

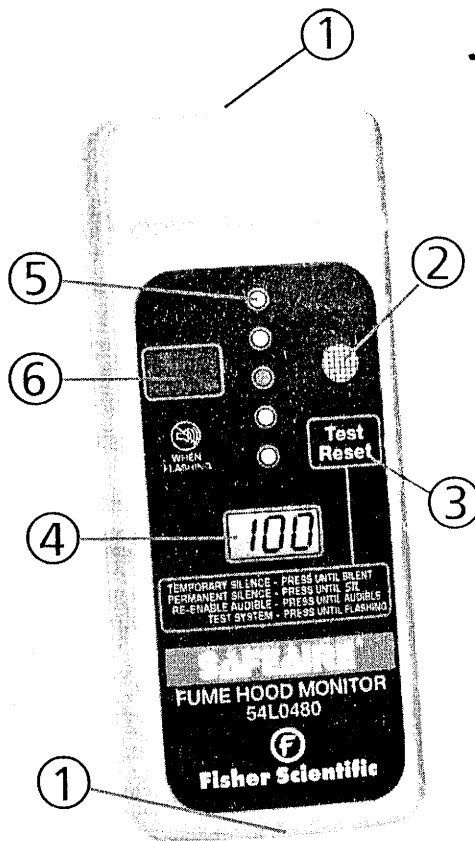
INSTALLATION AND MAINTENANCE INSTRUCTIONS

Model 54L0480 SAFEAIRE Fume Hood Monitor



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General Description

The SAFEAIRE 54L0480 fume hood monitor is installed on the surface of a fume hood to continuously measure air flow through the hood. It provides visual, audible, and remote alarms for abnormal air flow conditions. The face velocity is displayed numerically, but the monitor also features a visual LED column of lights to show air flow trends. The SAFEAIRE 54L0480 can also print and store air flow measurements at periodic intervals. It operates from a low voltage source and supplies a voltage output proportional to air flow.

The SAFEAIRE 54L0480 monitor must be calibrated in the field for accurate operation. Read this manual entirely before installing, calibrating, and using this monitor. The calibration and configuration of the monitor will be retained in the event of a power loss.

Figure 1:
Photo of the front of
the Model 54L0480
SAFEAIRE FHM

1. MOUNTING SCREWS	Two screws secure the monitor to the back mounting plate.
2. AIR INLET	Guides air to the sensors.
3. TEST/RESET BUTTON	If an alarm is present, pressing this button silences the alarm. If no alarm condition is present, the Test/Reset button tests the display, visual, and audible alarms. Additionally, this button is used during calibration and configuration set-up.
4. DIGITAL DISPLAY	Shows air flow measurement either in feet per minute or centimeters per second.
5. VISUAL LED DISPLAY	LED lights show air flow trends.
6. VISUAL ALARM	Indicates an air flow alarm when lit.

Table 1: Description of the front of the monitor. Reference Figure 1.

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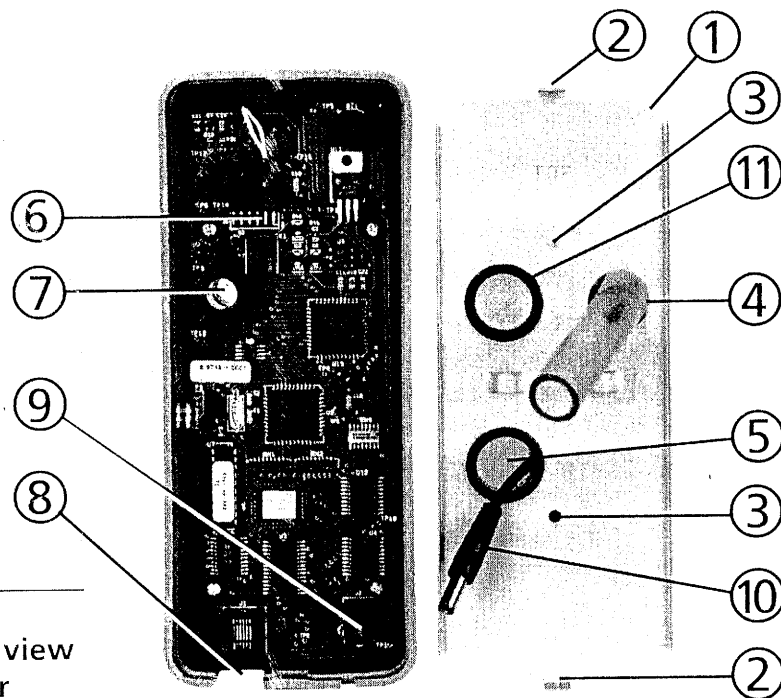


Figure 2:
Photo of the back view
of the monitor

1. BACK PLATE	Easily mounted plate which secures the monitor to the fume hood.
2. COVER HOLES	Two holes for screws to secure the monitor to the back plate.
3. MOUNTING HOLES	Two holes for screws to secure the back plate to the fume hood.
4. AIR HOSE HOLE	For the side wall air hose.
5. POWER CORD HOLE	For the power supply cord.
6. EXTERNAL INTERFACE	To connect input/output signals to the monitor.
7. FLOW TUBE	Contains sensor and must be connected to the air hose attached to the fume hood side wall.
8. SERIAL COMMUNICATIONS PORT	Connects to a printer or computer.
9. POWER JACK	Accepts the power cord.
10. POWER CORD	From the power supply provided.
11. WIRING HOLE	Wiring access for the input/output signals to the monitor.

Table 2: Description of the inside of the monitor and the back mounting plate. Reference Fig. 2.

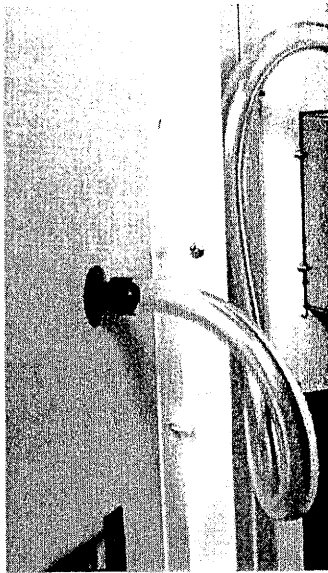


Figure 3:
Photo of the inside of
hood with side wall
adapter/hose

Installation Procedure

Installation of the monitor requires drilling holes in the fume hood to match the holes in the back plate (figure 2). A hole must also be drilled to attach the side wall adapter (figure 3).

Equipment Required

1. Electric Drill
2. Drill bit size #37 (0.104")
3. Phillips head screwdriver
4. Flat head screwdriver with 1/4" blade width
5. Carbide hole saw, adjustable
6. 7/8" (0.875") hole saw or equivalent size punch
7. 33/64" (0.515") hole saw
8. Eye protection

Note: *If the monitor is to be installed in a hood with Hardiboard™ fiber-cement side panels or similar material, use special drill bits designed for glass and other hard, abrasive materials.*



Warning

Always wear eye protection when using power tools. Observe all necessary precautions when installing or repairing monitors in the vicinity of electrical equipment.

Procedure

Step 1: Locate the aluminum back plate for the monitor (figure 2).

Step 2: Use the back plate as a template to drill two holes, #37 drill bit 0.104" diameter, (figure 2) to secure the back plate to the fume hood.

Step 3: Use the back plate as a template to drill or punch one hole 7/8" diameter, (figure 2) for the side wall air hose.

Step 4: Use the back plate as a template to drill or punch one hole 7/8" diameter for the power supply cord to power the monitor. The power supply cord

can also be routed from the front of the monitor, in which case this hole is not needed.

Step 5: If the monitor will be connected to wiring for input/output signals through the external interface (figure 2), then use the back plate as a template to drill or punch one hole 7/8" diameter, (figure 2) to route the wires to the connector.

Step 6: Drill one hole 33/64" diameter in the side wall of the fume hood **approximately 6" behind the sash and even with the sash bottom when it is fully open**. Insert the side wall adapter from the inside of the hood and securely lock it in place with the lock ring as shown in figure 3.

Step 7: Mount the back plate to the fume hood with the two self-tapping screws provided. Insert the plastic snap bushings into the holes.

Step 8: Connect the supplied air hose to the side wall adapter (figure 3). Then connect the opposite end to the flow tube on the monitor (figure 2). **Route hose as necessary to prevent kinks and bends which can affect calibration**. Attach the hose firmly to the flow tube on the monitor.

Step 9: Connect the input/output signal wiring, if present, to the external interface connector on the monitor (figure 2)

Step 10: Connect the power cord to the power jack (figure 2). The power cord may also be routed from the front side of the monitor if so desired.

Step 11: Secure the monitor to the back plate at the top and bottom with the screws provided. If the power cord is being routed through the front of the monitor, be careful to place the cord into the notch provided in the bottom of the cover before tightening the screws.

Step 12: Plug the power supply into a power source.

The installation of the monitor is now complete.

Custom Monitor Configuration Through the Keypad

Note: *There is a hidden button located under the "F" of the Fisher logo at the bottom of the unit. This is the menu select/scroll button. The Test/Reset button acts as an enter button during the calibration and setting of alarm points. It also lets the user choose units, enable or disable the audible alarm, and enable or disable the high alarm.*

Pressing and holding the hidden button for five seconds activates a custom configuration menu. Each time the hidden button is pressed, the top level menu advances one position (SiL or BiP, SEt, Prn, Hi1 or Hi0, End). A description of the items in this top level menu are as follows:

BiP or SiL Disable or enable the audible alarm. In SiL, the audible alarm is silenced (disabled). In BiP, the audible alarm will beep (enabled). Press the Test/Reset button to change the selection.

The second from bottom green LED is lit.

SEt Set monitor parameters through the second level menu, which is accessed through SEt. This menu is described later.

The center green LED is lit.

Prn Send stored data to the serial communications port. The last 100 readings will download to an Alnor 8521 printer or a computer using an application such as Microsoft® Windows™ Terminal.

The second from top green LED is lit.

Hi1 or Hi0 Disable or enable the high flow alarm. In Hi1, the high flow alarm is enabled. In Hi0, the high flow alarm is disabled. Press the Test/Reset button to change the selection.

The top yellow LED is lit.

End End the first level configuration menu.
The bottom yellow LED is lit.

Use the second level menu to set the monitor parameters. Using the Test/Reset button, find SET to access the second level menu. Each time the hidden button is pressed, the second level menu advances one position (LO, Hi, FPN or CnS, CAL, End). A description of the items in this menu are as follows:

LO Low alarm set point. Factory default setting is 80 feet per minute.

The bottom yellow LED and the second from bottom green LED are lit.

Hi High alarm set point. Factory default setting is 250 feet per minute.

The bottom yellow LED and the center green LED are lit.

FPn or CnS Unit of measurement is displayed in feet per minute or centimeters per second. Press the Test/Reset button to change the selection.

The bottom yellow LED and the second from top green LED are lit.

CAL Perform field calibration.

The bottom yellow LED and the top yellow LED are lit.

End End the second level menu.

The bottom yellow LED is lit.

Calibration

Note: Field calibration must be performed on each monitor because each hood installation and its air flow patterns are unique.

This calibration procedure will program the monitor to operate between a low flow set point and a high flow set point. Both set points must be within the range of the monitor.



Warning

Calibration of this monitor must be performed only by qualified personnel. Proper guidelines for monitoring any ventilation apparatus are established on the basis of toxicity or hazards of the materials used, or the operation conducted within the ventilation apparatus. Personnel calibrating this monitor must be completely aware of the regulations and guidelines specific to its application.

Equipment Required

A calibrated thermoanemometer. (Suggested instruments include an Alnor APM 360 or CompuFlow 8575 and probe.)

Note that the field calibration is performed in the current unit of measurement, either feet per minute or centimeters per second.

Procedure to Set Calibration Points

Note: *There is a hidden button located under the “F” of the Fisher logo at the bottom of the unit. This is the menu select/scroll button. The Test/Reset button acts as an enter button during the calibration and setting of alarm points. It also lets the user choose units, enable or disable the audible alarm, and enable or disable the high alarm.*

Step 1: Make sure that the monitor was installed properly.

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Step 2: Apply power to the monitor and wait at least 10 minutes for the monitor to reach a stable operating temperature.

Step 3: While the monitor warms up, use a calibrated thermoanemometer to determine the velocity through the face of the hood by taking two detailed traverses. Take one traverse at low flow with the sash fully open and another at high flow with the sash at 12". For each traverse, divide the area under the sash into equal increments, paying close attention not to move more than six inches between readings. A minimum of sixteen readings must be taken per traverse. Record the average velocities and sash heights to save time during initial set-up and troubleshooting of the hood.

Calibrate the monitor to match the measured value at the low face velocity:

Step 4: Move the sash to the fully open position.

Step 5: Press and hold the hidden button for five seconds; the display will show BiP (or SiL if left in permanent silence mode).

Step 6: Press the hidden button again to advance the menu to SEt. (If advanced past SEt, keep pressing the button until SEt is displayed again). Press the Test/Reset button.

Step 7: Advance until CAL is displayed. Press the Test/Reset button. A feet per minute value of 50 will appear. Press the hidden button to advance the value in 5 fpm increments from 50 to 250 fpm. Press the Test/Reset button when the value nearest to the measured low face velocity (sash fully open value) is displayed.

Step 8: A five second delay starts, allowing the user to step away from the face of the hood. The digital display shows the countdown. Then, the monitor will automatically take sample readings while the display counts down from 20 to 1. When finished, the first half of calibration is complete.

Step 9: Set the fume hood to a high face velocity (sash open at 12") which is typically around 150 fpm or higher. The height and velocities were obtained in step 3.

Calibrate the monitor to match the measured value at the high face velocity:

Step 10: A feet per minute value of 100 will appear. Press the hidden button to advance the value in 5 fpm increments from 50 to 250 fpm. (If you advance past 250, the monitor will go back to 50 fpm.) Press the Test/Reset button when the value nearest to the measured high face velocity is displayed.

Step 11: A five second delay starts, allowing the user to step away from the face of the hood. The digital display shows the countdown. Then, the monitor will automatically take sample readings while the display counts down from 20 to 1. When finished, calibration is complete.

→ **Step 12:** In a successful calibration, the display will show three dashes ("---") for ten seconds followed by 480 and then CAL. An unsuccessful calibration will be indicated by three dashes accompanied by a series of beeps. You will need to perform these steps again.

→ **Step 13:** To exit a successful calibration, press the hidden button to advance to End, then press the Test/Reset button. This brings up the top level menu. If you wish to exit the top level menu, press the hidden button to advance to End, and then press the Test/Reset button.

Procedure To Set Alarm Points

Reminder: *There is a hidden button located under the "F" of the Fisher logo at the bottom of the unit. This is the menu button. The Test/Reset button acts as an enter button during the calibration and setting of alarm points. It also lets the user choose units, enable or disable the audible alarm, and enable or disable the high alarm.*

Step 1: Press and hold the hidden button for five seconds; the display will show BiP (or SiL, if left in permanent silence mode).

Step 2: Press the hidden button again to advance the menu to SEt. (If advanced past SEt, keep pressing the button until SEt is displayed again). Press the Test/Reset button.

Step 3: The first item on the second level menu is LO. Press the Test/Reset button.

Step 4: The display will show FPn (feet per minute), and then a value. (The default low alarm point is 80, unless previously changed in the field.) If a different low alarm point is desired, press the hidden button to advance the value in 5 fpm increments from 70 to 250 fpm. Press the Test/Reset button when the desired low alarm value is displayed.

Step 5: After the selection, the display will show LO again. Press the hidden button to advance to Hi.

Step 6: The display will show a new value. (The default high alarm point is 250.) If a different high alarm point is desired, press the hidden button to advance the value in 5 fpm increments up to 250 fpm. Press the Test/Reset when the desired high alarm value is displayed.

Step 7: Press the hidden button to advance to End, then press the Test/Reset button. This returns you to the top level menu. If you wish to exit the top level menu, press the hidden button to advance to End, and then press the Test/Reset button.

Normal Operation

Digital Display

The digital display can show air flow in either feet per minute or centimeters per second. The unit of measurement is not displayed but can be viewed when the monitor is turned on or in the "SET" mode. Air flow above the high alarm point will be shown as Hi. Air flow below the low alarm set point will be shown as LO.

Visual Display

The visual LED display consists of five LED lights that show air flow trends. The order of the LED's from top to bottom are yellow, green, green, green, yellow. The top yellow LED corresponds to the high flow alarm set point. The bottom yellow LED corresponds to the low flow alarm set point. Note that the high and low alarm points are factory set at 80 fpm and 250 fpm, respectively, but may be altered during field calibration.

Permanent Audible Alarm Disabling

Under any operating condition, the horn may be permanently disabled by pressing the Test/Reset button for more than five seconds. The monitor will continue to show a visual display of air flow, but the appropriate LED light will flash on and off to indicate that the horn is disabled. The relay output will still be active. To turn the audible alarm back on, press the Test/Reset button until you hear one beep, then release. Removal of power to the monitor does not change whether the alarm is permanently enabled or disabled.

Monitor Test

If no alarm condition is present, press the Test/Reset button for up to four seconds to verify the display, visual, and audible alarms are working.

Local Acknowledgment of Audible Alarm

The audible alarm can be temporarily silenced by pressing the Test/Reset button. The visual and remote alarms remain active until the air flow is restored to normal levels.

External Interface

Input/output signals can be connected to the monitor using the external interface (figure 2). External wires are routed through the back mounting plate and terminated with a 12 position socket (supplied). Figure 4 shows the pin numbers of the external interface connector on the printed circuit board. *Make sure that the proper wires are terminated at the socket before plugging into the connector on the board.*

External Interface Connector

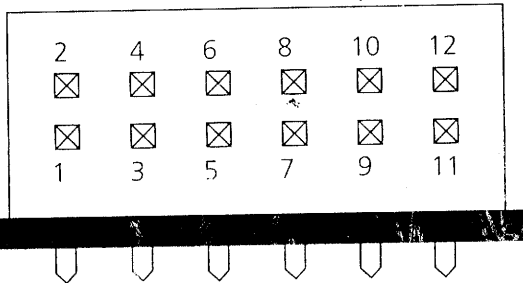


Figure 4:
12-pin external interface connector

Remote acknowledgment of audible alarm	The audible alarm can be silenced by supplying 10.0 VDC \pm 1.0 VDC to the external interface pin 1 (-) and pin 2 (+).
External Alarm	When the external alarm input pins 3 and 4 are opened, the horn on the monitor will sound intermittently. The local alarm event (steady horn) will always take precedence over an external alarm event.
Relay Output	Normally closed contacts at pins 6 and 7. Normally open contacts at pins 7 and 8. The relay contacts may be used to trigger a remote alarm device.
Analog output	0 to 5.0 VDC at pin 9 (-) and pin 10 (+). Signal scaled to the alarm set points. Load 2000 ohms minimum, 40 picofarads maximum.
Back-up input power	9 VDC, 500 mA to pin 11 (-) and pin 12 (+).

Problem
No display
No audible alarm
LED indicator
Pulsed
No alarm
Alarm immediately
The monitor display
The alarm shows a period

Troubleshooting Guide

Problem	Possible Cause
No display or lights.	Power supply not plugged into unit and live AC outlet.
No audible alarm.	Audible alarm was disabled. If the LED indicators are flashing, the horn was silenced using the Test/Reset button. Press the Test/Reset button to reset.
LED indicators are blinking.	The horn was silenced using the Test/Reset button. Press the Test/Reset button to reset.
Pulsed audible alarm.	<ol style="list-style-type: none"> 1. This is an indication of an external alarm. Acknowledge the external alarm event. 2. Pins 3 and 4 are open. Install connector with jumper.
No alarm at high flow.	The high flow alarm is disabled.
Alarm is not activated immediately.	The alarm condition must exist for a predetermined time period before it is interpreted as a true alarm event by the monitor. See the alarm delay timing specifications section.
The monitor does not seem to display expected air flows.	<ol style="list-style-type: none"> 1. The flexible air hose from the monitor to the side wall sensing hole has been inadvertently bent or kinked and is restricting the true air flow. Reroute the air hose and ensure it is not kinked or bent anywhere along its entire length. 2. Blower speed has changed. Adjust if required. 3. If the calibration of the monitor is suspect, recalibrate as outlined in the calibration section of the manual.
The alarm is continuously alarming. The digital display shows either LO or Hi, with a periodic numerical display.	The low and high alarm values are inappropriate. Change the low alarm value to 70 fpm and the high alarm value to 250 fpm. This lets the calibrating technician see the values the monitor is measuring. If the measured velocity goes below the low alarm value, LO will be displayed. If the measured velocity goes above the high alarm value, Hi will be displayed. See the section marked Procedure to Set Alarm Points.

Service Policy

Knowing that inoperative or defective instruments are as detrimental to Fisher Hamilton as they are to our customers, our service policy is designed to give prompt attention to all service requests. If any malfunction is discovered, please contact your nearest sales office or representative, or call Alnor's Customer Service department at (800) 424-7427 (U.S. and Canada only).

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