



# Fume Hood Monitor

Alnor® AirGard® 405

Owner's Manual

P/N 116159093, Rev. 12  
May 2022



## Start Seeing the Benefits of Registering Today!

Thank you for your TSI® instrument purchase. Occasionally, TSI® releases information on software updates, product enhancements and new products. By registering your instrument, TSI® will be able to send this important information to you.

## LIMITATION OF WARRANTY AND LIABILITY

(effective April 2014)

(For country-specific terms and conditions outside of the USA,)

Seller warrants the goods, excluding software, sold hereunder, under normal use and service as described in the operator's manual, to be free from defects in workmanship and material for **24 months**, or if less, the length of time specified in the operator's manual, from the date of shipment to the customer. This warranty period is inclusive of any statutory warranty. This limited warranty is subject to the following exclusions and exceptions:

- a. Hot-wire or hot-film sensors used with research anemometers, and certain other components when indicated in specifications, are warranted for 90 days from the date of shipment;
- b. Pumps are warranted for hours of operation as set forth in product or operator's manuals;
- c. Parts repaired or replaced as a result of repair services are warranted to be free from defects in workmanship and material, under normal use, for 90 days from the date of shipment;
- d. Seller does not provide any warranty on finished goods manufactured by others or on any fuses, batteries or other consumable materials. Only the original manufacturer's warranty applies;
- e. This warranty does not cover calibration requirements, and seller warrants only that the instrument or product is properly calibrated at the time of its manufacture. Instruments returned for calibration are not covered by this warranty;
- f. This warranty is **VOID** if the instrument is opened by anyone other than a factory authorized service center with the one exception where requirements set forth in the manual allow an operator to replace consumables or perform recommended cleaning;
- g. This warranty is **VOID** if the product has been misused, neglected, subjected to accidental or intentional damage, or is not properly installed, maintained, or cleaned according to the requirements of the manual.
- h. Unless specifically authorized in a separate writing by Seller, Seller makes no warranty with respect to, and shall have no liability in connection with, goods which are incorporated into other products or equipment, or which are modified by any person other than Seller.

The foregoing is **IN LIEU OF** all other warranties and is subject to the **LIMITATIONS** stated herein. **NO OTHER EXPRESS OR IMPLIED WARRANTY OF FITNESS FOR PARTICULAR PURPOSE OR MERCHANTABILITY IS MADE. WITH RESPECT TO SELLER'S BREACH OF THE IMPLIED WARRANTY AGAINST INFRINGEMENT, SAID WARRANTY IS LIMITED TO CLAIMS OF DIRECT INFRINGEMENT AND EXCLUDES CLAIMS OF CONTRIBUTORY OR INDUCED INFRINGEMENTS. BUYER'S EXCLUSIVE REMEDY SHALL BE THE RETURN OF THE PURCHASE PRICE DISCOUNTED FOR REASONABLE WEAR AND TEAR OR AT SELLER'S OPTION REPLACEMENT OF THE GOODS WITH NON-INFRINGEMENTS.**

TO THE EXTENT PERMITTED BY LAW, THE EXCLUSIVE REMEDY OF THE USER OR BUYER, AND THE LIMIT OF SELLER'S LIABILITY FOR ANY AND ALL LOSSES, INJURIES, OR DAMAGES CONCERNING THE GOODS (INCLUDING CLAIMS BASED ON CONTRACT, NEGLIGENCE, TORT, STRICT LIABILITY OR OTHERWISE) SHALL BE THE RETURN OF GOODS TO SELLER AND THE REFUND OF THE PURCHASE PRICE, OR, AT THE OPTION OF SELLER, THE REPAIR OR REPLACEMENT OF THE GOODS. IN THE CASE OF SOFTWARE, SELLER WILL REPAIR OR REPLACE DEFECTIVE SOFTWARE OR IF UNABLE TO DO SO, WILL REFUND THE PURCHASE PRICE OF THE SOFTWARE. IN NO EVENT SHALL SELLER BE LIABLE FOR LOST PROFITS, BUSINESS INTERRUPTION, OR ANY SPECIAL, INDIRECT, CONSEQUENTIAL OR INCIDENTAL DAMAGES. SELLER SHALL NOT BE RESPONSIBLE FOR INSTALLATION, DISMANTLING OR REINSTALLATION COSTS OR CHARGES. No Action, regardless of form, may be brought against Seller more than 12 months after a cause of action has accrued. The goods returned under warranty to Seller's factory shall be at Buyer's risk of loss, and will be returned, if at all, at Seller's risk of loss.

Buyer and all users are deemed to have accepted this LIMITATION OF WARRANTY AND LIABILITY, which contains the complete and exclusive limited warranty of Seller. This LIMITATION OF WARRANTY AND LIABILITY may not be amended, modified or its terms waived, except by writing signed by an Officer of Seller.

### Service Policy

Knowing that inoperative or defective instruments are as detrimental to TSI as they are to our customers, our service policy is designed to give prompt attention to any problems. If any mal-function is discovered, please contact your nearest sales office or representative,

---

---

## TABLE OF CONTENTS

<b>General Description .....</b>	<b>2</b>
<b>Setup.....</b>	<b>4</b>
<b>Installation.....</b>	<b>6</b>
General .....	6
Tools Required .....	6
Procedure.....	7
<b>Calibration.....</b>	<b>9</b>
Equipment .....	9
Procedure.....	9
<b>Step by Step Operation.....</b>	<b>11</b>
Alarm Acknowledgment .....	11
Alarm Test.....	11
Horn Disable (from keypad) .....	11
<b>Appendix A:</b>	
<b>Maintenance &amp; Troubleshooting .....</b>	<b>12</b>
Maintenance.....	12
Troubleshooting .....	12
<b>Service Policy .....</b>	<b>13</b>
Ship To .....	13
<b>Specifications .....</b>	<b>14</b>



**Figure 1:**  
Front view of instrument

### General Description

The AirGard® 405 monitor is designed to continuously monitor airflow through fume hoods. This permanently installed device provides both visual and audible alarms to alert you of abnormal airflow conditions after the instrument is calibrated for the particular installation. A green indicator on the front of the monitor indicates normal flow conditions. When flow conditions lower than the setpoint are encountered, a red indicator is activated along with an audible horn. A test button is provided at the front of the monitor to allow you to check the operation of the alarm. See Table 1 for a description of each key function located on the front of the monitor.

### NOTICE

For proper operation of the instrument, you must install and calibrate the AirGard® 405 monitor. The entire manual should be read first before proceeding with the actual installation and calibration of the instrument.

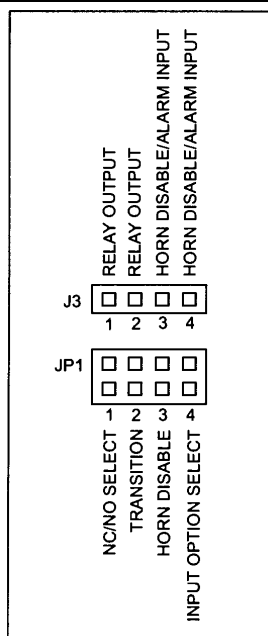
---

<b>1. MOUNTING SCREWS</b>	Two screws secure the monitor to the back plate which is then secured to the fume hood.
<b>2. AIR INLET</b>	A portion of the air coming into the hood passes through the air inlet and across the flow sensors.
<b>3. SETPOINT ADJUST</b>	This potentiometer is used to set low flow alarm setpoint.
<b>4. NORMAL FLOW INDICATOR</b>	This green indicator is illuminated when air flow is greater than the setpoint.
<b>5. ALARM INDICATOR</b>	This red indicator is illuminated approximately six seconds after airflow is less than the setpoint.
<b>6. TEST/RESET BUTTON</b>	If no alarm condition is present this button will cause the red indicator to be illuminated and will also cause the horn to sound. If an alarm is present, this button will silence the alarm.

---

**Table 1: Description of features on front of monitor**

---



**Figure 2:**  
Configuration/set-up  
options

## Setup

The AirGard® 405 fume hood monitor contains several configuration options. Two connectors provide access to remote control devices and firmware configuration jumpers. Observe the back of the monitor. Locate the two connectors at the left-center of the printed circuit board marked J3 and JP1. J3 is a polarized header for connection to a remote horn disable switch and a set of single-pole single-throw (SPST) relay contacts. JP1 is a four-pole double-row header in which shorting jumpers may be inserted to configure firmware options. Figure 2 illustrates these connectors.

Poles 1 and 2 of J3 are the relay contacts. Refer to [specification section](#) to determine the relay contact ratings before making connections to the relay. The relay contacts may be used to trigger a remote alarm device. The default configuration of the contacts are Normally Closed (NC) during normal airflow and Normally Open (NO) during low-flow alarm conditions.

Poles 3 and 4 of J3 may be connected to a remote single-pole single-throw (SPST) switch to silence the horn. Closing the switch will silence the horn only during an alarm condition. Opening the switch restores the horn during an alarm condition. It is recommended that this feature be used to disable the horn for night-time operation or fume hood exhaust motor shut-down periods.

Refer to the [Step-by-Step Operation](#) section for the Horn Disable from keypad feature.

---

Pole 1 of JP1 is used to select the relay configuration. Without the jumper installed, the relay is Normally Closed (NC) during normal airflow and Normally Open (NO) during an alarm condition. Installing a shorting jumper across pole 1 will cause the relay to be Normally Open (NO) during normal airflow and Normally Closed (NC) during an alarm condition. Install this jumper only when the monitor is powered down. Insertion or removal of this jumper while the monitor is powered up will not have any effect on the relay configuration.

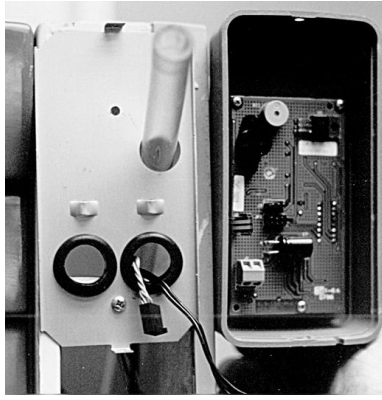
Pole 2 of JP1 is used to select the alarm-to-normal transition delay option. Without the jumper installed, the transition period from alarm to normal occurs in less than one second. Installing a shorting jumper across pole 2 enables a nominal five second delay before the alarm clears. Install this jumper only when the monitor is powered down. Insertion or removal of this jumper while the monitor is powered up will not have any effect on the delay configuration.

Pole 3 of JP1 is used to permanently silence the horn. Note that this pole is a parallel connection to poles 3 and 4 of J3. Inserting the shorting jumper will silence the horn during an alarm condition. It is recommended that this feature be used to permanently disable the horn if the relay contacts are to be used to trigger an alternate horn.

Pole 4 of JP1 is used to select either a horn disable or an alarm input configuration. Inserting a shorting jumper activates the alarm input option. The switch should have normally open contacts and be connected to poles 3 and 4 of J3. Switch closure will activate the fume hood monitor alarm.

NOTICE
By selecting this option, the horn disable configuration described previously is not possible. A shorting jumper cannot be inserted across both poles 3 and 4 of JP1 or a continuous alarm will occur.





**Figure 3:**  
**Front view of fascia**

## **Installation**

### **General**

Installation of the AirGard® 405 monitor requires several holes to be drilled in the fume hood using the back plate as a template.

To monitor face velocity, the air outlet port at the back of the AirGard® 405 is connected to the sidewall inside the fume hood as shown in figure 4. A flexible hose is used to attach the air outlet port to the interior of the hood using a side wall adapter. Polarity of power terminal block is as follows: 1 is Positive, 2 is Negative.



### **WARNING**

When using tools, **ALWAYS** wear proper eye protection. Also, all necessary precautions must be observed when installing or making repairs in the vicinity of electrical equipment.

### **Tools Required**

1. Electric drill
2. Drill bit size #37 (0.104")
3. Phillips head screwdriver
4. Flat head screwdriver with 1/8" and 1/4" blade widths
5. Carbide hole saw, adjustable
6. 7/8" (0.875") hole saw
7. 3/4" (0.750") hole saw
8. Eye protection

---

## NOTICE

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

Older hoods may contain asbestos. **ALWAYS** take special precautions when dealing with this material.



Figure 4:  
Back view of fascia

### Procedure

**Step 1:** Detach the back plate from the monitor.

**Step 2:** Use the back plate (figure 3) as a template to drill two holes, 0.104" diameter, to secure the back plate to the fume hood.

**Step 3:** Use the back plate as a template to drill one hole, 0.75" diameter, for airflow from the monitor to the fume hood.

**Step 4:** If the power cable is routed through the face of the fume hood, use the back plate as template to drill one hole, 0.875" diameter, to route the power cable from the back of the hood to the front. The power cable can also be routed from the front of the monitor, in which case this hole is not needed.

**Step 5:** Drill a 0.515" hole in the side wall of the fume hood approximately 6" behind the sash and even with its bottom when fully open. Insert the side wall adapter from the inside of the hood and lock with the lock ring (figure 4).

---

**Step 6:** Connect the supplied air hose between the sidewall adapter (figure 4) and the flow tube through the back plate orifice (figure 3). Secure hose firmly and cut to length as necessary to prevent accidental kinks and bends which can affect calibration.

**Step 7:** Mount back plate to fume hood with the two self-tapping screws provided and assemble snap bushing into wiring hole (if used).

**Step 8:** Connect the power cable (figure 3) to the terminal block. The power cable is shown routed from the back of the fume hood but may be also routed from the front side. If using DC power terminals, 1 is Positive, 2 is Negative.


**Step 9:** Secure the monitor to the back plate using a screw on the top and a screw at the bottom (figure 1). If front power cable routing is used, be careful to place the cable into the notch provided in the bottom of the front cover before securing the screws.

**Step 10:** Plug the power supply to a power source.

---

## Calibration

Field calibration must be performed since each hood installation is unique.

	<p style="text-align: center;"><b>WARNING</b></p> <p>Calibration of this instrument should only be performed 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 the AirGard® 405 monitor must be completely aware of the regulations and guidelines specific to their application.</p>
---	--



**Figure 5:**  
Typical installation

### Equipment

1. Calibrated thermoanemometer (TSI® Model 8575, APM360 or equivalent).
2. Small screwdriver with a 1/8" wide flat tip.

### Procedure


**Step 1:** Double check installation to ascertain that the AirGard 405 monitor, power supply and any ancillary parts are properly installed.

**Step 2:** Allow 20 minutes for the monitor to warm up.

**Step 3:** Determine the low flow setpoint. This is the value of where the monitor will first indicate a low flow condition. The red indicator will be illuminated for this value. Refer to facility's Industrial Hygiene Officer for the proper setpoint. For this example, assume the indicator is to be illuminated when the flow is 70 fpm.

---

**Step 4:** Adjust fume hood airflow to the low flow setpoint (as described in Step 3). One method to lower the face velocity of the hood is to close the volume damper (if available) in the ductwork.

	<b>WARNING</b>
	This method is only used as a temporary condition to set the low flow point. Make sure airflow is restored to proper level after calibration.

**Step 5:** Using a properly calibrated thermoanemometer, determine the velocity through the face of the hood by taking a detailed velocity traverse. Divide the face area of the hood into equal partitions. One reading per square foot of face area is recommended for an accurate traverse. Compute the average velocity for this area. For this example, assume that the traverse resulted in an average velocity of 70 fpm.

**Step 6:** If the red indicator is illuminated, slowly turn the adjustment screw counterclockwise until the green indicator illuminates. If the green indicator is illuminated, slowly turn the adjustment screw clockwise until the red indicator illuminates; now slowly turn the adjustment screw counterclockwise until the green indicator illuminates. It is important that these adjustments be done in small increments, at intervals of about ten seconds each, to allow for the delayed reaction of the alarm.

**Step 7:** Restore fume hood airflow to a normal level.

---

## **Step-By-Step Operation**

### **Alarm Acknowledgment**

The horn and red indicator will turn on approximately six seconds after an alarm condition is detected. To mute the horn, press and release the TEST/RESET button. Note that after an alarm condition has been detected, the red indicator will stay on. The horn will remain muted until airflow is restored to normal levels.

### **Alarm Test**

When no alarm condition is present, the alarm can be tested by pressing the TEST/RESET button. While the button is pressed, the indicator and horn will be activated.

### **Horn Disable (from keypad)**

Under any operating condition, the horn may be disabled by pressing the keypad for more than 5 seconds. The monitor will continue to drive the appropriate LEDs at a flash rate of 2 pulses per second. The horn will stay in the disabled mode until either of the following two conditions occur:

- a single, momentary press of the keypad
- power to the monitor goes off and then back on.

The relay output will still be active with its contacts closed or open depending on the current flow conditions.

---

## APPENDIX A: Maintenance & Troubleshooting

### Maintenance

The outside of the AirGard® 405 monitor may be wiped clean with mild soap (dish washing detergent) and water on a damp cloth to remove finger marks, oils or residue. **DO NOT** use abrasives or solvents. **DO NOT** immerse the monitor or allow liquids to enter the case. Dry the monitor thoroughly after cleaning.

### Troubleshooting

Symptom	Check
<b>NO INDICATORS</b>	Power supply not plugged into AC supply. Plug in power supply. Power supply cable not properly terminated into terminal block.
<b>NO AUDIBLE ALARM</b>	Horn has been silenced using the TEST/RESET button. Alarm condition must clear before horn may be re-activated. J3 poles 3 and 4 may be closed. Pole 3 of JP1 may have shorting jumper unintentionally installed. If permanent horn silence is not desired, disconnect power, remove pole 3 shorting jumper and reconnect power.
<b>WRONG ALARM SETPOINT</b>	Potentiometer was not properly adjusted. Repeat calibration steps outlined in <a href="#">Calibration section</a> .
<b>CONTINUOUS ALARM</b>	Blower speed has changed. Adjust if required. Check calibration using traverse technique. Recalibrate monitor as instructed in <a href="#">Calibration section</a> of manual if required. Shunts are in both positions 3 and 4 of JP1. See <a href="#">Setup section</a> .

---

Symptom	Check
<b>HORN SILENCE WILL NOT STAY ON</b>	An alarm condition must be continuously present before the horn can be silenced. If flow conditions fluctuate near the alarm setpoint, the alarm will automatically reset itself. Action should be taken to bring fumehood airflow to proper condition, or recalibrate the alarm setpoint.



---

---

## AIRGARD® 405 MONITOR SPECIFICATIONS

<b>Instrument Dimensions</b>	6.05" high x 3.15" wide x 1.8" deep (15.4 x 8.0 x 4.6 cm)
<b>Instrument Weight</b>	8 oz (0.23 kg)
<b>Shipping Weight</b>	1 lb. 8 oz (0.68 kg)
<b>Green Indicator</b>	0.75" x 0.5" (1.9 x 1.3 cm)
<b>Red Indicator</b>	0.75" x 0.5" (1.9 x 1.3 cm)
<b>Audible Horn</b>	85 dB @ 4" (10 cm)
<b>Alarm Setpoint</b>	Set point 80 fpm recommended
<b>Operating Temperature</b>	55°F to 86°F (13°C to 30°C), 5% to 95% RH, non-condensing
<b>Storage Temperature</b>	-40°F to 150°F (-40°C to 65°C), 5% to 95% RH, non-condensing
<b>Nominal Input Voltage</b>	12.0 ± 1.0 VDC or 9.0 ± 0.5 VAC
<b>Nominal Input Current</b>	0.12ADC @ 12 VDC input
<b>Transformer Specification</b>	120 VAC ± 10%. 60 Hz input 9 VAC nominal output. 0.50A max.
<b>Relay Contacts</b>	1.2A @ 200 VDC max.
<b>Monitor with 24V Input Module (Factory Installed)</b>	
<b>Nominal Input Voltage</b>	22.0 ± 4.0 VDC or 24.0 ± 6.0 VAC
<b>Nominal Input Current</b>	0.12 ADC @ 22.0 VDC input