



Vortex Control Face Velocity Monitor

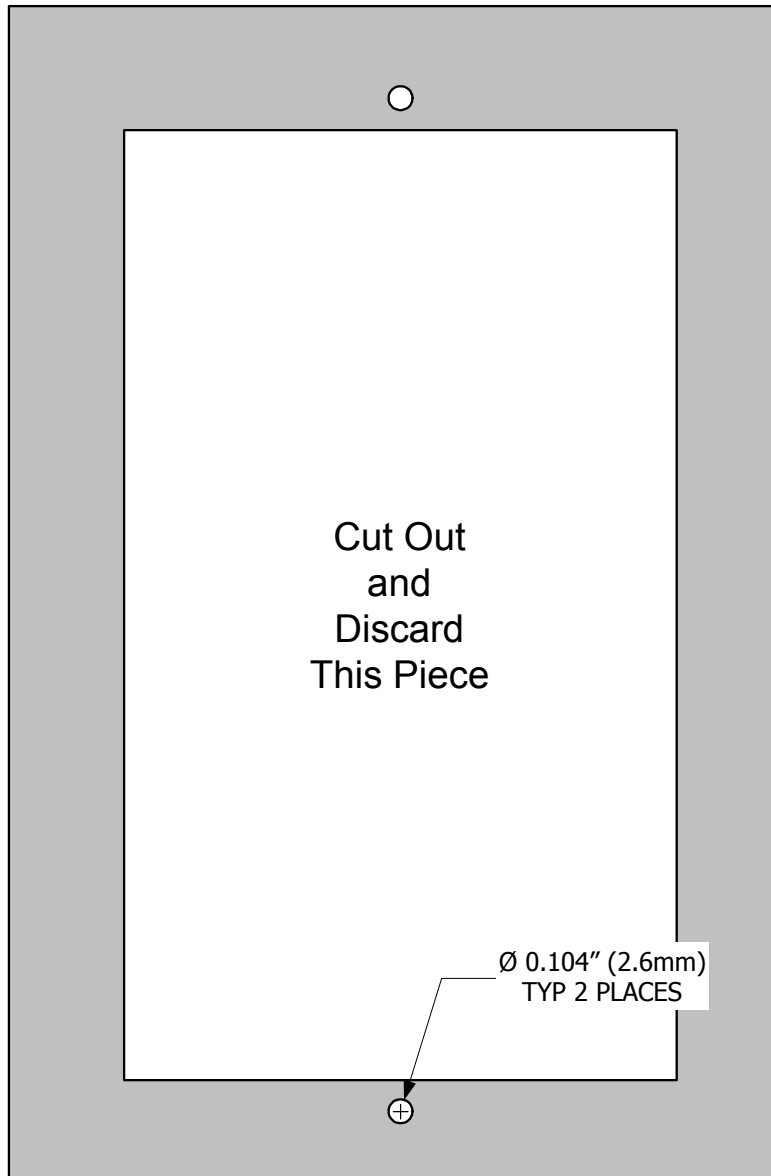
MODEL # VCTA

QUICK REFERENCE GUIDE

NOVEMBER 2022

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Mounting Hole Dimensions:

- Template should be utilized for proper locating cut-out.
- Shaded area represents the front bezel of monitor which is 3.35" (8.51cm) W x 5.1" (12.95cm) H x 0.5" (1.27cm) D. The cut-out dimensions are 2.4" (6.35cm) W x 4.125" (10.48cm) H.
- A minimum depth of 4" (10.2cm) is required behind cutout for rear of enclosure and tubing clearance.
- Secure monitor to fume hood using the two #6 x 1" sheet metal screws to provided.

Internal Hood Probe:

Refer to Appendix B for a diagram of approximate locations. The hood probe must be located on the same side as the face velocity monitor to keep tubing length to a minimum. Typical installation locations are approximately 4" to 10" (10.2cm to 25.4cm) back from the rear of the sash panel and approximately 2" to 8" (5.1cm to 20.3cm) above the highest vertical opening of the sash.

To Install: (refer to Appendix A) Drill a 7/16" diameter (11mm) hole in the side of the fume hood in a suitable location. Feed the supplied clear tubing through the drilled hole and carefully push it over the sensor port located on the rear of the monitor enclosure. Press the reference probe firmly to seat it properly into the side of the fume hood.

Refer to Appendix A & C for all input/output terminal blocks, wiring sizing, specifications, current and load ratings, etc.

Power:

Standard 24 VAC control voltage is utilized to power the monitor. An optional wall pluggable power supply (shipped with the unit if ordered) can also be utilized. When powering multiple units with a common transformer, polarity must be maintained to ensure proper operation.

Digital Inputs:

When required, connect a set of dry contacts between either digital input 1 (DIG.IN 1) and/or digital input 2 (DIG.IN 2) and ground (GND). Note: both the digital inputs share a common ground terminal.

Relay Output:

When required, connect the dry contacts from relay 2 (RELAY 2) to the device monitoring the alarm status of the monitor.

Analog Output Voltage:

Connect the analog output positive voltage terminal (AOUT) to the positive voltage input of the monitoring device. Connect the ground (GND) terminal to the negative voltage input of the monitoring device. Note: the digital inputs and the analog output share a common ground terminal.

NOTE: Area where monitor is located must be under stable temperature control, approximately 65°F to 75 °F (18 °C to 24 °C). A warning message will be displayed if temperature is outside of recommended range.

Enter Calibration Menu

1. Press **MUTE** and **SCROLL** simultaneously and release after password screen is displayed (approx. 5 sec.)
2. Enter correct password (default is 00000), press **ACCEPT**
3. Press **CAL MENU**

ONE POINT (VARIABLE AIR VOLUME):

1. Press **▼** two (2) times, then press **ONE-POINT CALIBRATION**
2. Open sash to stops or operating height, press screen
3. Perform face velocity verification, press screen
4. Enter face velocity verification reading, press **ACCEPT**
5. Stand back and wait for the monitor to complete calibration readings
6. Press **CONTINUE TO CONFIG MENU** or **EXIT**

TWO POINT (CONSTANT AIR VOLUME):

1. Press **▼** one (1) times, then press **TWO-POINT CALIBRATION**
2. Defeat the sash stops and open sash to the full/maximum open position, press screen
3. Perform face velocity verification, press screen
4. Enter face velocity verification reading, press **ACCEPT**
5. Stand back and wait for the monitor to complete calibration readings
6. Move sash to a desired minimum position, press screen
7. Perform face velocity verification, press screen
8. Enter face velocity verification reading, press **ACCEPT**
9. Stand back and wait for the monitor to complete calibration readings
10. Press **CONTINUE TO CONFIG MENU** or **EXIT**

THREE POINT (SPECIAL - NON LINEAR):

1. Press **THREE-POINT CALIBRATION**
2. Open sash to the full open position with the stops defeated, press screen
3. Perform face velocity verification, press screen
4. Enter face velocity verification reading, press **ACCEPT**
5. Stand back and wait for the monitor to complete calibration readings
6. Move sash to a desired mid-range position, press screen
7. Perform face velocity verification, press screen
8. Enter face velocity verification reading, press **ACCEPT**
9. Stand back and wait for the monitor to complete calibration readings
10. Move sash to a desired minimum position, press screen
11. Perform face velocity verification, press screen
12. Enter face velocity verification reading, press **ACCEPT**
13. Press **CONTINUE TO CONFIG MENU** or **EXIT**

NOTE: Calibration Adjustments can only be performed AFTER field calibration is performed. Calibration adjustments are not supported for 3 point calibrations, see CALIBRATION, section 3, for calibration steps.

Enter Calibration Adjustment Menu

1. Press **MUTE** and **SCROLL** simultaneously and release after password screen is displayed (approx. 5 sec.)
2. Enter password (default is 00000), press **ACCEPT**
3. Press **CAL MENU**
4. Press **▼** three (3) times, then press **CALIBRATION ADJUSTMENT**

ONE POINT ADJUSTMENT:

1. Enter desired adjustment value, press **ACCEPT**
2. Verify displayed face velocity reading is correct, press **ACCEPT** if correct or press **RETRY** to enter a different adjustment value

TWO POINT ADJUSTMENT:

1. Press desired calibration point to adjust
2. Enter desired adjustment value, press **ACCEPT**
3. Verify displayed face velocity reading is correct, press **ACCEPT** if correct or press **RETRY** to enter a different adjustment value
4. When adjustments are complete, press **EXIT**

Enter Configuration Menu

1. Press **MUTE** and **SCROLL** simultaneously and release after password screen is displayed (approx. 5 sec.)
2. Enter password (default is 00000), press **ACCEPT**
3. Press **CONFIG MENU**

LOW ALARM SETTINGS:

1. Press **▼** or **▲** until **ALARMS** is displayed, press **ALARMS**
2. Press **LOW ALARM**
3. Select the alarm point for low face velocity, press **ACCEPT**
4. Select the delay time required prior to alarming, press **ACCEPT**
5. Select appropriate range for the monitor to display a caution message prior to going into alarm, note: zero(0) turns off caution band, press **ACCEPT**
6. If done, press **EXIT**
7. Select **EXIT** to return to normal display mode

HIGH ALARM SETTINGS:

1. Press **▼** or **▲** until **ALARMS** is displayed, press **ALARMS**
2. Press **HIGH ALARM**
3. Select the alarm point for high face velocity, press **ACCEPT**
4. Select the delay time required prior to alarming, press **ACCEPT**
5. Select appropriate range for the monitor to display a caution message prior to going into alarm, note: zero(0) turns off caution band, press **ACCEPT**
6. If done, press **EXIT**
7. Select **EXIT** to return to normal display mode

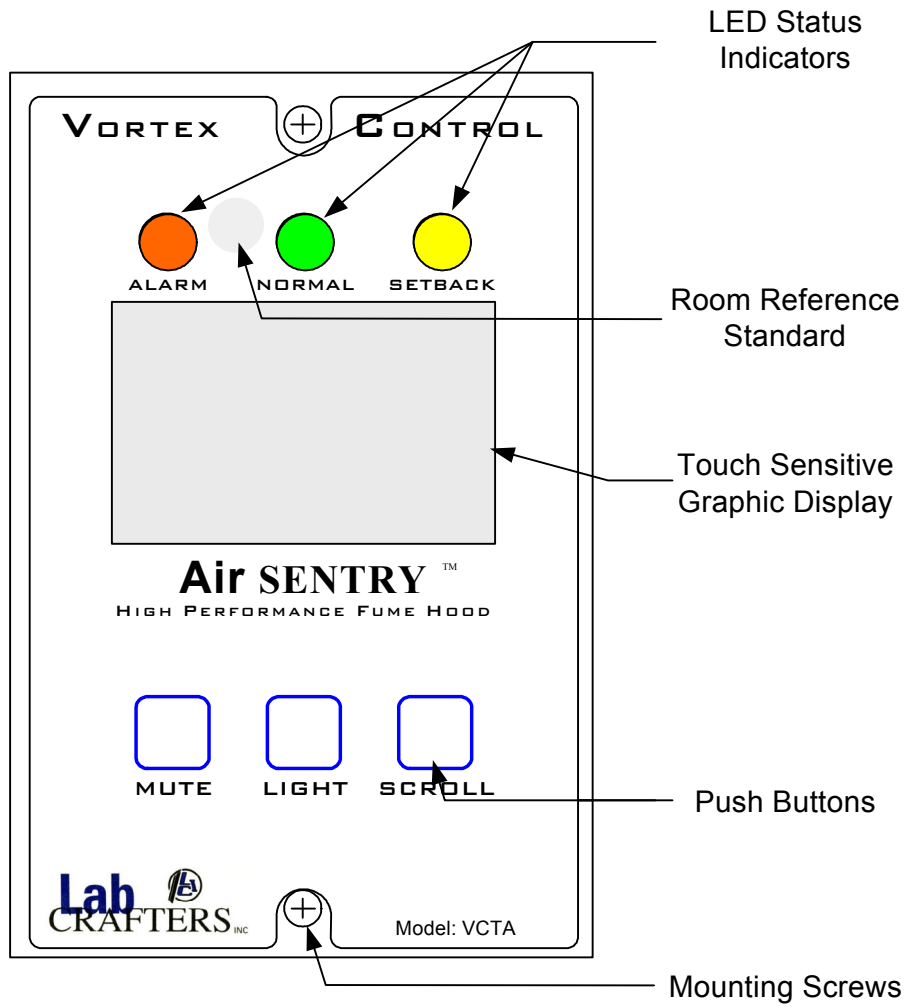
DIGITAL INPUT SETTINGS:

1. Press or until is displayed, press
2. Select either or
3. Select the proper function of the desired digital input, or press to ignore the digital input completely
 - a. If the digital input is configured as an ,
 - i. Select the desired input contact positions.
 - ii. Select the desired message to display on the monitor during an alarm condition on the input.
 - iii. Select the desired time delay prior to displaying the alarm condition on the input.
 - b. If the digital input is configured as an ,
 - i. Select the desired input contact positions.
 - ii. As previously described in the low/high alarm settings, select unoccupied low alarm or high alarm set points to configure. Select the desired alarm delay time and caution band for unoccupied mode.
 - iii. Press
4. If done, press
5. Select to return to normal display mode

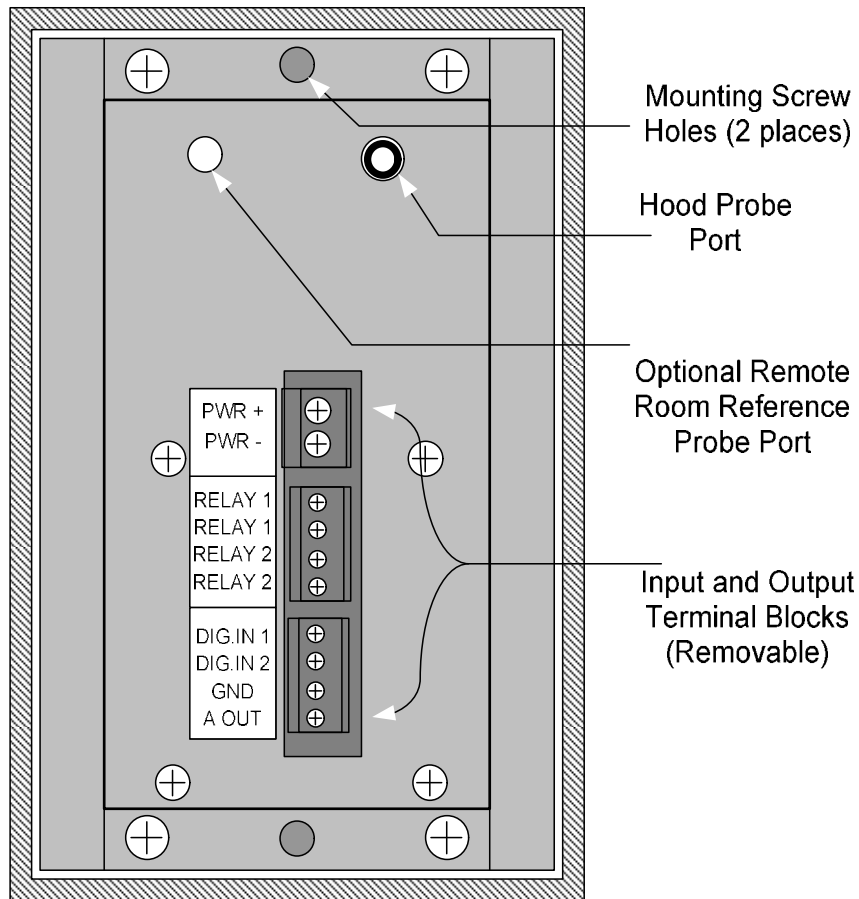
RELAY OUTPUT SETTINGS:

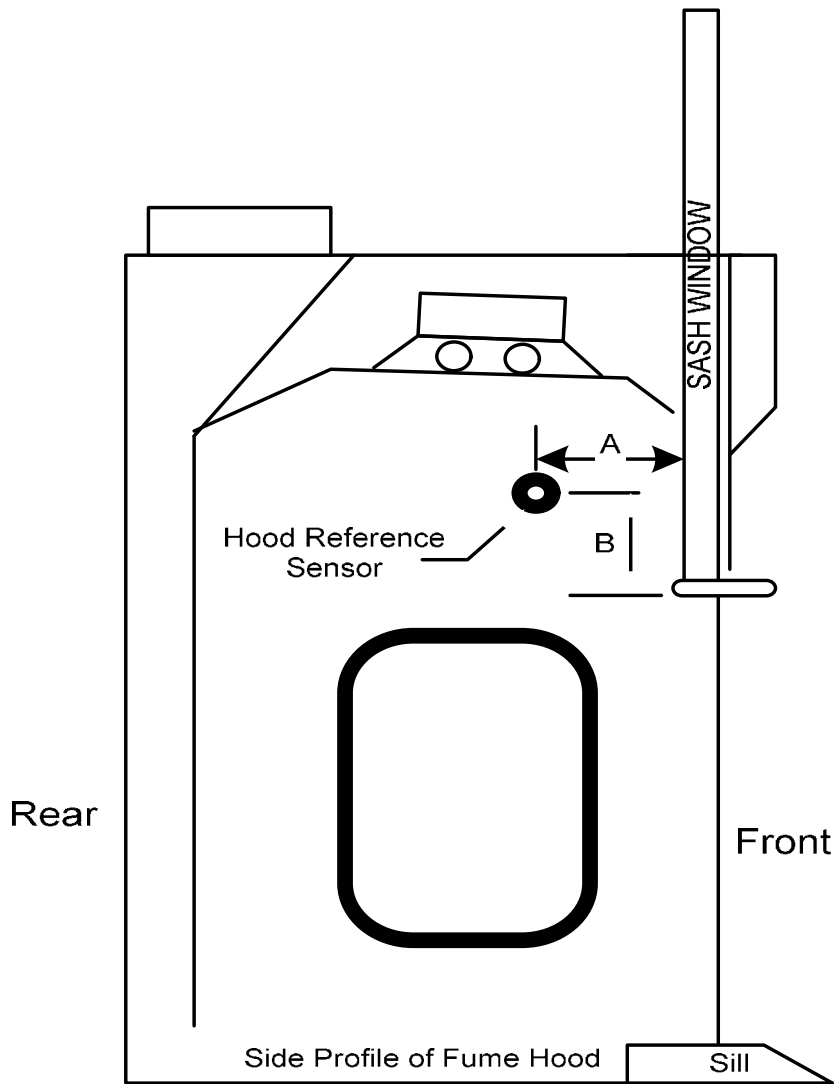
1. Press or until is displayed, press
2. Select either or
3. Select the function for the relay output, or press to ignore the relay output completely
4. If the relay output is configured as an , select the desired output contact positions.

***** END OF INSTRUCTIONS *****



Monitor Front





A dim. = approximately 4" - 10" (10.2 cm - 25.4 cm)

B dim. = approximately 2" - 8" (5.1 cm - 20.3 cm)

Note: Sash is in the full open position

Appendix C

Specifications

ENVIRONMENTAL

Calibrated Temp. Range: 60° to 80° F (15.6° to 26.7°C)
Operating Temp. Range: 40° to 120° F (4.4° to 48.9°C)
Storage Temp. Range: 0° to 150° F (-17.8° to 65.6°C)
Humidity Range: 20% to 80% RH, non condensing (LCD Display Limits)

DIMENSIONS

Face Plate: 5.1”(H) x 3.35”(W) x 0.5”(D) (13cm x 8.5cm x 1.3cm)
Rear Enclosure: 4”(H) x 2.2”(W) x 2.25”(D) (10.2 cm x 5.6cm x 5.8cm)

WEIGHT

15oz. (425g)

MOUNTING

4.25” (H) x 2.5” (W) (10.8cm x 6.4cm) cutout required.
Mounting Screws: stainless steel sheet metal #6 x 1” flat head
0.437” Diameter (11mm) hole required for hood reference probe

TERMINAL BLOCKS - WIRE SIZE

Power: removable block - 12 to 24 AWG stranded wire
Relay outputs: removable block - 16 to 28 AWG stranded wire
Digital in, Analog out: removable block - 16 to 28 AWG stranded wire

SENSOR TYPE

Factory calibrated mass air flow sensor

ACCURACY

Over the calibrated temp range: +/- 10 FPM (0.051MPS)

DIGITAL INPUTS

Referenced to digital common, accepts closed contact (1000 ohm max)

ANALOG OUTPUT

0-10Vdc output adjustable in 0.1Vdc increments proportional to 0-1000FPM
(5.08MPS) adjustable in 1FPM (.005MPS) increments displayed

RELAY OUTPUTS

Two independent SPST relays,
Relay 1 fails to N.O., 5A @250VAC or 30VDC (used for internal hood light)
Relay 2 fails to N.C., 0.5A @120VAC, 1A @30VDC

BACKLIGHT

Dual layer fiber optic, utilizing a single ultra bright green LED

INPUT POWER

24VAC, 50/60Hz, +/- 20%, 8VA or 15VDC, +/-20% @ 250mA

HOOD REFERENCE TUBING

¼”(6.4mm) I.D. clear Ester based polyurethane tubing, 185°F (85°C) Max

LCD TOUCH SCREEN

LCD type: 128 x 64 characters, FSTN, Positive, Transflective,

INDICATOR L.E.D.S

0.315” (8mm), Wide viewing angle, diffused lens

ALARM HORN

Sound output at 4” (10cm): min 85dB, typ 90dB @ 2,300Hz, +/-300 Hz

Vortex Control

Face Velocity Monitor

MODEL # VCTA

INSTALLATION, OPERATION
& MAINTENANCE MANUAL

FOR USE ON THE

**AIR
SENTRY**

High Performance
Fume Hood

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Introduction

Welcome to the LabCrafters AirSentry Vortex Control Fume Hood Monitor Installation, Operation and Maintenance Manual. The Vortex Control Monitor (Model VCTA) has been designed to provide accurate and reliable real-time monitoring of fume hood face velocity.

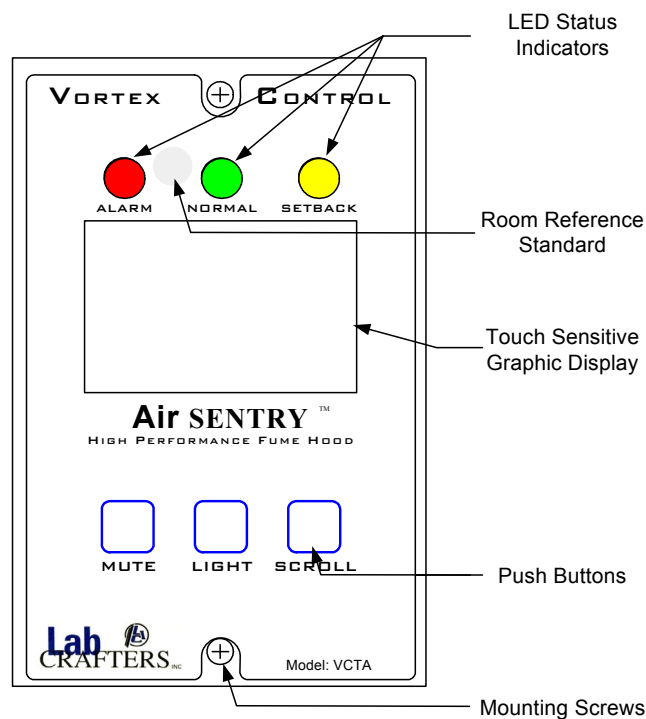


Figure 1 Front View

The revolutionary touch screen display allows the set-up technician to easily calibrate and configure the VCTA with no external tools or interfaces, yet remains completely invisible to the operator or lab occupant. Password protection is utilized to prevent any unauthorized personnel from changing calibration or configuration items.

The VCTA utilizes 3 front-mounted touch pads to mute the alarm horn, control the hood light, and view the internal settings of the VCTA. The mute touch pad can be disabled if desired.

Introduction

Some of the unique features of the Vortex Control Fume Hood Monitor include:

- + Password protection of calibration and configuration modes
- + Touch screen setup for calibration and configuration
- + Visual L.E.D.'s indicate hood status at a glance
- + Loud audible horn to alert the fume hood operator to alarm conditions
- + Three Display Modes of Operation:
 - o Alpha mode – displays text description of hood performance
 - o Numeric mode – displays real-time face velocity
 - o Graphic mode – graphs a trend line of face velocity over a time period
- + Configurable high & low velocity alarms with time delays and warning bands
- + Full unoccupied mode, with high and low set points, warning bands and time delays
- + Dual digital inputs for external alarm inputs, or unoccupied mode inputs
- + Selectable external warning messages to inform fume hood operator of external troubles not directly relating to the fume hood
- + Dual relay outputs for light and external alarm indications
- + One, two or three point calibration routines built in
- + Available calibration adjustments to “tweak” calibration to exact values if required
- + Built in internal room reference probe
- + Removable terminal blocks to simplify wiring of the device

Attention: Reference ANSI/ASHRAE STANDARD 110-1995 for proper method of testing performance of laboratory fume hoods. Per ASHRAE guidelines; *“The performance of a laboratory fume hood in providing protection for the worker at the face of a hood is strongly influenced by the aerodynamic design of the hood, the ventilation of the laboratory room, and by other features of the laboratory in which it is installed.”*

The following items are identified by ASHRAE as being important factors contributing to the safe operation of laboratory fume hoods:

- “1. *Cross-drafts.* Air currents may, by creating turbulent air pockets, draw contaminants from the hood. Such cross-drafts could be caused by air supply diffusers or grilles, open windows or doors, or rapid movements of people in front of the hood.
2. *Work procedures.* There is substantial evidence to suggest that all work in a hood should be conducted as far back in the hood as practical. Typically, users have standardized the requirement that all work should occur at least 6 inches behind the face of the hood. However, significantly improved protection can be achieved by working farther than 6 inches from the face of the hood.
3. *Internal obstructions.* The location of too much laboratory equipment (bottles, glass, etc.) in the hood will disturb airflow patterns into the hood.
4. *The procedure being performed.* The intrinsic hazard of the procedure being performed can affect the level of safety required by the user.
5. *Thermal challenge.* Heat produced in the hood can cause significant disturbance in the hood performance and even cause leakage of warm and possibly contaminated air from the top of the hood or from behind the sash.
6. *Rate of response.* The transient state or interval required for a variable-air-volume hood to respond to a rapid opening of the sash, or the time interval required for a hood to respond to a change in static pressure in the main exhaust duct serving multiple hoods, may affect hood performance. ”

Installation

Step 1: Choosing a Suitable Location

Care must be observed when choosing a suitable location for the VCTA. Locate a position on the fume hood pillar that is free from piping, electrical conduit or obstacles. The VCTA requires at least 4" (10.2cm) of depth behind it for tubing and wiring clearance. Care must be taken to stay away from external air influences such as air registers, diffusers, equipment cooling fans, cross drafts, doors, windows, or anything influencing air flow. Keep in mind the VCTA is reading an extremely small amount of air flow at any given moment; any large airflow on or across the face of the VCTA will cause the readings to change dramatically and inaccurate readings and false alarms will result.

Figure 2 shows a typical mounting location for the VCTA. When possible, always install the VCTA above the maximum height of the sash pane bottom to decrease the chances of a cross draft across the face of the VCTA and into the fume hood.

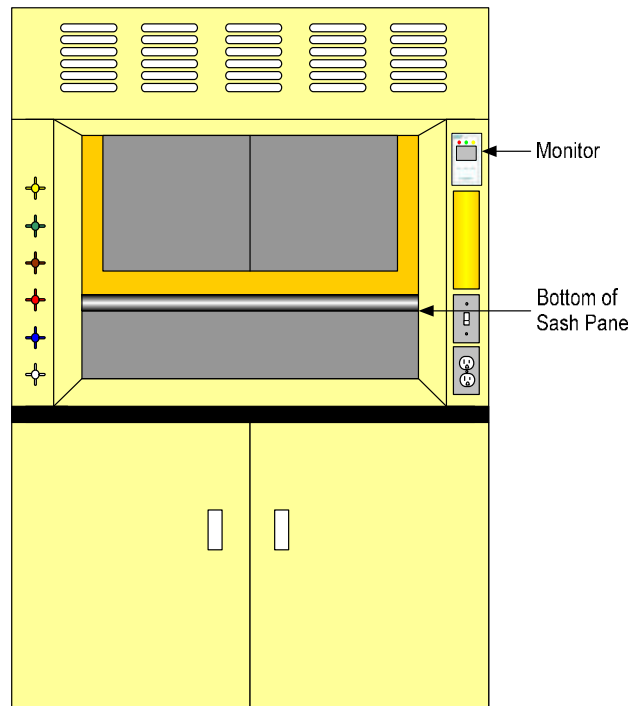


Figure 2, Typical Installation

Installation

Step 2: Cutting the Mounting Hole

Use the template supplied to aid in finding the best location (see Appendix A). Cut along the inner dimensions of the template and drill the two pilot holes. Slip the VCTA into the cutout to test fit the unit and make sure the depth is correct. Do not attach the unit at this time until electrical connections and the hood reference tubing is installed. Once the electrical connections are completed, use the two screws provided to permanently mount the VCTA.

Step 3: Locating the Hood Probe

The hood probe is located on the same side as the VCTA to keep tubing length to a minimum. Reference Figure 3 below for typical probe location. Note: Optimum probe location is dependant on the hood type and size, therefore the fume hood manufacturer will identify best location for the particular hood model.

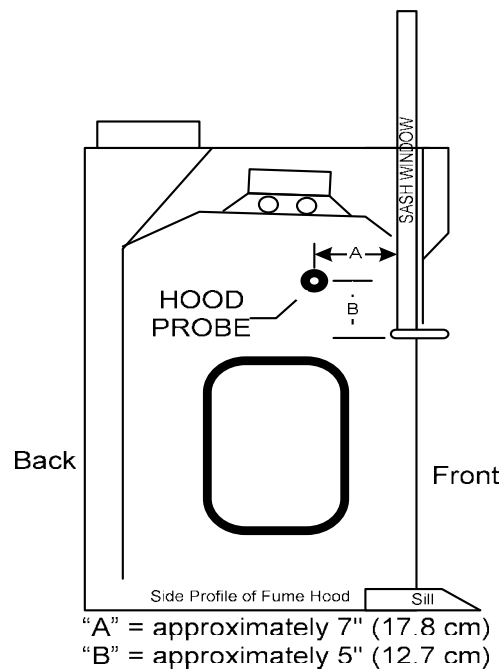


Figure 3 Typical Hood Probe Location

Step 4: Installing the Hood Probe

Once a suitable location has been selected, drill a 7/16" diameter (11mm) hole in the side of the fume hood. Again referencing Appendix D, feed the supplied clear tubing through the drilled hole and carefully push it over the sensor port located on the rear of the VCTA enclosure (refer to Appendix B). Press the hood probe firmly to seat it properly into the side of the fume hood.

Electrical Connections

The steps to correctly wire the VCTA are as follows; Reference **Appendix C** for proper wiring techniques and **Appendix E** for all electrical specifications of the VCTA.

Step 1: Power

For 24 VAC Power: Remove the 2-terminal green terminal block from the back of the VCTA, loosen the terminal screws and insert power wires. **Caution:** Care must be taken to observe proper polarity when wiring multiple VCTA's to the same transformer. **Always connect the HOT 24 VAC power lead to the power (+) terminal, and the Neutral lead to the power (-) terminal. Damage to the VCTA can result in incorrect polarity wiring and will void the product warranty.**

For Wall Pluggable Power Cube: Plug the optional power cube into an acceptable 120 VAC power outlet. Connect the power terminal block to the power input on the rear of the VCTA.

Step 2: Digital Inputs

Per job requirements, connect the device sending the unoccupied or external alarm dry contact closure between digital input 1 or 2 and the ground terminal. The digital inputs are software configurable to handle either input. The digital inputs are actuated by a dry contact closure to ground, maximum resistance to ground potential is 1000ohms.

Step 3: Relay Output

Per job requirements, connect relay output 2 to the device requiring an alarm notification from the VCTA via dry contacts. Through software configuration, the relay output can be set to operate as either normally closed or normally open. The relay is capable of handling ½ A @ 120VAC or 1A @ 30Vdc. Relay 1 can handle up to 5A @ 250VAC or 30VDC and fails normally open (no power to VCTA). Relay 1 is used to control the light present inside of the fume hood cavity.

Step 4: Analog Output

Connect the analog output positive terminal to the positive terminal of the device monitoring the output voltage. The ground terminal is connected to the negative terminal of the monitoring device. The analog output provided by the VCTA is software selectable (from 0 to 10Vdc in 0.1Vdc steps) and is proportional to the indicated face velocity displayed

Enabling Touch Screen & Password Protection

The touch screen is only used to configure and calibrate the VCTA. Refer to Appendix F for actual displayed VCTA screens, specific screens are called out in brackets and highlighted as shown: [SCREEN XX]. To enable the touch screen perform the following steps.

Step 1: Enable the Touch Screen

The touch screen can be enabled at any time by simply pressing the [MUTE] and [SCROLL] buttons simultaneously until the password screen [SCREEN 0] is initialized, (approximately 5 seconds) then release. The touch screen is now initialized and will respond to anything touching it. Light finger pressure is all that's required for selections, care must be exercised not to damage the touch screen or display. The use of a stylus is recommended, but not required unless finger size is a problem.

Step 2: Password Protection

The first screen that is displayed is the password screen that prompts the operator to enter a 5 digit numeric password. The default password shipped with the unit is set to all zeros (00000). The password is easily changed via the password configuration menu [SCREEN1F]; this will be covered in detail later.

Calibration Basics

Field calibration is required for all VCTA monitors. The purpose of performing field calibration is to correlate the VCTA's internal velocity sensor with the measured face velocity of the fume hood to which it is mounted on.

The VCTA Monitor has three different field calibration routines available; One-Point, Two-Point and Three-Point. For standard configuration AirSentry fume hoods, the **Two-Point** calibration routine is recommended to achieve the best results. The One-Point and Three-Point routines have been included for reference, however they should not be required.

IMPORTANT: The following items **MUST** be verified before calibrating the VCTA:

- ✚ The **room temperature** must be under stable control with the nominal temperature between 68°F and 72°F (20°C and 22.2°C).
- ✚ The VCTA must be **properly installed**, wired and powered-up for a period of 20 minutes minimum.
- ✚ Fume hood exhaust and room supply must be under stable control and the fume hood exhaust **static pressure** must be sufficient to achieve all design flows.
- ✚ **Proper instrumentation** must be available for measuring face velocity. The airflow velocity instrument shall be recently calibrated and capable of measuring in the range between 40 to 400 fpm (0.2 to 2.0 m/s) with an accuracy of +/- 5% of reading.
- ✚ Average face velocity measurements shall be made in accordance with methods consistent with **ANSI/AHSRAE 110-1995**.

Two-Point Calibration Procedure

The Two-Point calibration procedure is recommended for calibrating the VCTA on a standard configuration Constant Volume AirSentry Fume Hood. This procedure requires two face velocity readings to be entered into the VCTA, one at a high face velocity and another at a low face velocity. The Two-Point Calibration process will result in correlating the internal sensor's "offset" and "slope" to match the measured values provided.

Step 1: Enable Two-Point Calibration Mode

With the touch screen enabled and correct password entered, press **CAL MENU** reference **[SCREEN 1]** and **[SCREEN 1K]**. Using the up and down arrows [**▼** or **▲**] select **TWO-POINT CALIBRATION** and press it, **[SCREEN 1K]**.

Step 2: Move Sash to Full Open (Low Velocity Point)

Following the instructions on the VCTA **[SCREEN 2K]**, open the sash(es) to the full open position to achieve a low face velocity calibration point. If the fume hood has sash stops available, defeat them and open past the stops. The goal is to achieve the maximum operating open area of the fume hood face. Press the screen to confirm sash is in position.

Step 3: Traverse Hood Face at Max. Open Sash (Low Velocity Point)

Perform a face velocity traverse across the open area of the fume hood face. Once the average face velocity reading is obtained, press the touch screen **[SCREEN 3K]**.

Step 4: Enter Traversed Reading (Low Velocity Point)

Using the plus and minus signs [**+** or **-**] on the touch screen **[SCREEN 4K]**, enter the value obtained in the previous step. *Note: By pressing and holding the sign, the number will first change at a slow rate then at a fast rate automatically.* Depressing the **RESET** button will return the velocity value to the factory default setting.

Press the **ACCEPT** button when the desired value appears in the velocity box and step a few feet away from the hood. After a 5-second delay, the VCTA will now acquire 15 data points while displaying the measured values on the LCD screen **[SCREENS 5K & 6K]**.

Observe the display and confirm that the values are consistent and do NOT vary by more than +/- 5 fpm (0.02 m/s). If the values are within limits then proceed to the next step. If the values are unstable, then STOP calibration process and determine the cause of problem before proceeding.

Step 5: Move Sash(es) to Min. Open Position (High Velocity Point)

Following the instructions on the VCTA **[SCREEN 7K]**, move the sash(es) to a minimum working sash position. **Do NOT close the sash(es) completely.** The minimum working sash height is typically 6" to 12" open (15.2 to 30.5 cm). Press the screen to confirm sash is in place.

Two-Point Calibration Procedure

Step 6: Traverse Hood Face at Min. Sash Position (High Velocity Point)

Perform a face velocity traverse across the entire open area of the fume hood face. Press the touch screen [SCREEN 8K] to confirm measurement is complete.

Step 7: Enter Traversed Reading (High Velocity Point)

Enter the measure value using the same process as described in Step 4.

Step 8: Completion of the Two-Point Calibration

The Two-Point Calibration procedure has been completed. The final screen [SCREEN 10K] in the calibration process allows you to either [EXIT] or [CONTINUE TO CONFIG MENU]. Selecting [EXIT] will return the VCTA to monitor mode, while depressing the [CONTINUE TO CONFIG MENU] option will bring you into the configuration menu which will allow configuration of the VCTA.

One-Point Calibration (For Reference Only)

The One-Point calibration procedure is intended for applications where the measured velocity is constant, such as variable air volume applications (VAV) without flow limits.

The One-Point calibration process requires only one face velocity reading to be entered into the VCTA. The calibration affects the “offset” of the factory calibrated curve only and does not result in a change of the slope of the factory calibration.

Step 1: Enable One-Point Calibration Mode

With the touch screen enabled and correct password entered, press **CAL MENU** (reference **SCREEN 1** & **SCREEN 1G**). Using the up and down arrows [**▼** or **▲**] select **ONE-POINT CALIBRATION**, **SCREEN 1K**.

Step 2: Move Sash to Nominal Working Height

Following the instructions on the VCTA **SCREEN 11K**, move the sash to its normal operating position. Typical operating position may be; 18” (45.73cm) from the work surface, to the sash stops if available, one horizontal pane open, etc. (consult the fume hood manufacturer’s specifications for all proper air flow details). Press the screen to confirm sash is in the proper position.

Step 3: Traverse Hood Face

Perform a face velocity traverse across the open area of the fume hood face. Once the average face velocity reading is obtained, press the touch screen **SCREEN 12K**.

Step 4: Enter Traversed Reading

Using the plus and minus signs [**+** or **-**] on the touch screen **SCREEN 13K**, enter the value obtained in the previous step. *Note: By pressing and holding the sign, the number will first change at a slow rate then at a fast rate automatically.* Depressing the **RESET** button will return the velocity value to the factory default setting.

Press the **ACCEPT** button when the desired value appears in the velocity box and step a few feet away from the hood. After a 5-second delay, the VCTA will now acquire 15 data points while displaying the measured values on the LCD screen **SCREENS 5K & 6K**.

Observe the display and confirm that the values are consistent and do NOT vary by more than +/- 5 fpm (0.02 m/s). If the values are within limits then proceed to the next step. If the values are unstable, then STOP calibration process and determine the cause of problem before proceeding.

Step 5: Completion of the One Point Calibration

The final screen in the calibration process allows you to exit completely out of the calibration and configuration menus and go into monitor mode, or to continue to the configuration section of the VCTA. Press **EXIT** to go to monitor mode or **CONTINUE TO CONFIG MENU** to configure the VCTA **SCREEN 10K**.

Three-Point Calibration (For Reference Only)

The Three-Point Calibration Process is intended for “Special Application” fume hoods that are typically difficult to calibrate using linear calibration techniques. Some examples of these special application hoods may include large walk-in hoods and custom hoods that have been designed for specific research or manufacturing applications.

The VCTA Three-Point calibration routine allows for three discrete face velocity calibration points to be applied to the internal sensor curve which results in a non-linear correction factor that matches the hood characteristics.

Step 1: Enable Calibration Mode

With the touch screen enabled and correct password entered, press **CAL MENU** [SCREEN 1]. Using the up and down arrows [▼ or ▲] select **THREE-POINT CALIBRATION** and press it, [SCREEN 1K].

Step 2: Move Sash(es) to Full Open (Low Velocity Point)

Following the instructions on the VCTA [SCREEN 1N], move the sash(es) to the full open position. If the fume hood has sash stops available, defeat them and open past the stops. Press the screen.

Step 3: Traverse Hood Face at Full Open

Perform a face velocity traverse across the open area of the fume hood face. Once the average face velocity reading is obtained, press the touch screen [SCREEN 2N].

Step 4: Enter Traversed Reading

Using the plus and minus signs [+ or -] on the touch screen [SCREEN 3N], enter the value obtained in the previous step. *Note: By pressing and holding the sign, the number will first change at a slow rate then at a fast rate automatically.* Depressing the **RESET** button will return the velocity value to the factory default setting.

Press the **ACCEPT** button when the desired value appears in the velocity box and step a few feet away from the hood. After a 5-second delay, the VCTA will now acquire 15 data points while displaying the measured values on the LCD screen [SCREENS 5K & 6K].

Observe the display and confirm that the values are consistent and do NOT vary by more than +/- 5 fpm (0.02 m/s). If the values are within limits then proceed to the next step. If the values are unstable, then STOP calibration process and determine the cause of problem before proceeding.

Step 5: Move Sash a Mid-Open Position (Mid Velocity Point)

Following the instructions on the VCTA [SCREEN 4N], move the sash(es) to a mid-open position. This sash position should be a position indicative of a half opened sash (approximately). Press the screen.

Three-Point Calibration (For Reference Only)

Step 6: Traverse Hood Face at Mid-Open Position (Mid Velocity Point)

Perform a face velocity traverse across the open area of the fume hood face. Once the average face velocity reading is obtained, press the touch screen [SCREEN 5N].

Step 7: Enter Traversed Reading (Mid Velocity Point)

Following the same process described in Step 4, enter the second measured face velocity value into the VCTA [SCREEN 6N]. Press the **ACCEPT** button when finished.

Step 8: Move Sash(es) to Min. Position (High Velocity Point)

Following the instructions on the VCTA [SCREEN 7N], move the sash(es) to a minimum position. The minimum sash position should be a position where the operator can still access the interior of the hood, NOT a full closed sash position. Typically the opening is approximately 6 to 12" opened (15.2 to 30.5 cm). Again press the screen.

Step 9: Traverse Hood Face at Min. Sash Position (High Velocity Point)

Perform a face velocity traverse across the open area of the fume hood face. Once the average face velocity reading is obtained, press the touch screen [SCREEN 8N].

Step 10: Enter Traversed Reading (High Velocity Point)

Following the same process described in Step 4, enter the third measured value into the VCTA [SCREEN 9N]. Press the **ACCEPT** button when finished.

Step 11: Completion of the Three Point Calibration

The final screen in the calibration process allows you to exit completely out of the calibration and configuration menus and go into monitor mode, or to continue to the configuration section of the VCTA. Press **EXIT** to go to monitor mode or **CONTINUE TO CONFIG MENU** to configure the VCTA [SCREEN10K].

Manual Calibration Adjustments

An interesting feature of the VCTA is a Manual Calibration Function which allows adjustment of the original calibration point(s) obtained during the one-point or two-point calibration routines. **This feature is not intended to replace the initial calibration process that is required upon initial installation and start-up.** This function can be desirable if, for example, during the periodic hood validation, the calibration at a high velocity is reading 6 FPM higher than the traverse. By using the manual calibration adjustment, the high flow calibration set point can be manually offset to a value of -6 FPM to correct the error and display the expected results. The manual calibration feature allows adjustment of the displayed readings WITHOUT performing a full calibration routine. This function can be a real time saver during periodic hood validation. The VCTA will automatically choose whether the technician can adjust one point (for a one point calibration routine) or two points (for a two point calibration routine).

➤ Manual Calibration Adjustment for One-Point Calibration Routine

Step 1a: Enable Calibration Adjustment Mode

With the touch screen enabled and correct password entered, press **CAL MENU**, [SCREEN 1] or [SCREEN 1G]. Using the up and down arrows [▼ or ▲] select **CALIBRATION ADJUSTMENT** and press it, [SCREEN 1K].

Step 2a: Enter in Desired Offset Value

Assuming a one point calibration was previously completed, the VCTA will prompt for an offset value [SCREEN 19K]. This value will be added (or subtracted when a negative number is entered) to the calibration point obtained when the calibration was originally performed. Using the plus and minus buttons [+ or -] enter a positive or negative offset value and press **ACCEPT**.

Step 3a: Verify New Reading

The next displayed screen, [SCREEN 18K], will show a face velocity reading for the given position of the sash at that moment. It is a live reading and varying the sash position will vary the reading as expected. If the new readings are correct as displayed, press **ACCEPT**, if not, press **RETRY** to try again or **CANCEL** to quit.

➤ Manual Calibration Adjustment for Two-Point Calibration Routine

Step 1b: Enable Calibration Adjustment Mode

With the touch screen enabled and correct password entered, press **CAL MENU**, [SCREEN 1] or [SCREEN 1G]. Using the up and down arrows [▼ or ▲] select **CALIBRATION ADJUSTMENT** and press it, [SCREEN 1K].

Manual Calibration Adjustments

Step 2b: Select Calibration Point to Adjust

Assuming a two point calibration was previously performed, the VCTA will prompt for which calibration point to adjust [SCREEN 15K]. Select [HIGH VEL. CAL POINT] to adjust the value obtained when the sash was at a minimum position, select [LOW VEL. CAL POINT] to adjust the value obtained when the sash was at a full open position, or select [EXIT] to cancel out of this section.

Step 3b: High Velocity Calibration Point Adjustment

After selecting [HIGH VEL. CAL POINT], the VCTA will ask for an offset value to move the calibration point by [SCREEN 16K]. This value will be added (or subtracted when a negative number is entered) to the calibration point obtained when the two point calibration was originally performed. Using the plus and minus buttons [+] or [-] enter a positive or negative offset value and press [ACCEPT].

Step 4b: Verify New Reading

The next displayed screen, [SCREEN 18K], will show a face velocity reading for the given position of the sash at that moment. It is a live reading and varying the sash position will vary the reading as expected. If the new readings for the high velocities (sash in a minimum position) are correct as displayed, press [ACCEPT], if not, press [RETRY] to try again or [CANCEL] to quit. Note that the low face velocity readings do not change as the only adjusted point was for the high velocity readings.

Step 5b: Low Velocity Calibration Point Adjustment

After selecting [LOW VEL. CAL POINT], the VCTA will ask for an offset value to move the calibration point by [SCREEN 17K]. This value will be added (or subtracted when a negative number is entered) to the calibration point obtained when the two point calibration was originally performed. Using the plus and minus buttons [+] or [-] enter a positive or negative offset value and press [ACCEPT].

Step 6b: Verify New Reading

The next displayed screen, [SCREEN 18K], will show a face velocity reading for the given position of the sash at that moment. It is a live reading and varying the sash position will vary the reading as expected. If the new readings for the low velocities (sash in a full open position) are correct as displayed, press [ACCEPT], if not, press [RETRY] to try again or [CANCEL] to quit. Note that the high face velocity readings do not change as the only adjusted point was for the low velocity readings.

Step 7b: Exiting Out of the Calibration Adjustment Menu

On the TWO POINT CALIBRATION ADJUSTMENT main screen, [SCREEN 15K] select [EXIT] to go back to the CALIBRATION MAIN MENU, [SCREEN 1K].

Configuration of the VCTA

The Vortex Control Monitor is designed to be easily configurable for a wide variety of applications. Many of the functions of the VCTA are selectable and can be disabled when not required. This section will discuss all of the configurable functions of the VCTA. Configurations are easily changed; simply press the desired buttons on the touch screen as they appear.

Some configurable features are:

- ✚ Display type
- ✚ Mute and alarm horn
- ✚ External digital inputs
- ✚ Relay output
- ✚ Analog voltage output
- ✚ Contrast
- ✚ High and low flow alarms
- ✚ Alarm delays
- ✚ Alarm caution bands
- ✚ Password protection

To access the configuration menu, perform the steps outlined in the **ENABLING THE TOUCH SCREEN AND PASSWORD PROTECTION** section of this manual, and then simply select the **CONFIG MENU** button on the main screen **[SCREEN 1]**.

Display Modes

The VCTA has three distinct modes in which to display information to the operator. The three Display Modes are; **Alpha**, **Numeric** and **Graphic** **[SCREEN 1A]** each of which are described below.

Alpha Display Mode

Alpha Display Mode is intended for applications where the lab occupant does not require actual face velocity values to be displayed. When operating in Alpha Mode the VCTA displays text messages to describe the hood status in lieu of face velocity measurements. This mode utilizes messages such as NORMAL, WARNING HIGH FACE VELOCITY DETECTED, WARNING LOW FACE VELOCITY DETECTED, etc. (see Appendix G). When operating in Alpha Mode, the alarms are all based on actual flow measurements, but only text is displayed to the operator. Note: when in this mode, pressing the **SCROLL** button once will allow anyone to view the actual air flow velocity reading. This is the simplest mode to display in.

Selection 1: To select Alpha mode, simply choose **DISPLAY** from the **CONFIGURATION MENU** **[SCREEN1A]**.

Selection 2: Next press the **ALPHA** selection to enable alpha mode.

Configuration of the VCTA

Numeric Display Mode

Numeric mode is the most common mode setting to display actual live face velocity readings. The numeric display also adds an “averaging” function designed to minimize “bouncy” readings.

Selection 1: Once **NUMERIC** display is chosen, the VCTA will ask if the displayed velocities are to be in **IMPERIAL** (Feet Per Minute or FPM) or **METRIC** (Meters Per Second or MPS) [SCREEN 3A]. Once **IMPERIAL** or **METRIC** is chosen, all units within the VCTA are changed to that selection. For example, if **IMPERIAL** is chosen, all set points, alarm points, caution bands, configuration and calibration screens, etc are in FPM.

Selection 2: After the correct units are chosen, next the VCTA will ask for the desired displayed resolution, either 1FPM or 5FPM (0.005MPS or 0.025MPS) [SCREEN 5A]. If high accuracy is not required to be displayed, the higher velocity setting will display a more “stable” reading and not vary as much as the lower velocity setting. Note, this is for display purposes ONLY. The VCTA always internally reacts off of a 1 FPM (0.005MPS) resolution.

Selection 3: Finally the VCTA will ask for a desired smoothing rate, this is selectable in three increments [SCREEN 6A]:

- FAST (REAL TIME)** - The VCTA will update the displayed velocity as fast as it can calculate it. The displayed number is not averaged at all.
- MEDIUM (5 SEC. AVG.)** – The VCTA will average it’s readings for 5 seconds then display the averaged readings. This slows down the displayed response time slightly and allows for a smoother display of the actual velocity.
- SLOW (10 SEC. AVG.)** – The VCTA will average it’s readings for 10 seconds then display the averaged readings. This selection also slightly slows down the displayed response time. It’s designed to minimize intermittent drafty locations, heavy traffic areas, etc. By averaging over 10 second, the VCTA can smooth out the displayed face velocity and present a better overall face velocity indication.

Note, the displayed rate is the same for all 3 modes, the smoothing just averages the numbers prior to being displayed.

Configuration of the VCTA

Graphic Display Mode

This mode allows the operator to view a graph of the fume hoods performance over a given time interval. This feature is excellent for monitoring the hood during times when the operator is working at another location, on the phone, out to lunch, away home for the day, etc..

Selection 1: Graphic mode has the same configuration units as the numeric mode, IMPERIAL or METRIC units [SCREEN 3A]. The VCTA will ask if the displayed velocities are to be in IMPERIAL (Feet Per Minute or FPM) or METRIC (Meters Per Second or MPS). Once IMPERIAL or METRIC is chosen, all units within the VCTA are changed to that selection. For example, if IMPERIAL is chosen, all set points, alarm points, caution bands, etc are in FPM.

Selection 2: The next selection is the time duration for the displayed graph, the selections are as follows [SCREEN 4A]:

- REAL TIME - The VCTA will continuously display approximately 2 minutes worth of data points on the display at a time.
- ONE HOUR – The VCTA will display 1 hour worth of data points on the display at a time. This is a useful setting for monitoring the hood performance during lunch and break times.
- ONE DAY – The VCTA will display 24 hour worth of data points on the display at a time. This is a useful setting for monitoring the hood performance over night.
- ONE WEEK – This is the slowest setting. The VCTA will display information on hood airflow in a one week “snapshot”. This setting is only useful for fume hoods that are performing long experiments in which the hood status does not change much. Note that this selection lacks good resolution due to the fact of the long scan time for the graph, but is useful in monitoring a hoods status over a long time frame.

Selection 3: Following the time duration, the next setting is for the high limit or highest displayed point on the graph [SCREEN 7A]. Note any flow numbers higher than this number will result in a flat line at the top of the screen (clipped waveform). By making this selection close to the hoods maximum displayed velocities, the best resolution is attained.

Selection 4: The last selection is the low limit or lowest displayed point on the graph [SCREEN 8A]. Note any flow numbers lower than this number will result in a flat line at the bottom of the screen (clipped waveform). By making this selection close to the hoods minimum displayed velocities, the best resolution is attained.

Configuration of the VCTA

Mute & Alarm Horn Settings

The VCTA allows the technician to configure the front **MUTE** button and also the alarm horn internal to the VCTA. Not all applications will require all of these functions and disabling them may be beneficial, here how it's done.

Selection 1: Under the configuration menu, select **HORN, MUTE AND PURGE BUTTONS** see **[SCREEN1B]**.

Selection 2: Configure Horn **[SCREEN 2B]**

Select **ENABLE** to use the internal horn to alert of alarms or **DISABLE** to permanently turn it off. This is used to alert the operator in case of an alarm condition, either internal or external in nature.

Selection 3: Configure Mute Button **[SCREEN 3B]**

Note: this selection only is displayed if the alarm horn is enabled. The front **MUTE** button can be **ENABLED**, **DISABLED**, or set to **RE-BEEP** mode. Re-beep mode will allow the alarm horn to be muted, but will send out two short duration “beeps” to notify the operator the VCTA is still in an alarm mode. This is a helpful way to make sure the operator doesn't simply shut off an alarm and forget to take corrective action.

Selection 4: Mute Re-beep Delay **[SCREEN 4B]**

Note: this selection is only displayed if the alarm horn is enabled and re-beep mode is selected. This is the time duration allowed before the VCTA emits two short duration “beeps” while in re-beep mode.

Digital Input Configuration

There are two (2) discrete digital inputs located on the rear of the VCTA (see Appendix B for more details). These inputs are designed to be activated with a dry contact closure between the digital input and the ground terminal. The digital inputs are configurable to provide either an external alarm message on the VCTA display, or to set the VCTA into unoccupied or “night setback” mode.

Appendix G gives a list of all available messages that can be displayed on the VCTA as a result of a closed or open contact (configurable) on either digital input.

Selection 1: Under the configuration menu, select **DIGITAL INPUTS** see **[SCREEN1C]**.

Selection 2: Select Digital Input to Configure **[SCREEN 2C]**.

Both digital inputs are configured in the same way, with the same options available for each. To keep things simple, digital input 1 will be demonstrated, with the same steps being available for digital input 2. Press **[DIGITAL INPUT 1]** to select it for configuration.

Configuration of the VCTA

Digital Input Configuration, Continued

Selection 3: External Input or Unoccupied Input Selection [SCREEN 3C]

To configure the digital input to accept an external switch contact to indicate an external alarm situation, press the **EXTERNAL ALARM INPUT** button. By pressing the **UNOCCUPIED INPUT** selection, the VCTA will interpret a switch contact to indicate unoccupied mode and thus cause the VCTA to change its internal setting for unoccupied mode. Note; if the **UNOCCUPIED INPUT** is being used, please skip to selection 5.

Selection 3a: After selecting external alarm input, the VCTA will ask for information on the status of the digital input and what to associate it with [SCREEN 4C]. Select **OPEN=NORMAL CLOSE=ALARM** if a normally open switch contact will be used to drive the input; thus a closed contact between digital input 1 and ground will cause the VCTA to display an external alarm message and go into alarm mode. Select **CLOSE=NORMAL OPEN=ALARM** if a normally closed switch contact will be used to drive the input (an open contact between digital input 1 and ground will cause the VCTA to display an external alarm message and go into alarm mode).

Selection 3b: Displaying an External Alarm Message [SCREEN 7C]

The VCTA offers thirteen different messages that can be displayed on the VCTA during an alarm condition. Appendix G lists all available messages; however, if a message is not necessary, simply pressing the disable button will disable this function. The VCTA simply displays “WARNING” if disabled is chosen.

Selection 3c: External Alarm Delay [SCREEN 8C]

If an external alarm message is selected from the list, the next screen displayed on the VCTA is the delay time entry screen. By using the plus and minus buttons [**+** or **-**] the time delay, in seconds, can be increased or decreased as desired. Press **ACCEPT** when completed. Note a value of 0 turns off the delay completely.

Selection 4: Exiting the External Alarm Configuration Menu

When complete, press the **EXIT** button to go back to the **DIGITAL INPUTS** configuration options screen. Press the **EXIT** button once again to go back to the **CONFIGURATION MENU** screen.

Selection 5: Unoccupied Input State

By choosing the unoccupied mode for the digital input, the VCTA will prompt for the proper digital input states for the unoccupied mode [SCREEN 5C]. Select **OPEN=OCCUPIED CLOSE=UNOCCUPIED** if a normally open switch contact will be used to drive the input; thus a closed contact between digital input 1 and ground will cause the VCTA to reset the set points to the unoccupied values. The VCTA will also display a message informing the operator the VCTA is in unoccupied mode. Select **CLOSE=OCCUPIED OPEN=UNOCCUPIED** if a normally closed switch contact will be used to drive the input (an open contact between digital input 1 and ground will cause the VCTA to reset the set points to the unoccupied values).

Configuration of the VCTA

Digital Input Configuration, Continued

Selection 6a: Unoccupied Low Alarm Set Point [SCREEN 6C]

By choosing unoccupied mode for the digital input, the VCTA needs a new set of alarm points to “reset” to during unoccupied mode. Press the **UNOCC LOW ALARM** button to set the new unoccupied low alarm set point. By using the plus and minus buttons [**+** and **-**] the set point value can be adjusted. Press **ACCEPT** when the correct value is displayed, or press the **DISABLE** button to completely disable the low alarm set point during unoccupied mode [SCREEN 9C].

Selection 6b: Unoccupied Low Alarm Delay Time

If an unoccupied low alarm set point was entered, the next screen displayed is the delay time selection screen [SCREEN 10C]. By using the plus and minus buttons [**+** and **-**] the time delay, in seconds, can be increased or decreased as desired. Press **ACCEPT** when completed. Note a value of 0 turns off the delay.

Selection 6c: Unoccupied Low Alarm Caution Band [SCREEN 11C]

If desired, a caution band can be utilized to warn the operator of an impending alarm condition. The caution band is a value in FPM or MPS that is added to the unoccupied low alarm set point and will display a warning message and flash the normal green LED until the unoccupied low alarm set point is reached, then the unit goes into full alarm. For example if the unoccupied low alarm set point is set to 50FPM and the unoccupied low caution band is set to 10FPM; the VCTA will display a warning message for all readings between 51 and 60FPM. Once the airflow velocity drops to 50 or below, the VCTA will go into alarm mode. Readings above 60FPM are displayed in the normal fashion. By using the plus and minus buttons [**+** and **-**] the caution band, in FPM or MPS, can be increased or decreased as desired. Press **ACCEPT** when completed. Note a value of 0 turns off the caution warning completely.

Selection 7a: Unoccupied High Alarm Set Point [SCREEN 12C]

Press the **UNOCC HI ALARM** button to set the new unoccupied high alarm set point. By using the plus and minus buttons [**+** and **-**] the set point value can be adjusted. Press **ACCEPT** when the correct value is displayed, or press the **DISABLE** button to completely disable the high alarm set point during unoccupied mode.




Selection 7b: Unoccupied High Alarm Delay Time

If an unoccupied high alarm set point was entered, the next screen displayed is the delay time selection screen [SCREEN 13C]. By using the plus and minus buttons [**+** and **-**] the time delay, in seconds, can be increased or decreased as desired. Press **ACCEPT** when completed. Note a value of 0 turns off the delay.





Configuration of the VCTA

Digital Input Configuration, Continued

Selection 7c: Unoccupied High Alarm Caution Band [SCREEN 14C]

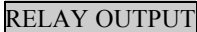
If desired, a caution band can be utilized to warn the lab occupant of an impending alarm condition. The caution band is a value in FPM or MPS that is subtracted from the unoccupied high alarm set point and will display a warning message and flash the normal green LED until the unoccupied high alarm set point is reached, then the unit goes into full alarm. For example if the unoccupied high alarm set point is set to 130FPM and the unoccupied high caution band is set to 25FPM; the VCTA will display a warning message for all readings between 105 and 129FPM. Once the airflow velocity increases above 130FPM or higher, the VCTA will go into alarm mode. By using the plus and minus buttons [ and ] the caution band, in FPM or MPS, can be increased or decreased as desired. Press  when completed. Note a value of 0 turns off the caution warning completely.

Selection 8: Exiting the Unoccupied Configuration Menu



When complete, press the  button to go back to the  configuration options screen. Press the  button once again to go back to the  screen.

Relay Output Configuration





There is one (1) discrete relay output located on the rear of the VCTA (see Appendix B) that can be used for external options. This output can be configured to react to an internal alarm indication.

Selection 1: To configure the output choose the  selection on the configuration menu [SCREEN 1D].



Selection 2: Alarm Selection [SCREEN 6D].

Press the  button to configure relay output 2 to respond to an internal alarm indication from the VCTA. With this selection, relay output 1 will change states when an alarm is indicated on the VCTA. Press  to disable relay output 2.

Selection 4: Selecting Contact States [SCREENS 7D]

After selecting the alarm option, the VCTA will ask for information on the status of the relay output contacts [SCREEN 7D], select  if a normally open switch contact is required to indicate no alarm, thus a closed contact between the two  terminals on the rear of the VCTA will occur whenever the VCTA goes into alarm. By selecting  the contacts act in reverse; no alarm results in closed contacts between the two  terminals on the rear of the VCTA, and an alarm indication on the VCTA causes the relay 2 contacts to open.

Selection 5: Exiting [SCREEN 6D]

Simply press the  button to return to the  selection.

Configuration of the VCTA

Analog Output Configuration

The analog output is a 0 to 10Vdc output that is fully configurable to any flow desired. The calibration of the analog output is very easy, here's how it's done:

Selection 1: Select Voltage Range [SCREEN 2L].

After pressing the **ANALOG OUTPUT** selection on the main menu, press the **VOLTAGE RANGE** button [SCREEN 2L] to configure the voltage output.

Selection 2: Configure Low Voltage Output Level [SCREEN 3L]

The first item to configure is the required low voltage output from the VCTA. This is the lowest voltage the VCTA will provide indicating a low face velocity. For example, if the desired voltage output is 1 to 5Vdc, indicating 50 to 200FPM the value of 1Vdc would be entered using the plus and minus buttons [**+** and **-**]. Press the **ACCEPT** button when the required minimum output voltage is correctly displayed.

Selection 3: Configure High Voltage Output Level [SCREEN 4L]

The next item to configure is the required high voltage output from the VCTA. This is the highest voltage the VCTA will provide indicating a high face velocity. For example, if the desired voltage output is 1 to 5Vdc, indicating 50 to 200FPM the value of 5Vdc would be entered using the plus and minus buttons [**+** and **-**]. Press the **ACCEPT** button when the required maximum output voltage is correctly displayed.

Selection 4: Select Velocity Range [SCREEN 2L].

Press the **VELOCITY RANGE** button to configure the velocity range for the analog output to follow.

Selection 5: Configure Low Velocity Level [SCREEN 5L]

The low velocity selection screen appears and prompts for a low velocity to equate to the previously entered low voltage value. This is the lowest velocity the analog output will respond to. For example, if the desired voltage output is 1 to 5Vdc, indicating 50 to 200FPM, the value of 50FPM would be entered using the plus and minus buttons [**+** and **-**]. Press the **ACCEPT** button when the required minimum velocity is correctly displayed.

Selection 6: Configure High Velocity Range [SCREEN 6L]

The last item to configure is the required high velocity reading to equate to the previously entered high voltage selection. This is the highest velocity the analog output of the VCTA will respond to. For example, if the desired voltage output is 1 to 5Vdc, indicating 50 to 200FPM the value of 200FPM would be entered using the plus and minus buttons [**+** and **-**]. Press the **ACCEPT** button when the required maximum velocity is correctly displayed.

Configuration of the VCTA

Analog Output Configuration, Continued

Selection 7: Final Verification of Settings

After all the configuration screens have been completed, the resulting setup of the analog output will be properly displayed on the main ANALOG OUTPUT SCALING SCREEN [SCREEN 2L]. Verify all entered values are correct, if not re-configure them as stated in the above selections and when all settings are correct, press the COMPLETE button to exit back to the MAIN CONFIGURATION MENU.

Contrast Adjustment

If desired, the contrast of the display can be adjusted by the CONTRAST ADJUST configuration menu [SCREEN 1M]. Press the CONTRAST ADJUST button on the main configuration menu to enable. By pressing the INCREASE or DECREASE buttons, the contrast will be adjusted accordingly. Note; the contrast adjustment buttons are designed to “wrap around” so if the same button is pressed, the contrast will be adjusted to the maximum or minimum and then flip back around again. Also note that the contrast adjustment can cause the contrast to change to the point of not being legible, if this happens, continue to press the same place on the display to allow for the adjustment to wrap around and once again become legible.

Press the ACCEPT button when the best contrast is achieved. Press the CANCEL button to cancel out of this screen.

Alarm Configuration

The most important function of the VCTA is the ability to warn the operator of any impending problems with the air flow for a given hood. The Vortex Control Monitor utilizes both a high and low flow alarm set point in addition to a warning or “caution” band to alert the operator of any impending alarm conditions. The alarms are designed to call the attention of anyone nearby through the use of large LED light indicators, an audible alarm horn and text messages available on the display.

The alarm section of the configuration menu allows the complete setup of all occupied mode alarm settings. Note; unoccupied mode alarm settings are located under the DIGITAL INPUT CONFIGURATION section of this manual.

Selection 1: Under the configuration menu, select ALARMS see [SCREEN1E].



Selection 2: Selecting Low Alarm Configuration [SCREEN 2E]

To configure the low alarm set point, press the LOW ALARM button on the touch screen.

Configuration of the VCTA



Alarm Configuration, Continued

Selection 3: Entering the Low Alarm Set Point Value [SCREEN 6E].



The low alarm set point is the value that the VCTA will compare to the measured face velocity. If the measured value is BELOW the low alarm set point, the VCTA will begin its low alarm routine. After choosing the low alarm option, the VCTA will prompt for the set point value for the low alarm. Using the plus and minus buttons [ and ] adjust the set point to a desired value and press **ACCEPT** when the correct value is displayed, or press the **DISABLE** button to completely disable the low alarm.

Selection 4: Entering the Low Alarm Delay Time [SCREEN 7E].

The VCTA can delay an alarm condition by up to 60 seconds (1 minute). This is desirable if “nuisance alarms” are a potential problem. For example, if the operator causes an alarm every time they open the sash fully for moving equipment into or out of the hood due to lack of face velocity for a short time, the alarm delay can give them up to a minute before going into full blown alarm mode.

To select a desired delay time, use the plus and minus buttons [ and ] to adjust the time duration in seconds. Press **ACCEPT** when completed. Note if this option is not required, it can be disabled by setting the delay time to 0 seconds.



Selection 5: Entering the Low Alarm Caution Band [SCREEN 8E].

If desired, a caution band can be utilized to warn the operator of an impending alarm condition. The caution band is a value in FPM or MPS that is added to the low alarm set point and will display a warning message and flash the normal green LED until the low alarm set point is reached, then the unit goes into full alarm (after delay if utilized). For example if the low alarm set point is set to 50FPM and the low caution band is set to 20FPM; the VCTA will display a warning message for all readings between 51 and 70FPM. Once the airflow velocity drops to 50 or below, the VCTA will go into alarm mode (after delay if utilized). Readings above 70FPM are displayed in the normal fashion. By using the plus and minus buttons [ and ] the caution band, in FPM or MPS, can be increased or decreased as desired. Press **ACCEPT** when completed. Note a value of 0 turns off the caution warning completely.

Selection 6: Selecting High Alarm Configuration [SCREEN 2E]

To configure the high alarm set point, press the **HIGH ALARM** button on the touch screen.

Selection 7: Entering the High Alarm Set Point Value [SCREEN 3E].

The high alarm set point is the value that the VCTA will compare to the measured face velocity for alarming. If the measured value is ABOVE the high alarm set point, the VCTA will begin its high alarm routine. After choosing the high alarm option, the VCTA will prompt for the set point value for the high alarm. Using the plus and minus buttons [ and ] adjust the set point to a desired value and press **ACCEPT** when the correct value is displayed, or press the **DISABLE** button to completely disable the high alarm set point.

Configuration of the VCTA

Alarm Configuration, Continued

Selection 8: Entering the High Alarm Delay Time [SCREEN 4E].

The VCTA can delay an alarm condition by up to 60 seconds (1 minute). This is desirable if “nuisance alarms” are a potential problem. For example, if the operator causes an alarm every time they move large equipment directly across the front of the sash, the alarm delay can give them up to a minute delay before going into full blown alarm mode. To select a desired delay time, use the plus and minus buttons [+] and [-] to adjust the time duration in seconds. Press [ACCEPT] when completed. Note if this option is not required, it can be disabled by setting the delay time to 0 seconds.

Selection 9: Entering the High Alarm Caution Band [SCREEN 5E].

If desired, a caution band can be utilized to warn the operator of an impending alarm condition. The caution band is a value in FPM or MPS that is subtracted from the high alarm set point and will display a warning message and flash the normal green LED until the high alarm set point is reached, then the unit goes into full alarm (after delay if utilized). For example if the high alarm set point is set to 200FPM and the high caution band is set to 25FPM; the VCTA will display a warning message for all readings between 175 and 199FPM. Once the airflow velocity increases to 200FPM or above, the VCTA will go into alarm mode (after delay if utilized). Readings below 175FPM are displayed in the normal fashion. By using the plus and minus buttons [+] and [-] the caution band, in FPM or MPS, can be increased or decreased as desired. Press [ACCEPT] when completed. Note a value of 0 turns off the caution warning completely.

Selection 10: Exiting the Alarm Configuration Menu [SCREEN 2E]

When complete, press the [EXIT] button to go back to the [CONFIGURATION MENU] screen.

Change Password

The password protection for the internal calibration and configuration of the VCTA can be changed to any 5 digit numeric sequence desired; it's done in the following manner:

***WARNING: once changed, the new password is the only way into the configuration and calibration modes, the new password should be recorded for future reference. If the password is lost, the unit must be shipped back to Lab Crafters, for re-programming at owners expense!!!**

Step 1: Select [CHANGE PASSWORD] on the [CONFIGURATION MENU], see [SCREEN 1F].

Step 2: Use the left and right arrow buttons [←] and [→] to select which digit to modify. By pressing the arrow buttons, the small underline moves across the 5 digits, place the underline directly below the digit to change.

Step 3: Use the plus and minus buttons [+] and [-] to adjust the desired digit to a value between 0 and 9. Note the numbers wrap-around so the next number after nine (9) is zero (0). By using steps two and three above, all the digits can be changed to a desired value.

Configuration of the VCTA

Change Password, Continued

Step 4: Press **ACCEPT** when completed or **CANCEL** to quit.

Step 5: Verify the entered password is correct by again entering it **[SCREEN 3F]**. Note, if the password is incorrect, the VCTA will default back to the **CHANGE PASSWORD** screen **[SCREEN 2F]**. If the verified password matches, then the VCTA will default back to the **CONFIGURATION MENU SCREEN**.

Calibration Menu Selection

The **CALIBRATION MENU** can be selected at any time from the **CONFIGURATION MENU** screen, see **[SCREEN 1G]**. Press the **CALIBRATION MENU** button to go to the **CALIBRATION** section of the VCTA (reference the **CALIBRATION** section of this manual for more information).

Restore Factory Defaults

Another helpful option on the VCTA is the ability to restore the entire VCTA to factory defaults at any time. This is desirable if the VCTA setup that was performed was incorrect. Sometimes starting over again from “scratch” is the best way to make sure nothing was missed when re-configuring or re-calibrating a unit. Note that this selection will permanently wipe out all field changes that were made to the VCTA including all calibrations, set points, passwords, and adjustments. The result is that the VCTA is returned to the same state it was in when it was first powered up right out of the box. For a complete list of all default values, see Appendix H.

To return the VCTA to factory defaults, select the **RETURN TO FACTORY DEFAULTS** option from the **CONFIGURATION MENU**, see **SCREEN [1H]**. The VCTA will prompt again for confirmation, see **[SCREEN 2H]**. Press **ACCEPT** to return the VCTA to default values, press **CANCEL** to exit out.

Calibrate Touch Screen

There are two separate ways to initiate the touch screen calibration. The touch screen is factory calibrated, however, if ever the need arises to re-calibrate the touch screen here's how it's performed:

The first way is initiated every time the **RETURN TO FACTORY DEFAULTS** option is initiated. The first screen displayed after a **RETURN TO FACTORY DEFAULTS** is initiated, is the touch screen calibration **[SCREEN 21K]**, simply follow the directions on the screen and touch the small dot displayed on the upper left hand side of the screen. Next touch the small dot located on the lower right hand side of the screen and that's it! Use of a stylus is highly recommended for the calibration of the touch screen.

Configuration of the VCTA

Calibrate Touch Screen, Continued

The second way to get to the touch screen calibration is by performing the following steps:

Step 1: Press and hold all three buttons on the face of the VCTA until a small beep is heard, this takes about 5 to 6 seconds.

Step 2: Next release the center button only. The touch screen calibration will start automatically, just hold onto the outer two buttons until the screen changes.

Exit Configuration and Calibration

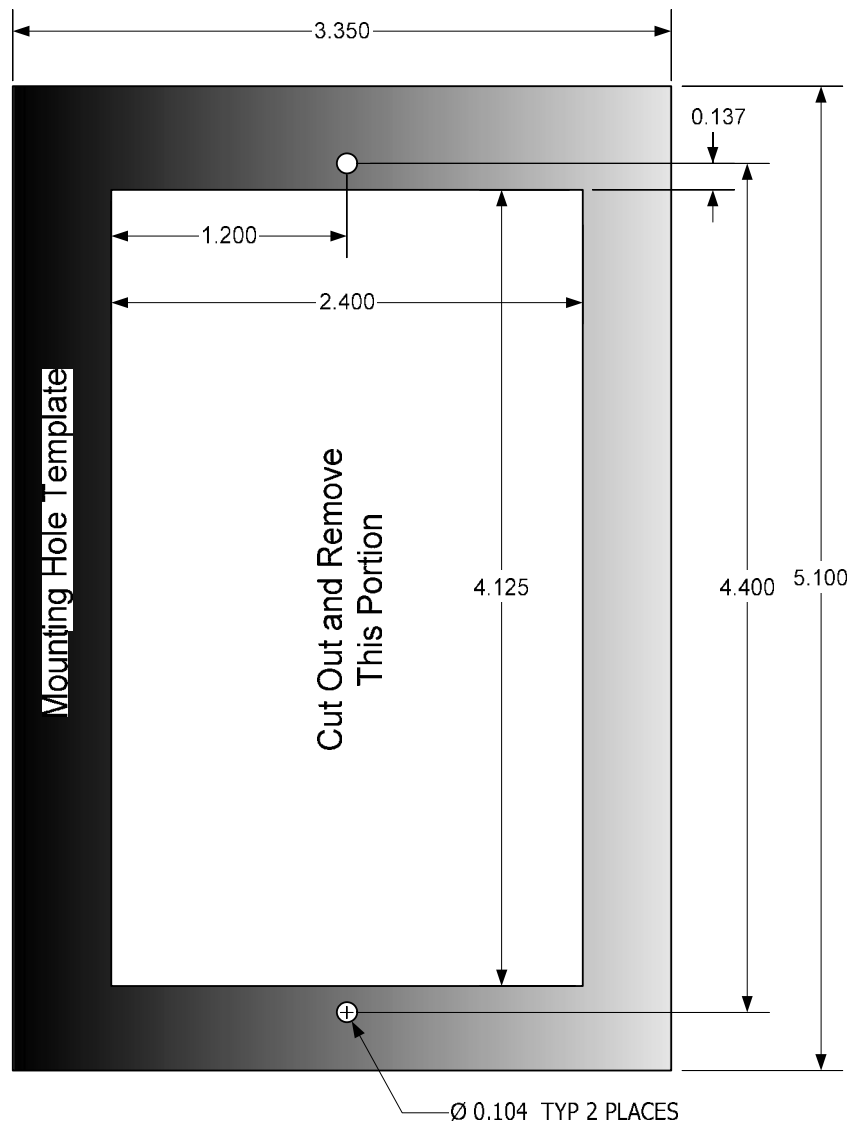
At any time, selecting the **EXIT** selection from the **CONFIGURATION MENU** and pressing it will put the VCTA back into its normal operational mode.

Maintenance

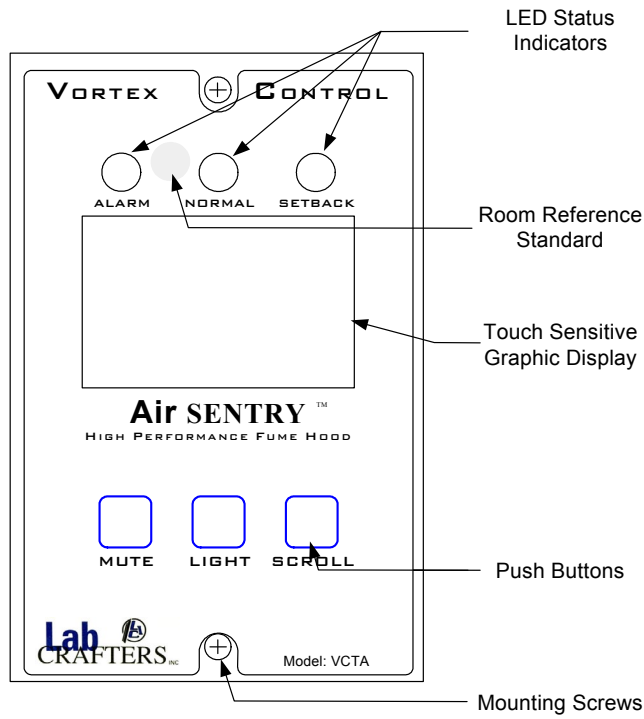
The VCTA is designed to provide years of service with little or no maintenance. If required the front face of the VCTA can be cleaned by wiping with a clean, lint free cloth. The use of a mild detergent can be used to remove stains, but typically a damp cloth is all that is required. Care should be taken near the small perforated area between the alarm and normal LED's. This is the room reference probe inlet and plugging of these holes will block the air flow to the internal air flow sensor and will cause erroneous readings.

Periodically inspect the hood reference probe (and external room reference if applicable). The probes should be free of obstacles, clean and dust free. If dirty, they can be easily cleaned with a mild detergent and a soft clean, damp cloth. Care should be taken not to get any liquids inside of the tubing or a blockage can result within the sensing tube and the VCTA will give erroneous readings.

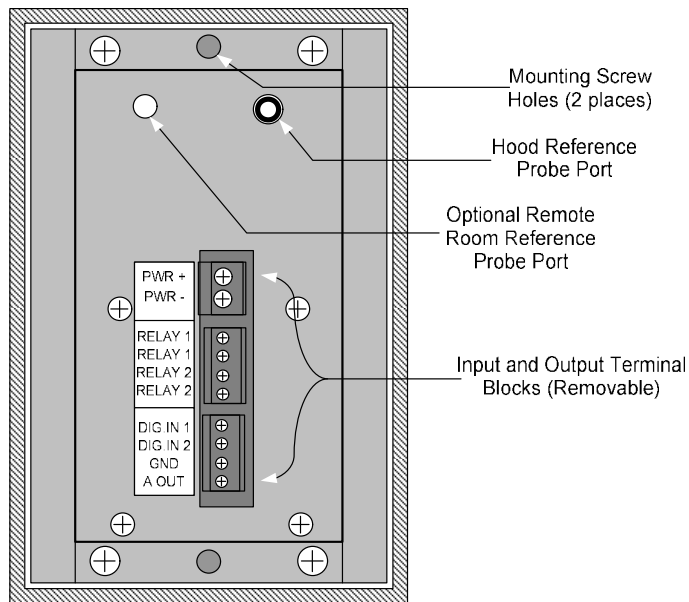
APPENDIX A: Mounting Hole Template Dimensions



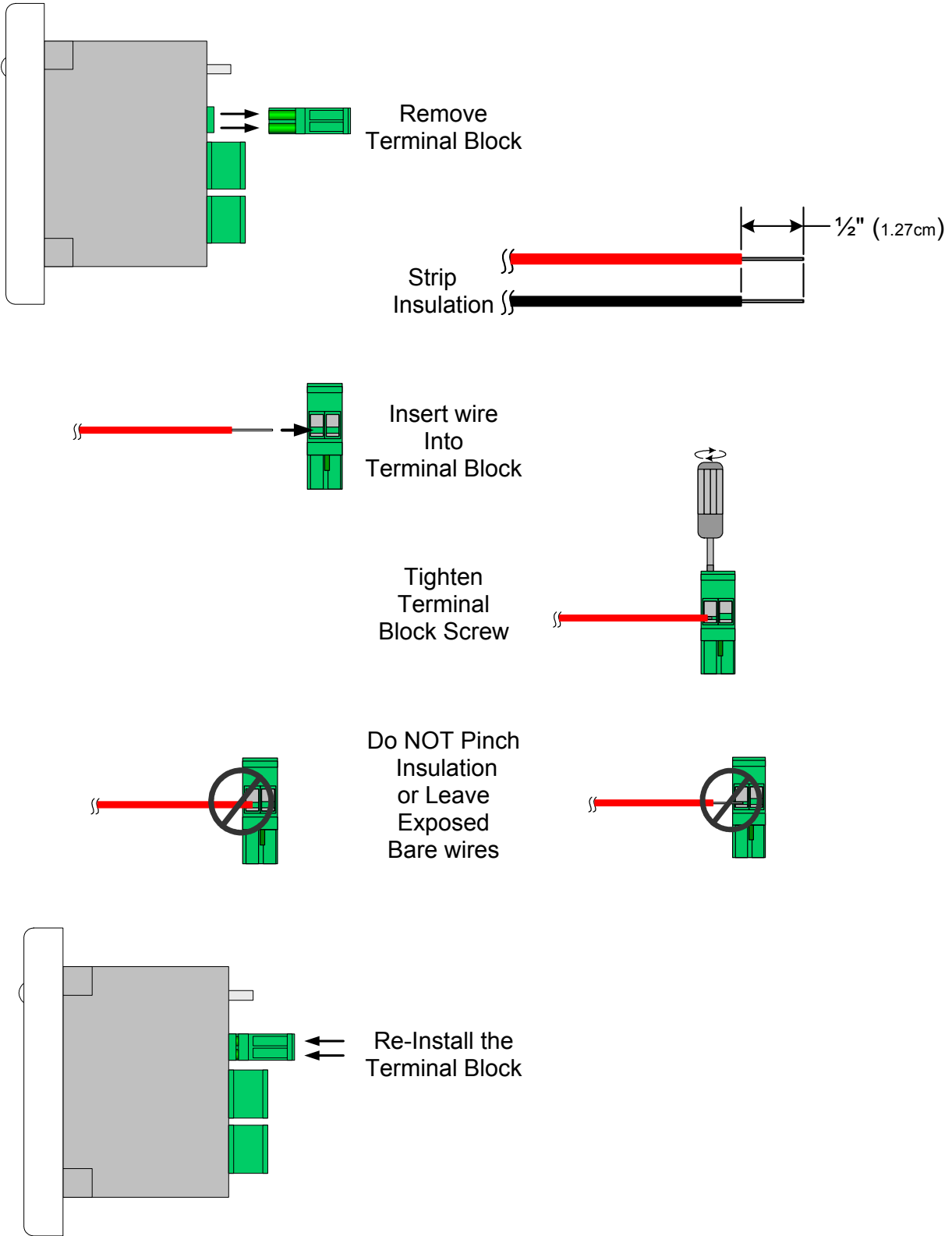
APPENDIX B: VCTA Detailed Description



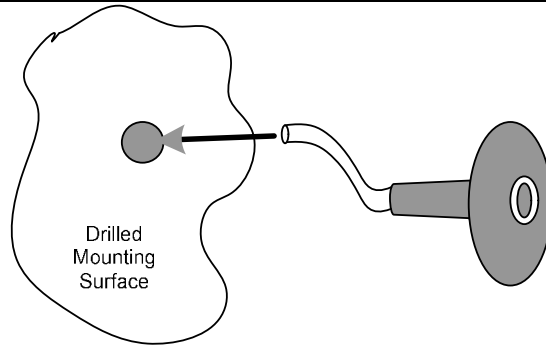
Front of VCTA



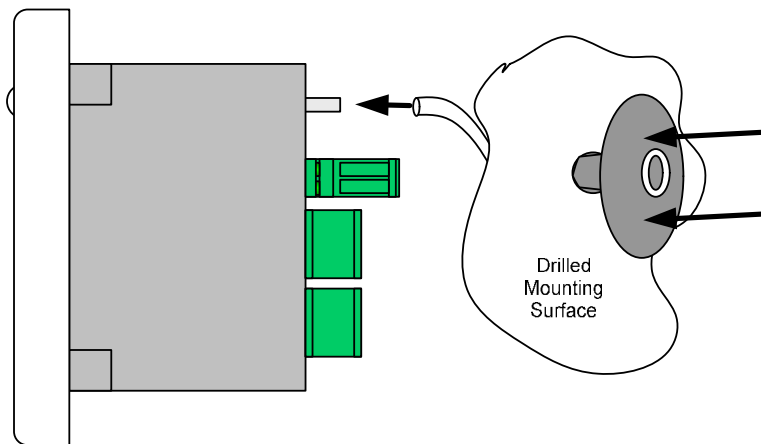
APPENDIX C: Proper Wiring Techniques



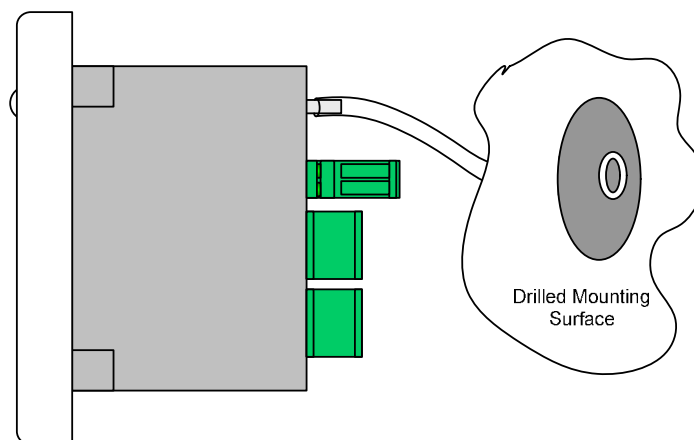
APPENDIX D: Proper Reference Probe Installation



Insert Tubing Through Pre-Drilled Hole



Press Reference Probe Firmly Into Mounting Hole and Attach to Reference Port Barb on Rear of VCTA



Completed Installation

APPENDIX E: VCTA Specifications

ENVIRONMENTAL

Calibrated Temp. Range: 60° to 80° F (15.6° to 26.7°C)
Operating Temp. Range: 40° to 120° F (4.4° to 48.9°C)
Storage Temp. Range: 0° to 150° F (-17.8° to 65.6°C)
Humidity Range: 20% to 80% RH, non condensing (LCD Display Limits)

DIMENSIONS

Face Plate: 5.1”(H) x 3.35” (W) x 0.5” (D) (13cm x 8.5cm x 1.3cm)
Rear Enclosure: 4”(H) x 2.2”(W) x 2.25”(D) (10.2 cm x 5.6cm x 5.8cm)

WEIGHT

15oz. (425g)

MOUNTING

4.25” (H) x 2.5” (W) (10.8cm x 6.4cm) cutout required.
Mounting Screws: stainless steel sheet metal #6 x 1” flat head
0.437” Diameter (11mm) hole required for hood reference probe

TERMINAL BLOCKS - WIRE SIZE

Power: removable block - 12 to 24 AWG stranded wire
Relay outputs: removable block - 16 to 28 AWG stranded wire
Digital in, Analog out: removable block - 16 to 28 AWG stranded wire

SENSOR TYPE

Factory calibrated mass air flow sensor

ACCURACY

Over the calibrated temp range: +/- 10 FPM (0.051MPS)

DISPLAYED VELOCITY RANGE

40 to 500FPM (0.2 to 2.54 MPS) in 1 or 5FPM (.0051 to 0.025 MPS) increments

DIGITAL INPUTS

Referenced to digital common, accepts closed contact (1000 ohm max)

ANALOG OUTPUT

0-10Vdc output adjustable in 0.1Vdc increments proportional to 0-1000FPM (5.08MPS) adjustable in 1FPM (.005MPS) increments displayed

RELAY OUTPUTS

Two independent SPST relays,
Relay 1 fails to N.O., 5A @250VAC or 30VDC
Relay 2 fails to N.C., 0.5A @120VAC, 1A @30VDC

BACKLIGHT

Dual layer fiber optic, utilizing a single ultra bright green LED

INPUT POWER

24VAC, 50/60Hz, +/- 20%, 8VA or 15VDC, +/-20% @ 250mA

HOOD REFERENCE TUBING

¼”(6.4mm) I.D. clear Ester based polyurethane tubing, 185°F (85°C) Max

LCD TOUCH SCREEN

LCD type: 128 x 64 characters, FSTN, Positive, Transflective,

INDICATOR L.E.D.S

0.315” (8mm), Wide viewing angle, diffused lens

ALARM HORN

Sound output at 4” (10cm): min 85dB, typ 90dB @ 2,300Hz, +/-300 Hz

APPENDIX F: Configuration and Calibration Screens

<p>SELECT PASSWORD</p> <p>◀ ▶ + 12345</p> <p>ACCEPT - CANCEL</p>	<p>Config Menu Cal Menu</p> <p>Exit</p>	<p>CONFIGURATION MENU</p> <p>SELECT OPTION TO CONFIGURE</p> <p>▲ ▼</p> <p>DISPLAY</p>	<p>CONFIGURE DISPLAY</p> <p>SELECT DISPLAY TYPE TO CONFIG</p> <p>▲ ▼</p> <p>Options displayed in this scrolling box</p>
SCREEN 0	SCREEN 1	SCREEN 1A	SCREEN 2A
<p>CONFIGURE DISPLAY UNITS</p> <p>IMPERIAL METRIC</p>	<p>GRAPHIC DISPLAY TIME PERIOD</p> <p>SELECT DESIRED TIME PERIOD</p> <p>▲ ▼</p> <p>Options displayed in this scrolling box</p>	<p>NUMERIC DISPLAY VELOCITY RESOLUTION</p> <p>1 FPM 5 FPM</p>	<p>CONFIGURE DISPLAY SMOOTHING</p> <p>SELECT SMOOTHING RATE</p> <p>▲ ▼</p> <p>Options displayed in this scrolling box</p>
SCREEN 3A	SCREEN 4A	SCREEN 5A	SCREEN 6A
<p>SELECT HIGH GRAPH LIMIT VALUE</p> <p>RESET + 200</p> <p>ACCEPT - FPM</p>	<p>SELECT LOW GRAPH LIMIT VALUE</p> <p>RESET + 200</p> <p>ACCEPT - FPM</p>	<p>CONFIGURATION MENU</p> <p>SELECT OPTION TO CONFIGURE</p> <p>▲ ▼</p> <p>HORN, MUTE AND PURGE BUTTONS</p>	<p>CONFIGURE HORN</p> <p>ENABLE DISABLE</p>
SCREEN 7A	SCREEN 8A	SCREEN 1B	SCREEN 2B
<p>CONFIGURE MUTE BUTTON</p> <p>SELECT MUTE BUTTON MODE</p> <p>▲ ▼</p> <p>Options displayed in this scrolling box</p>	<p>MUTE REBEEP DELAY</p> <p>RESET + 1000</p> <p>ACCEPT - SEC</p>	<p>DELETED SCREEN</p>	<p>CONFIGURATION MENU</p> <p>SELECT OPTION TO CONFIGURE</p> <p>▲ ▼</p> <p>DIGITAL INPUTS</p>
SCREEN 3B	SCREEN 4B	SCREEN 5B	SCREEN 1C
<p>DIGITAL INPUT 1 DIGITAL INPUT 2</p> <p>EXIT</p>	<p>EXTERNAL ALARM IN DISABLE D.I.-1</p> <p>UNOCCUPIED INPUT</p>	<p>DIGITAL INPUT 1 EXTERNAL ALARM INPUT</p> <p>OPEN = NORMAL CLOSE = ALARM</p> <p>CLOSE = NORMAL OPEN = ALARM</p>	<p>DIGITAL INPUT 1 UNOCCUPIED INPUT</p> <p>OPEN = OCCUPIED CLOSE = UNOCCUPIED</p> <p>CLOSE = OCCUPIED OPEN = UNOCCUPIED</p>
SCREEN 2C	SCREEN 3C	SCREEN 4C	SCREEN 5C
<p>UNOCC LOW ALARM UNOCC HIGH ALARM</p> <p>D.I.-1 EXIT</p>	<p>D.I.-1 EXTERNAL ALARM SELECT ALARM MESSAGE</p> <p>Options displayed in this scrolling box</p> <p>▲ ▼</p> <p>DISABLE</p>	<p>D.I.-1 EXTERNAL ALARM ENTER DELAY TIME</p> <p>RESET + 60</p> <p>ACCEPT - SEC</p>	<p>D.I.-1 SELECT UNOCCUPIED LOW ALARM SETPOINT</p> <p>DISABLE + 60</p> <p>ACCEPT - FPM</p>
SCREEN 6C	SCREEN 7C	SCREEN 8C	SCREEN 9C

APPENDIX F: Configuration and Calibration Screens

<p>D.I.-1 SELECT UNOCCUPIED LOW ALARM DELAY TIME</p> <p>RESET + 60 ACCEPT - SEC</p>	<p>D.I.-1 SELECT UNOCCUPIED LOW ALARM CAUTION BAND</p> <p>RESET + 60 ACCEPT - FPM</p>	<p>D.I.-1 SELECT UNOCCUPIED HIGH ALARM SETPOINT</p> <p>DISABLE + 60 ACCEPT - FPM</p>	<p>D.I.-1 SELECT UNOCCUPIED HIGH ALARM DELAY TIME</p> <p>RESET + 60 ACCEPT - SEC</p>
SCREEN 10C	SCREEN 11C	SCREEN 12C	SCREEN 13C
<p>D.I.-1 SELECT UNOCCUPIED HIGH ALARM CAUTION BAND</p> <p>RESET + 60 ACCEPT - FPM</p>	<p>EXTERNAL ALARM IN DISABLE D.I.-2</p> <p>UNOCCUPIED INPUT</p>	<p>DIGITAL INPUT 2 EXTERNAL ALARM INPUT</p> <p>OPEN = NORMAL CLOSE = ALARM</p> <p>CLOSE = NORMAL OPEN = ALARM</p>	<p>DIGITAL INPUT 2 UNOCCUPIED INPUT</p> <p>OPEN = OCCUPIED CLOSE = UNOCCUPIED</p> <p>CLOSE = OCCUPIED OPEN = UNOCCUPIED</p>
SCREEN 14C	SCREEN 15C	SCREEN 16C	SCREEN 17C
<p>UNOCC LOW ALARM UNOCC HIGH ALARM</p> <p>D.I. -2 EXIT</p>	<p>D.I.-2 EXTERNAL ALARM SELECT ALARM MESSAGE</p> <p>Options displayed in this scrolling box</p> <p>DISABLE</p>	<p>D.I.-2 EXTERNAL ALARM SELECT DELAY TIME</p> <p>RESET + 60 ACCEPT - SEC</p>	<p>D.I.-2 SELECT UNOCCUPIED LOW ALARM SETPOINT</p> <p>DISABLE + 60 ACCEPT - FPM</p>
SCREEN 18C	SCREEN 19C	SCREEN 20C	SCREEN 21C
<p>D.I.-2 SELECT UNOCCUPIED LOW ALARM DELAY TIME</p> <p>RESET + 60 ACCEPT - SEC</p>	<p>D.I.-2 SELECT UNOCCUPIED LOW ALARM CAUTION BAND</p> <p>RESET + 60 ACCEPT - FPM</p>	<p>D.I.-2 SELECT UNOCCUPIED HIGH ALARM SETPOINT</p> <p>DISABLE + 60 ACCEPT - FPM</p>	<p>D.I.-2 SELECT UNOCCUPIED HIGH ALARM DELAY TIME</p> <p>RESET + 60 ACCEPT - SEC</p>
SCREEN 22C	SCREEN 23C	SCREEN 24C	SCREEN 25C
<p>D.I.-2 SELECT UNOCCUPIED HIGH ALARM CAUTION BAND</p> <p>RESET + 60 ACCEPT - FPM</p>	<p>CONFIGURATION MENU</p> <p>SELECT OPTION TO CONFIGURE</p> <p>RELAY OUTPUT</p>	<p>DELETED SCREEN</p>	<p>DELETED SCREEN</p>
SCREEN 26C	SCREEN 1D	SCREEN 2D	SCREEN 3D
<p>DELETED SCREEN</p>	<p>DELETED SCREEN</p>	<p>ALARM DISABLE</p> <p>EXIT</p>	<p>RELAY OUTPUT 2 EXTERNAL ALARM</p> <p>NORMALLY OPEN CLOSE ON ALARM</p> <p>NORMALLY CLOSED OPEN ON ALARM</p>
SCREEN 4D	SCREEN 5D	SCREEN 6D	SCREEN 7D

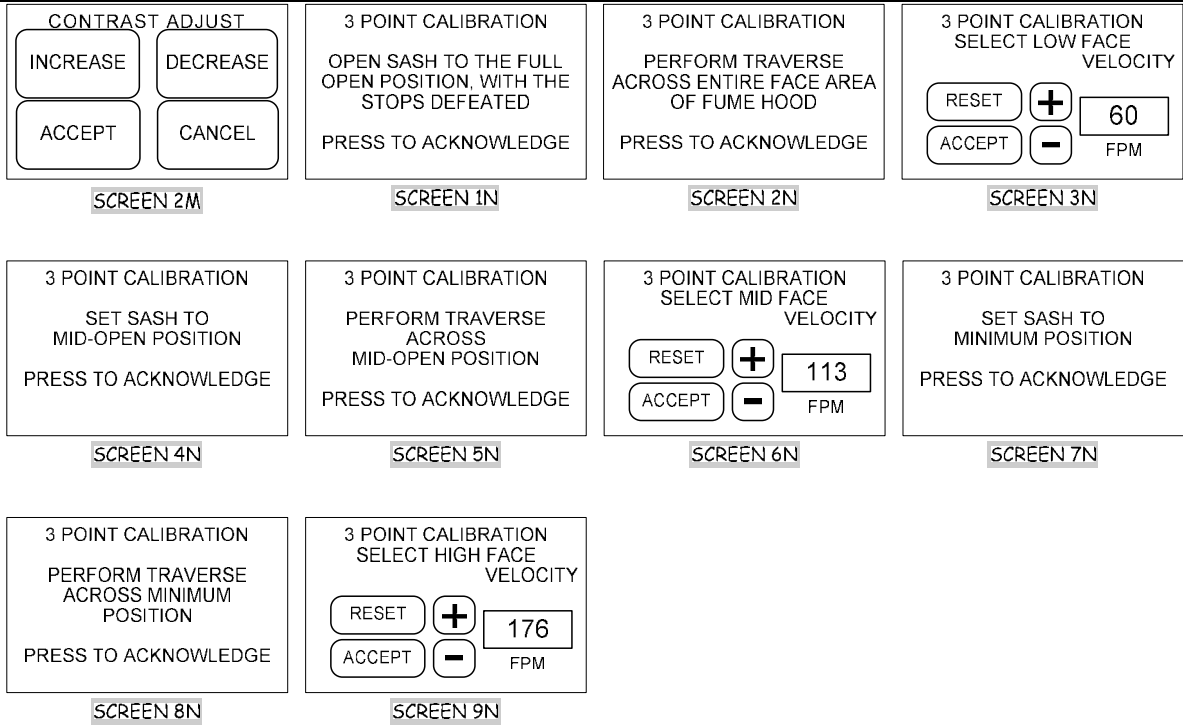
APPENDIX F: Configuration and Calibration Screens

<p>DELETED SCREEN</p>	<p>CONFIGURATION MENU</p> <p>SELECT OPTION TO CONFIGURE</p> <p>▲</p> <p>▼</p> <p>ALARMS</p>	<p>HIGH ALARM</p> <p>LOW ALARM</p> <p>EXIT</p>	<p>SELECT HIGH VELOCITY ALARM SETPOINT</p> <p>DISABLE + 160</p> <p>ACCEPT - FPM</p>
SCREEN 8D	SCREEN 1E	SCREEN 2E	SCREEN 3E
<p>SELECT HIGH VELOCITY ALARM DELAY TIME</p> <p>RESET + 60</p> <p>ACCEPT - SEC</p>	<p>SELECT HIGH VELOCITY ALARM CAUTION BAND</p> <p>RESET + 60</p> <p>ACCEPT - FPM</p>	<p>SELECT LOW VELOCITY ALARM SETPOINT</p> <p>DISABLE + 70</p> <p>ACCEPT - FPM</p>	<p>SELECT LOW VELOCITY ALARM DELAY TIME</p> <p>RESET + 60</p> <p>ACCEPT - SEC</p>
SCREEN 4E	SCREEN 5E	SCREEN 6E	SCREEN 7E
<p>SELECT LOW VELOCITY ALARM CAUTION BAND</p> <p>RESET + 60</p> <p>ACCEPT - FPM</p>	<p>CONFIGURATION MENU</p> <p>SELECT OPTION TO CONFIGURE</p> <p>▲</p> <p>▼</p> <p>CHANGE PASSWORD</p>	<p>CHANGE PASSWORD</p> <p>◀ ▶ + 12345</p> <p>ACCEPT - CANCEL</p>	<p>VERIFY NEW PASSWORD</p> <p>◀ ▶ + 12345</p> <p>ACCEPT -</p>
SCREEN 8E	SCREEN 1F	SCREEN 2F	SCREEN 3F
<p>CONFIGURATION MENU</p> <p>SELECT OPTION</p> <p>▲</p> <p>▼</p> <p>Calibration Menu</p>	<p>CONFIGURATION MENU</p> <p>SELECT OPTION</p> <p>▲</p> <p>▼</p> <p>Restore All Factory Defaults</p>	<p>RESTORE DEFAULTS ARE YOU SURE?</p> <p>ACCEPT</p> <p>CANCEL</p>	<p>CONFIGURATION MENU</p> <p>SELECT OPTION</p> <p>▲</p> <p>▼</p> <p>EXIT</p>
SCREEN 1G	SCREEN 1H	SCREEN 2H	SCREEN 1I
<p>WARNING TEMPERATURE NOT WITHIN CAL. RANGE</p> <p>CONTINUE</p> <p>CANCEL</p>	<p>CALIBRATION MENU</p> <p>SELECT OPTION</p> <p>▲</p> <p>▼</p> <p>Options displayed in this scrolling box</p>	<p>2 POINT CALIBRATION</p> <p>OPEN SASH TO THE FULL OPEN POSITION, WITH THE STOPS DEFEATED</p> <p>PRESS TO ACKNOWLEDGE</p>	<p>2 POINT CALIBRATION</p> <p>PERFORM TRAVERSE ACROSS ENTIRE FACE AREA OF FUME HOOD</p> <p>PRESS TO ACKNOWLEDGE</p>
SCREEN 1J	SCREEN 1K	SCREEN 2K	SCREEN 3K
<p>2 POINT CALIBRATION SELECT LOW FACE VELOCITY</p> <p>RESET + 60</p> <p>ACCEPT - FPM</p>	<p>CALIBRATING</p> <p>PLEASE STAND BACK WHILE DISPLAY ACQUIRES DATA IN 5 SECONDS</p>	<p>ACQUIRING DATA</p> <p>102</p> <p>▬▬▬▬▬▬▬▬▬▬</p>	<p>2 POINT CALIBRATION</p> <p>SET SASH TO MINIMUM POSITION</p> <p>PRESS TO ACKNOWLEDGE</p>
SCREEN 4K	SCREEN 5K	SCREEN 6K	SCREEN 7K

APPENDIX F: Configuration and Calibration Screens

<p>2 POINT CALIBRATION</p> <p>PERFORM TRAVERSE ACROSS MINIMUM POSITION</p> <p>PRESS TO ACKNOWLEDGE</p>	<p>2 POINT CALIBRATION SELECT HIGH FACE VELOCITY</p> <p>RESET + 160 ACCEPT - FPM</p>	<p>CALIBRATION COMPLETE</p> <p>CONTINUE TO CONFIG MENU EXIT</p>	<p>1 POINT CALIBRATION</p> <p>OPEN SASH TO WORKING HEIGHT POSITION, WITH SASH STOPS</p> <p>PRESS TO ACKNOWLEDGE</p>
SCREEN 8K	SCREEN 9K	SCREEN 10K	SCREEN 11K
<p>1 POINT CALIBRATION</p> <p>PERFORM TRAVERSE ACROSS ENTIRE FACE AREA OF FUME HOOD</p> <p>PRESS TO ACKNOWLEDGE</p>	<p>1 POINT CALIBRATION ENTER TRAVERSED FACE VELOCITY</p> <p>RESET + 101 ACCEPT - FPM</p>	<p>DELETED SCREEN</p>	<p>HIGH VEL. CAL POINT LOW VEL. CAL POINT</p> <p>EXIT</p>
SCREEN 12K	SCREEN 13K	SCREEN 14K	SCREEN 15K
<p>2 POINT CAL. HIGH POINT SELECT OFFSET VALUE</p> <p>RESET + -5 ACCEPT - FPM</p>	<p>2 POINT CAL. LOW POINT SELECT OFFSET VALUE</p> <p>RESET + -5 ACCEPT - FPM</p>	<p>IS NEW READING ACCEPTABLE?</p> <p>RETRY 106 FPM ACCEPT CANCEL</p>	<p>1 POINT CALIBRATION SELECT OFFSET VALUE</p> <p>RESET + -5 ACCEPT - FPM</p>
SCREEN 16K	SCREEN 17K	SCREEN 18K	SCREEN 19K
<p>TOUCHSCREEN CALIBRATION</p> <p>PROCESS ENABLED</p>	<p><input type="checkbox"/></p> <p>PRESS THE DOT</p>	<p>PRESS THE DOT <input type="checkbox"/></p>	<p>INTERNAL COMMUNICATIONS FAILURE</p> <p>CONTACT LAB CRAFTERS SERVICE DEPARTMENT (631) 471-7755</p>
SCREEN 20K	SCREEN 21K	SCREEN 22K	SCREEN 23K
<p>WARNING FIELD CALIBRATION REQUIRED PRIOR TO MANUAL ADJUSTMENTS</p> <p>PRESS ANYWHERE TO CONTINUE</p>	<p>CONFIGURATION MENU</p> <p>SELECT OPTION TO CONFIGURE</p> <p><input type="button" value="▲"/> <input type="button" value="▼"/></p> <p>ANALOG OUTPUT</p>	<p>ANALOG OUT SCALING</p> <p>VOLTAGE RANGE VELOCITY RANGE</p> <p>XX.X TO XX.XV XXX TO XXXX FPM COMPLETE</p>	<p>SELECT DESIRED LOW OUTPUT VOLTAGE LEVEL</p> <p>RESET + 0.0 ACCEPT - VDC</p>
SCREEN 24K	SCREEN 1L	SCREEN 2L	SCREEN 3L
<p>SELECT DESIRED HIGH OUTPUT VOLTAGE LEVEL</p> <p>RESET + 10.0 ACCEPT - VDC</p>	<p>SELECT ANALOG OUTPUT LOW VELOCITY</p> <p>RESET + 0 ACCEPT - FPM</p>	<p>SELECT ANALOG OUTPUT HIGH VELOCITY</p> <p>RESET + 1000 ACCEPT - FPM</p>	<p>CONFIGURATION MENU</p> <p>SELECT OPTION TO CONFIGURE</p> <p><input type="button" value="▲"/> <input type="button" value="▼"/></p> <p>CONTRAST ADJUST</p>
SCREEN 4L	SCREEN 5L	SCREEN 6L	SCREEN 1M

APPENDIX F: Configuration and Calibration Screens



APPENDIX G: Available External Alarm Messages

- ↵ ALARM
- ↵ SYSTEM ALARM
- ↵ EXTERNAL ALARM
- ↵ LOW FLOW ALARM
- ↵ HIGH FLOW ALARM
- ↵ LOWER SASH
- ↵ PLEASE CLOSE SASH
- ↵ FIRE ALARM
- ↵ BUILDING ALARM
- ↵ FLOOR ALARM
- ↵ ROOM ALARM
- ↵ EVACUATE BUILDING
- ↵ UNSAFE CONDITION

APPENDIX H: Default Values of VCTA

Variable Name	Factory Default	Range for Variable
High Alarm Mode	Occupied	Occupied or Unoccupied
Occupied High Alarm Mode	Disabled	Disabled or Enabled
Occupied High Alarm Set Point	150 FPM	100 to 250 FPM
Occupied High Alarm Delay	10 seconds	0 to 60 seconds
Occupied High Alarm Caution Band	20 FPM	0 to 99 FPM
Unoccupied High Alarm Mode	Disabled	Disabled or Enabled
Unoccupied High Alarm	150 FPM	100 to 250 FPM
Unoccupied High Alarm Delay	10 seconds	0 to 60 seconds
Unoccupied High Alarm Caution Band	20 FPM	0 to 99 FPM
Low Alarm Mode	Occupied	Occupied or Unoccupied
Occupied Low Alarm Mode	Disabled	Disabled or Enabled
Occupied Low Alarm Set Point	50 FPM	0 to 99FPM
Occupied Low Alarm Delay	10 seconds	0 to 60 seconds
Occupied Low Alarm Caution Band	20 FPM	0 to 99 FPM
Unoccupied Low Alarm Mode	Disabled	Disabled or Enabled
Unoccupied Low Alarm	10 seconds	0 to 60 seconds
Unoccupied Low Alarm Delay	20 FPM	0 to 99 FPM
Unoccupied Low Alarm Caution Band	Disabled	Disabled or Enabled
Light Button	Enabled	Enabled
Horn	Enabled	Disabled or Enabled
Units	Imperial	Imperial or Metric
Digital Input 1	Disabled	Disabled or Enabled
Digital Input 1 Configuration	External Alarm	External Alarm or Occupied / Unoccupied mode
Digital Input 1 state	Closed = Normal	Closed = Normal or Open = Normal
Digital Input 1 Occupied/Unoccupied state	Open = Occupied	Open = Occupied or Closed = Occupied
Digital Input 2	Disabled	Disabled or Enabled
Digital Input 2 Configuration	External Alarm	External Alarm or Occupied / Unoccupied mode
Digital Input 2 State	Closed = Normal	Closed = Normal or Open = Normal
Digital Input 2 Occupied/Unoccupied state	Open = Occupied	Open = Occupied or Closed = Occupied
Password	00000	00000 to 99999
Re-beep mode	Disabled	Disabled or Enabled
Re-beep delay	30 seconds	0 to 1000 seconds
Numeric mode range	1FPM	1 or 5 FPM
External Alarm 1 Delay	0 seconds	0 to 60 seconds
External Alarm 2 Delay	0 seconds	0 to 60 seconds
External Alarm 1	Disabled	Disabled or Enabled
External Alarm 2	Disabled	Disabled or Enabled
Relay Output 1	Disabled	Disabled or Enabled
Relay Output 1 Configuration	Light	Light
Relay Output 1 State	Normally Open	Normally Open or Normally Closed
Relay Output 1 Purge State	Normally Open	Normally Open or Normally Closed
Relay Output 2	Disabled	Disabled or Enabled
Relay Output 2 Configuration	Alarm	Alarm or Purge
Relay Output 2 State	Normally Open	Normally Open or Normally Closed
Relay Output 2 Purge State	Normally Open	Normally Open or Normally Closed
Analog Output Low Voltage Level	0.0	0.0 to 10.0V
Analog Output High Voltage Level	10.0V	0.0 to 10.0V
Analog Output Low Velocity Range	0	0 to 1000 FPM
Analog Output High Velocity Range	1000FPM	0 to 1000 FPM

APPENDIX I: Troubleshooting the VCTA

Symptom	Possible Causes	Corrective Action
VCTA dead	Input power problem	Verify 24VAC or 15VDC is properly connected to the VCTA power plug and firmly inserted into VCTA, also verify polarity is correct.
VCTA displays message "Internal Communications Failure"	Internal communications not functioning properly	Call Lab Crafters (631) 471-7755 for a Return Authorization number and return unit. There are no serviceable parts inside of the VCTA.
Touch screen not functioning properly	Calibration of the touch screen is not correct or the touch screen is defective	Re-calibrate the touch screen, see the Calibrate Touch Screen section of this manual.
No audible horn	Not properly configured	See the Mute & Alarm Horn Settings section of this manual for proper configuration.
Mute button does not work	Not properly configured	See the Mute & Alarm Horn Settings section of this manual for proper configuration.
"WARNING face velocity below range" message on VCTA	Not enough air flow through the VCTA for accurate readings	Check all tubing for pinched or kinked sections, make sure lengths are as short as possible, verify there is hood air flow and it's adequate to satisfy the hood requirements. Make sure the reference probe and or hood probe are not blocked, verify they are connected properly to their respected barbs. Note, the VCTA is directional sensitive, so if there is a "negative" flow from the hood to the room, the VCTA will read this message.
WARNING face velocity above range" message on VCTA	Too much air flow through the VCTA for accurate readings	Make sure the reference probe and or hood probe are not being influenced by fans or stray air movements. Verify the hood air flow is adequate for the hood requirements, the hood may not be under stable pressure and/or velocity control.
"WARNING Temperature not Within Cal. Range" message is displayed	Room temperature not adequate for calibration	Verify the room temp is between 65° and 75° F (18 ° and 24 °C) and stable, make sure the VCTA has time to adjust to room temp. If the message is still displayed after checking the temp and giving time to stabilize, press the CONTINUE button. The VCTA can only verify the temperature inside of the enclosure and it may be slightly higher than the room temp and therefore indicating a false warning.
"WARNING Field Calibration Required Prior to Manual Adjustments" message displayed	Calibration must be done first, then adjustments can be made	Perform a one point or two point calibration per the Calibration section of this manual. Note that there is NO three point calibration adjustments for the VCTA, only one or two point adjustments depending on which one is performed.
Displayed face velocities are bouncy	Dynamic lab area can cause the readings to jump a little	Add some "smoothing" to the display per the Configuration section of this manual. Verify there are no stray air flows near the reference probes, if there is, they must be moved or blocked off from the VCTA. Change the displayed resolution from 1FPM to 5FPM (0.005MPS to 0.025MPS)

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