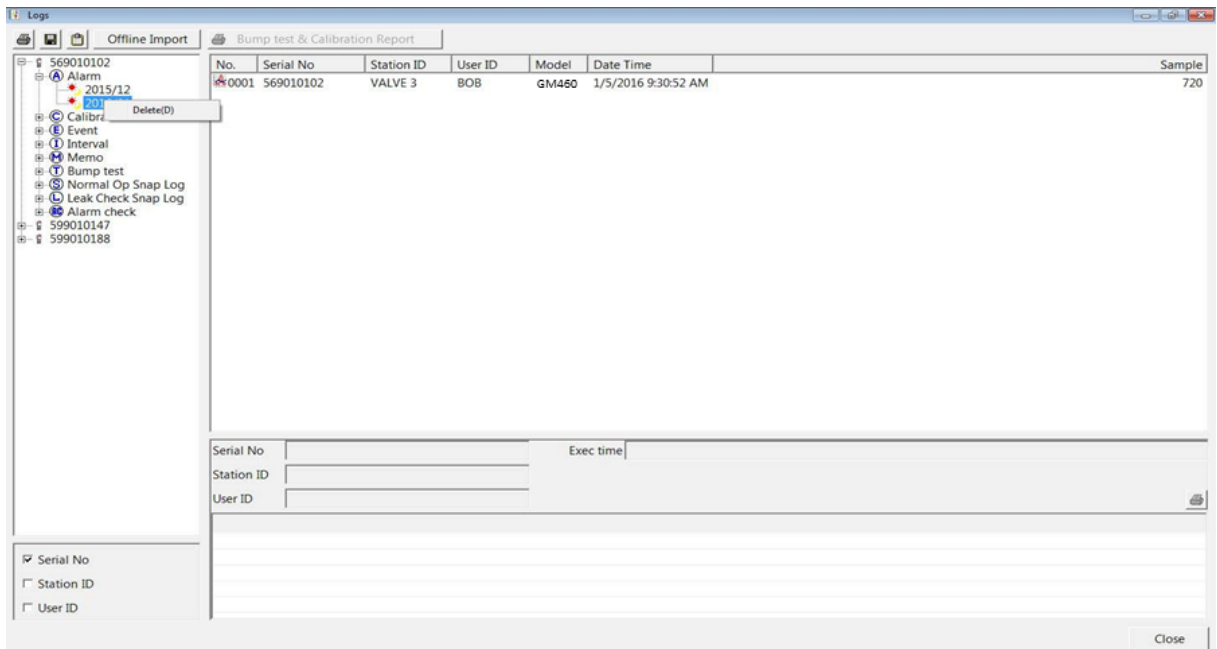
**Figure 6-33: Save As Dialog Box**

7. The file type will be “.csv” (comma separated values).
8. Specify the filename and location and click **Save**.
9. To copy alarm check data in a date folder to the clipboard, be sure the desired date folder is selected and click the **Save to Clipboard** control button. The data will be saved to the clipboard. It can then be pasted into a document by using the **Paste** command in an application.



## Deleting Data in the Logs Window

Data can be deleted from the **Logs** window by right-clicking on the folder or file you want to delete. Any file or folder except for **Memo** data may be deleted.



**Figure 6-34: Deleting Data in the Logs Window**

1. Right-click on the folder or file you want to delete and click **Delete**.
2. You will be prompted for a password. The factory set password is ABCDE. It is case-sensitive. After you have entered the password, click **OK**.
3. To delete the folder or file, click **OK** in the confirmation window that comes up to delete the data or click **Cancel**.

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## CHAPTER 7

# Instrument Function Menu

## Instrument Function Menu

When you are in the main program window, if you right-click on a GM460 or a docking station, the **Instrument Function Menu** appears.

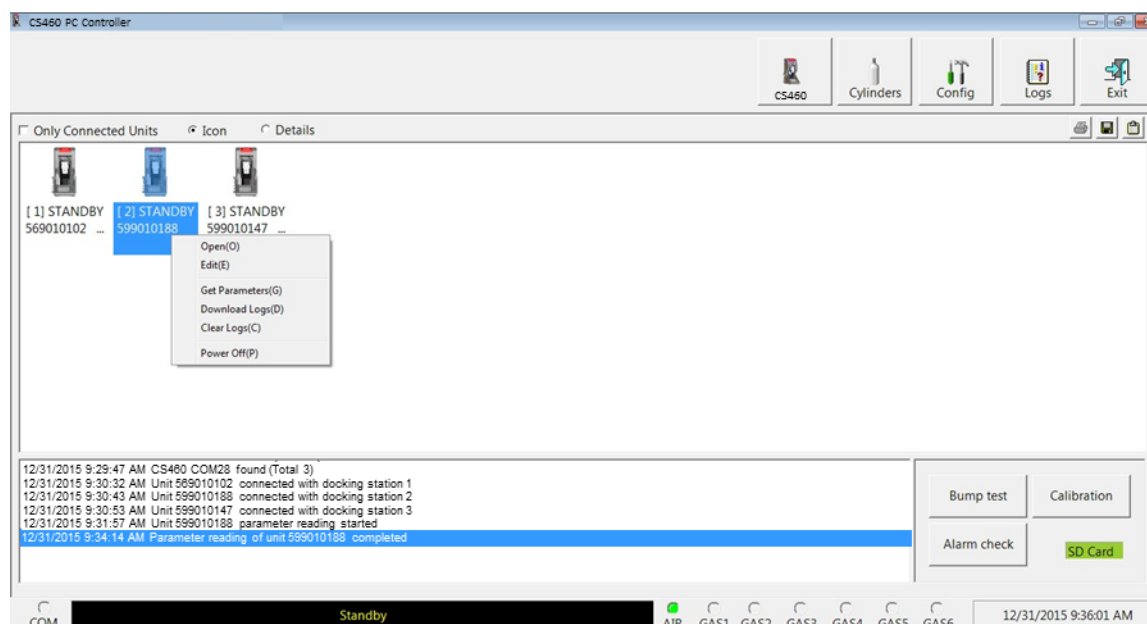


Figure 7-1: Instrument Function Menu

The functions in the Instrument Function Menu are **Open**, **Edit**, **Get Parameters**, **Download Logs**, **Clear Logs**, and **Power Off**. **Open** and **Edit** are only selectable if a **Get Parameters** operation has been performed. **Open** and **Edit** will not become selectable if only a **Download Logs** operation has been performed.

- If you right-click on a GM460 that is currently connected to a docking station and has had a **Get Parameters** operation performed on it, all items in the **Instrument Function** menu are selectable as shown in figure above.
- If you right-click on a GM460 that is not currently connected to the CS460 PC Controller Program but that has previously been connected and had a **Get Parameters** operation performed on it, only the **Open** function is selectable. The other functions will be grayed out.

- If you right-click on a CS460 that is connected to the CS460 PC Controller Program but does not have a GM460 in it, no functions will be selectable.

## Open Function

This function can be activated by either right-clicking a GM460 and selecting **Open(O)** when the pull-down menu appears or by selecting a GM460 and then using the **<Alt><O>** key combination. The **Open** function brings up the **Instrument Information** window for viewing only. No changes can be made with the **Open** function. The **Instrument Information** window consists of the **Parameter** tab, the **Sensor** tab, and the **Station & User** tab. For further explanation of each tab, see the next section.

569010102

Serial No. 569010102 Station ID VALVE 3 Date Time 1/4/2016 9:34:42 AM  
Model GM460 User ID BOB Load Date 1/4/2016 9:36:35 AM

Parameter Sensor Station & User

Serial No. 569010102  
Station ID VALVE 3  
User ID BOB

Cal Interval(Day) 90  
Interval Time(Sec) 30

Memo

Option 1 Option 2 Option 3 Option 4

OXY Alarm Pattern ☒ Falling and Rising ☐ Both Alarms Falling ☐ Both Alarms Rising  
Cal past due Act ☒ Confirm to Cal ☐ Must Calibrate ☐ Notification Only  
Cal Check Gas 4GAS

☒ Alarm Latching ☒ Cal Reminder ☒ Data Log Overwrite ☒ Data Log Remain  
☒ Alarm Silence ☐ Lunch Break ☒ Data Log Memory  
☒ User/StationID ☐ Auto Fresh Air Adj ☒ Zero Adjustment on demand ☐ Pump OFF Display

(Left space 0) OK Cancel

**Figure 7-2: Instrument Information Window, Parameter Tab**

To exit the **Instrument Information** window and return to the Main program window, click **Cancel**.

# Edit Function

In order for the **Edit** function to be active, you must first perform a **Get Parameters** operation for the GM460(s) whose parameters you want to edit.

This function can be activated by either right-clicking a GM460 and selecting **Edit(E)** when the pull-down menu appears or by selecting a GM460 and then using the <Alt><E> key combination.

All of the parameters that can be changed in the **Edit** function tabs are GM460 parameters only. Any changes made do not affect the CS460 or the PC Controller Program.

## Note

If a sensor has been removed from the GM460 but that sensor's channel has not been turned **OFF** in the GM460's Maintenance Mode 2 before connecting the instrument to the PC Controller Program, the Edit function cannot be utilized without an error occurring. Be sure to disable any channels whose sensors have been removed before connecting a GM460 to the PC Controller Program.

## Parameter Tab

The **Parameter** tab is selected when the **Edit** function is opened. This tab allows you to view and change various instrument parameters and settings and has information in four sub-tabs: the **Option 1** tab, the **Option 2** tab, the **Option 3** tab, and the **Option 4** tab.

The table below lists the instrument parameters shown in the **Parameter** tab along with the parameter's available choices and the factory setting.

Table 7-1: Parameters

Parameter Tab Name	Sub Tab Location	Available Choices	Factory Setting
<a href="#">Serial No.</a>	N/A		
<a href="#">Station ID</a>	N/A		
<a href="#">User ID</a>	N/A		
<a href="#">Cal Interval (Day)</a>	N/A	1 to 365 days	90 days
<a href="#">Interval Time (Sec)</a>	N/A	<ul style="list-style-type: none"><li>• 10 sec</li><li>• 20 sec</li><li>• 30 sec</li><li>• 60 sec</li><li>• 180 sec</li><li>• 300 sec</li><li>• 600 sec</li></ul>	30 sec
<a href="#">Oxy Alarm Pattern</a>	Option 1	<ul style="list-style-type: none"><li>• Falling and Rising</li><li>• Both Alarms Falling</li><li>• Both Alarms Rising</li></ul>	Falling and Rising

Parameter Tab Name	Sub Tab Location	Available Choices	Factory Setting
<a href="#">Cal Past Due Act</a>	Option 1	<ul style="list-style-type: none"> <li>Confirm to Cal</li> <li>Must Calibrate</li> <li>Notification Only</li> </ul>	Confirm to Cal
<a href="#">Cal Check Gas</a>	Option 1	<ul style="list-style-type: none"> <li>4GAS</li> <li>ALL</li> </ul>	4GAS
<a href="#">Alarm Latching</a>	Option 1	<ul style="list-style-type: none"> <li>selected</li> <li>not selected</li> </ul>	selected
<a href="#">Alarm Silence</a>	Option 1	<ul style="list-style-type: none"> <li>selected</li> <li>not selected</li> </ul>	selected
<a href="#">User/Station ID</a>	Option 1	<ul style="list-style-type: none"> <li>selected</li> <li>not selected</li> </ul>	not selected
<a href="#">Cal Reminder</a>	Option 1	<ul style="list-style-type: none"> <li>selected</li> <li>not selected</li> </ul>	selected
<a href="#">Lunch Break</a>	Option 1	<ul style="list-style-type: none"> <li>selected</li> <li>not selected</li> </ul>	not selected
<a href="#">Auto Fresh Air Adj</a>	Option 1	<ul style="list-style-type: none"> <li>selected not selected</li> </ul>	not selected
<a href="#">Data Log Overwrite</a>	Option 1	<ul style="list-style-type: none"> <li>selected</li> <li>not selected</li> </ul>	selected
<a href="#">Data Log Memory</a>	Option 1	<ul style="list-style-type: none"> <li>selected</li> <li>not selected</li> </ul>	selected
<a href="#">Zero Adjustment on Demand</a>	Option 1	<ul style="list-style-type: none"> <li>selected</li> <li>not selected</li> </ul>	selected
<a href="#">Data Log Remain</a>	Option 1	<ul style="list-style-type: none"> <li>selected</li> <li>not selected</li> </ul>	selected
<a href="#">Pump OFF Display</a>	Option 1	<ul style="list-style-type: none"> <li>selected</li> <li>not selected</li> </ul>	not selected
<a href="#">Language</a>	Option 2	<ul style="list-style-type: none"> <li>English</li> <li>Japanese</li> <li>Spanish</li> <li>German</li> <li>French</li> <li>Portuguese</li> <li>Russian</li> <li>Korean</li> <li>Italian</li> </ul>	English
<a href="#">Backlight Delay</a>	Option 2	0 to 255 seconds	30 seconds
<a href="#">LCD Contrast</a>	Option 2	1 to 50	25
<a href="#">LCD Auto Invert</a>	Option 2	<ul style="list-style-type: none"> <li>selected</li> <li>not selected</li> </ul>	selected
<a href="#">Peak Bar Display</a>	Option 2	<ul style="list-style-type: none"> <li>selected</li> <li>not selected</li> </ul>	not selected

Parameter Tab Name	Sub Tab Location	Available Choices	Factory Setting
<a href="#">LB Mode</a>	Option 2	<ul style="list-style-type: none"> <li>• OFF</li> <li>• LEAK CHECK ONLY</li> <li>• BAR HOLE ONLY</li> <li>• BH &amp; LC</li> </ul>	OFF
<a href="#">BH Measuring Time</a>	Option 2	<ul style="list-style-type: none"> <li>• 30 sec</li> <li>• 45 sec</li> <li>• 60 sec</li> </ul>	30 sec
<a href="#">User Mode Protection</a>	Option 2	<ul style="list-style-type: none"> <li>• selected</li> <li>• not selected</li> </ul>	not selected
<a href="#">Password Protection</a>	Option 2	<ul style="list-style-type: none"> <li>• selected</li> <li>• not selected</li> </ul>	not selected
<a href="#">Maintenance Mode Protection</a>	Option 2	<ul style="list-style-type: none"> <li>• selected</li> <li>• not selected</li> </ul>	selected
<a href="#">Leak Check Buzzer</a>	Option 2	<ul style="list-style-type: none"> <li>• selected</li> <li>• not selected</li> </ul>	selected
<a href="#">Leak Check with CO</a>	Option 2	<ul style="list-style-type: none"> <li>• selected</li> <li>• not selected</li> </ul>	not selected
<a href="#">Confirmation</a>	Option 2	<ul style="list-style-type: none"> <li>• selected</li> <li>• not selected</li> </ul>	not selected
<a href="#">Bump Test Function</a>	Option 3	<ul style="list-style-type: none"> <li>• selected</li> <li>• not selected</li> </ul>	not selected
<a href="#">Bump Test Time Remaining</a>	Option 3	<ul style="list-style-type: none"> <li>• selected</li> <li>• not selected</li> </ul>	not selected
<a href="#">Bump Test Interval (Day)</a>	Option 3	0 to 30 days	30 days
<a href="#">Bump Test Past Due Act</a>	Option 3	<ul style="list-style-type: none"> <li>• Confirm to Bump Test</li> <li>• Must Bump Test</li> <li>• Notification Only</li> </ul>	Confirm to Bump Test
<a href="#">Bump Check Gas</a>	Option 3	<ul style="list-style-type: none"> <li>• 4GAS</li> <li>• ALL</li> </ul>	4GAS
<a href="#">Bump Test Time (Sec)</a>	Option 3	<ul style="list-style-type: none"> <li>• 30 sec</li> <li>• 45 sec</li> <li>• 60 sec</li> <li>• 90 sec</li> </ul>	30 sec
<a href="#">Calibration After Bump Test Failed</a>	Option 3	<ul style="list-style-type: none"> <li>• selected</li> <li>• not selected</li> </ul>	selected
<a href="#">Bump Test Threshold (%)</a>	Option 3	10 to 50%	30%
<a href="#">Calibration Time (sec) After Bump Test Failed</a>	Option 3	<ul style="list-style-type: none"> <li>• 90 sec</li> <li>• 120 sec</li> </ul>	90 sec
<a href="#">Panic</a>	Option 4	<ul style="list-style-type: none"> <li>• selected</li> <li>• not selected</li> </ul>	selected

Parameter Tab Name	Sub Tab Location	Available Choices	Factory Setting
<a href="#">Man Down</a>	Option 4	<ul style="list-style-type: none"> <li>selected</li> <li>not selected</li> </ul>	not selected
<a href="#">Man Down 1</a>	Option 4	10 to 120 sec	60 sec
<a href="#">Man Down 2</a>	Option 4	10 to 120 sec	75 sec
<a href="#">Man Down Alarm</a>	Option 4	10 to 120 sec	90 sec
<a href="#">Inert Function</a>	Option 4	<ul style="list-style-type: none"> <li>selected</li> <li>not selected</li> </ul>	not selected
<a href="#">Warning</a>	Option 4		5.0%
<a href="#">Alarm</a>	Option 4		10.0%
<a href="#">Date Format</a>	Option 4	<ul style="list-style-type: none"> <li>DD/MM/YYYY</li> <li>MM/DD/YYYY</li> <li>YYYY/MM/DD</li> </ul>	MM/DD/YYYY
<a href="#">Key Tone</a>	Option 4	<ul style="list-style-type: none"> <li>selected</li> <li>not selected</li> </ul>	selected
<a href="#">IR Auto Range</a>	Option 4	<ul style="list-style-type: none"> <li>selected</li> <li>not selected</li> </ul>	selected
<a href="#">Destination</a>	Option 4	<ul style="list-style-type: none"> <li>Japan</li> <li>Other</li> </ul>	Other

Several parameters are always selectable and do not depend on which sub-tab is selected.

Parameter	Description
<b>Serial No.</b>	To change the current GM460 serial number, place the cursor in the <b>Serial No.</b> field and enter the desired serial number. If you change the serial number, once you upload the changes to the GM460 and return to the main program window, the PC Controller Program will indicate that the GM460 with the old serial number was disconnected. A GM460 with the new serial number will then connect to the PC Controller Program.
<b>Station ID</b>	To change the station ID, select the drop-down menu and select the desired station ID. To change the station ID list, see <a href="#">"Station &amp; User Tab" (in this chapter)</a> .
<b>User ID</b>	To change the user ID, select the drop-down menu and select the desired station ID. To change the user ID list, see <a href="#">"Station &amp; User Tab" (in this chapter)</a> .
<b>Cal Interval (Day)</b>	The calibration interval is the length of time between scheduled calibrations. To change the calibration interval, use the arrows to the right of the current value to increase or decrease the interval. You may also highlight the current setting and type in the new desired setting. It can be set anywhere between 1 and 365 days. The factory setting is 90 days.



Parameter	Description
<b>Interval Time (Sec)</b>	The interval time is how often the GM460 will log interval trend readings. It can be set to 10, 20, 30 (factory setting), 60, 180, 300, or 600 seconds. To change the interval time, use the arrows to the right of the current value to increase or decrease it. You may also highlight the current setting and type in the new desired setting. The value that you type in must match the allowable interval settings. If it does not, when you save your changes, your entered value will be shifted to the closest match. For example, if you enter 90 seconds, when you save the changes, the interval will adjust itself to 60 seconds.

## Memo Section

The **Memo** section of the **Parameter** tab allows you to enter remarks for a GM460 that is connected to the program. The Memo may be used to document anything of interest, such as maintenance records (noting when a sensor or a battery pack was changed). The **Memo** section is empty until you enter information.

The first time information is entered, a Memo file is created in the **Logs** window. If the Memo is changed in the same operating session, that Memo file is updated. When the GM460 is disconnected from the PC Controller Program and connected again, a new Memo file is created with the current memo. If you edit the memo field in that operating session, the new Memo file is updated. If you clear the Memo field for a GM460, the Memo file that was created when the GM460 was connected to the PC Controller Program will be deleted since it is now empty. All memos from previous operating sessions will always be available in the Logs window. They cannot be deleted.

To enter information into the Memo section:

1. Place the cursor in the **Memo** field. If a memo has been previously entered, it will still appear in the Memo field.
2. If necessary, delete the old memo. Enter the information you want to document.
3. Click the **OK** button in the lower-right corner of the window. A confirmation screen will appear asking if you would like to save the changes you have made. To save the changes and return to the main program window, click **Yes**. To return to the main program window without saving your changes, click **No**. To return to the Parameter tab and update your changes, click **Cancel**.

To return to the main program window without saving any changes, click **Cancel** in the lower-right corner of the window.

## Option 1 Sub Tab

**Figure 7-3: Parameter Tab, Option 1**

The adjustable parameters in the **Option 1** tab are:

Parameter	Description
<b>OXY Alarm Pattern</b>	<p>The oxygen alarms can be set to <b>Falling and Rising</b>, <b>Both Alarms Falling</b>, or <b>Both Alarms Rising</b>. If set to <b>Falling and Rising</b> (factory setting), the first oxygen alarm will be a decreasing alarm and the second oxygen alarm will be an increasing alarm.</p> <p>If set to <b>Both Alarms Falling</b>, both oxygen alarms will be decreasing alarms. If set to <b>Both Alarms Rising</b>, both oxygen alarms will be increasing alarms.</p>
<b>Cal Past Due Act</b>	<p>The <b>Cal Past Due Act</b> determines how the GM460 will react to a needed calibration during the start-up sequence. If <b>Cal Past Due Act</b> is set to <b>Confirm to Cal</b> (factory setting), the GM460 will sound an alarm and you will have to press and release the <b>RESET</b> button to continue.</p> <p>If set to <b>Must Calibrate</b>, the GM460 cannot be used until a calibration has been performed. If set to <b>Notification Only</b>, the GM460 will display that a calibration is due but will continue with the warm up sequence. See the GM460 Operator's Manual for a description of the start-up sequence.</p>

Parameter	Description
<b>Cal Check Gas</b>	<p>The <b>Cal Check Gas</b> defines which sensors are used to update the calibration reminder screen. With <b>Cal Check Gas</b> set to <b>4 GAS</b> (factory setting), the calibration dates for only the standard four sensors (<b>LEL</b>, <b>O<sub>2</sub></b>, <b>H<sub>2</sub>S</b>, and <b>CO</b>) are used to determine if a calibration is due.</p> <p>With <b>Cal Check Gas</b> set to <b>ALL</b>, the calibration dates for the standard four sensors along with the PID sensor and any other installed smart sensors are used to determine if a calibration is due.</p>
<b>Alarm Latching</b>	<p>With <b>Alarm Latching</b> selected (factory setting), the GM460 remains in alarm condition until the alarm condition passes <i>and</i> the <b>RESET</b> button is pressed.</p> <p>With <b>Alarm Latching</b> not selected, the GM460 automatically resets an alarm when the alarm condition passes.</p>
<b>Alarm Silence</b>	<p>With <b>Alarm Silence</b> selected (factory setting), pressing and releasing the <b>RESET</b> button silences the buzzer when the GM460 is in a gas alarm. The LEDs continue to flash and the display continues to show the alarm. When the gas concentration falls below the alarm level, pressing and releasing <b>RESET</b> clears all alarm indications for that alarm.</p> <p>With <b>Alarm Silence</b> not selected, you cannot silence the buzzer. You must wait until the alarm condition clears before you can press <b>RESET</b> to clear the alarm indications.</p>
<b>User/Station ID</b>	<p>With <b>User/Station ID</b> selected, the <b>User ID</b> and <b>Station ID</b> screens display during startup and in Display Mode.</p> <p>With <b>User/Station ID</b> not selected (factory setting), the User ID and Station ID screens do not display during startup or in Display Mode.</p>
<b>Cal Reminder</b>	<p>With <b>Cal Reminder</b> selected (factory setting), the GM460 will give an indication at start up if it is due for calibration. The type of indication will depend on the <b>Cal Past Due Act</b> setting.</p> <p>With <b>Cal Reminder</b> not selected, there will be no indication at start up if the instrument is due for calibration.</p>

Parameter	Description
<b>Lunch Break</b>	<p>With <b>Lunch Break</b> not selected (factory setting), the GM460 automatically starts new TWA and PEAK reading collection and resets the time in operation at startup.</p> <p>With <b>Lunch Break</b> selected, the <b>Lunch Break</b> screen displays during startup. From this screen, you can choose to continue accumulating TWA and PEAK readings and the time in operation from the last time the GM460 was used or start collecting new readings and reset the time in operation.</p>
<b>Auto Fresh Air Adj</b>	<p>With <b>Auto Fresh Air Adj</b> selected, the GM460 will perform a fresh air adjustment after the start up sequence.</p> <p>If <b>Auto Fresh Air Adj</b> is not selected (factory setting), the GM460 will not perform a fresh air adjustment after the start up sequence.</p>
<b>Data Log Overwrite</b>	<p>With <b>Data Log Overwrite</b> selected (factory setting), the GM460 writes over the oldest data with new data when the data logger memory is full.</p> <p>With <b>Data Log Overwrite</b> not selected, the GM460 stops saving data to the data logger when the data logger memory is full.</p>
<b>Data Log Memory</b>	<p>With <b>Data Log Memory</b> selected (factory setting), the <b>LOG CLEAR</b> screen appears in <b>Display Mode</b> and asks whether you want to clear the logged data.</p> <p>With <b>Data Log Memory</b> not selected, the <b>LOG CLEAR</b> Screen does not appear in <b>Display Mode</b>.</p>
<b>Zero Adjust on Demand</b>	<p>With <b>Zero Adjust on Demand</b> selected (factory setting), you can manually perform a fresh air adjust in <b>Measuring Mode</b> by pressing the <b>▲ AIR</b> button.</p> <p>With <b>Zero Adjust on Demand</b> not selected, you cannot manually perform a fresh air adjust in <b>Measuring Mode</b>.</p>
<b>Data Log Remain</b>	<p>With <b>Data Log Remain</b> selected (factory setting), the <b>Log Time Remaining</b> screen appears in <b>Display Mode</b> and shows the time remaining until the datalogging memory is full.</p> <p>With <b>Data Log Remain</b> not selected, the <b>Log Time Remaining</b> screen does not appear in <b>Display Mode</b>.</p>
<b>Pump OFF Display</b>	<p>With <b>Pump OFF Display</b> selected, the <b>Pump Off</b> screen appears in <b>Display Mode</b> and you can turn off the pump in order to conserve battery power.</p> <p>With <b>Pump OFF Display</b> not selected (factory setting), the <b>Pump Off</b> screen does not appear in <b>Display Mode</b> and you cannot turn the pump off.</p>

## Option 2 Sub Tab

**Figure 7-4: Parameter Tab, Option 2**

The adjustable parameters in the **Option 2** tab are:

Parameter	Description
<b>Language</b>	You can change the language of your GM460 to <b>English</b> (factory setting), <b>Japanese</b> , <b>Spanish</b> , <b>German</b> , <b>French</b> , <b>Portuguese</b> , <b>Russian</b> , <b>Korean</b> , or <b>Italian</b> . Select the drop-down menu and make your selection.
<b>Backlight Delay</b>	The <b>Backlight Delay</b> setting is how long the backlight stays on after the last button push. It can be set anywhere from 0 to 255 seconds. The factory setting is 30 seconds. Use the arrows to the right of the value to make your selection or highlight the existing value and enter the desired value.
<b>LCD Contrast</b>	The <b>LCD Contrast</b> parameter allows you to adjust the display contrast on the GM460. Select the setting so the characters on the display are easy to see. It can be set from 1 to 50. The factory setting is 25. The higher the setting, the darker the characters and LCD background. Use the arrows to the right of the value to make your selection or highlight the existing value and enter the desired value.

Parameter	Description
<b>LCD Auto Invert</b>	<p>If <b>LCD Auto Invert</b> is selected (factory setting), the GM460's LCD will automatically flip if the instrument is turned upside down.</p> <div> <p><b>Note</b></p> <p>Even if LCD Auto Invert is selected, the screens in <b>Calibration Mode</b>, <b>User Mode</b>, and <b>Maintenance Mode</b> will not flip if the instrument is turned upside down.</p> </div> <p>If <b>LCD Auto Invert</b> is not selected, the GM460's LCD will not flip and can only be read when the instrument is right side up. A <b>LOCK</b> symbol will appear at the top of the screen to indicate that the LCD's position is fixed.</p>
<b>Peak Bar Display</b>	<p>If <b>Peak Bar Display</b> is selected, the peak bar appears along the right side of each gas reading in <b>Measuring Mode</b> and on the <b>Peak Screen</b> in <b>Display Mode</b>. It shows the peak readings for each channel in bar graph format.</p> <p>If <b>Peak Bar Display</b> is not selected (factory setting), the peak bars do not appear.</p>
<b>LB Mode</b>	<p>The <b>LB Mode</b> selection allows you to turn on <b>Leak Check Mode</b> (LEAK CHECK ONLY), <b>Bar Hole Mode</b> (BAR HOLE ONLY), or both (BH &amp; LC). If any of these modes are turned on, you will be prompted to select an operational mode when you turn the GM460 on. The factory setting is <b>OFF</b>. To update this parameter, select the drop-down menu and make your selection. See the GM460 Operator's Manual for a description of the operational modes.</p>
<b>BH Measuring Time</b>	<p>The <b>BH Measuring Time</b> parameter only applies to GM460s being used in <b>Bar Hole Mode</b>. The <b>BH Measuring Time</b> is the amount of time the GM460 samples the bar hole. It can be set to 30 (factory setting), 45, or 60 seconds. Use the up and down arrow buttons to make your selection.</p>
<b>User Mode Protection</b>	<p>When <b>User Mode Protection</b> is selected, the GM460 prompts you for a password when you enter <b>User Mode</b> and <b>Calibration Mode</b>. When <b>User Mode Protection</b> is not selected (factory setting), no password is required to enter <b>User Mode</b> or <b>Calibration Mode</b>. The box to the right of this selection allows you to change the password required if <b>User Mode Protection</b> is selected (factory set password is 0405).</p>

Parameter	Description
<b>Password Protection</b>	This parameter is factory set as deselected and should not be changed.
<b>Maintenance Mode Protection</b>	<p>When <b>Maintenance Mode Protection</b> is selected (factory setting), the GM460 prompts you for a password when you enter <b>Maintenance Mode</b>.</p> <p>When <b>Maintenance Mode Protection</b> is not selected, no password is required to enter <b>Maintenance Mode</b>. The box to the right of this selection allows you to change the password required if <b>Maintenance Mode Protection</b> is selected (factory set password is 0006).</p>
<b>Leak Buzzer</b>	If selected (factory setting), the buzzer will operate in <b>Leak Check Mode</b> .
<b>Leak Check with CO</b>	<p>When <b>Leak Check with CO</b> is not selected (factory setting), the CO channel is not displayed in <b>Leak Check Mode</b>.</p> <p>When <b>Leak Check with CO</b> is selected, the CO channel will be displayed in <b>Leak Check Mode</b> but there will be no CO alarms.</p>
<b>Confirmation</b>	<p>When <b>Confirmation</b> is selected, the GM460 periodically double beeps and double flashes the LED arrays to verify that it is operating. The interval between the confirmation alert is user-defined and can be set between 1 and 60 minutes. The factory setting is 5 minutes.</p> <p>When <b>Confirmation</b> is not selected (factory setting), the GM460 does not provide a confirmation alert.</p>

## Option 3 Sub Tab

**Figure 7-5: Parameter Tab, Option 3**

The adjustable parameters in the **Option 3** tab are:

Parameter	Description
<b>Bump Test Function</b>	When <b>Bump Test Function</b> is selected, the <b>BUMP TEST</b> menu item will appear in <b>Calibration Mode</b> .  When <b>Bump Test Function</b> is not selected (factory setting), the <b>BUMP TEST</b> menu item will not appear in <b>Calibration Mode</b> .
<b>Bump Test Time Remaining</b>	When <b>Bump Test Time Remaining</b> is selected, the GM460 will give an indication at start up if it is due for bump testing. The type of indication will depend on the <b>Bump Test Past Due Act</b> setting.  When <b>Bump Test Time Remaining</b> is not selected (factory setting), the GM460 will not give an indication at start up if it is due for bump testing.
<b>Bump Test Interval (Day)</b>	The <b>Bump Test Interval</b> defines the amount of time between bump tests. The time can be set between <b>0</b> and 30 days in one day increments. The factory setting is 30 days. Use the arrows to the right of the value to make your selection or highlight the existing value and enter the desired value.



Parameter	Description
<b>Bump Test Past Due Act</b>	<p>The <b>Bump Test Past Due Act</b> parameter determines how the GM460 will react to a needed bump test during the start-up sequence. If <b>Bump Test Past Due Act</b> is set to <b>Confirm to Bump Test</b> (factory setting), the GM460 will sound an alarm and you will have to press and release the <b>RESET</b> button to continue.</p> <p>If set to <b>Must Bump Test</b>, the GM460 cannot be used until a bump test has been performed. If set to <b>Notification Only</b>, the GM460 will display that a bump test is due but will continue with the warm up sequence. See the GM460 Operator's Manual for a description of the start-up sequence.</p>
<b>Bump Check Gas</b>	<p>The <b>Bump Check Gas</b> parameter defines which sensors are used to update the bump test reminder screen. With <b>Bump Check Gas</b> set to <b>4 GAS</b> (factory setting), the bump test dates for only the standard four sensors (<b>LEL</b>, <b>O<sub>2</sub></b>, <b>H<sub>2</sub>S</b>, and <b>CO</b>) are used to determine if a bump test is due.</p> <p>With <b>Bump Check Gas</b> set to <b>ALL</b>, the bump test dates for the standard four sensors along with the PID sensor and any other installed smart sensors are used to determine if a bump test is due.</p>
<b>Bump Test Time (Sec)</b>	<p>The <b>Bump Test Time</b> parameter is the amount of time that the GM460 is exposed to gas during a bump test. The available choices are 30 (factory setting), 45, 60, and 90 seconds. Use the arrows to the right of the value to make your selection or highlight the existing value and enter the desired value.</p>
<b>Calibration After Bump Test Failed</b>	<p>When <b>Calibration After Bump Test Failed</b> is selected (factory setting), if a bump test fails, the GM460 will automatically begin a calibration.</p> <p>When <b>Calibration After Bump Test Failed</b> is not selected and a bump test fails, nothing will happen.</p>
<b>Bump Test Threshold (%)</b>	<p>The <b>Bump Test Threshold</b> parameter is the bump test tolerance value and is represented as a percentage. It is the percentage that the bump test reading can differ from the actual gas concentration. If the bump test reading differs more, the bump test will fail. The available values are 10%, 20%, 30% (factory setting), 40%, and 50%. Use the arrows to the right of the value to make your selection or highlight the existing value and enter the desired value.</p>

Parameter	Description
<b>Calibration Time (sec) After Bump Test Failed</b>	The <b>Calibration Time After Bump Test Failed</b> parameter is the total time the GM460 is exposed to calibration gas when a bump test fails if <b>Calibration After Bump Test Failed</b> is selected. The bump test time is deducted from the calibration time. For example, if the <b>Calibration Time After Bump Test Failed</b> is set to 90 seconds and the Bump Test Time is set to 30 seconds, if the bump test fails, the GM460 will only be exposed to gas for an additional 60 seconds. The available values are <b>90</b> seconds (factory setting), and 120 seconds. Use the arrows to the right of the value to make your selection or highlight the existing value and enter the desired value.

### Option 4 Sub Tab

**Figure 7-6: Parameter Tab, Option 4**

The adjustable parameters in the **Option 4** tab are:

Parameter	Description
<b>Panic</b>	When <b>Panic</b> is selected (factory setting), a <b>Panic Alarm</b> can be manually initiated by holding down the <b>SHIFT ▼(PANIC)</b> button.  When <b>Panic</b> is not selected, a <b>Panic Alarm</b> cannot be manually initiated.

Parameter	Description
<b>Man Down</b>	<p>When <b>Man Down</b> is selected, the <b>Man Down</b> alarm can be triggered if the GM460 detects no motion for the period of time defined in <b>Man Down 1</b>, <b>Man Down 2</b>, and <b>Man Down Alarm</b> below.</p> <p>When <b>Man Down</b> is not selected (factory setting), the <b>Man Down</b> alarm cannot be triggered.</p>
<b>Man Down 1</b>	<p>The <b>Man Down 1</b> time is the amount of time that has to pass between a <b>Man Down</b> detection and the first preliminary alarm. It can be set in 1 second increments from 10 to 120 seconds. The factory setting is 60 seconds.</p> <p>When setting the <b>Man Down 1</b> time, keep in mind that <b>Man Down Alarm</b> <math>\geq</math> <b>Man Down 2</b> <math>\geq</math> <b>Man Down 1</b>. Use the arrows to the right of the value to make your selection or highlight the existing value and enter the desired value.</p>
<b>Man Down 2</b>	<p>The <b>Man Down 2</b> time is the amount of time that has to pass between a <b>Man Down</b> detection and the second preliminary alarm. It can be set in 1 second increments from 10 to 120 seconds. The factory setting is <b>75</b> seconds.</p> <p>When setting the <b>Man Down 1</b> time, keep in mind that <b>Man Down Alarm</b> <math>\geq</math> <b>Man Down 2</b> <math>\geq</math> <b>Man Down 1</b>. Use the arrows to the right of the value to make your selection or highlight the existing value and enter the desired value.</p>
<b>Man Down Alarm</b>	<p>The <b>Man Down Alarm</b> time is the amount of time that has to pass between a <b>Man Down</b> detection and the main alarm. It can be set in 1 second increments from 10 to 120 seconds. The factory setting is 90 seconds.</p> <p>When setting the <b>Man Down 1</b> time, keep in mind that <b>Man Down Alarm</b> <math>\geq</math> <b>Man Down 2</b> <math>\geq</math> <b>Man Down 1</b>. Use the arrows to the right of the value to make your selection or highlight the existing value and enter the desired value.</p>
<b>Inert Function</b>	<p>When <b>Inert Function</b> is selected, <b>Inert Mode</b> becomes an option in the <b>Mode Select</b> screen when the GM460 turns on. <b>Normal Mode</b> is still an option. See the GM460 Operator's Manual for a description of <b>Inert Mode</b>.</p> <p>When <b>Inert Function</b> is not selected (factory setting), selecting <b>Inert Mode</b> at startup is not an option.</p>
<b>Warning</b>	<p>The <b>Warning</b> parameter is the Warning setpoint for the oxygen channel when the GM460 is used in <b>Inert Mode</b>. The factory setting is 5.0 and it is factory set as a rising alarm. Highlight the existing value and enter the desired value.</p>

Parameter	Description
<b>Alarm</b>	The <b>Alarm</b> parameter is the Alarm setpoint for the oxygen channel when the GM460 is used in <b>Inert Mode</b> . The factory setting is 10.0 and it is factory set as a rising alarm. Highlight the existing value and enter the desired value.
<b>Date Format</b>	The <b>Date Format</b> can be displayed as <b>MM/DD/YYYY</b> (factory setting), <b>DD/MM/YYYY</b> , or <b>YYYY/MM/DD</b> . Select the drop-down menu and make your selection.
<b>Key Tone</b>	When <b>Key Tone</b> is selected (factory setting), the GM460 will beep every time a button is pressed.  When <b>Key Tone</b> is not selected, the GM460 will not beep when a button is pressed.
<b>IR Auto Range</b>	When <b>IR Auto Range</b> is selected (factory setting), the IR channel's gas reading will be displayed in %LEL until the gas level reaches 100 %LEL, or 5.0 %vol for methane. Once the gas reading is above 100 %LEL, it is displayed in %vol. Alarm points exist for the %LEL range but do not exist for the %vol range.  When <b>IR Auto Range</b> is not selected, the IR channel's gas reading will only be displayed in %LEL up to 100 %LEL.
<b>Destination</b>	This parameter should always be set to <b>Other</b> .

To exit the **Parameter** tab, click the **OK** button in the lower-right corner of the window. A confirmation screen will appear asking if you would like to save the changes you have made. To save the changes and return to the main program window, click **Yes**. To return to the main program window without saving your changes, click **No**. To return to the Parameter tab and update your changes, click **Cancel**.

To return to the main program window without saving any changes, click **Cancel** in the lower-right corner of the window.

## Sensor Tab

The **Sensor Tab** displays the alarm settings and auto calibration values for all installed sensors. It also shows the date and time of the most recent calibration and bump test for each channel.

If a PID sensor is installed in the GM460, the PID information will be displayed at the bottom of the **Sensor Tab**. This information is displayed for reference and is not editable. The PID gas must be edited in the GM460's Display Mode.

Parameter	Description
<b>PID No.</b>	The PID No is the library number of the selected PID gas.
<b>Chemical Formula</b>	This shows the chemical formula of the selected gas.
<b>Modulus</b>	The modulus is the selected gas's response factor relative to isobutylene.
<b>GAS Full Name</b>	This field shows the full name of the selected PID gas.

Serial No. 569010102 Station ID VALVE 3 Date Time 12/31/2015 12:49:21 PM  
 Model GM460 User ID BOB Load Date 12/31/2015 12:53:26 PM  
 Logs

Parameter Sensor Station & User

Sensor	Warning	Alarm	STEL	TWA	Auto Cal.	Last Calibration	Channel	Last Bump test
CH4(100%LEL)	10	50	*****	*****	50	11/15/2015 5:51:36 AM	1	11/15/2015 5:51:36 AM
O2(40.0%)	19.5	23.5	*****	*****	12.0	11/15/2015 5:51:36 AM	2	11/15/2015 5:51:36 AM
H2S(100.0ppm)	5.0	30.0	5.0	1.0	25.0	11/15/2015 5:51:36 AM	3	11/15/2015 5:51:36 AM
CO(500ppm)	25	50	200	25	50	11/15/2015 5:51:36 AM	4	11/15/2015 5:51:36 AM
VOC(6000ppm)	400.0	1000	*****	*****	100.0	12/7/2015 12:02:49 PM	5	12/7/2015 12:02:49 PM
HCN(15.0ppm)	5.0	10.0	4.7	*****	10.0	7/1/2015 1:53:37 PM	6	7/1/2015 1:53:37 PM

VOC Information

PID No 382 Chemical Formula C4H8 Modulus 1  
 GAS Full Name Isobutylene

(Left space 0) OK Cancel

**Figure 7-7: Sensor Tab**

Any value in a white box can be changed. Values in shaded boxes cannot be changed. To change a value:

1. Click the box whose value you want to change. The entire box will turn blue.
2. Click the box again and only the value will be highlighted in blue.

3. Type in the new desired value.
4. Repeat steps 1 through 3 for any other values you want to change and then click **OK**.
5. You will be asked if you want to save the changes that you made.
  - Select **Yes** to save the changes. The PC Controller Program will update the GM460 and then return you to the main program window.
  - Select **No** to not save the changes. The PC Controller Program will return you to the main program window.
  - Select **Cancel** to return to the **Sensor** tab and make any additional changes.

## Station & User Tab

With the **Station & User** tab you can update the **Station ID** and **User ID** lists in a connected GM460.

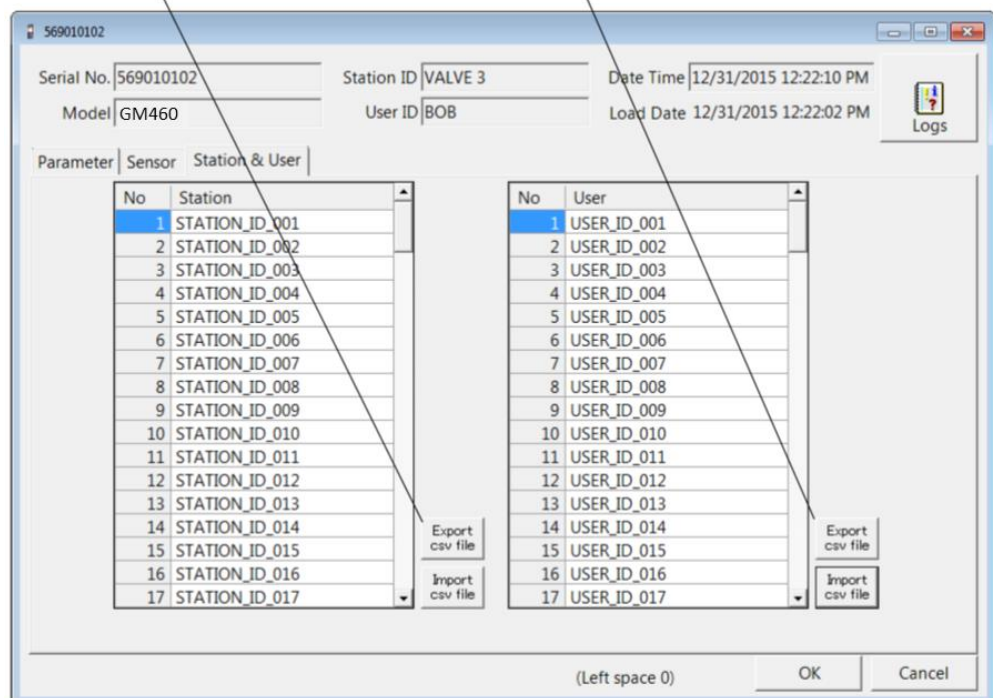
To edit the **Station ID** or **User ID** list, you will need to import a csv (comma-separated values) file into the program. A Station csv file and a User csv file are provided with the CS460 product CD. In addition, you can generate csv files for editing from the program.

### Creating ID Files

1. To create a csv file for editing, click the **Export csv file** button for either the **Station ID** or **User ID** list.

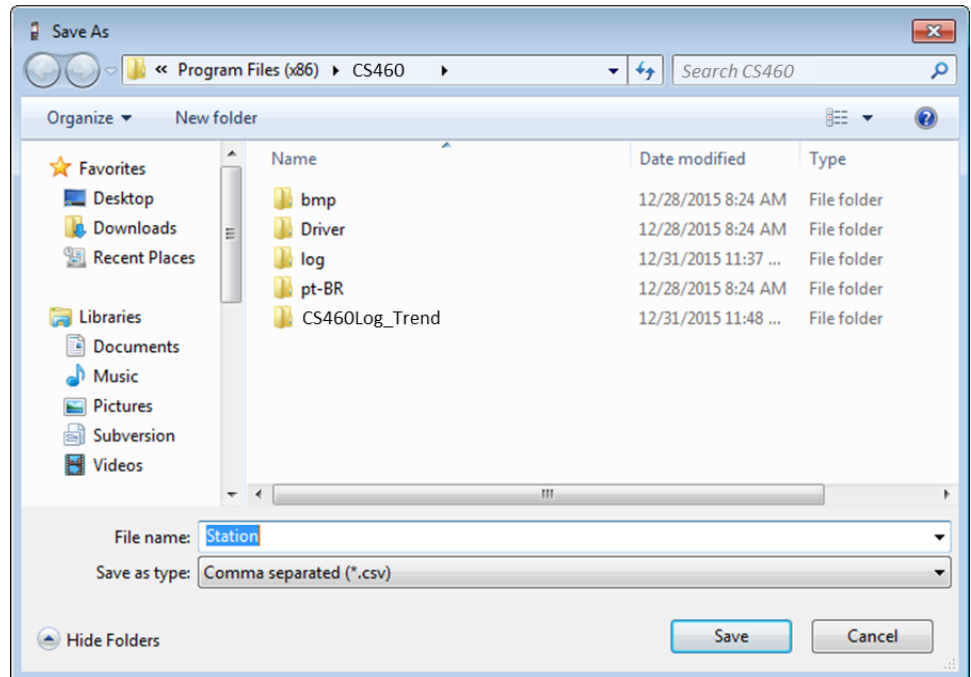
Click to generate Station .csv file

Click to generate User .csv file



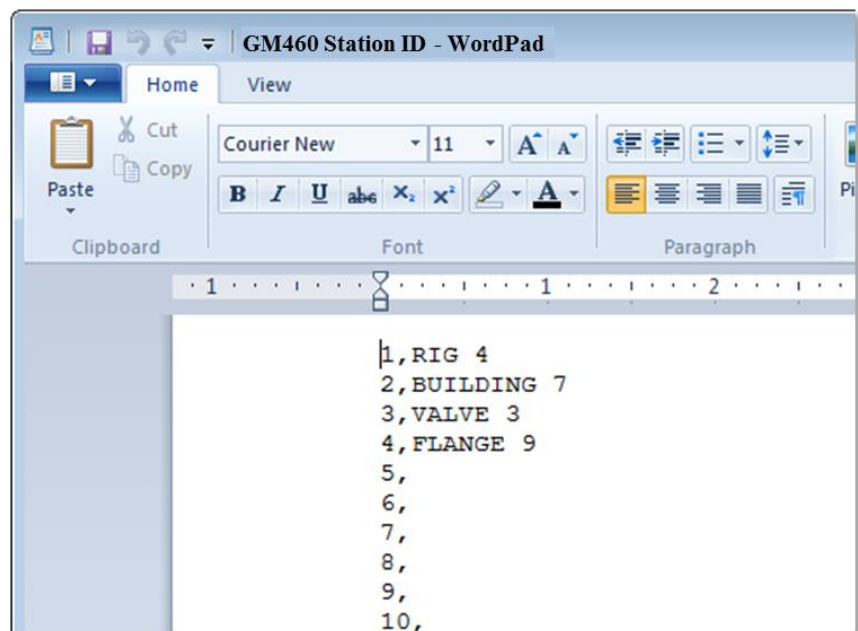
**Figure 7-8: Station and User Tab**

2. Navigate to the location you want to save the file, type in a filename, and click **Save**. You can save multiple station and user ID files.



**Figure 7-9: Save As Screen**

3. The csv files can be opened, edited, and saved using a word processing program such as Microsoft® Word®, WordPad®, or Notepad®. The Station and User csv files consist of the **Station ID** or **User ID** number and its associated name. Below is an example of the Station csv file opened in WordPad®.



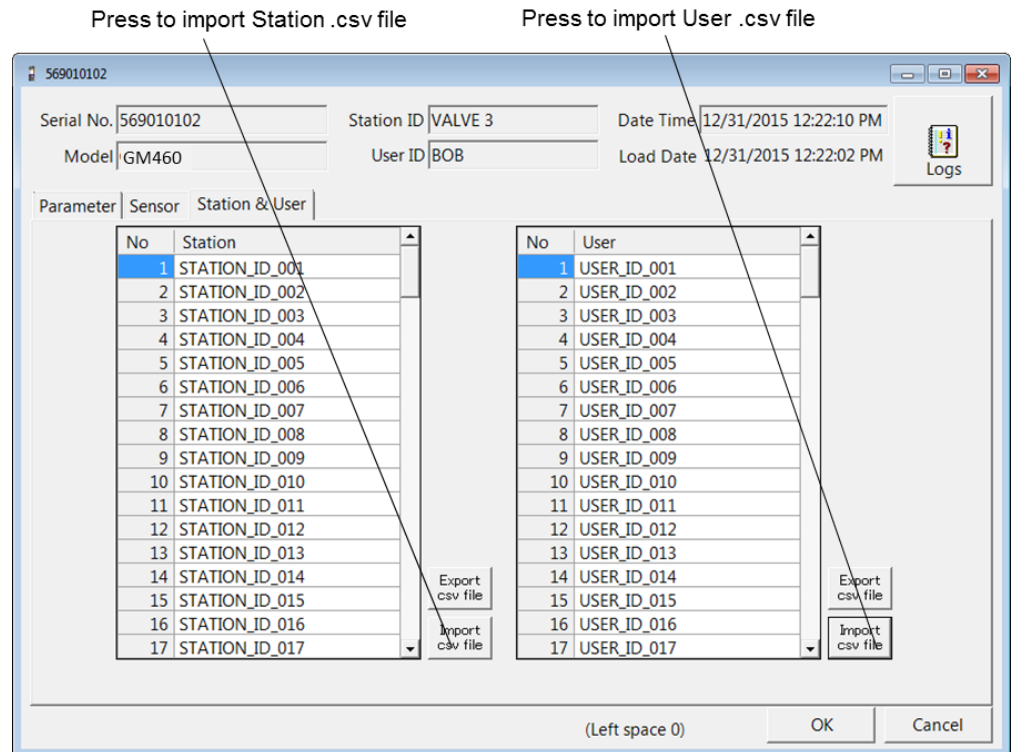
**Figure 7-10: Station ID CSV File Opened in WordPad**

Any existing Station or User IDs will be displayed as **STATION\_ID\_XXX** or **USER\_ID\_XXX** with the “XXX” being the ID number. To edit a **Station ID** or **User ID**, delete the existing name and replace it with the desired name. The name may consist of any letter, number, or character.

4. Save the changes you made to the csv file.

## Loading ID Files

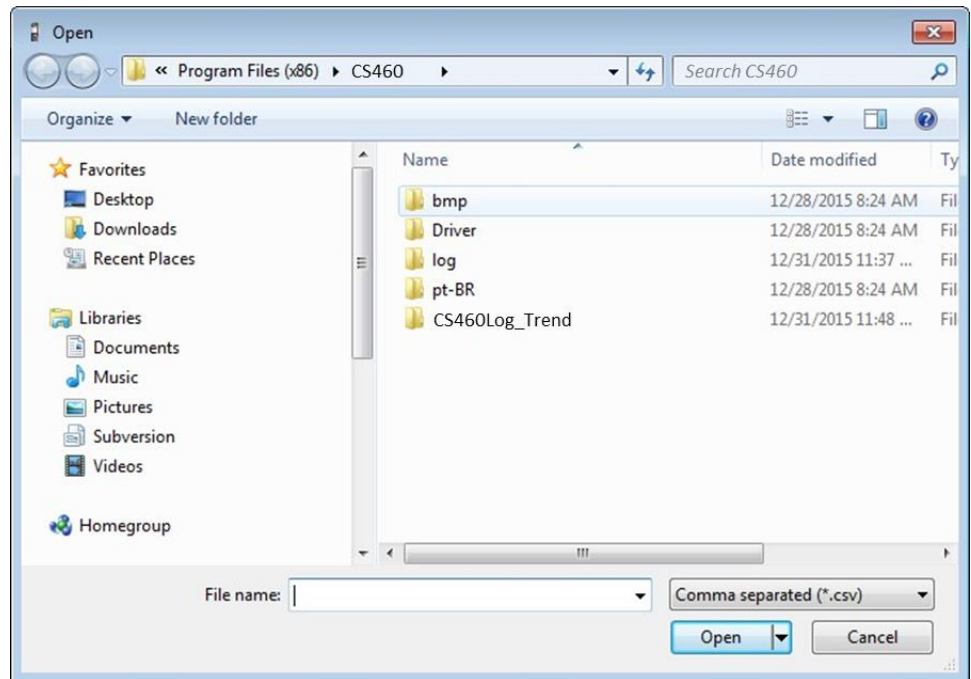
1. In the **Station & User** tab, click **Import csv file** for either the **Station ID** list or **User ID** list.



**Figure 7-11: Station and User Tab**

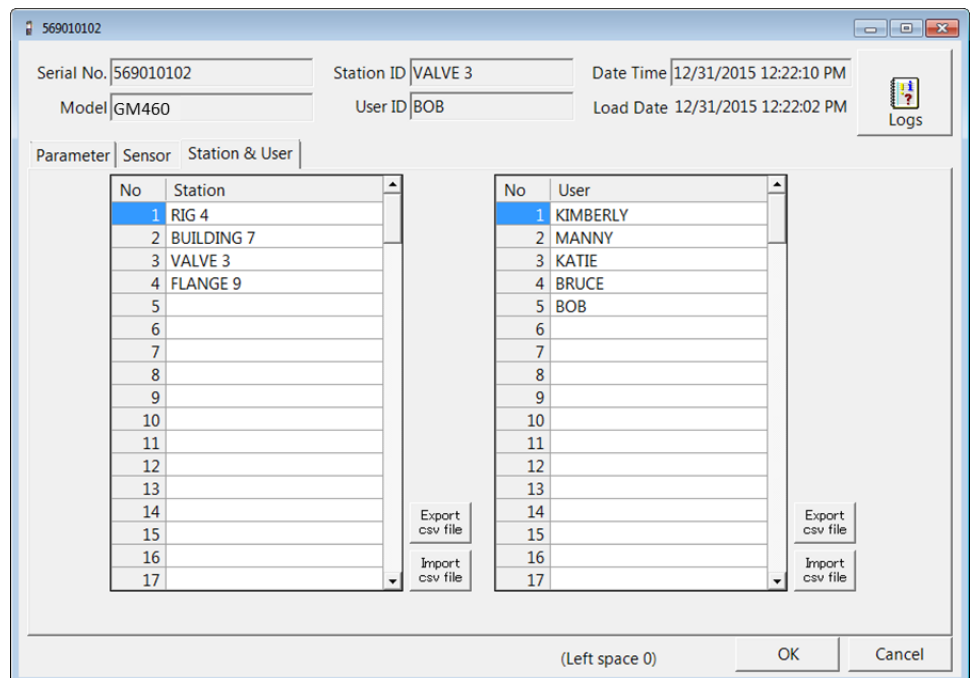


2. Navigate to the file you want to import and click **Open**.



**Figure 7-12: Open Station ID CSV File**

3. Once you have imported the **Station ID** and/or **User ID** csv files, the new list will be reflected in the **Station & User** tab.



**Figure 7-13: New Station and User IDs**

4. Click **OK** to save the changes and click **Yes** in the confirmation window that comes up. The program will prompt you to wait while it updates the GM460.

5. To exit this screen without saving changes, click **Cancel**.
6. To select a **Station ID** or **User ID** for the GM460, go back to the **Parameter** tab. See ["Parameter Tab" in Chapter 7](#) for instructions to select a station ID or user ID.

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## Get Parameters Function

This function can be activated by:

- Right-clicking a GM460 and selecting **Get Parameters (G)** when the pull-down menu appears *or*
- Selecting a GM460 and then using the **<Alt><G>** key combination.

The **Get Parameters** function downloads the selected GM460's instrument parameters. A **Get Parameters** function must be completed before you can edit any instrument parameters using the **Edit** function. If you select **Get Parameters (G)**, a confirmation box appears. Click the **OK** button to proceed with the parameters download. A parameter download will take approximately 5 minutes to complete.

---

## Download Logs Function

This function can be activated by:

- Right-clicking a GM460 and selecting **Download Logs(D)** when the pull-down menu appears *or*
- Selecting a GM460 and then using the **<Alt><D>** key combination.

The **Download Logs** function downloads all logged data from the GM460 to the PC Controller Program. Performing a Download Logs operation will not make the **Open** or **Edit** functions selectable. If you select **Download Logs(D)**, a confirmation box appears. Click the **OK** button to proceed with the data download. A data download will take 20 to 25 minutes to complete.

### Note

Even if an SD card is installed in the CS460, a **Download Logs(D)** operation will not save downloaded data to that SD card. It will only save data to the PC Controller Program's database.

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## Clear Logs Function

This function can be activated by:

- Right-clicking a GM460 and selecting **Clear Logs(C)** when the pull-down menu appears or
- Selecting a GM460 and then using the **<Alt><C>** key combination.

The **Clear Logs** function clears all logged data from a GM460. If you select **Clear Logs(C)**, a confirmation box appears. Click the **OK** button to proceed with clearing all the data from the GM460. The message window will indicate that the data is being cleared. When the data has been cleared, the message window will indicate this.

---

## Power Off Function

This function can be activated by either right-clicking a GM460 and selecting **Power Off(P)** when the pull-down menu appears or by selecting a GM460 and then using the **<Alt><P>** key combination. The Power Off function turns off the selected GM460. If you select **Power Off(P)**, a confirmation box appears. Click **OK** to turn off the selected GM460.

### Note

The GM460 can also be turned off by pressing the **Detector Off** button on the CS460's touch screen.

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## Spare Parts List

Table 7-2: Spare Parts List

Part Number	Description
06-1248RK-03	3-foot length of 5/16-inch OD x 3/16-inch ID, for connecting calibration cylinder to inlet fittings
14-0401	Wall mounting brackets, set of 3, with screws
14-0402	Connection brackets, set of 2, with screws, for connecting SV-3 to CS460
14-0403	Connection brackets, set of 3, with screws, for connecting CS460s together
17-4710	Sample fitting plugs
21-1935	Panel cover for right side of CS460
33-0167RK	Particle air filter replacement, CF-8369
33-6015RK	CO <sub>2</sub> scrubber
47-1013RK	Multi-station AC adapter line cord only

Part Number	Description
47-5073RK	USB cable, Type A to Type B, for connecting to a computer
47-5085RK	Cable, USB A to USB mini, for connecting printer to CS460
47-5088	Ethernet cable, black, 5 ft.
49-0126	Single-station AC adapter
49-0128	Multi-station AC adapter with line cord
49-0128-01	Multi-station AC adapter, without line cord
81-0012RK-01	Calibration cylinder, 50 %LEL CH <sub>4</sub> in air, 34 liter steel
81-0012RK-03	Calibration cylinder, 50 %LEL CH <sub>4</sub> in air, 103 liter steel
81-0013RK-01	Calibration cylinder, 50% vol CH <sub>4</sub> in N <sub>2</sub> , 34 liter steel
81-0013RK-05	Calibration cylinder, 50% vol CH <sub>4</sub> in N <sub>2</sub> , 58 liter steel
81-0018RK-01	Calibration cylinder, 50 %LEL Isobutane in air, 34 liter steel
81-0018RK-03	Calibration cylinder, 50 %LEL Isobutane in air, 103 liter steel
81-0076RK-01	Zero air cylinder, 34 liter steel
81-0076RK-03	Zero air cylinder, 103 liter steel
81-0090RK-01	Three-gas calibration cylinder, 50% LEL CH <sub>4</sub> /12% O <sub>2</sub> /50 ppm CO, 34 liter steel
81-0090RK-03	Three-gas calibration cylinder, 50% LEL CH <sub>4</sub> /12% O <sub>2</sub> /50 ppm CO, 103 liter steel
81-0103RK-01	Calibration cylinder, isobutylene, 100 ppm in air, 34 liter steel
81-0103RK-03	Calibration cylinder, isobutylene, 100 ppm in air, 103 liter steel
81-0103RK-04	Calibration cylinder, isobutylene, 100 ppm in air, 34 liter aluminum
81-0104RK-01	Calibration cylinder, isobutylene, 10 ppm in air, 34 liter steel
81-0104RK-03	Calibration cylinder, isobutylene, 10 ppm in air, 103 liter steel
81-0104RK-04	Calibration cylinder, isobutylene, 10 ppm in air, 34 liter aluminum
81-0142RK-02	Five-gas calibration cylinder, 50% LEL CH <sub>4</sub> /12% O <sub>2</sub> /25 ppm H <sub>2</sub> S/50 ppm CO/5 ppm SO <sub>2</sub> in nitrogen, 58 liter aluminum
81-0142RK-04	Five-gas calibration cylinder, 50% LEL CH <sub>4</sub> /12% O <sub>2</sub> /25 ppm H <sub>2</sub> S/50 ppm CO/5 ppm SO <sub>2</sub> in nitrogen, 34 liter aluminum
81-0143RK-02	Five-gas calibration cylinder, CH <sub>4</sub> /O <sub>2</sub> /H <sub>2</sub> S/CO/IBL, 58 liter aluminum

Part Number	Description
81-0143RK-04	Five-gas calibration cylinder, CH <sub>4</sub> /O <sub>2</sub> /H <sub>2</sub> S/CO/IBL, 34 liter aluminum
81-0154RK-02	Four-gas calibration cylinder, 50% LEL CH <sub>4</sub> /12% O <sub>2</sub> /50 ppm CO/25 ppm H <sub>2</sub> S, 58 liter aluminum
81-0154RK-04	Four-gas calibration cylinder, 50% LEL CH <sub>4</sub> /12% O <sub>2</sub> /50 ppm CO/25 ppm H <sub>2</sub> S, 34 liter aluminum
81-0158RK-02	Four-gas calibration cylinder, 50% LEL Isobutane/12% O <sub>2</sub> /50 ppm CO/25 ppm H <sub>2</sub> S, 58 liter aluminum
81-0158RK-04	Four-gas calibration cylinder, 50% LEL Isobutane/12% O <sub>2</sub> /50 ppm CO/25 ppm H <sub>2</sub> S, 34 liter aluminum
81-0170RK-02	Calibration cylinder, 5 ppm SO <sub>2</sub> in nitrogen, 58 liter
81-0170RK-04	Calibration cylinder, 5 ppm SO <sub>2</sub> in nitrogen, 34 liter
81-0176RK-02	Calibration cylinder, 25 ppm NH <sub>3</sub> in nitrogen, 58 liter
81-0176RK-04	Calibration cylinder, 25 ppm NH <sub>3</sub> in nitrogen, 34 liter
81-0182RK-02	Calibration cylinder, 5 ppm NO <sub>2</sub> in air, 58 liter
81-0182RK-04	Calibration cylinder, 5 ppm NO <sub>2</sub> in air, 34 liter
81-0185RK-02	Calibration cylinder, 0.5 ppm PH <sub>3</sub> in nitrogen, 58 liter
81-0196RK-02	Calibration cylinder, 10 ppm HCN in nitrogen, 58 liter
81-0196RK-04	Calibration cylinder, 10 ppm HCN in nitrogen, 34 liter
81-1055RK	Demand flow regulator, for 17/34 liter steel cylinders
81-CS460	Docking station for GM460, includes docking station, air filter, exhaust tubing, and connection brackets
81-CS460-01	Docking station for GM460, includes docking station, air filter, exhaust tubing, connection brackets, single-station AC adapter, USB cable, Ethernet cable, and SD card with SD to USB reader
81-CS460-02	Docking station for GM460, includes docking station, air filter, exhaust tubing, connection brackets, multi-station AC adapter, USB cable, Ethernet cable, and SD card with SD to USB reader
81-SV3	SV-3 solenoid valve unit, with connection brackets
82-6107	SDHC card and SD to USB reader

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## CHAPTER 8

# Contacting Customer Service

This chapter gives directions for contacting TSI Incorporated for technical information and directions for returning the Model CS460 Docking Station for service.

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## Technical Contacts

- If you have any difficulty setting up or operating the CS460 Docking Station, or if you have technical or application questions about this system, contact an applications engineer at TSI Incorporated, 1-800-680-1220 (USA) or (651) 490-2860 or e-mail [technical.services@tsi.com](mailto:technical.services@tsi.com).
- If the CS460 Docking Station, does not operate properly, or if you are returning the instrument for service, visit our website at <http://rma.tsi.com>, or contact TSI Customer Service at 1-800-680-1220 (USA) or (651) 490-2860.

## International Contacts

### Service

#### **TSI Instruments Singapore Pte Ltd**

150 Kampong Ampat  
#05-05 KA Centre  
Singapore 368324

**Telephone:** +65 6595-6388  
**Fax:** +65 6595-6399  
**E-mail:** [tsi-singapore@tsi.com](mailto:tsi-singapore@tsi.com)

#### **TSI Instrument (Beijing) Co., Ltd.**

Unit 1201, Pan-Pacific Plaza,  
No.12 A, Zhongguancun South Avenue  
Haidian District, Beijing  
CHINA 100081

**Telephone:** +86-10-8219 7688  
**Fax:** +86-10-8219 7699  
**E-mail:** [tsibeijing@tsi.com](mailto:tsibeijing@tsi.com)

**TSI Instruments Ltd.**

Stirling Road  
Cressex Business Park  
High Wycombe, Bucks  
HP12 3ST  
UNITED KINGDOM

**Telephone:** +44 (0) 149 4 459200

**E-mail:** [tsiuk@tsi.com](mailto:tsiuk@tsi.com)

**Web:** [www.tsiinc.co.uk](http://www.tsiinc.co.uk)

**Technical Support****TSI Instruments Singapore Pte Ltd**

150 Kampong Ampat  
#05-05 KA Centre  
Singapore 368324

**Telephone:** +65 6595-6388

**Fax:** +65 6595-6399

**E-mail:** [tsi-singapore@tsi.com](mailto:tsi-singapore@tsi.com)

**TSI Instrument (Beijing) Co., Ltd.**

Unit 1201, Pan-Pacific Plaza,  
No.12 A, Zhongguancun South Avenue  
Haidian District, Beijing  
CHINA 100081

**Telephone:** +86-10-8219 7688

**Fax:** +86-10-8219 7699

**E-mail:** [tsibeijing@tsi.com](mailto:tsibeijing@tsi.com)

**TSI GmbH**

Neuköllner Strasse 4  
52068 Aachen  
GERMANY

**Telephone:** +49 241-52303-0

**Fax:** +49 241-52303-49

**E-mail:** [tsigmbh@tsi.com](mailto:tsigmbh@tsi.com)

**Web:** [www.tsiinc.de](http://www.tsiinc.de)

**TSI Instruments Ltd.**

Stirling Road  
Cressex Business Park  
High Wycombe, Bucks  
HP12 3ST  
UNITED KINGDOM

**Telephone:** +44 (0) 149 4 459200

**E-mail:** [tsiuk@tsi.com](mailto:tsiuk@tsi.com)

**Web:** [www.tsiinc.co.uk](http://www.tsiinc.co.uk)



**TSI France Inc.**  
Hotel technologique  
BP 100  
Technopôle de Château-Gombert  
13382 Marseille cedex 13  
FRANCE

**Telephone:** +33 (0)1 41 19 21 99  
**Fax:** +33 (0)1 47 86 00 07  
**E-mail:** [tsifrance@tsi.com](mailto:tsifrance@tsi.com)  
**Web:** [www.tsiinc.fr](http://www.tsiinc.fr)

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## Returning for Service

Visit our website at <http://rma.tsi.com> and complete the on-line "Return Merchandise Authorization" form or call TSI at 1-800-680-1220 (USA), (651) 490-2860, or 001 651 680-1220 (International) for specific return instructions.

Customer Service will need the following information:

- The instrument model number (CS460)
- The instrument serial number
- A purchase order number (unless under warranty)
- A billing address
- A shipping address

Use the original packing material to return the instrument to TSI. If you no longer have the original packing material, seal off any ports to prevent debris from entering the instrument and ensure that the display and the connectors on the instrument front and back panels are protected. This instrument is very fragile and must be packed in a manner appropriate for a precision instrument.

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# APPENDIX A

## Specifications

Specification are subject to change without notice.

Input Power	24 VDC
Environmental Conditions	<ul style="list-style-type: none"> <li>• For Indoor Use Only</li> <li>• 0° C to 40° C, below 95% Relative Humidity, Non-Condensing</li> </ul>
Applicable Instrument	GM460
Memory Capacity	Dependent on capacity of installed SDHC card, Standalone configuration only
Record Size	1.1 KB (bump test + calibration + alarm check), Standalone configuration only
Maximum Number of Records Saved	Dependent on capacity of installed SDHC card, Standalone configuration only
Number of Calibration Gas Cylinders	<ul style="list-style-type: none"> <li>• SV-3 not connected: Up to three calibration gas cylinders per bump test or calibration at a time</li> <li>• SV-3 connected: Up to six calibration gas cylinders per bump test or calibration at a time</li> </ul>
Standard Accessories	<ul style="list-style-type: none"> <li>• Instruction Manual*</li> <li>• CS460 Docking Station PC Controller Program*</li> <li>• Inlet Air Filter</li> <li>• 10 Foot Long Exhaust Tube</li> <li>• Connection Brackets</li> </ul>
Available Accessories	<ul style="list-style-type: none"> <li>• AC Adapter</li> <li>• USB Cable, Type A to Type B</li> <li>• Ethernet Cable</li> <li>• SDHC Card and SD to USB Reader</li> <li>• Demand Flow Regulator</li> <li>• 3-Foot Long Calibration Tubing</li> <li>• Calibration Gas Cylinder</li> <li>• SV-3</li> <li>• Printer</li> <li>• Wall Mounting Brackets</li> <li>• CO<sub>2</sub> Scrubber</li> </ul>

\* Not included with CS460. Download from [www.tsi.com](http://www.tsi.com).

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UNDERSTANDING, ACCELERATED

**TSI Incorporated** – Visit our website [www.tsi.com](http://www.tsi.com) for more information.

<b>USA</b>	<b>Tel:</b> +1 800 680 1220	<b>India</b>	<b>Tel:</b> +91 80 67877200
<b>UK</b>	<b>Tel:</b> +44 149 4 459200	<b>China</b>	<b>Tel:</b> +86 10 8219 7688
<b>France</b>	<b>Tel:</b> +33 1 41 19 21 99	<b>Singapore</b>	<b>Tel:</b> +65 6595 6388
<b>Germany</b>	<b>Tel:</b> +49 241 523030		

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