LIMITATION OF WARRANTY AND LIABILITY

Seller warrants that this product, under normal use and service as described in the operator's manual, shall be free from defects in workmanship and material for a period of twenty four (24) months, or the length of time specified in operator's manual, from the date of shipment to the customer. This limited warranty is subject to the following exclusions:

a. Batteries and certain other components when indicated in specifications are warranted for a period of 90 days from the date of shipment to the customer.

b. With respect to any repair services rendered, Seller warrants that the parts repaired or replaced will be free from defects in workmanship and material, under normal use, for a period of 90 days from the date of shipment to the customer.

c. Seller does not provide any warranty on finished goods manufactured by others. Only the original manufacturer's warranty applies.

d. Unless specifically authorized in a separate writing by Seller, Seller makes no warranty with respect to, and shall have no liability in connection with, any goods which are incorporated into other products or equipment by the Buyer. All goods returned under warranty shall be at the Buyer's risk of loss, Seller's factory prepaid, and will be returned at Seller's risk of loss, Buyer's factory prepaid.

The foregoing is IN LIEU OF all other warranties and is subject to the conditions and LIMITATIONS stated herein. NO OTHER EXPRESS OR IMPLIED WARRANTY OF FITNESS FOR PARTICULAR PURPOSE OR MERCHANTABILITY IS MADE.

THE EXCLUSIVE REMEDY OF THE USER OR PURCHASER, AND THE LIMIT OF THE LIABILITY OF SELLER FOR ANY AND ALL LOSSES, INJURIES, OR DAMAGES IN CONNECTION WITH THIS PRODUCT (INCLUDING CLAIMS BASED ON CONTRACT, NEGLIGENCE, STRICT LIABILITY, OTHER TORT, OR OTHERWISE) SHALL BE THE RETURN OF THE PRODUCT TO THE FACTORY OR DESIGNATED LOCATION AND THE REFUND OF THE PURCHASE PRICE, OR, AT THE OPTION OF SELLER, THE REPAIR OR REPLACEMENT OF THE PRODUCT. IN NO EVENT SHALL SELLER BE LIABLE FOR ANY SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES. SELLER SHALL NOT BE RESPONSIBLE FOR INSTALLATION, DISMANTLING, REASSEMBLY OR REINSTALLATION COSTS OR CHARGES. NO ACTION, REGARDLESS OF FORM, MAY BE BROUGHT AGAINST THE SELLER MORE THAN ONE YEAR AFTER THE CAUSE OF ACTION HAS ACCRUED.

The purchaser and all users are deemed to have accepted the terms of 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 or modified nor may any of its terms be waived except by a writing signed by an authorized representative of Seller.

Service Policy

Knowing that inoperative or defective instruments are as detrimental to Alnor as they are to our customers, our service policy is designed to give prompt attention to any problems. If any malfunction is discovered, please contact your nearest sales office or representative, or call Alnor’s Customer Service department at (800) 424-7427 (USA) and (1) 651-490-2811 (International).
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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.

Note: 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.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOUNTING SCREWS</td>
<td>Two screws secure the monitor to the back plate which is then secured to the fume hood.</td>
</tr>
<tr>
<td>AIR INLET</td>
<td>A portion of the air coming into the hood passes through the air inlet and across the flow sensors.</td>
</tr>
<tr>
<td>SETPOINT ADJUST</td>
<td>This potentiometer is used to set low flow alarm setpoint.</td>
</tr>
<tr>
<td>NORMAL FLOW INDICATOR</td>
<td>This green indicator is illuminated when air flow is greater than the setpoint.</td>
</tr>
<tr>
<td>ALARM INDICATOR</td>
<td>This red indicator is illuminated approximately six seconds after airflow is less than the setpoint.</td>
</tr>
<tr>
<td>TEST/RESET BUTTON</td>
<td>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.</td>
</tr>
</tbody>
</table>

Table 1: Description of features on front of monitor


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.

Note: 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.
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.

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
</tr>
</tbody>
</table>

Tools Required

1. Electric drill
2. Drill bit size #37 (0.104”)
3. Phillips head screwdriver
4. Flat head screwdriver with ⅜” and ¼” blade widths
5. Carbide hole saw, adjustable
6. ⅜” (0.875”) hole saw
7. ¾” (0.750”) 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.

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Older hoods may contain asbestos. Always take special precautions when dealing with this material.</td>
</tr>
</tbody>
</table>
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.

**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.

| ![WARNING] 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. |

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**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.
WARNING

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

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO INDICATORS</td>
<td>Power supply not plugged into AC supply. Plug in power supply. Power supply cable not properly terminated into terminal block.</td>
</tr>
<tr>
<td>NO AUDIBLE ALARM</td>
<td>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.</td>
</tr>
<tr>
<td>WRONG ALARM SETPOINT</td>
<td>Potentiometer was not properly adjusted. Repeat calibration steps outlined in Calibration section.</td>
</tr>
<tr>
<td>CONTINUOUS ALARM</td>
<td>Blower speed has changed. Adjust if required. Check calibration using traverse technique. Recalibrate monitor as instructed in Calibration section of manual if required. Shunts are in both positions 3 and 4 of JP1. See Setup section.</td>
</tr>
<tr>
<td>HORN SILENCE WILL NOT STAY ON</td>
<td>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.</td>
</tr>
</tbody>
</table>
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 all service requests. If any malfunction is discovered, please contact your nearest sales office or representative, or call TSI’s Customer Service department at (800) 424-7427 (U.S. and Canada only).

Ship to:

TSI Incorporated
Alnor Products
500 Cardigan Road
Shoreview, MN 55126  USA

Toll-Free (800) 424-7427
Telephone (651) 490-2811
Fax (651) 490-3824
Email: customerservice@Alnor.com
www.alnor.com
<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instrument Dimensions</td>
<td>6.05&quot; high x 3.15&quot; wide x 1.8&quot; deep (15.4 x 8.0 x 4.6 cm)</td>
</tr>
<tr>
<td>Instrument Weight</td>
<td>8 oz (0.23kg)</td>
</tr>
<tr>
<td>Shipping Weight</td>
<td>1 lb 8 oz (0.68 kg)</td>
</tr>
<tr>
<td>Green Indicator</td>
<td>0.75&quot; x 0.5&quot; (1.9 x 1.3 cm)</td>
</tr>
<tr>
<td>Red Indicator</td>
<td>0.75&quot; x 0.5&quot; (1.9 x 1.3 cm)</td>
</tr>
<tr>
<td>Audible Horn</td>
<td>85 dB @ 4&quot; (10 cm)</td>
</tr>
<tr>
<td>Alarm Setpoint</td>
<td>Set point 80 fpm recommended</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>55°F to 86°F (13°C to 30°C), 5% to 95% RH, non-condensing</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-40°F to 150°F (-40°C to 65°C), 5% to 95% RH, non-condensing</td>
</tr>
<tr>
<td>Nominal Input Voltage</td>
<td>12.0 ± 1.0VDC or 9.0 ± 0.5VAC</td>
</tr>
<tr>
<td>Nominal Input Current</td>
<td>0.12ADC @ 12VDC input</td>
</tr>
<tr>
<td>Transformer Specification</td>
<td>120VAC ± 10%, 60 Hz input 9VAC nominal output, 0.50A max.</td>
</tr>
<tr>
<td>Relay Contacts</td>
<td>1.2A @ 200VDC max.</td>
</tr>
<tr>
<td>Monitor with 24V Input Module</td>
<td></td>
</tr>
<tr>
<td>(Factory Installed)</td>
<td></td>
</tr>
<tr>
<td>Nominal Input Voltage</td>
<td>22.0 ± 4.0VDC or 24.0 ± 6.0VAC</td>
</tr>
<tr>
<td>Nominal Input Current</td>
<td>0.12ADC @ 22.0VDC input</td>
</tr>
</tbody>
</table>