

# AirGard® 350 CEM Critical Environment Monitor

Owner's Manual



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### 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 malfunction is discovered, please contact your nearest sales office or representative, or call Customer Service at (800) 874-2811 (USA) and (1) 651-490-2811 (International).

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# SECTION 1

## Introduction

### General Description

The AirGard<sup>®</sup> 350 CEM continuously monitors air velocity of a duct or space by measuring the air velocity via a remote probe. The monitor then reports this information via audio and visual indicators.

Visual Indicators — An electronic bargraph moves back and forth through universally recognized red (danger), yellow (caution) and green (safe) colored zones as the flow velocity changes. Corresponding large colored LEDs also illuminate. A digital display can be enabled to view velocity quantitatively.

Audible Indicator — A continuous audible alarm alerts you of a low flow situation when the air velocity is in an alarm condition.

Alarm information can be sent to other personnel in a remote location by means of a relay output.

Read this manual entirely before installing, configuring, and using the AirGard<sup>®</sup> 350 CEM. If you need assistance or any further explanation regarding this instrument, please contact TSI.

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## Component Identification



Figure 1 — Front View of Instrument

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Status LEDs	<u>Red (Alarm)</u> — Indicates a high or low airflow alarm; <u>Yellow (Caution)</u> — Indicates the airflow is within the caution zone between normal and low alarm; <u>Green (Good)</u> — Indicates that the airflow is within normal range.
Up Button	Up scroll button for configuration and calibration.
Down Button	Down scroll button for configuration and calibration.
Analog Bargraph	Electronic bargraph expands/contracts through colored zones as the flow velocity changes.
Colored Bands	Red, yellow and green colored bands on LCD glass correspond to alarm, caution, and normal zones.
Digital Display	Status indicators and icons reflect the status of monitor features. If digits are enabled, shows airflow velocity measurement either in feet per minute or meters per second.
Test/Reset Button	Silences the audible alarm if an alarm is present. If no alarm is present, this button is used to test the digital display, LEDs, audible alarm, and relay output. It is also used during calibration and configuration.
Air Probe	Contains the air flow sensors.
Mounting Bracket	Secured by bolts or double-stick tape.

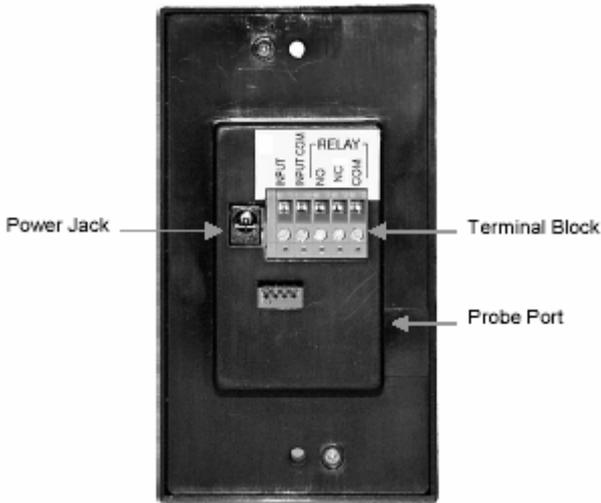


Figure 2—Back View of Instrument

Probe Port	Connects the air probe to the monitor
Terminal Block	Accepts 14-24 AWG wires. See the Installation section for wiring the monitor's various input/output features.
Power Jack	A suitable AC/DC power supply is supplied with domestic units; a 2.1 mm plug with 1.8 m power cord is provided with export units.

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## SECTION 2

### Installation

#### Mounting the Monitor and Probe

**DANGER:** Always wear eye protection when using power tools. Observe all necessary precautions when installing or repairing monitors near electrical equipment.

**DANGER:** Configuration 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 configuring this monitor must be completely aware of the regulations and guidelines specific to its application.

1. Determine where the monitor will be mounted. The mounting bracket may be bolted or taped (double-sided tape provided) to a flat surface or the unit may be flush mounted, such as within the front panel of a Biological Safety Cabinet. A mounting template is provided in the back of this manual for flush mounting purposes.
2. Determine the probe mounting position. The different mounting positions (described below) will give different velocity readings. Be certain of the parameter you wish to measure and mount the probe accordingly.

Duct Mounting — Find a location at least 6 inches above the transition. Drill or punch an 11/16-inch hole in the duct for the compression fitting for the probe. Deburr the hole as needed. Install the compression fitting in the duct.

**NOTE:** *Do not allow chips from drilling/deburring operations to come in contact with the HEPA filter. Sharp chips may damage the filter.*

Cabinet Mounting — Find a suitable location just above the HEPA filter of the Biological Safety Cabinet. Secure the mounting bracket to the cabinet's studs or another available mounting location. Make sure the compression fitting is installed in the mounting bracket.

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**NOTE:** Do **not** drill or otherwise perforate the cabinet in any way as this could violate the integrity of the cabinet's seal and cause the escape of contaminants to the surrounding environment.

**Transition/Thimble Mounting** — Some transitions have threaded ports available that can be used for probe mounting. Remove the threaded plug from the thimble connection and install the compression fitting in the threaded port. If no port is available, drill an 11/16 inch hole, deburr the hole, and install the compression fitting.

**NOTE:** Do **not** allow chips from drilling/deburring operations to come in contact with the HEPA filter. Sharp chips may damage the filter.

3. Insert the probe 3 to 6 inches into the compression fitting. The window on the probe must face the air flow, exposing the sensor to the flow.
4. Connect the input/output signal wiring, if required, to the terminal block on the back of the monitor. See the Electrical Wiring below.
5. Attach or mount the monitor.
6. Plug the power supply into an appropriate electrical outlet.

## Electrical Wiring

**Power Jack** — Power is supplied to the monitor through a power jack located on the rear of the monitor. For units shipped within the United States and Canada, a suitable AC/DC power supply is supplied with the unit. Plug the power supply into 120 VAC nominal 60 Hz mains.

For monitors shipped outside the United States and Canada, a 2.1 mm plug with a 1.8 m cord is provided. See the Specification section on the inside front cover for power requirements.

**Terminal Block** — The monitor has a five-pin screw terminal block connector protruding from the rear of the monitor. The terminal block accepts 14-24 AWG wires. These connections are for input/output features. See the Configuration Parameters section where indicated. The connections available are described below:

**INPUT:** This input, when used with INPUT COM, operates a number of different functions. It accepts a remote switch closure. See Configuration Parameter P07.

**INPUT COM** (Input Common): This is the ground used for the INPUT and connection.

**RELAY** (Relay): This relay has both normally open and normally closed contacts. See Configuration Parameter P08.

**Relay Status Under Various Conditions**

Relay Setting Displayed	Wiring	Monitor Status		
		Good	Alarm	Caution
— —	NO	Open	Open	Open
	NC	Closed	Closed	Closed
CL with horn icon and red LED	NO	Open	Closed	Open
	NC	Closed	Open	Closed
OP with horn icon and red LED	NO	Closed	Open	Closed
	NC	Open	Closed	Open
CL with horn icon and yellow LED	NO	Open	Closed	Closed
	NC	Closed	Open	Open
OP with horn icon and Yellow LED	NO	Closed	Open	Open
	NC	Open	Closed	Closed

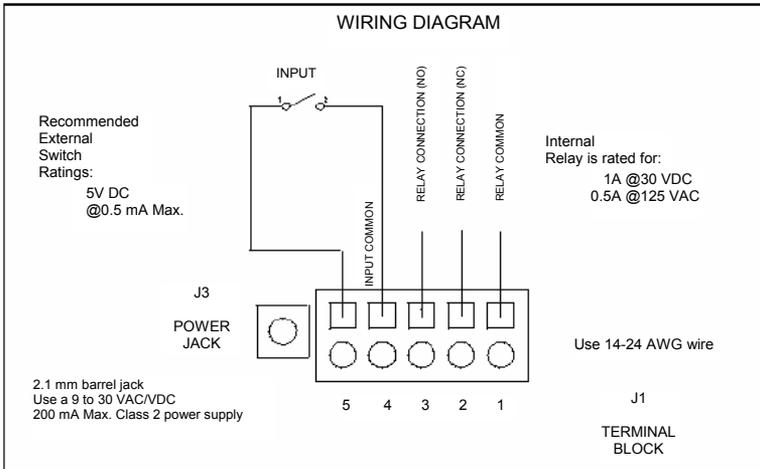


Figure 3 – Field Wiring Diagram

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## SECTION 3

### Calibration

#### Overview

The AirGard 350 CEM may be calibrated before first use. The calibration is stored in the non-volatile memory of the instrument and is not lost when the monitor loses power. If the AirGard 350 CEM is used to display true air velocity, no calibration is needed.

**DANGER:** Calibration and configuration of this monitor must 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 this monitor must be completely aware of the regulations and guidelines specific to its application.

**NOTE:** *The low and high alarm settings will change every time calibration is performed.*

#### Procedure

1. Ensure that the monitor is properly installed.
2. The power supply plug should be firmly in the power jack on the back of the monitor and the power supply should be plugged into an appropriate live electrical outlet. The probe must be connected and firmly in place. The monitor must be warmed up for at least 10 minutes to reach a stable operating temperature.

**NOTE:** *For the one point calibration, a velocity needs to be determined.*

3. While the monitor warms up, determine the velocity to be matched.
4. Press and hold the Test/Reset button until you hear a double beep and see CAL displayed.

**NOTE:** *This Calibration initialization sequence takes approximately 10 seconds, during which the display will be fully lit (all segments on) for about 3 seconds and then blank (all segments off) for about 5 seconds before the word CAL appears.*

5. Press the Test/Reset button to begin the calibration process. Use the Up or Down buttons to adjust the displayed value to match the actual measured low velocity.
6. Press the Test/Reset button once the desired value is displayed. The monitor will take readings for 20 seconds (shown as a countdown display).

**NOTE:** *If an error message is displayed at this point, there is problem with the calibration and the procedure will be terminated. See Calibration Error Codes below.*

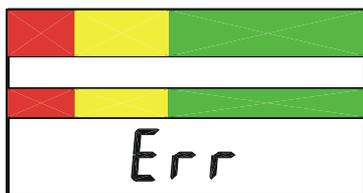
7. The monitor now conducts a self-test to determine if the calibration was successful. If this test indicates that the calibration was successful, the instrument will emit two quick beeps, store the new values in memory, and return the display to the CAL configuration menu selection.
8. The low and high alarms are automatically set. The low alarm is set at a velocity 15% lower than the calibration point; the high alarm is set at a velocity 15% higher than the calibration point.

**NOTE:** *The low and high alarms may also be manually set. See Changing Alarm Set Points in Section 3.*

This completes the calibration procedure. To view other parameter configuration menu selections, press the Up/Down buttons. To exit and return to the Run mode, press and hold the Test/Reset button for two seconds.

### Calibration Error Codes

If an error occurs during a calibration step, the instrument will emit one long beep and the display will show an error code.



Error Code	Cause
ErL	Airflow below the instrument's measurement range.
ErH	Airflow above the instrument's measurement range.
Err	Too much variation in airflow.

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If a calibration error is detected, you must press the Test/Reset button to acknowledge the error condition. After acknowledgement, the monitor will return to the CAL configuration menu selection so that another calibration can be attempted. The incorrect values will not be stored in memory. The monitor will continue to use the previous calibration values until a correct calibration is successfully completed.

### **Suggestions For Obtaining An Acceptable Calibration**

**ErL** — Indicates that the air velocity is too low to calibrate the monitor. Move the probe to a location where the velocity is higher and/or check for a blockage upstream of the probe mounting position.

**NOTE:** *If the probe is mounted above a HEPA filter and moving it to a different position (yet no closer or further from the filter) yields a substantially higher air velocity, the HEPA filter may need replacement.*

**ErH** — Indicates that the air velocity is too high to calibrate the monitor. Move the probe to a location where the air velocity is lower, check for a partial blockage which could be accelerating the flow over the probe, and/or change the HVAC system to operate at a lower speed.

**Err** — To get a more laminar (stable) set of sample readings, check the following during the 20 second calibration period:

- Make sure doors and windows are not being opened and closed.
- Check to see if the lab HVAC is cycling on or off, either heating or air conditioning.
- Compare all readings taken to see if any vary by more than 10 fpm (or 10%) above or below the calculated average ('fast spots' or 'slow spots'). Hint: Set the thermoanemometer to the lowest possible time constant.
- Verify that the window on the probe faces the flow, fully exposing the sensor.

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## Low Alarm Setup

This monitor must be setup before first use and checked regularly thereafter according to the prevailing safety standard. The alarm setup is stored to nonvolatile memory and is not lost when the monitor loses power.

Because each installation and its air flow patterns are unique, this monitor must be set up in the field on the air flow system on which it is intended to monitor.

Configuration 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 setting up this monitor must be completely aware of the regulations and guidelines specific to its application.

### Alarm Setup Procedure:

Verify that the monitor was properly installed. The probe connector should be attached securely into the side of the monitor.

The power supply plug should be firmly in the power jack on the rear of the monitor and the power supply should be plugged into an appropriate live electrical outlet. The monitor must be warmed up for at least 10 minutes to reach a stable operating temperature.

Once the monitor warms up, note the velocity displayed by the air flow. This can be observed without changing the settings by pressing the Up Button and watching the number that alternates with the high alarm setting (the default setting is OFF).

Press and hold the Down Button for 5 seconds to access the low alarm setup menu. The current alarm setting will be displayed.

Use either the Up or Down Button to change the displayed value to match the actual desired low alarm point. Press the Test/Reset button when the desired value is displayed.

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## SECTION 4

### Normal Operation

#### Power Up Sequence

On power up, the digital display is initialized and every segment of the display turned on for two seconds. All three of the LEDs and the horn are also activated.



After the two seconds has expired, the three LEDs and the horn will turn off. The version number of the firmware will then be displayed for two seconds.

#### Run Mode

An electronic bargraph travels horizontally through universally recognized red (danger), yellow (caution) and green (safe) colored zones as the flow velocity changes. Corresponding large colored LEDs also illuminate.

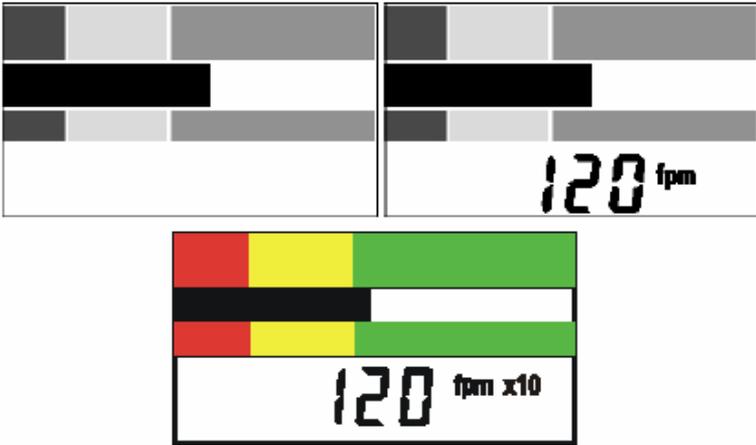
The Good LED (green) indicates a normal airflow condition. The Caution LED (yellow) indicates that the airflow is within the caution zone between normal and low alarm. The Alarm LED (red) indicates an airflow alarm.

These Good, Caution, and Alarm zones are determined by a user programmed low alarm set point and set point offset. If the digits are enabled, the digital display shows the air flow velocity measurement either feet per minute (fpm) or meters per second (m/s). Over range measurements are shown as Hi. Under range measurements are shown as Lo.

**IMPORTANT:** *When feet per minute air flow velocity exceeds 999 fpm, the X10 icon lights. This indicates that the displayed reading should be multiplied by ten to obtain the actual air velocity. For*

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*example, if the display reads 120 fpm X10, the actual air velocity is 1200 fpm.*



## Monitor Test

During normal operation, pressing and holding the Test/Reset Button for 2 to 5 seconds will turn on all segments on the LCD, and all LEDs as well as the horn and the alarm relay output.

## Horn

The horn will be activated whenever the Low or High Alarm zone has been reached (unless the horn has been permanently disabled).

Once the horn has been activated due to an alarm condition, it will stay on until it is temporarily or permanently disabled. If the horn is temporarily disabled, the horn will turn off and not come back on until either the temporary horn disable timer expires (Configuration Parameter P03) or another alarm condition is detected. If the horn is permanently disabled, the horn will not come back on until the horn is re-enabled.

The horn will sound when the local alarm input is active and will remain on until the local alarm input is deactivated or the Test/Reset button is pressed. The horn will pulse intermittently when the external alarm input is active and will remain on until the external alarm input is deactivated.

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If the night setback is active (with P10 set to “OFF”), the horn will be completely disabled in all instances until the input is deactivated. (See P07 for details).

**Temporary Horn Disable** — Pressing the Test/Reset button temporarily silences the horn. The horn slash through icon will be on the display indicating that the horn is temporarily disabled. If the horn is temporarily disabled, it will turn off and not come back on until either the temporary horn disable timer expires or until the monitor detects another alarm condition. See Configuration Parameter P03 for programming the timer.

**Permanent Horn Disable** — The horn may be permanently disabled during normal operation by pressing and holding the Test/Reset button for five seconds. After five seconds, the horn slash through icon will continuously flash on the display indicating that the horn is permanently disabled; the horn will no longer sound in an alarm zone or when any alarm input is activated. Removal of power to the monitor does not change this setting; upon restoration of power, the horn will still be disabled. The horn may be re-enabled by pressing the Test/Reset button for five seconds. The flashing horn slash through icon will then be shut off.

## **Viewing Alarm Set Points**

The alarm set points may be viewed during normal operation by pressing the Up and Down Buttons. The Up Button is to the right of the green LED. The down button is to the left of the red LED. A straightened out paper clip works well to access them. If the Up Button is pressed, the display will toggle between the current reading and the High Alarm set point. If the Down Button is pressed, the display will toggle between the current reading and the Low Alarm set point.

The display will toggle between the current reading and the selected set point until there is no keypad activity for five seconds. At that point, the monitor will return to normal operation and display the current airflow reading.

## **Changing Alarm Set Points**

The alarm set points can be changed during normal operation and while viewing a set point by holding the Up Button (High Alarm) or Down Button (Low Alarm) for five seconds. When the button is first pushed, the display will toggle between the current reading and the selected set point. If the button is held for five seconds, the monitor goes into a

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program mode that allows changing the selected set point. The corresponding LED will continuously flash and the display will turn on the PGM descriptor to indicate that the monitor is in program mode.

The displayed setting is changed by pressing the Up and Down Buttons. The Up Button will increment the set point by 1 fpm or by 0.1 m/s, depending on the units configuration. The Down Button will decrement the set point by 1 fpm or by 0.1 m/s. When the desired setting is displayed, press the Test/Reset Button. The PGM descriptor will flash once and the horn will give two quick beeps to acknowledge the save and the monitor will return to normal operation and display the current airflow reading.

**NOTE:** *When the alarm set point is over 1000 fpm, the increment or decrement is 10 fpm.*

**IMPORTANT:** *If the Test/Reset button is pressed and held for 2 seconds, the change will not be saved; this is signalled via one long horn beep*

### **LED Status When Changing the Alarm Setpoint**

<b>Alarm</b>	<b>LED Status</b>
Low alarm	Red LED flashes
High alarm	Green LED flashes
Night setback low alarm	Yellow LED flashes

### **High Alarm Disable**

The high alarm is enabled/disabled through the Changing Alarm Set Points procedure described above. To disable the high alarm, the high alarm set point should be set to OFF. While scrolling through the high alarm set point values, the OFF selection is located right after the upper most range of the allowable values. If the high alarm is enabled, the relay can be disabled/enabled for the high alarm by using Configuration Parameter P09.

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## SECTION 5

### Parameter Configuration

#### General

**NOTE:** *Configurable parameters are stored to nonvolatile memory of the instrument and will not be lost when the monitor loses power.*

To access the Configuration mode, press and hold the Test/Reset button until you hear a double beep and see CAL displayed.

**NOTE:** *This Calibration initialization sequence takes approximately 10 seconds, during which the display will be fully lit (all segments on) for about 3 seconds and then blank (all segments off) for about 5 seconds before the word CAL appears.*

Once this mode is entered, the monitor will stop monitoring the airflow and display the configuration menu selections. The configuration menu selections are CAL, P01, P02, P03, P04, P05, P06, P07, P08, P09, P10, and dEF.

The first menu selection displayed is P01. To view the other parameter configuration menu selections, successively press the Up and Down Buttons (Up to go forward; Down to go backward). When the desired configuration menu selection is displayed, press the Test/Reset button to enter. Within a selection, pressing the Up Button will scroll forward and pressing the Down Button will scroll backward. To quickly scroll, hold the button. The scrolling will wrap around when the allowable range is exceeded.

When a configuration menu selection is entered and a setting is changed, the Test/Reset button must be pressed to save the change. The PGM descriptor will flash once and the horn will give two quick beeps to acknowledge the save and the monitor will return to the Parameter Configuration menu.

**IMPORTANT:** *If the Test/Reset button is pressed and held for 2 seconds, the change will not be saved; this is signalled via one long horn beep.*

All parameters are configured in the same manner. To exit the Parameter Configuration menu, press and hold the Test/Reset button for 2 seconds. The monitor will also time out and exit the Parameter

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Configuration menu after 1 minute has elapsed without any keypad activity.

**SUMMARY:** *Pressing the Test/Reset button for 10 seconds accesses the Configuration menu. Pressing the Up or Down Button advances to the next parameter and also navigates within a selection. Pressing once manually scrolls; holding scrolls quickly. Pressing and releasing the Test/Reset button after a change has been made saves it; pressing and holding the Test/Reset Button for two seconds cancels the change and exits.*

## Configuration Parameters

The following table shows the factory default settings for the monitor's various programmable parameters. A default reset restores these settings.

Configuration Parameter	Factory Default
P01 — Digits enabled/disabled	Enabled
P02 — Units of measure	English (feet/minute)
P03 — Temporary horn disable timer	255 (infinite)
P04 — Caution-to-alarm transition delay timer	3 seconds
P05 — Alarm-to-caution transition delay timer	3 seconds
P06 — Caution offset	5 fpm
P07 — Input	CL (disables with contact closure)
P08 — Relay output	CL (alarm output, contacts close with alarm)
P09 — High alarm relay	OFF
P10 — Night setback low alarm	OFF
dEF — Default reset	Resets P01 – P12 parameters to factory defaults

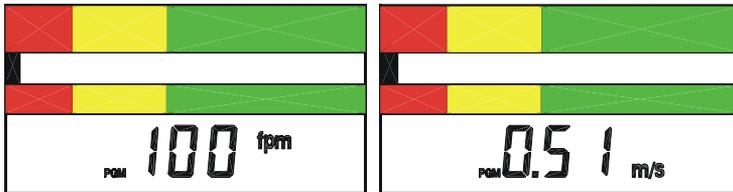
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## P01 — Digits Enabled/Disabled

The digits can be enabled or disabled using this Configuration Parameter. It only disables the numeric airflow velocity reading. The status indicators and icons will not be turned off. After this Configuration menu selection is entered, the monitor will turn on the program mode PGM descriptor and, if the digits are disabled, will show:



If the digits are enabled, one of the following will be displayed depending on the current unit of measure selected:



Pressing either the Up or Down Button toggles between the two settings. When the desired setting is displayed, press the Test/Reset button. The PGM descriptor will flash once and the horn will give two quick beeps to acknowledge the save. The digits and applicable unit descriptor (fpm or m/s) will either be on or off during normal run mode.

The monitor will return to the P01 Configuration menu selection. Press the Up and Down Buttons to advance to another Configuration Parameter. Press and hold the hold the Test/Reset button for 2 seconds to exit the Configuration menu.

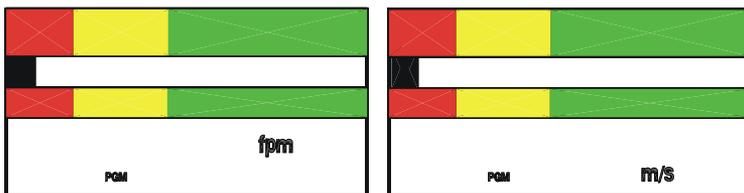
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## P02 — Unit of Measure

The velocity can be displayed either in feet per minute (fpm) or in meters per second (m/s), with the applicable descriptor (fpm or m/s) on during normal run mode.

**IMPORTANT:** *When feet per minute air flow velocity exceeds 999 fpm, the X10 icon will light. This indicates that the displayed reading should be multiplied by ten to obtain the actual air velocity.*

After this Configuration menu selection is entered, the monitor will turn on the program mode PGM descriptor and display the current unit descriptor:



Press the Up or Down Button to toggle between the two settings. When the desired setting is displayed, press the Test/Reset button. The PGM descriptor will flash once and the horn will give two quick beeps to acknowledge the save. The applicable unit descriptor (fpm or m/s) will then be on during normal run mode.

The monitor will return to the P02 Configuration menu selection. Press the Up and Down Buttons to advance to another Configuration Parameter. Press and hold the hold the Test/Reset button for 2 seconds to exit the Configuration menu.

## P03 — Temporary Horn Disable Timer

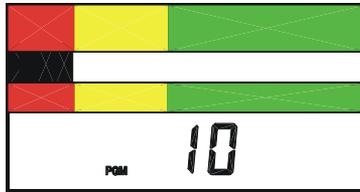
During an alarm condition, the alarm can be acknowledged by pressing the Test/Reset button. This temporarily silences the horn. Normally, the horn will be silenced for the duration of the current alarm condition. The monitor can be configured to have the horn come back on after a specified number of minutes or configured so that the horn cannot be silenced at all.

This Configuration Parameter sets the temporary disable timer. After this Configuration menu selection is entered, the monitor will turn on the program mode PGM descriptor and display the current value for the temporary horn disable timer. This timer can be set to a value from 0 to 255. A setting of 255 indicates that when the alarm is temporarily

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silenced by pressing the Test/Reset button, the horn will not come on again until this alarm condition clears and another alarm event occurs. A setting of 0 is used to prevent silencing of the horn by pressing the Test/Reset button. Any value between indicates the time, in minutes, after which when the horn will come back on if the alarm condition has not been corrected.

For example, if the monitor is configured for a temporary horn disable time of 10 minutes, the display will show:



Press the Up Button to increase the timer value by 1 minute or the Down Button to decrease the timer value by 1 minute. When the desired setting is displayed, press the Test/Reset button. The PGM descriptor will flash once and the horn will give two quick beeps to acknowledge the save.

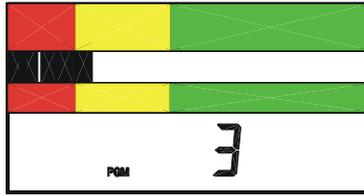
The monitor will return to the P03 Configuration menu selection. Press the Up and Down Buttons to advance to another Configuration Parameter. Press and hold the hold the Test/Reset button for 2 seconds to exit the Configuration menu.

#### **P04 — Caution-to-Alarm Transition Delay Timer**

The yellow caution to red alarm transition time is the delay period, in seconds, that a given air flow condition must remain present before the monitor will go into the appropriate alarm zone. This feature prevents the monitor from toggling back and forth between zones when a condition is on the border.

This Configuration Parameter sets the caution-to-alarm transition timer. After this configuration menu selection is entered, the monitor will turn on the program mode PGM descriptor and display the current value for the caution-to-alarm transition timer. This timer can be set from 0 to 255 seconds.

For example, if the monitor is currently configured for a caution-to-alarm transition time of three seconds, the display will show:



Press the Up Button to increase the timer value by 1 second or the Down Button to decrease the timer value by 1 second. When the desired setting is displayed, press the Test/Reset button. The PGM descriptor will flash once and the horn will give two quick beeps to acknowledge the save.

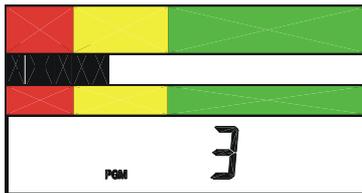
The monitor will return to the P04 Configuration menu selection. Press the Up and Down Buttons to advance to another Configuration Parameter. Press and hold the Test/Reset button for 2 seconds to exit the Configuration menu.

### **P05 — Alarm-to-Caution Transition Delay Timer**

The red alarm to yellow caution transition time is the delay period in seconds that an air flow condition must remain present before the monitor will go into the appropriate warning zone. This feature prevents the monitor from toggling back and forth between zones when a condition is on the border.

This Configuration Parameter sets the alarm-to-caution transition timer. After this Configuration menu selection is entered, the monitor will turn on the program mode PGM descriptor and display the current value for the alarm-to-caution transition timer. This timer can be set from 0 to 255 seconds.

For example, if the monitor is currently configured for an alarm-to-caution transition time of three seconds, the display will show:



Press the Up Button to increase the timer value by 1 second or the Down Button to decrease the timer value by 1 second. When the desired setting is displayed, press the Test/Reset button. The PGM descriptor will flash once and the horn will give two quick beeps to acknowledge the save.

---

The monitor will return to the P05 Configuration menu selection. Press the Up and Down Buttons to advance to another Configuration Parameter. Press and hold the hold the Test/Reset button for 2 seconds to exit the Configuration menu.

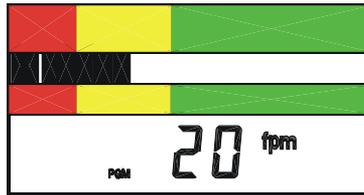
### **P06 — Caution Offset**

The caution offset defines the starting point of the caution zone. It is a value (in the current unit of measure) that is added to the low alarm set point. It determines when the yellow low caution light comes on.

**EXAMPLE:** *If the low alarm is set at 70 fpm and the caution offset is set at 20 fpm, the yellow low caution light will come on at a value of 70 to 89 fpm.*

This Configuration Parameter sets the caution offset. After this configuration menu selection is entered, the monitor will turn on the program mode PGM descriptor and display the current value for the caution offset.

For example, if the monitor is currently configured for a caution offset of 20 fpm, the display will show:



Press the Up Button to increase the value by 1 measurement unit or the Down Button to decrease the value by 1 measurement unit. When the desired setting is displayed, press the Test/Reset button. The PGM descriptor will flash once and the horn will give two quick beeps to acknowledge the save.

The monitor will return to the P06 Configuration menu selection. Press the Up and Down Buttons to advance to another Configuration Parameter. Press and hold the hold the Test/Reset button for 2 seconds to exit the Configuration menu.

---

## P07 —Input

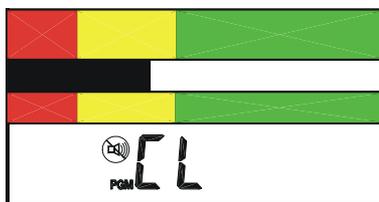
This Configuration Parameter configures the switch settings for the instrument's Remote Test/Reset , Night Setback, and Alarm Input features. After this Configuration menu selection is entered, the monitor will turn on the Program mode PGM descriptor and display the current setting. Press the Up and Down arrow keys to scroll through the available settings.

**NOTE:** *P07 may only be configured to have one of these features operational at a time.*

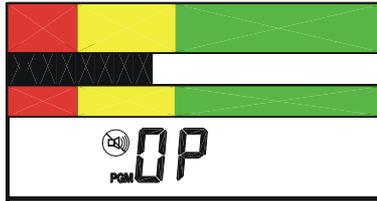
**Remote Test/Reset** — This allows the operator to activate the instrument's Test/Reset function remotely via a contact closure. It functions in the same manner as the Test/Reset button on the instrument's front panel (see Section 1). The local Test/Reset button is still active even if the instrument is configured for Remote Test/Reset. If this function is active, the following display will appear under P07:



**Night Setback** — Night setback can be configured for either a contact closure or opening. If the monitor is configured to go into the night setback mode when the contacts are closed, the display will show:

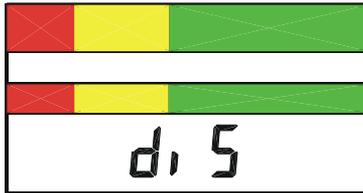


If the monitor is configured to go into night setback when the contacts are opened, the display will show:



When activated, the night setback performs one of two possible actions, based on the setting of P10.

**P10 = OFF** — The monitor is disabled when in the Night Setback mode. The horn is off, the relays are in their “normal” state, and all the LEDs are off. The LCD flashes “diS” once per second.



**P10 = a Number** — This number is the low alarm setpoint value when the monitor is in the Night Setback mode; this value overrides the normal low alarm setting. The caution range during Night Setback is automatically extended from the normal caution alarm point to the P12 setting. Normal flow is any flow reading that is above the normal caution alarm limit. Night Setback also alters the low alarm setting feature. Pressing the Down button while in Night Setback Low Alarm mode displays the night setback low alarm setting; holding the Down button down for five seconds allows you to change the night setback low alarm setting, but does not allow you to turn it off. See P12 for information on turning the night setback low alarm off.

**Alarm Input**— A selection can be made between a local alarm override input and external alarm input. The differences between the inputs relates to the visual, audible, and remote indications activated when the input is received by the monitor.

The local alarm input can be connected to a switch. When activated, the local alarm puts the monitor into alarm in the same manner as a low air flow condition. The red LED lights, the horn sounds, the alarm relay is activated, and the Override descriptor on the display illuminates.

The external alarm input is typically used for some external remote event that may not warrant an alarm to you, but is used rather as an

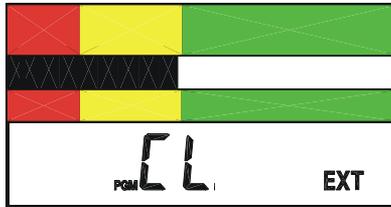
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alert of a situation that may necessitate attention. When activated, the external alarm input causes the horn on the monitor to sound intermittently and illuminates the EXT descriptor on the display to indicate that this is an external alarm. The EXT descriptor will remain on until the external alarm input returns to an inactive state. Note that this selection will *not* cause the alarm relay to activate.

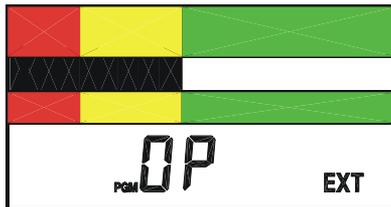
**NOTE:** *The local alarm (steady horn) will always take precedence over an external alarm event.*

This Configuration Parameter selects the input and configures it for open or closed contacts. Open indicates that opening the contacts activates this alarm; closed indicates that closing the contacts activates the alarm.

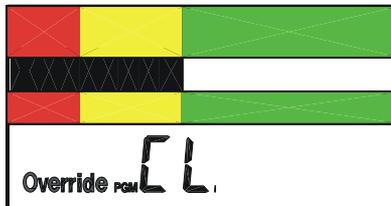
If the monitor is configured for closed contacts to activate the external alarm, the display will show:



If the monitor is configured for open contacts to activate the external alarm, the display will show:

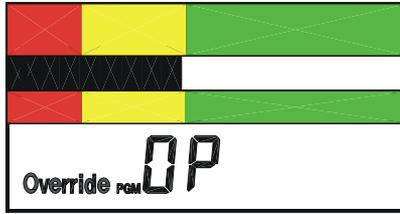


If the monitor is configured for closed contacts to activate the sash override alarm, the display will show:



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If the monitor is configured for open contacts to activate the sash override alarm, the display will show:



Press either the Up or Down button to scroll through the settings. When the desired setting is displayed, press the Test/Reset button. The PGM descriptor will flash once and the horn will give two quick beeps to acknowledge the save.

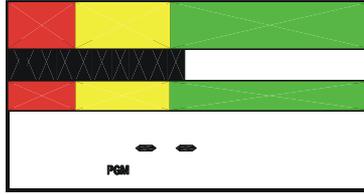
When the desired setting (Remote Test/Reset, Night Setback, or Sash Override/External Alarm Input) is displayed, press the Test/Reset button. The PGM descriptor will flash once and the horn will emit two quick beeps to acknowledge that the setting has been saved.

The monitor will return to the P07 Configuration menu selection. Press the Up and Down Buttons to advance to another Configuration Parameter. Press and hold the hold the Test/Reset button for 2 seconds to exit the Configuration menu.

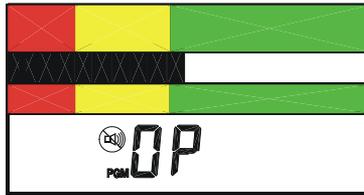
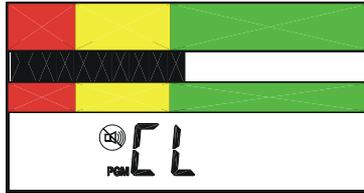
### **P08 — Relay Output**

The monitor's relay contact may be wired for either normally open or normally closed operation (see Electrical wiring in Section 2). The setting selected for the relay output under P08 determines when the relay contact is energized and when it is non-energized. The following table describes the available selections:

<b>Relay Function</b>	<b>Setting Displayed</b>	<b>Contact State</b>
Not Used (disabled)	— —	Always non-energized
Alarm Output	CL.1 with horn icon and red LED	Energized when in alarm
Alarm Output	OP.1 with horn icon and red LED	Energized when in good or caution
Caution Output	CL.1 with horn icon and yellow LED	Energized when in caution or alarm
Caution Output	OP with horn icon and yellow LED	Energized when in good



The relay function is disabled when the display shown above is selected. The relay function is enabled when one of the following displays is selected.



**NOTE:** *The red LED at the top of the instrument will light in conjunction with two displays shown above when the Alarm Output selections appear; the yellow LED will light when the Caution Output selections appear.*

Press either the Up or Down button to cycle through the settings. When the desired setting is displayed, press the Test/Reset button. The PGM descriptor will flash once and the horn will give two quick beeps to acknowledge the save.

The monitor will return to the P08 Configuration menu selection. Press the Up and Down Buttons to advance to another Configuration Parameter. Press and hold the hold the Test/Reset button for 2 seconds to exit the Configuration menu.

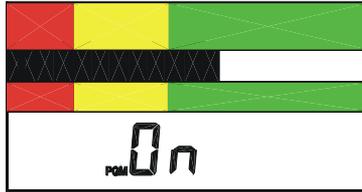
### **P09 — High Alarm Relay Disable**

The alarm state can be sent to a remote location by means of a relay output. The relay can be disabled for the high alarm if it is not warranted for the application.

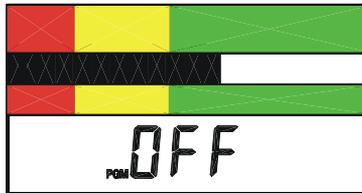
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This Configuration Parameter disables or enables the high alarm relay output. After this Configuration menu selection is entered, the monitor will turn on the program mode PGM descriptor and display the current value for the high alarm relay activation.

If the monitor is configured for the relay to be enabled for the high alarm, the display will show:



If the monitor is configured for the relay to be disabled for the high alarm, the display will show:



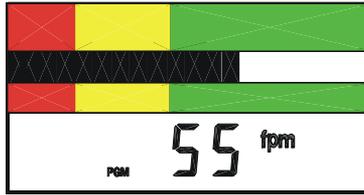
Press either the Up or Down button to alternate between the two settings. When the desired configuration is displayed, press the Test/Reset button. The PGM descriptor will flash once and the horn will give two quick beeps to acknowledge the save.

The monitor will return to the P09 Configuration menu selection. Press the Up and Down Buttons to advance to another Configuration Parameter. Press and hold the hold the Test/Reset button for 2 seconds to exit the Configuration menu.

### **P10 — Night Setback Low Alarm**

This Configuration Parameter sets the night setback low alarm. After this configuration menu selection is entered, the monitor will turn on the program mode PGM descriptor and display the current value for the night setback low alarm. It may be set to “OFF” or a numerical value; see P07 for a functional description of this feature.

If the monitor is configured for a night setback low alarm of 55 fpm, for example, the display will show:

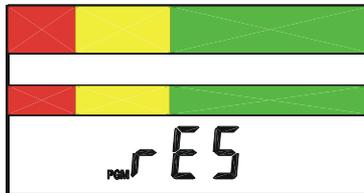


Press the Up/Down buttons to increase/decrease the displayed value by 1 measurement unit. Once the displayed value reaches a setting where it is above the normal low alarm or below the lowest setpoint of the instrument, the display will go to OFF.

When the desired setting is displayed, press the Test/Reset button. The PGM descriptor will flash once and the horn will emit two quick beeps to acknowledge the save.

### **dEF — Reset Configuration Parameters to Factory Default Settings**

All the parameters configurable by you can be reset to the factory defaults located in the memory of the monitor. After this configuration menu selection is entered, the monitor will turn on the program mode PGM descriptor and the display will show:



Press the Test/Reset button. The PGM descriptor will flash once and the horn will give two quick beeps to acknowledge that the configuration settings have been set to their factory default settings.

The monitor will return to the dEF Configuration menu selection. Press the Up and Down Buttons to advance to another Configuration Parameter. Press and hold the hold the Test/Reset button for 2 seconds to exit the Configuration menu.

**NOTE:** *Any calibration information will be reset; i.e., the unit will now show the true air velocity. The alarm settings will not be changed.*

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## SECTION 6

### Troubleshooting and Service

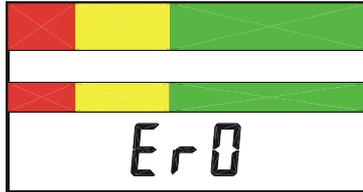
#### Error Codes

**NOTE:** Error codes associated with Calibration (*ErL*, *ErH*, and *Err*) do not affect normal operation. See Section 2: Installation for more information on Calibration Error Codes.

Error checks are continuously performed on the monitor. In the event the monitor detects an error, an error message will continuously flash on the display to alert you. The number in the error code relates to the specific error found.

Error message *Er0* cannot be cleared; the monitor needs to be returned to the factory for service. Please contact TSI for assistance.

**NOTE:** To prevent erroneous readings, the monitor will lock up.



## Troubleshooting Guide

<b>Problem</b>	<b>Possible Cause / Corrective Action</b>
No display or lights.	The power supply cord is not plugged into the monitor or live AC outlet. Plug it in.
No audible alarm when display shows Lo or Hi.	Audible alarm disabled. If horn slash through icon is flashing, the horn has been permanently disabled. Press Test/Reset button for 5 seconds to re-enable.
No audible alarm only when display shows Hi.	High alarm disabled. See "Changing Alarm Set Points" section to enable.
Pulsed audible alarm.	This indicates an external alarm. The EXT descriptor on the LCD should also be on. Attend to the external alarm event. See Configuration Parameter P07.
Alarm does not activate immediately.  Alarm does not come out of alarm immediately when good air flow is restored.	The alarm or clear condition must exist for a predetermined time period before it is interpreted as a true event. See Configuration Parameters P04 and P05 to set the transition delays.
Audible alarm cannot be temporarily silenced using the Test/Reset button.	The temporary disable timer is set to 0. See Configuration Parameter P03 to set the temporary disable timer.
Monitor is flashing "diS."	The monitor is in night set back mode and is disabled. See Configuration Parameter P07 and P10.
Monitor displays ---	Probe connection faulty. Check and correct.
Unexpected low air flow velocity after installation.	Probe inserted in duct incorrectly. Make sure window on probe faces flow.

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<b>Problem</b>	<b>Possible Cause / Corrective Action</b>
Measured air flow velocity does not agree with reference instrument value (>25% difference).	Check probe installation and connection. If installation and connection are correct, contact TSI for assistance.
Monitor keeps bouncing back and forth between adjacent zones.	Air flow is not steady; check probe location. Also see Configuration Parameters P04 and P05 to set the transition delays.

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## **Service Requests**

If you need assistance, please contact TSI.

Ship to:

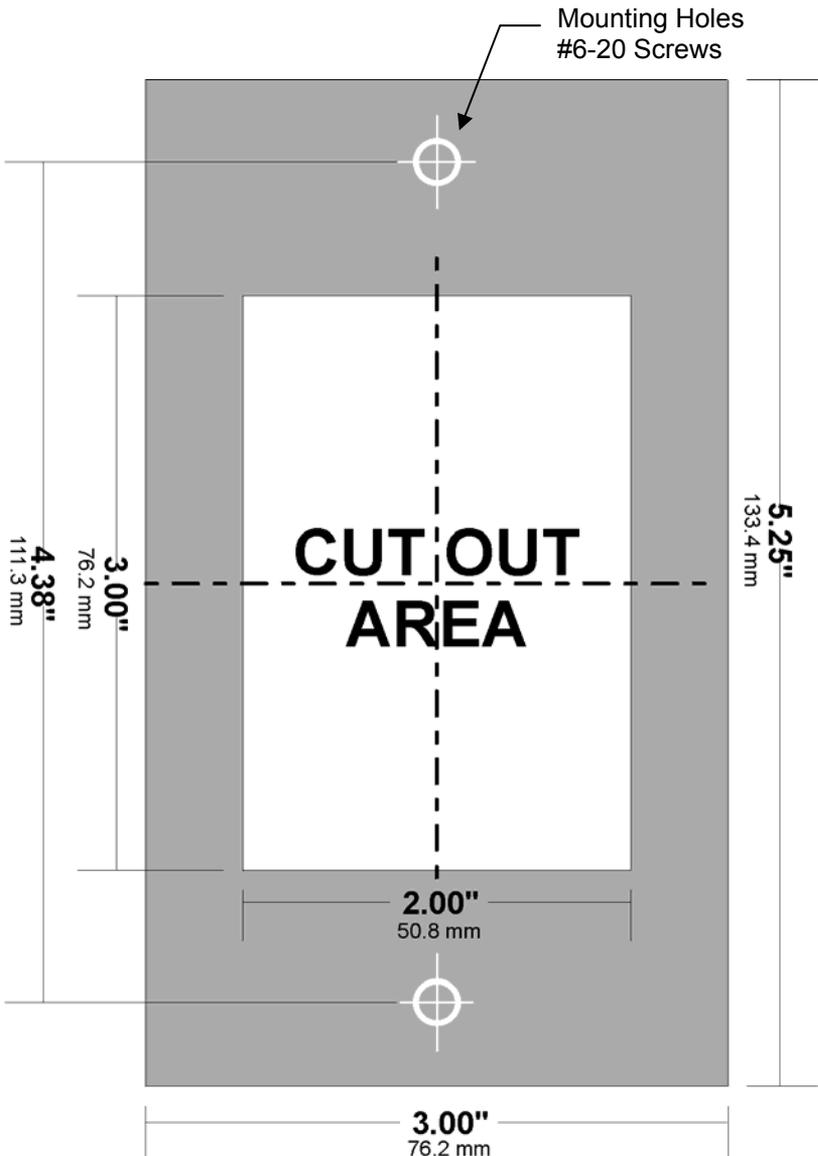
TSI Incorporated  
Alnor Products  
500 Cardigan Road  
Shoreview, MN 55126 USA  
Toll-Free (800) 874-2811  
Telephone (651) 490-2811  
Fax (651) 490-3824  
Email: [customerservice@Alnor.com](mailto:customerservice@Alnor.com)  
[www.alnor.com](http://www.alnor.com)

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## SECTION 7

### Mounting Template





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## AIRGARD® 350 CEM SPECIFICATIONS

Digital Display	3 digit, 7 segment LCD with status indicators and icons. Electronic bar graph moves through colored zones as the velocity changes.
Display Units	If digits are enabled, velocity is represented in feet per minute (fpm) or meters per second (m/s). User selectable through menu.
Display Range	25 to 2000 fpm (0.13 to 10.2 m/s). Over range measurements shown as Hi. Under range measurements show as Lo.
Resolution	1 fpm (0.1 m/s) up to 999 fpm; 10 fpm over 1000 fpm
Accuracy	±5%.
Alarm Range	25 to 2000 fpm (0.13 to 10.2 m/s).
Alarm Delays	User configurable from 0 to 255 seconds.
Audible Alarm Indication	85 dB at 4 inches (10 cm).
Horn Silence	Temporary and permanent.
Night Set Back	Monitor can be remotely disabled.
Visual Alarm Indication	Large red LED for low flow and high flow alarm zones.
Visual Caution Indication	Large yellow LED for caution zone. Caution offset is configurable through menu.
Visual Normal Indication	Large green LED for normal flow zone.
High Flow Alarm Disable	Audible, visual, and relay disable.
Alarm Relay Output	Nominal switching capacity 1A at 30 VDC, 0.5A at 125 VAC; form C relay.
External Alarm Input	Intermittent audible and LCD status indicate external alarm.
Local Alarm Input	Audible and LCD status indicators indicate that the local alarm switch has been tripped.
Instrument Dimensions	<u>Front Faceplate</u> — 5.25 (L) x 3.0 (W) x 5/8 (D) inches (13.3 x 7.6 x 1.5 cm); <u>Rear Enclosure</u> — 3.0 (L) x 2.0 (W) x 0.5 (D) inches (7.6 x 5.0 x 1.3 cm).
Mounting	Flush, 3.0 (L) x 2.0 (W) inch cutout required or bracket mount.
Operating Conditions	50° to 95°F (10° to 35°C), 5% to 95% RH, non-condensing.
Storage Temperature	-40° to 150°F (-40° to 65°C), 5% to 95% RH, non-condensing.
Power Requirement	9 to 30 V AC/DC. Wall plug in power supply supplied with domestic units.

The configurable parameters are stored in the non-volatile memory of the instrument and are not lost when the monitor loses power.

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**Alnor Products, TSI Incorporated –**

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**USA Tel:** +1 800 874 2811    **E-mail:** [customerservice@alnor.com](mailto:customerservice@alnor.com)



Contact your local Alnor Distributor or visit our website [www.alnor.com](http://www.alnor.com) for more detailed specifications.