



FVC-2000plus[™]

Face Velocity Monitor and Controller

MODEL FVC-2100 & 2200

CONSTANT FACE VELOCITY, VARIABLE VOLUME

Installation, Operating and Maintenance Manual

Release A.09

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I. BASIC FUME HOOD CONTROL: MODEL 2100, AND 2200 WITH VORTEK

The basic personality of the FVC-2000plus is Face Velocity Control using the side wall sensing method.

The Model 2100 system consists of a controller and a display unit. The controller is typically either mounted on the airflow control valve, or above the fume hood. Tubing connects the sensor in the controller to the inner liner side wall of the fume hood and the room. The controller continuously compares the measured face velocity to the setpoint and adjusts the electronic output to the airflow control valve to modulate the exhaust volume.

Model 2200 consists of the same components as model 2100, with the addition of VorTek air volume sensors. This provides for min and max air volume limits to be configured into the system.

The FVC-2000plus can be programmed for night face velocity setback, remote emergency over-ride, high and low face velocity alarms, and remote alarm horn mute. Output travel of the exhaust air valve can be digitally limited to both maximum opening and minimum closure points. All limits and setpoints are adjustable using a setup tool which plugs into the controller.

The FVC-2000plus display monitor is typically mounted at the fume hood and can display face velocity and setpoints, alarm conditions and setpoints, and percent output to the exhaust valve. A mute button is provided to silence the alarm horn which activates if an alarm condition occurs.

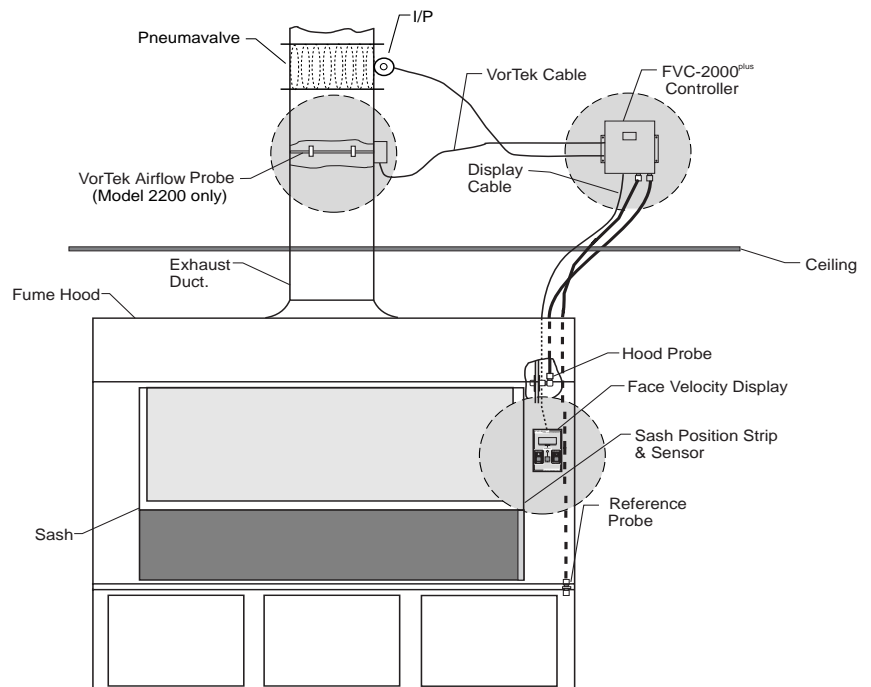


Figure 1, Typical Installation of FVC-2000plus Model 2100 and 2200 with VorTek

II. COMPONENTS

An FVC-2000plus system is made up of several components, each of which may be a requirement for specific mode selections, but not others. Refer to table 1. The components include:

MODEL	OPERATIONAL MODE	FVC Controller	Display	VorTek	Hood & Room Reference Probe
2100	1: Constant Face Velocity, Variable Volume	Required	Required	Not Required	Required
2200	2: Constant Face Velocity with Min/Max Volume	Required	Required	Required	Required

Table 1, Component Applications for Model 2100 and 2200

III. STEPS TO STARTUP

1. Unpack and identify components
2. Install power and interconnection wiring as required.
3. Install instrument-air pneumatic tubing as required.
4. Install controller
5. Install VorTek Probe (Model 2200)
6. Power-up
7. Configure controller
8. Calibrate controller and associated sensors and control devices
9. Put controller into operation and tune
10. Record parameters when done - store for future reference; update as required.

IV. UNPACKING

Remove the packing materials from the top of the carton and lay out the FVC-2000*plus* Face Velocity Monitor and Controller on a clean work space. The following components should be found in the carton:

- Controller Module - one, 10".5 x 8.5" x 2.75", metallic enclosure containing the main circuit board and pressure sensor, tubing connections, electrical terminations, and data line receptacle.
- Display Module - one, 5" x 3.17" x 1.5", metallic enclosure with color-coded display lights and a square, alarm push button on the front. A back bracket and screws should be included with the display.
- Data Cable - One, twenty-foot long, data cable with 8-pin, RJ-45, phone-type jacks on both ends.
- Probe(s) - Two (2) bulkhead fittings are provided, one 90° for hood probe and one straight for reference probe.
- Power Transformer (Option) - One, 120 to 24VAC, 40 VA transformer, provided only if specifically ordered. Will power up to four devices.
- 1/2" OD Tubing - Two 20 foot lengths of plenum rated tubing.
- VorTek probes (model 2200 only)

If any of the components are determined to be missing, please contact your local representative or Tek-Air's Service Department immediately, at (203) 791-1400. Please have your order number and our job number available when you call.

The following are required but not provided:

TOOLS:

- Phillips head screw driver
- Standard Screw driver
- Electric drill
- Assorted drill bits
- 2" dia. hole saw
- Wire cutters and strippers
- Saber saw with metal cutting blade

INSTALLATION MATERIALS:

- 18 gage, two conductor wire cable (for transformer to controller connection)
- Single gang electrical box (for display)
- Double gang electrical box (for transformer)
- 2 cond. 20 gage, twisted and shielded pair cable (for connection to output device)
- Conduit or Romex power wiring as required by code (for power to transformer)
- #6 sheet metal screws, 1/2 inch long
- #8 sheet metal screws, 1/2 inch long
- 120/24 VAC 40VA transformer, if not supplied by Tek-Air

V. CONTROLLER ROUGH-IN

The controller should be installed on a suitable mounting surface above the ceiling, but within five feet of the fume hood.

The controller should be roughed in as follows:

1. Select the mounting location for the controller. Make sure there is sufficient space around the enclosure to allow access to connections and to allow opening the door fully. Refer to fig. 1, page 1.
2. Using #8 screws, attach the enclosure to the chosen mounting surface using the mounting flanges. Refer to fig. 7, page 10.

VI. FACE VELOCITY HOOD PROBE INSTALLATION

Face Velocity Probe location is critical to the proper performance of the fume hood controller. An improperly mounted or located probe will not provide the proper representation of face velocity. Refer to figure 5, page 9 for probe location. If any questions arise regarding the location of the sensor, please don't hesitate to call for technical support.

The FVC-2000 sensor must also be referenced to the room (ambient) pressure. This is accomplished through a Reference Probe, which is similar in construction to the Face Velocity Probe. Typical location for the Reference Probe is in the hood chase at counter height.

1. Use fig. 5, page 9 to determine the probe location. The probe should be on the same side of the hood as the controller.
2. Drill a 1 inch diameter hole in the location selected.
3. Install mounting plates provided for the sensor to the fume hood. See fig. 6, page 9.
4. **Install Sensor Probe Tubing** (Reference figures 5 and 6 on page 9) - To connect the Face Velocity and Reference Probes to the controller, use the two 20-foot lengths of tubing provided. One length is solid black and is intended for use on the Reference Probe. The other length has a colored stripe and is intended for use on the Face Velocity Probe. The length of tubing between the controller and each probe need not be the same. Therefore, either length can be cut to less than 20 feet if necessary. However, neither tube should be lengthened beyond 20 feet. Make sure that there are no kinks or sharp bends in the tubing.

Insert a brass fitting into the end of the black tube then fully insert that tube end into the REF fitting located on the controller. Repeat this process for the other tube and fittings. Be sure to "seat" the tubing completely into the fitting to prevent leakage.

VII. DISPLAY ROUGH-IN

The display should be installed on either the right or left escutcheon panel of the fume hood, in a location where the hood operator has the ability to see it while working at the hood. It is generally recommended that the display be located at approximately five feet from the floor.

The display should be roughed in as follows:

1. Select the mounting location of the display. It is typically mounted above the service controls. See Figure 4, page 8.
2. Cut a hole at this location, sized to allow for recessed mounting of a standard single gang electrical box.
3. Use the #6 sheet metal screws to mount the gang box to the escutcheon panel.
4. **Mount the Display Bracket** - Mount the bracket for the display module on the utility box

installed in step 3. Use either two or four of the screws provided with the display, in the the display with the cable plugged in. Pull the cable into the controller through the right knock-out at the bottom of the enclosure. If conduit is not used, use a romex type squeeze connector to provide strain relief. Plug the cable into the female receptacle provided inside the controller. See Fig. 4, page 8.

6. Plug display cable into receptacle on back of display. Mount the display onto the bracket using the allen-head screws supplied.

VIII. WIRING OF CONTROLLER

Power to the controller should be provided from a 24 VAC power transformer. Less than 10VA is required for each unit. Multiple controllers may be powered from the same transformer but care must be taken that the hots (A) and neutrals (B) of each controller are wired together (polarity must be maintained). CAUTION- As the 120 to 24 VAC transformer provides the only isolation from ground, the potential exists for ground loop problems if hots (A) and neutrals (B) are mixed! When unsure about grounding, provide one transformer per unit. See figure 7 and 8, page 10.

The controller should be wired in accordance with the following sequence. Where a particular set of terminals is not utilized, the step should be skipped. See Figure 7 and 8, page 10 for details.

1. Carefully open the controller.
2. Connect 24VAC power wires to the controller AC power terminals. Maintain polarity if more than one unit is powered from a single transformer. Make sure power is off during this step!
3. If used, connect alarm output wires to terminals 13 and 14, or 12 and 13 (as required.)

Alarm Contact Outputs - Terminals 12, 13, and 14 provide relay contacts that can be connected for remote alarm indication. The contact current is limited to 0.5 amp and only low (less than 30 volts AC or DC) voltage should be used. Wire gauge should not exceed 18 gauge. Contacts are normally energized and can be wired as shown in figure 3.

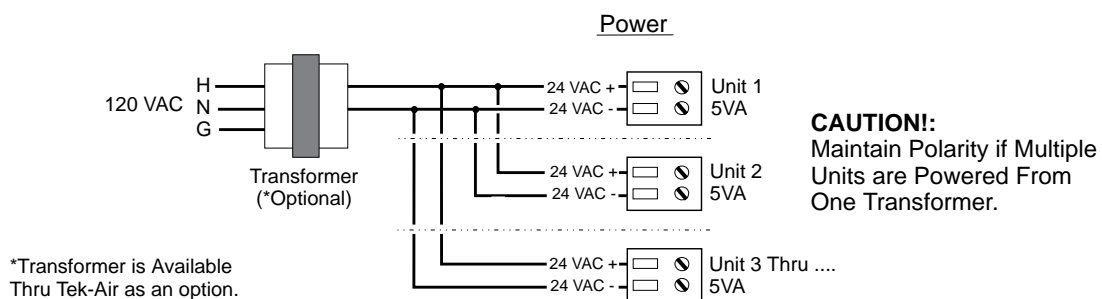


Figure 2, Other Connection Options

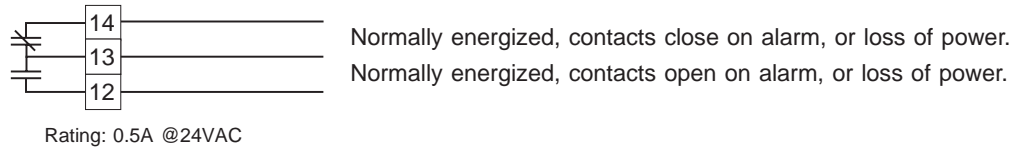


Figure 3, Alarm Contact Connections

4. Connect I/P output terminals 7 and 8 to the output convertor or to a variable speed drive, observing polarity at both ends.
5. To connect communications, use terminals 1 & 2 per figure 8, page 10.
6. Connect Remote Switch input wires to terminals 9 and 10 or 10 and 11 (as required.), observe polarity between controller input and sending device.
7. Figure 9 on page 11 shows mounting of VorTek and connections to the FVC-2000*plus* controller.

IX. POWER UP OF CONTROLLER

1. **Double Check All Connections** - Review connections to power, remote interface devices, and display to be sure that they are correct before applying power to the unit.
2. **Power Up Unit** - Activate the circuit breaker that feeds the power transformer. The unit should begin to function. Proper functioning is indicated by a flashing red LED (R11) near the center of the circuit board.
3. If the airflow modulating device being controlled is a normally open damper and all other system components (fan, I/P, damper, etc.) are operational, the unit should begin controlling at the default face velocity setpoint. This should not be taken to mean that the unit is properly calibrated or configured. Setup must be performed in accordance with subsequent chapters.

X. VORTEK INSTALLATION (MODEL 2200)

The VorTek measurement system consists of two basic elements, the probes and the preamp. The VorTek sensing probes are inserted into the duct and measure the velocity of the air moving through the duct. The VorTek preamp, which is mounted in close proximity to the probes, converts the electronic pulses generated by the probes into an electronic signal compatible with most DDC control systems.

The following details are provided on the mounting and installation of the VorTek flow probes. Please read this data carefully and install the equipment in strict accordance with the instructions provided. See figure 9, page 11. Should you have any questions, contact Tek-Air directly.

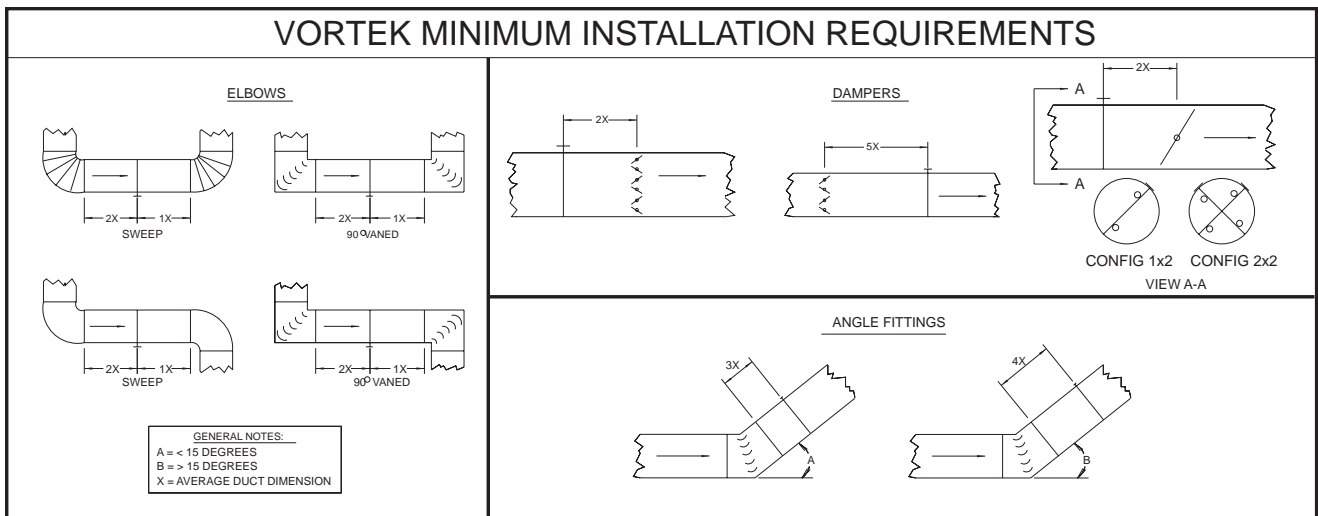
1. Probe Mounting and Location

General- VorTek probes are designed for installation in ducts, regardless of the duct size. Usually, the larger the duct, the more sensing points are required to provide an accurate measurement of airflow volume. In a typical fumehood application, one or two probe support bars are directly inserted in the duct. Each probe bar has multiple VorTek sensors for measurement of the air velocity in the area of the duct it serves.

Turbulent Airflow- Probe design allows for installation in ductwork without the requirement for special air straighteners. However, care should be taken to avoid installation within close proximity to:

- Balancing dampers
- Non-airfoil type, normally open dampers
- Expanding transitions
- Coils
- Modulating opposed blade dampers
- Elbows without Turning Vanes
- Humidifiers

Refer to the drawing “ VorTek Minimum Installation Requirements” below, for the minimum acceptable installation criteria for specific applications. If more space is available probes should be located so that they have two thirds of the straight duct length upstream of the probe. Keep in mind that locations other than those specified as minimums often have areas with very high turbulence and reverse flow. Accurate airflow measurement is impractical in these locations.



1. For ducts greater than 6" round diameter, cut a 3 3/4" round hole (a 2" hole for less than 6")
2. Use 4, #10 "tek" screws to secure the probe duct wall plate.

Direction of Flow- VorTek airflow probes must be mounted so airflow direction corresponds to the direction indicated by the flow arrow on the duct mounting flange. Failure to mount the units properly will result in a "no flow" output. Probes can be mounted in any plane, vertical, or horizontal without effecting the measurement quality.

Temperature- VorTek probes are designed for use in normal HVAC applications. Continuous operation with temperatures over 200 degrees with standard materials of construction is not recommended. Fume hood exhaust sensors with CPVC construction have a limit of 175 degrees. Close proximity to steam humidifiers and coils is not recommended. Should a steam valve leak when air is not flowing, temperatures in excess of the recommended maximum can occur.

Airborne Contaminants- Normal dirt and dust associated with air conditioning applications will not effect probe performance. The presence of agglomerating or sticky particles can cause performance problems and should be avoided. Should this occur however, the probes can be cleaned with soapy water.

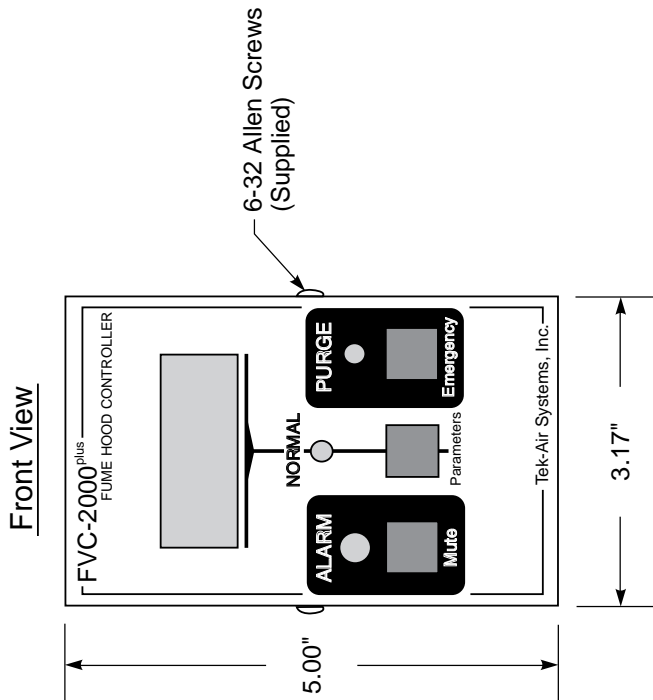
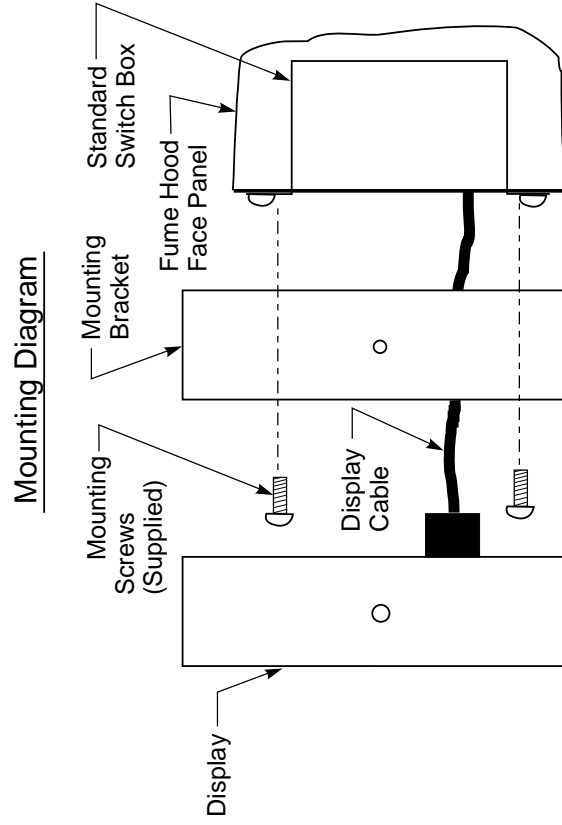
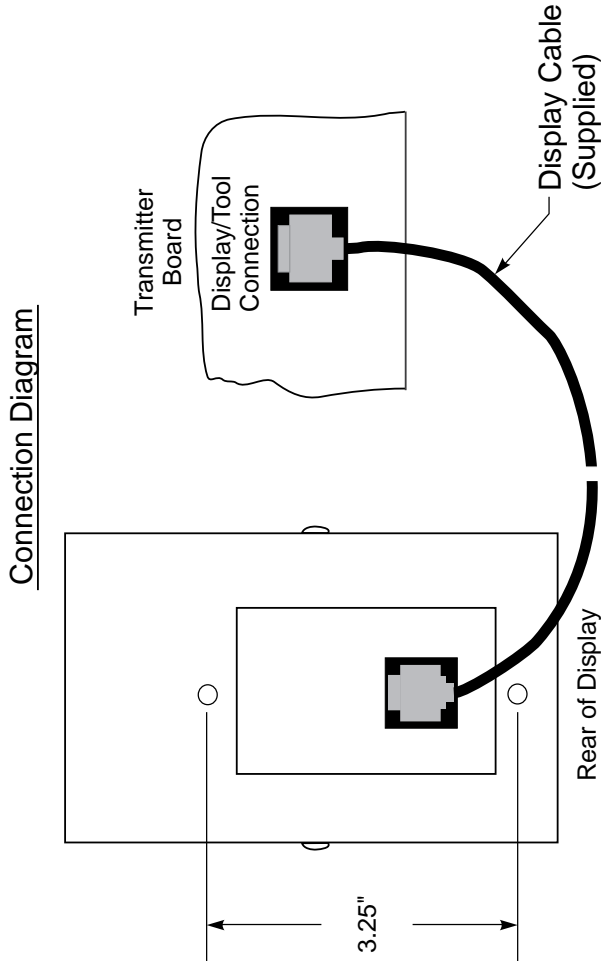
Inspection- Carefully unpack and inspect the probes. If probes have been bent or broken in shipment, advise Tek-Air immediately.

Installation- Probes greater than 13" long are attached to the duct on both sides whereas probes less than 14" are attached to the duct only on one side. A 3 3/4" diameter hole should be located on the side of the duct where the probe will be inserted and, a 5/16" diameter hole is required in the duct wall on the opposite side of the duct for probes 14" and greater.

The sensor flange plate is provided with a neoprene gasket and does not require the application of special sealants. The flange plate should also not be insulated to allow for easy removal if ever desired.

XI. PROBE (VORTEK) TO CONTROLLER CONNECTION

Probe Connection- Ten foot connecting cables are provided for each insertion probe. This cable has a shielded 8 pin connector from the probe electronics enclosure and is plugged into the connector on the side of the controller.



Typical Fume Hood

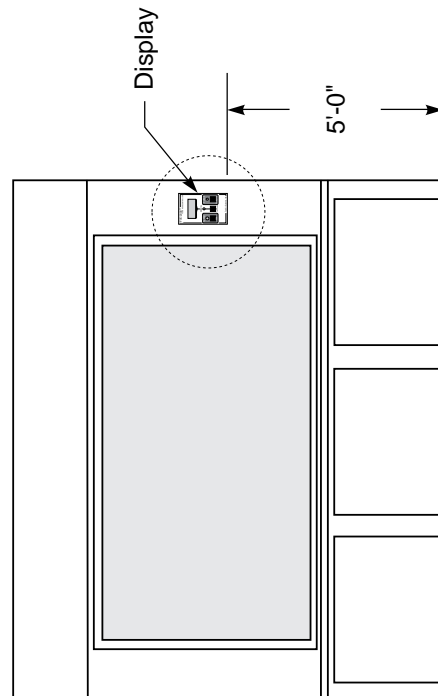
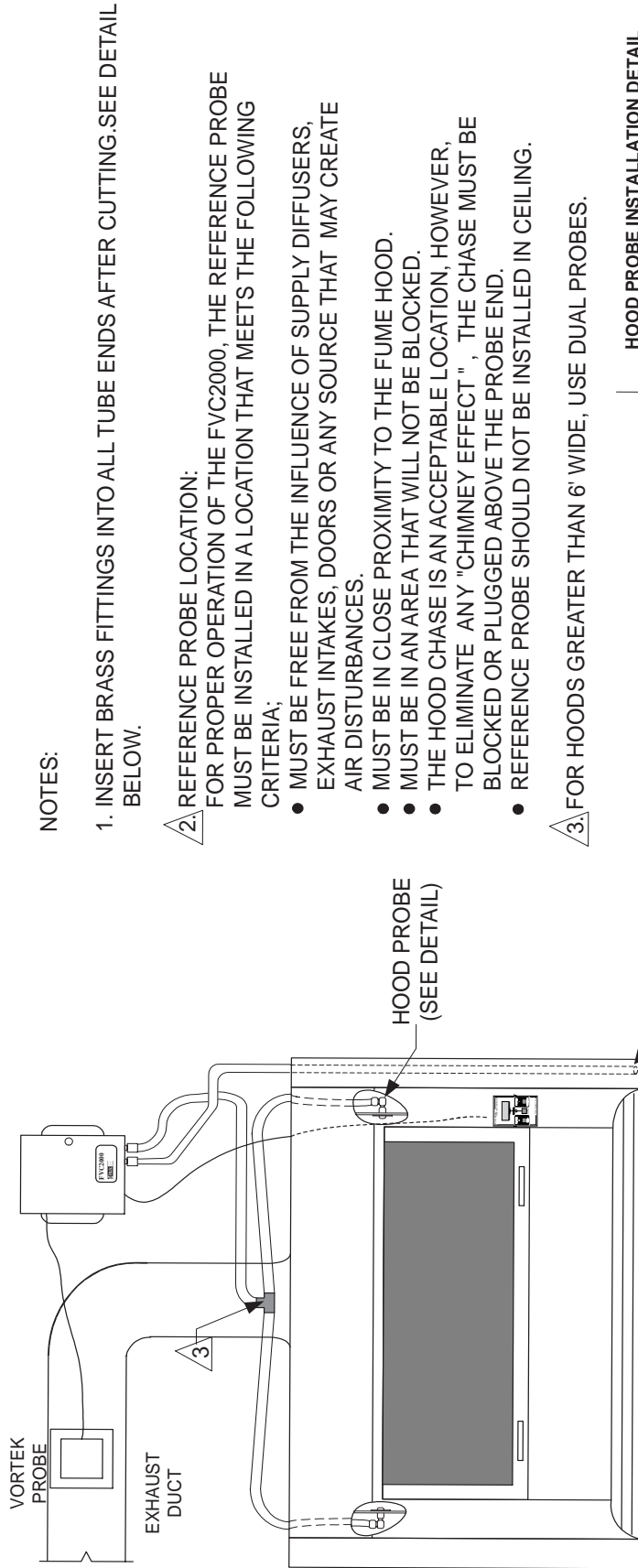


Figure 4, Display Mounting



NOTES:

1. INSERT BRASS FITTINGS INTO ALL TUBE ENDS AFTER CUTTING. SEE DETAIL BELOW.
2. REFERENCE PROBE LOCATION: FOR PROPER OPERATION OF THE FVC2000, THE REFERENCE PROBE MUST BE INSTALLED IN A LOCATION THAT MEETS THE FOLLOWING CRITERIA:
 - MUST BE FREE FROM THE INFLUENCE OF SUPPLY DIFFUSERS, EXHAUST INTAKES, DOORS OR ANY SOURCE THAT MAY CREATE AIR DISTURBANCES.
 - MUST BE IN CLOSE PROXIMITY TO THE FUME HOOD.
 - MUST BE IN AN AREA THAT WILL NOT BE BLOCKED.
 - THE HOOD CHASE IS AN ACCEPTABLE LOCATION, HOWEVER, TO ELIMINATE ANY "CHIMNEY EFFECT", THE CHASE MUST BE BLOCKED OR PLUGGED ABOVE THE PROBE END.
 - REFERENCE PROBE SHOULD NOT BE INSTALLED IN CEILING.
3. FOR HOODS GREATER THAN 6' WIDE, USE DUAL PROBES.

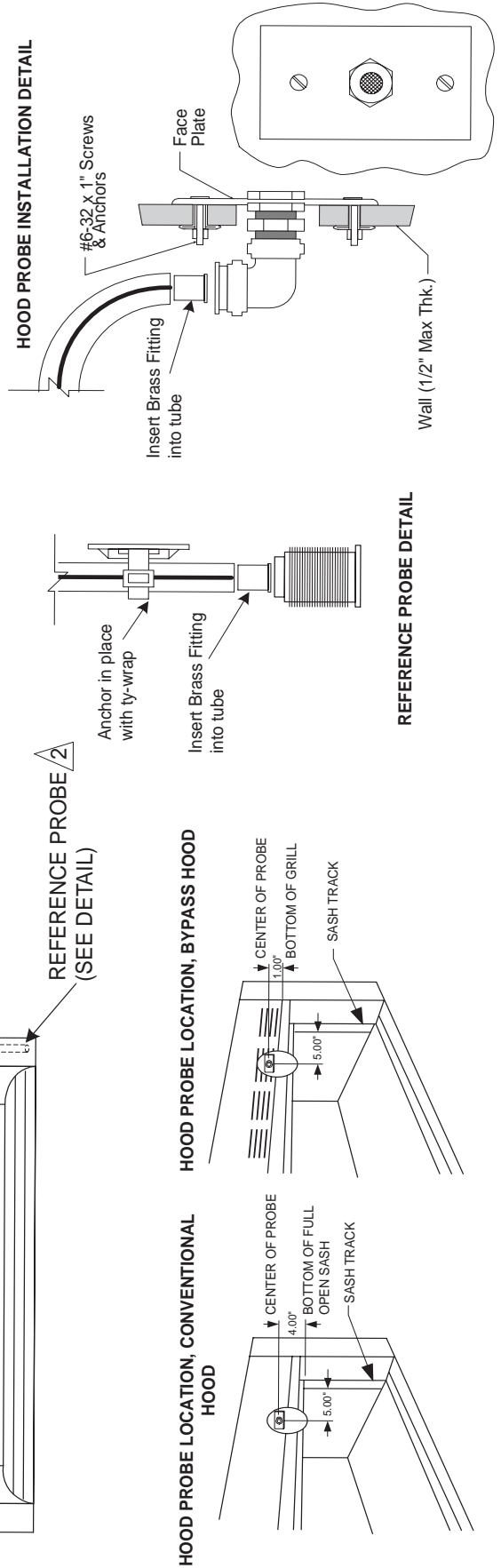
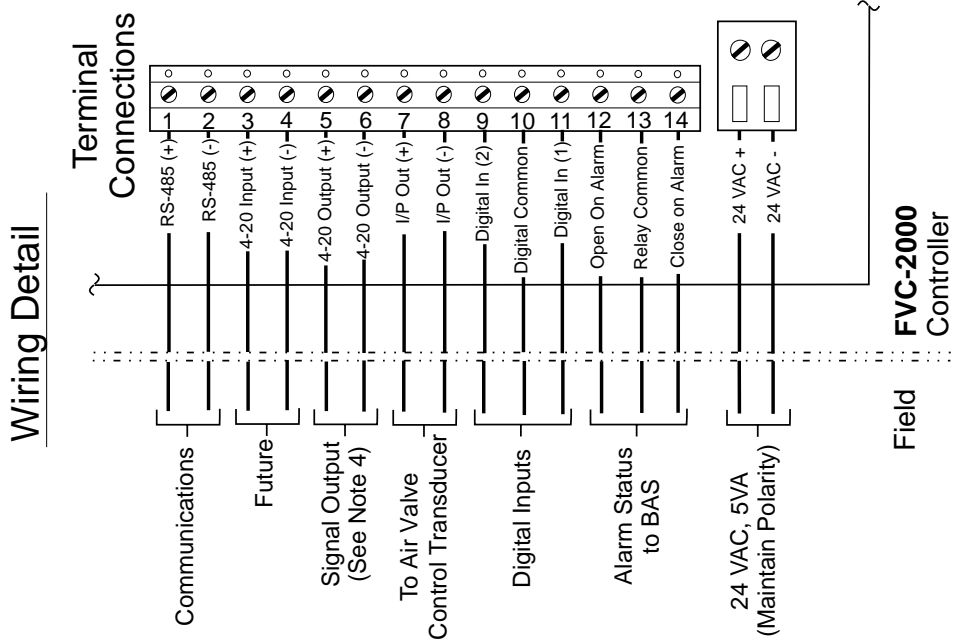


Figure 6, Probe Mounting

Figure 5, Probe Location



- Notes:**
1. External 24 VAC By Others.
 2. Cabinet Description:
Rating: Nema 1
Construction: 18 ga. CRS.
Paint: Blue Enamel
 3. 40 ft. Lengths of tubing provided, combined
 4. See "Control" Menu, Configuration Tool Menu Definitions in Brief

Figure 8, Controller Connection Diagram

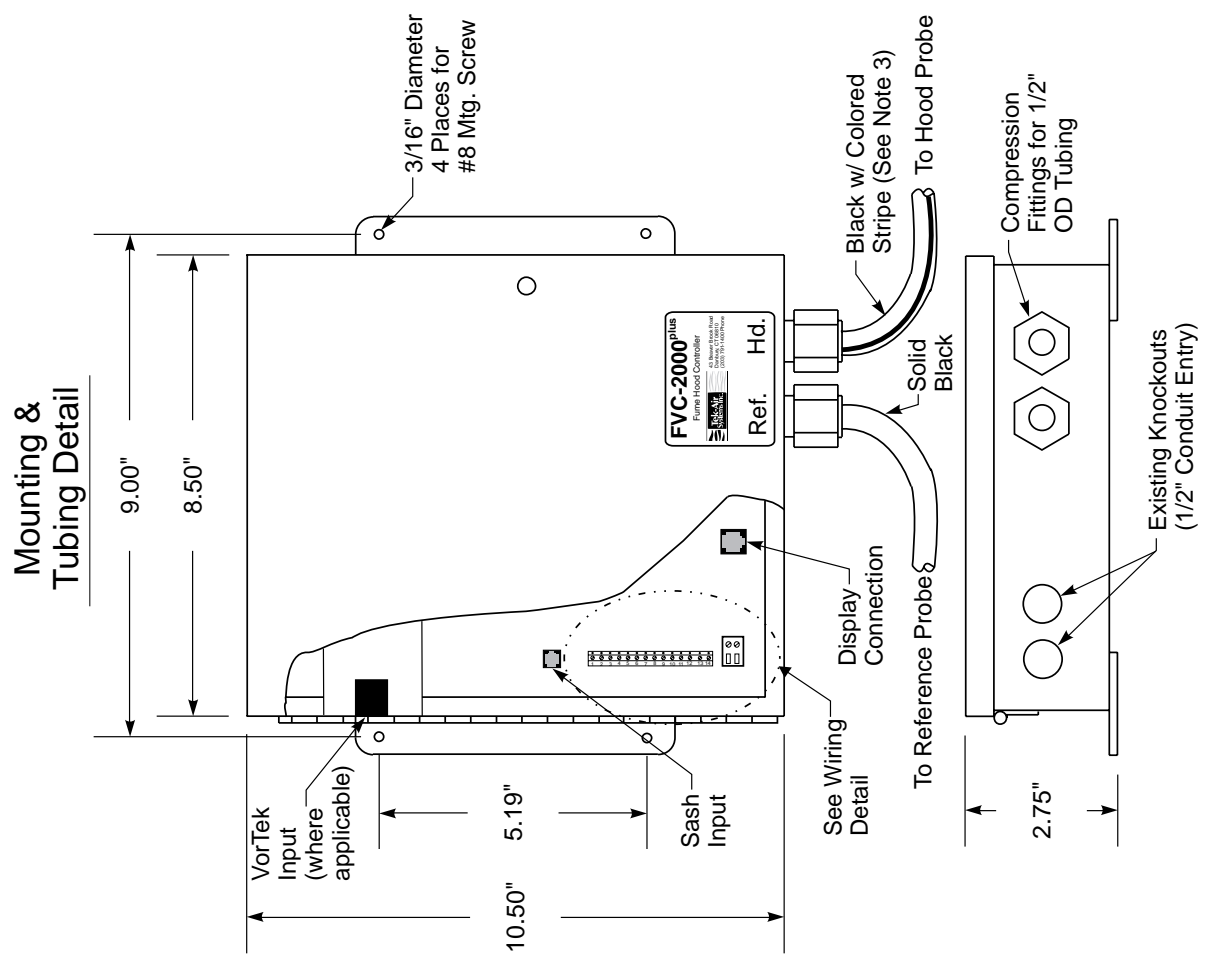
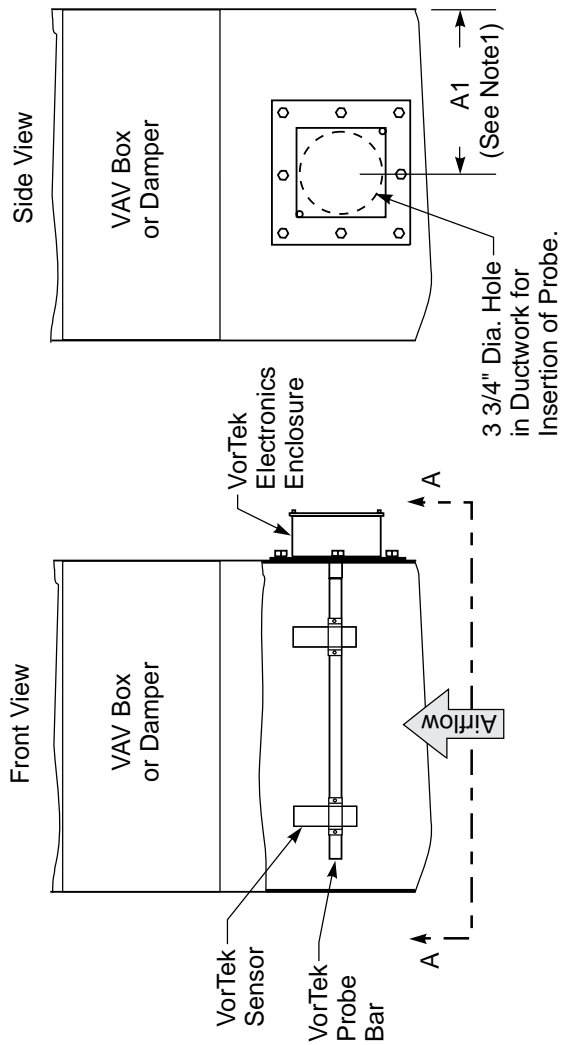


Figure 7, Controller Mounting and Tubing Detail

Installation Diagram



- Notes:
1. A1 Dimension to be Calculated as Follows:
 Circular Ducts: $A1 = D/2$.
 Rectangular Ducts: $A1 = (H/2) + 1.25"$.

Connection Diagram

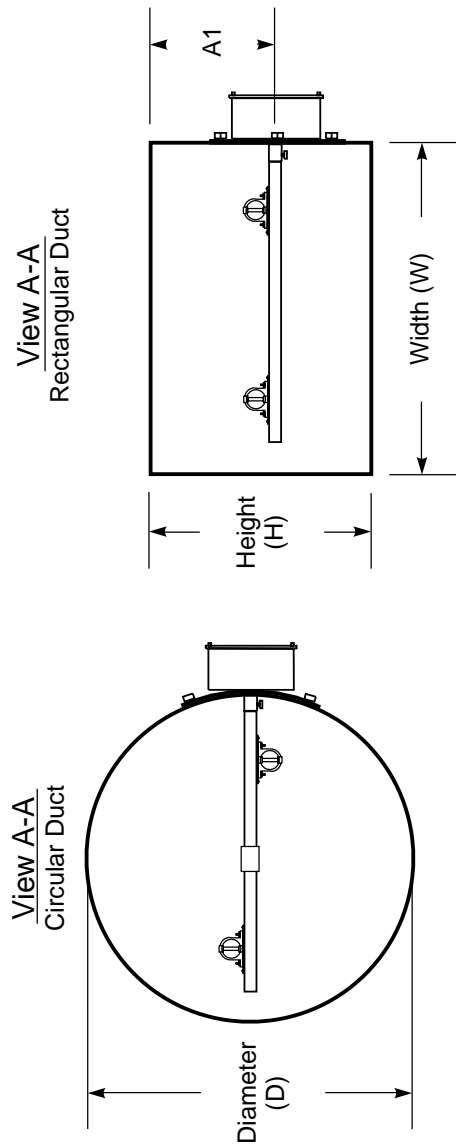
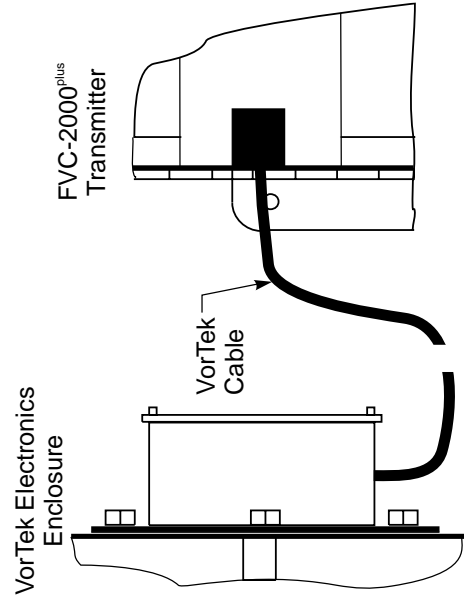


Figure 9, Vortek Installation

XII. FVC-2000PLUS CONFIGURATION TOOL

The FVC-2000*plus* configuration tool is a hand-held device used to configure the operation of the FVC-2000plus fume hood controller. The tool is menu-driven, and incorporates a 4-line, 16-character per line, LCD window. Two different types of Configuration Tools are available, one is for ARCnet applications and the other is for Non-ARCnet applications. The two different types of tools are not interchangeable and must be ordered from the factory as either ARCnet or Non-ARCnet.

Key Pad Operation

1. The **Mode Key** causes the tool to alternately select between displaying the Current Status and any other location in the System Menu Tree where the cursor is positioned,(unless the cursor is active in the option selection position).
2. The **Enter Key** is used to select menu categories and choose from listed options for subsequent uploading, or downloading with the Controller
3. The **Up, Down, Left, Right Arrows** keys are used to move a cursor through the menus.

Connecting the Tool

ARCnet Configuration

Using the white cable provided with the tool, simply attach one end into receptacle located on the lower left side of the Tool and the other end into the jack located on the bottom of the Fume Hood Display. The Fume Hood Display will automatically recognize that the Tool is connected and all information will now bypass the Display and be sent directly to the Tool.*

Non-ARCnet Configuration

The Non-ARCnet Tool can be connected to either the cable that is plugged in at the back of the Display or directly to the Controller.

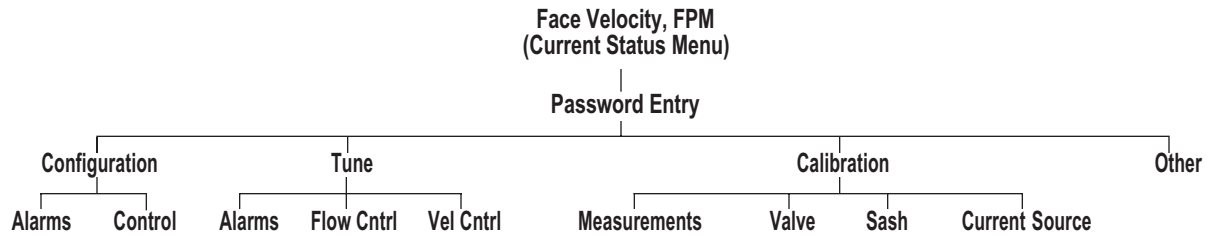
- To connect the Tool to the Display cable, you must first remove the Display from the Fume Hood, disconnect the permanent cable from the Display, and plug the permanent cable into the female end of the grey cable provided. Now connect the male end of the grey cable into receptacle located on the lower left side of the Tool.
- To connect the Tool directly to the Controller, go to the location where the Controller is mounted and open the enclosure door. Disconnect the permanent display cable from the Controller PC Board and connect the male end of the white cable into this location. Now connect the other end of this cable into the receptacle located on the lower left side of the Tool.

Upon connection the tool will display either, "**comm.=SPI**" for Non-ARCnet applications or "**comm.=SCI**" for ARCnet applications. One second later the display will change to indicate face velocity in FPM. This is the starting point for accessing all available menus.

Password Functions

A Password function is provided to protect against unauthorized tampering with the controller. The factory preset default password is "**1234**". To access the Password Function press the down-arrow "**v**" key. The display should now read "**Password Entry**". Now use the arrow keys to enter "**1234**" and press "**Enter**". You may now navigate through the Menu using the arrow keys: **<**, **^**, **>**, and **v**.

Menu Hierarchy





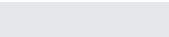

Navigating Throught Menus

The Menu's **Major Categories** includes: **Configuration**, **Tune**, **Calibration** and **Other**. Use the "<" and ">" keya to move to the desired Major Category.

Once in the desired Major Category, use the "v" key to go to next level of menus, wich contain the **Basic Functions**.

Once in the desired **Basic Function**, use the "^" and "v" keys to move the cursor to any desired **Parameter**. Use the ">" key to select a minor group or the "<" key to exit the group. Within the selected minor group, use the "^" and "v" keys to move the cursor to any desired sub-menu. When viewing a specific menu, a "*" cursor identifies the current selection. Use the ">" key to move to the options. The cursor will now become a ">" to indicate selection mode. Use the "^" and "v" keys to move the cursor among the options. In some of the specific tuning and calibration menus, you may need to use the "^" and "v" keys to adjust numerical data. Push **Enter** to select or the "<" to return without selecting.

Key:

Model 2100 (Mode 1) and Model 2200 (Mode 2)	Model 2200 (Mode 2) only	Description
		Configuration Tool Menus available
		Configuration Tool Menus required
Non-boxed and Non-highlighted menu options are not applicable		

Face Velocity, FPM
(Current Status Menu)

Password Entry

Configuration

Alarms

Alarm Latching	Enables or disables the latching function of the alarm indication
Alarm Mute	Determines if or how the Display Mute button will function as an acknowledge
Face Velocity Lo/Lo	Enables or disables the low/low face velocity alarm function
Face Velocity Lo Alarm	Enables or disables the low face velocity alarm function
Face Velocity Hi Alarm	Enables or disables the high face velocity alarm function
Face Volume Lo Alarm	Enables or disables the low volume alarm function
Face Volume Hi Alarm	Enables or disables the high volume alarm function
Volume Dev Alarm	N/A – Enables or disables the deviation volume alarm function
Sash Open Alarm	N/A – Enables or disables the sash high alarm function

Control

Control Action	Selects the operation of the air flow control device
Mode 1–6	Selects 1 of 6 operational modes
Setpt. Reset Indexing	Determines if the control set point can be changed to the reset setpoint
Reset Warning	Enables or disables the reset advanced warning function
Setpoint Reset Warning Delay	To enter the setpoint reset advanced warning delay time value
Digital Input (1)	Selects the meaning of the input
Digital Input (2)	Selects the meaning of the input
4-20ma Output Define	Selects the information (as % of its full scale) put on the current output signal

Tune

Alarms

Alarm Delay	To enter the alarm delay value
Face Velocity Lo/Lo Alarm Setpt.	To enter the low/low face velocity alarm setpoint value
Face Velocity Lo Alarm Setpt.	To enter the low face velocity alarm setpoint value
Face Velocity Hi Alarm Setpt.	To enter the high face velocity alarm setpoint value
Face Velocity Display Alert Band	To enter the face velocity alert band value

C. CONFIGURATION TOOL MENU DEFINITIONS IN BRIEF

CONFIGURATION

ALARMS

CONTROL

TUNE

ALARMS

(cont.)

Tune (cont.)	Tune (cont.)
Alarms	Alarms
Volume Low Alarm Setpoint	To enter the low volume alarm setpoint value
Volume Hi Alarm Setpt.	To enter the high volume alarm setpoint value
Volume Deviation	N/A - To enter the CFM volume deviation alarm setpoint value in CFM
Sash Alarm Active Above	N/A - To enter the sash position (as % of full open) alarm setpoint value
Flow Control	FLOW CONTROL
Volume Setpt. Normal	To enter the normal constant volume air flow desired
Volume Full Scale	To enter the volume full scale limit of hood exhaust airflow
Volume Prop Gain	To enter the flow control loop proportional gain value
Volume Repeats/min.	To enter the flow control loop repeats per minute (error integration)
Max Volume	To enter the maximum permitted hood exhaust volume
Min Volume	To enter the minimum permitted hood exhaust volume
Volume Reset Setpt.	To enter the reset constant volume air flow desired
Volume Open Reset Position	To enter sash position point (% of full open) for transition to Reset Value
Velocity Control	VELOCITY CONTROL
Face Vel Setpt.	To enter the normal face velocity value
Face Vel Full Scale	To enter the full scale limit of the hood face velocity
Face Vel Prop Gain	To enter the velocity control loop proportional gain value, used outside the 'slow Bandwidth' band. The value used inside the band is zero.
Face Velocity Repeats/min.	To enter the velocity control loop repeats per minute (error integration) value, used outside the 'slow Bandwidth' band
Face Vel Slow Repeats/min.	To enter the velocity control loop repeats per minute (error integration) value, used within the 'slow Bandwidth' error band
Face Vel Slow Bandwidth	To enter the bandwidth around set point
Face Vel Reset point	To enter the reset face velocity value
Calibration	CALIBRATION
Measurements	MEASUREMENTS
Flow Volume	The real time measured hood exhaust volume
Vortek Coef, Hertz	The calibration information used to convert vortek output to volume. Factory set, but can be adjusted manually or by performing 'Vortek Vol Cal'
Vortek Area	To enter the actual vortek duct area of the hood exhaust
Vortek Channel Input Select.	To enter the active Vortek sensor channels. The four possible channels are labeled #1,2, 4, 8. The selection number entered is the summation of the used channel label #'s.
Vortek Volume Cal	Used to perform a field calibration of Vortek Coefficients. This menu includes a group of sub menus which guide the user through calibration.
Face Velocity Zero	Used to perform a 'zero face velocity' calibration
Face Velocity Span	Used to perform a 'face velocity' calibration at the desired face velocity, active measurement

<p>Valve</p>	<p>VALVE</p>
<p>Output to Valve Output to Valve Override Valve Control Max Output Valve Control Min Output</p>	<p>The current, real time, I/P output signal (expressed as %) to the valve controller To select the ability to specify the control output % value to the valve controller. Selecting override causes a new menu to be seen displaying the output % which can now be adjusted. The high limit of the I/P valve control output, in % The low limit of the I/P valve control output, in %</p>
<p>Sash</p>	<p>SASH</p>
<p>Sash Type Vert Sash Dim, Width Vert Sash Dim, Height Horiz Sash Dim, Width Horiz Sash Dim, Height Set Vert Sash Open Set Vert Sash Closed Set Horiz Sash Open Set Horiz Sash Closed Sash Output, Realtime Sash FF Lock Time Sash FF Cal</p>	<p>N/A - To enter the type of sash on the hood N/A - To enter the width measurements of the sash at its max open position, for vertical or combination types N/A - A series of four menus used to enter actual hood sash location information for the Sash position sensor. N/A - A menu displaying the current sash open area as a % of the max possible area Used to enter the desired temporary hold time of the I/P % valve control output following a sash movement (mode 3 only) N/A - A series of sub menus used to calibrate the sash position to the face velocity to provide the appropriate feedforward compensation N/A - A menu used to enter actual hood sash location information for the Sash position sensor. N/A - A menu used to enter actual hood sash location information for the Sash position sensor. N/A - A menu used to enter actual hood sash location information for the Sash position sensor. N/A - A menu used to enter actual hood sash location information for the Sash position sensor. N/A - A menu displaying the current sash open area as a % of the max possible area N/A - Used to enter the desired temporary hold time of the I/P % valve control output following a sash movement A menu used with the sash position to the face velocity calibration to provide the appropriate feedforward compensation hold time</p>
<p>Current Source</p>	<p>CURRENT SOURCE</p>
<p>I/P Output cal, 4ma I/P Output, 20 ma 4-20 Output, 4ma 4-20 Output 20ma I/P Reference Output 4-20 Reference Output</p>	<p>Used to calibrate the specific 4 ma bias point. It is pre set at the factory. Used to calibrate the span from the 4 to the 20 ma point. Preset at the factory. Used to calibrate the specific 4 ma bias point. It is pre set at the factory. Used to calibrate the span from the 4 to the 20 ma point. Preset at the factory. Used to select the specific indicated current; or 'auto' to enable normal operation Used to select the specific indicated current; or 'auto' to enable normal operation</p>

(cont.)

L Other

OTHER

<p>Password Change</p> <p>Units</p> <p>Display Type</p> <p>Address</p> <p>Display Smoothing</p> <p>Comm Variable</p> <p>Revision</p>	<p>Used to change the current password</p> <p>Used to select either English or metric engineering units</p> <p>Used to select either an alpha or numeric display</p> <p>Will display the Controller address - the DIP switch on the board (read only)</p> <p>Used to select either fast or slow smoothing of the displayed measurement value. Slow provides a 10 sec average, fast provides a 3 sec average.</p> <p>Defines those parameters which can be remotely changed via communications: options are:</p> <ul style="list-style-type: none"> 0- no transfers allowed 1- face velocity set point 2- face velocity high alarm set point 4- face velocity low alarm set point 8- emergency 16- face velocity low/low alarm set point — and combinations created by adding the selection numbers <p>Displays the current Controller and Configuration</p>
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XIII. MODEL 2100 MODE 1 CONFIGURATION

- 1) Go to the Configuration/Alarm menu group
- 2) From the following menus select the alarm (ON or OFF) configuration as you require:
 - Alarm Latching
 - Alarm Mute
 - Face Velocity Lo/Lo Alarm
 - Face Velocity Lo Alarm
 - Face Velocity Hi Alarm

- 3) Go to the Configuration/Control menu group
- 4) Enter in the following menus configuration information:

Control Action	set to 'Reverse' for a PRD Pneumavalve
Operational Mode	set to 1
Set Point Reset Indexing	set to 'active' if remote resetting of the face velocity is desired via this input.
Digital Input 1	set to 'set pt reset' if remote resetting of the face velocity is desired
Reset Warn	select on or off as required
Reset Warning Delay	if desired, enter the setpoint reset advanced warning delay time value. If not turned on, will reset immediately.
Digital Input 2	select an option if required
4-20ma Output	select an option if required

- 5) Go to the Tune/Alarms menu group
- 6) Enter in the following menus configuration information as you require:

Alarm Delay	
Face Velocity Lo/Lo Alarm Set Point	if desired, is normally set to 1/2 of the normal face velocity set point
Face Velocity Lo Alarm Set Point	typically set to 25 – 35 fpm below the normal face velocity set point
Face Velocity Hi Alarm Set Point	typically set to a value which is twice the normal face velocity setpoint
Face Velocity Display Alert Band	typically set so that the upper edge of the band is at least 20 fpm below the normal face velocity set point. Refer to the Alpha Display Operation Band figure.

- 7) No entry required in the Tune/Flow Control menu group
- 8) Go to the Tune/VelocitY Control menu group
- 9) Enter in the following menus configuration information as you require:

Face Velocity Set Point	enter the desired normal desired face velocity
Face Velocity Full Scale	typically set to a value which is four to five times the normal face velocity set point. Factory set at 500 fpm.
Face Velocity Prop Gain	set to 1. Then refer to the tuning section
Face Velocity Fast Repeats/min	set to 30. Then refer to the tuning section
Face Velocity Slow Repeats/min	set to 30. Then refer to the tuning section
Face Velocity Slow Bandwidth	set to 15. Then refer to the tuning section
Face Velocity Reset Point	if desired, enter the reset face velocity set point

- 10) No entry required in the Calibration/Measurements Control menu group
- 11) No additional entry required in the Calibration/Valve menu group
- 12) No entry required in the Calibration/Sash menu group
- 13) No entry required in the Calibration/Current Source menu group

- 14) Go to the Other menu group
- 15) Enter in the following menus configuration information as you require:
 - Units
 - Display Type
 - Display Smoothing
 - Comm Variable - Factory set at 31 wich should apply to 99% of applications.
- 16) Control options are:

0- no transfers allowed	4- low alarm set point
1- face velocity set point	8- emergency
2- high alarm set point	16- low/low alarm setpoint and combinations equal to the sum of the selection numbers

XIV. MODEL 2100 MODE 1 CALIBRATION & TUNING

Zero Set

- 1) Before pluggin the tool in, check to see that the controller is not in Emergency Override. This can be done by looking at the Purge LED on the display face. If the controller is in Purge, have the operator take the unit out of override.
- 2) Plug the FVC-2000 tool into the receptacle at the bottom of the controller display unit.
- 3) In order for any of the following calibrations to take affect, the correct password must be entered. Refer to the tool operating section of the quick start manual for the FVC-2000 controller.
- 4) Path to the "Face Velocity Zero" display by performing the following:
 - 4.1. Press the Down Arrow one time. The display will show "Configuration"
 - 4.2. Press the Right Arrow two times. The display will show "Calibration"
 - 4.3. Press the Down Arrow one time. The display will show "Measurements"
 - 4.4. Press the Right Arrow one time. The display will show "Flow Volume"
 - 4.5. Press the Down Arrow five times. The display will show "Face Velocity Zero"
- 5) When the "Face Velocity Zero" display is open, the raw, unbiased data from the velocity sensor is displayed.
- 6) Insert rubber plugs into the sidewall sensing fitting mounted inside the hood on the and the reference fitting mounted outside the hood.
 - 6.1. Be sure the probe inlet holes is completely sealed. This can be accomplished by watching the value displayed on the tool display which should be a steady value between -25to +25. If the value is a steady value between -25 to +25 then the "zero set" is complete, now proceed to "Face Velocity Span".
 - 6.2. If the velocity still is not steady between -25 and +25, tighten (with pliers) the Hood Probe and Reference Probe nylon compression fitting nuts (on both the inside and outside of the

wall) one extra turn past hand tight. Also tighten the two fittings found on the controller one extra turn past hand tight. Make sure there are no leaks or kinks in the tubing.

NOTE: your unit, if shipped after July '99, may have o-ring fittings with no compression nuts (push-in type). If you suspect a leak, press in on the collar of the fitting and pull out the tube. Make sure there is a metal tubing insert used inside the plastic tubing and that the tubing is cut straight and clean. Then re-insert the tube into the fitting, being sure to "bottom" the tubing into the fitting.

- 6.3. If there are no leaks and the display still doesn't read between -25 and +25, go to step 7.
- 7) Press the Right arrow key once. Make this change question will be displayed. Press the Enter button to accept the changes.
- 8) Once the Enter button is pushed, the unit output is locked. This also displays the last biased velocity reading. This is the normal velocity reading that is used for control and display.
- 9) The controller will now perform a Zero Calculation routine. The value displayed at the bottom of the screen should be between 185 and 70. If the value is not in this range then call Tek-Air service department for further instructions.
- 10) After the Zero Calculation routine is complete the display will show the result. Write down the Zero value then press the Enter button to continue. Displayed Value = _____.
- 11) The FVC-2000 will next perform an auto offset calculation process. The display will show the device offset values.
- 12) After the Offset routine is complete the display will show the result. Write down the Offset value then press the Enter button to continue. Displayed Value = _____.
- 13) Once both the Zero and Offset routines are done you will be given a chance to save the new values. If the Zero value you wrote down IS NOT between a value of 70 and 185 or if the Offset value you wrote down IS NOT between the value of 30 and 75 then DO NOT change the values. Call Tek-Air Service Help Desk for further instructions. If the values are acceptable, then press enter to save the changes.
- 14) Remove the Probe Zero tubes.

Face Velocity Span

- 1) Enter "Face Velocity Span" display using the tool by doing the following:
 - 1.1. Press the Mode button to display the current Face Velocity status.
 - 1.2. Press the Down Arrow two times. The display will show "Configuration"
 - 1.3. Press the Right Arrow two times. The display will show "Calibration"
 - 1.4. Press the Down Arrow one time. The display will show "Measurements"
 - 1.5. Press the Right Arrow one time. The display will show "Flow Volume"
 - 1.6. Press the Down Arrow six times. The display will show "Face Velocity Span"
- 2) When the "Face Velocity Span" display is open, the raw, unbiased data from the velocity

sensor is displayed.

- 3) Now set the vertical sash at 18 in. open. If dealing with a horizontal sash, move the sash doors so the center of the hood is fully open. Remove any objects from inside the fume hood to prevent any obstruction of airflow.
- 4) Wait until the velocity display is stable. This should take no more than one minute.
- 5) Hit the right arrow key. This locks the output to the exhaust valve, and also displays the last biased velocity reading.
- 6) The hood is now ready to be traversed. When the traverse is complete, compare the traverse average value to the locked velocity value on the tool. If the tool value is within 3% of the traverse hit the left arrow key until the unit beeps. This exits the mode without a change. If the value is outside 3% hit the right arrow button again. A cursor will appear which can be moved back and forth with the left and right arrow keys. The values can be changed with the up and down keys.
- 7) Set the value to the traversed velocity, and press the enter button. The tool will ask if the change should be made, press the enter button again.
- 8) Traverse the hood again and compare the result to the displayed face velocity value found at the "Current Status" Display screen. If the value is unacceptable, then complete steps 4.1 through 4.8 again.

Mode 1 Tuning

- 1) While viewing the Current Status on the tool, raise and lower the sash. Get a feel for how the hood responds with the default tuning settings. This depends on the characteristics of the hood and exhaust static pressure.
- 2) Close the hood sash entirely and wait until the velocity comes under control. Enter field "Output To Valve" by path: (menu)-Calibration/ (submenu)-Valve/ (parameter)-Output To Valve. Note the valve output percentage. Move down 2 fields to "Valve Control Max. Output". Add 10 to the value of "output to valve" and input this as the new max. output value.
- 3) Open the hood sash entirely and wait until the velocity comes under control. Go to Path: (menu)-Calibration/ (submenu)-Valve/ (parameter)-Output To Valve, and note the valve output percentage. Move down 3 fields to "valve control min. output". Subtract 10 from the value of "output to valve" and input this as the new min. output value.
- 4) Open and close the sash continuously during the rest of the tuning process after each change is made. Watch for overshoot, hunting and speed of response.
- 5) Begin increasing the "Face Vel. Prop Gain" and the Face Velocity Repeats/Min. Increase the prop first, in small increments, and test in between. Continue until the controller begins to overshoot, then back it down to the last stable value.
- 6) Now increase the repeats/min. in small increments, testing in between. Continue until the controller begins to overshoot, then back it down to the last stable value.
- 7) Leave the controller in a steady state for 1 minute. If the velocity has trouble holding setpoint(+/- 10-20 FPM), try increasing the "Slow Repeats/Min.". If this doesn't work after some time, try decreasing the "Slow Repeats/Min." and increasing the "Face Vel. Slow Bandwidth."

XV. MODEL 2200 MODE 2 CONFIGURATION

- 1) Go to the Configuration/Alarm menu group
- 2) From the following menus select the alarm (ON or OFF) configuration as you require:
 - Alarm Latching
 - Alarm Mute
 - Face Velocity Lo/Lo Alarm
 - Face Velocity Lo Alarm
 - Face Velocity Hi Alarm
 - Volume Lo Alarm
 - Volume Hi Alarm

- 3) Go to the Configuration/Control menu group
- 4) Enter in the following menus configuration information:

Control Action	set to 'Reverse' for a PRD Pneumavalve
Operational Mode	set to 2
Set Point Reset Indexing	set to 'active' if remote resetting of the face velocity is desired via this input.
Digital Input 1	set to 'set pt reset' if remote resetting of the face velocity is desired
Reset Warn	select on or off as required
Reset Warning Delay	if desired, enter the setpoint reset advanced warning delay time value, if not turned on, will reset immediately.
Digital Input 2	select an option if required
4-20ma Output	select an option if required

- 5) Go to the Tune/Alarms menu group
- 6) Enter in the following menus configuration information as you require:

Alarm Delay	
Face Velocity Lo/Lo Alarm Set Point	if desired, is normally set to 1/2 of the normal face velocity set point
Face Velocity Lo Alarm Set Point	typically set to 25 – 35 fpm below the normal face velocity set point
Face Velocity Hi Alarm Set Point	typically set to a value which is twice the normal face velocity setpoint
Face Velocity Display Alert Bandleast	typically set so that the upper edge of the band is at 20 fpm below the normal face velocity set point. Refer to the Alpha Display Operation Band figure.
Volume Lo Alarm Set Point	set this temporarily to 0. After determining the min volume, set 20 % below the minimum flow volume point.
Volume Hi Alarm Set Point	set this temporarily to the same value as the volume full scale. After determining the max volume, set 20% above the maximum flow volume point.

- 7) Go to the Tune/Flow Control menu group
- 8) Enter in the following menus configuration information as you require:

Volume Full Scale	enter a value approximately 50% greater than the maximum expected flow volume
Volume Proportional Gain	set to 0.50
Volume Repeats /min	set to 20
Volume Max	set to full scale volume } (set to desired limits after performing Tuning, then recheck hood operation)
Volume min	

- 9) Go to the Tune/Velocity Control menu group
- 10) Enter in the following menus configuration information as you require:
 - Face Velocity Set Point enter the desired normal desired face velocity
 - Face Velocity Full Scale typically set to a value which is four to five times the normal face velocity set point
 - Face Velocity Prop Gain set to 1. Then refer to the tuning section
 - Face Velocity Fast Repeats/min set to 30. Then refer to the tuning section
 - Face Velocity Slow Repeats/min set to 30. Then refer to the tuning section
 - Face Velocity Slow Bandwidth set to 15. Then refer to the tuning section
 - Face Velocity Reset Point if desired, enter the reset face velocity set point
- 11) Go to the Calibration/Measurements Control menu group
- 12) Enter in the following menus configuration information as you require:
 - VorTek Area enter the duct area
 - VorTek Input Channel Selection The four possible channels are labeled #1, 2, 4, 8. The selection number entered is the summation of the used channel label #'s For the FVC-20000plus, the selection should be made as follows:
 - 1 VorTek sensor enter 08 [channel #8 only]
 - 2 VorTek sensors enter 12 [channel #8 + 4]
 - 4 VorTek sensors enter 15 [channel #8 + 4 + 1]
- 13) No entry required in the Calibration/Sash menu group
- 14) No entry required in the Calibration/Current Source menu group
- 15) Go to the Other menu group
- 16) Enter in the following menus configuration information as you require:
 - Units
 - Display Type
 - Display Smoothing
 - Comm Variable
- 17) Control options are:

0- no transfers allowed	4- low alarm set point
1- face velocity set point	8- emergency
2- high alarm set point	16- low/low alarm setpoint

and combinations equal to the sum of the selection numbers

XVI. MODEL 2200 MODE 2 TUNING

Mode 2 Tuning is identical to Mode 1.

When Tuning is complete, enter the min and max volume, in the Tune/Flow control menu group and re-check hood control operation. Verify that the controller limits the exhasut volume at the entered values.

XVII.USE OF DISPLAY

The display operation is determined by the setting of various configuration parameters which are listed in previous section. Display will normally be setup as either numeric or alpha. The operator will also be alerted to the presence of face velocity conditions outside the high and low limits set. This mode is designed to provide operational information only and access to adjustable parameters is restricted.

1. Button Functions

a. Mute

This button is used to acknowledge an alarm condition. Pressing the button causes the alarm tone to silence, and the alarm LED will become continuous. If the ‘re-beep’ Mute option is active, the tone will beep twice with a 15 second period, until the alarm condition clears. (If the alarms are not “Latched”, TONE & LED are automatically cleared when alarm condition clears.)

Pressing and holding for 3 continuous seconds (when no alarm) will cause the Display to perform a self test. It will illuminate all LED’s and all LCD segments, and beep the alarm tone for one second. It will then display the current display software revision, and then the Controller address, each held on screen for two seconds.

b. Emergency (Purge)

Pressing this button will cause the hood exhaust valve to be opened to Max valve limit or Max volume. Pressing again, returns to normal control.

c. Parameters

This button provides the user with a method to look at the important parameters concerning the hood operation. The Display LCD will temporarily stop showing the primary default screen, and scroll through the list seen below (primary default screen included) one parameter at a time, with each individual depression of the button.

If the Controller display is configured as a numeric type :

Parameter 0 data(see table below) is the primary default screen.

If the Controller display is configured as an alpha type :

The message SAFE (or ALrt) is the primary default screen.

When the Parameters button is pressed, the LCD will show, beginning with #1, the parameter abbreviation for 1 second, and then the parameter data for 10 seconds. (or until the button is pressed again)

Parameter#/Description	Abbreviation	Data
0- face velocity measurement	face	xxx
1- face velocity set point	Sp	xxx
2- % valve open	out	xx
3- volume CFM measurement	Flo	xxx
4- face velocity low alarm set point	Lo	xxx
5- face velocity hi alarm set point	Hi	xxx
6-controller software revision	FHC	xxx

1. LED Indicators

There are three LED indicators: Alarm (red), Normal (green), and Emergency (red).

- a. - Alarm: will flash during an alarm condition until the Mute button has been pressed, then it will become continuous.
- b. - Normal This indicator will be illuminated during safe (and alert) hood operation.
- c. - Emergency: will illuminate after the Emergency button has been pushed. It will turn off after the button has again been pressed. (Equivalent operation of the indicator can be accomplished via 'Emergency' commands over the RS-485 communications link, or digital input)

2. Display Operation

The Display will communicate with the Controller once per second, to transfer data. If communication cannot be correctly completed over a period of 4 seconds, a C1 message will be displayed on the LCD, and the alarm tone will be activated. Pressing the Mute button will silence the tone.

The response time of the numeric display measurement display can be adjusted to provide a fast (3 sec average) or slow (10 sec average) visual response.

3. Alarm Indicators

* All alarms can be turned on or off. This can be done in the Configuration/Alarms menu group of the Setup Tool.

When the face velocity falls outside the Low to High Alarm Limit window for longer than the alarm delay, the audible alarm tone will activate. If there is no Low/Low alarm set, the relay will also become active (unpowered). If there is a Low/Low limit, the relay activates when the face velocity falls below this limit.

When the air flow volume falls outside the Low to High Alarm Limit window, or outside the Deviation Limit, the audible alarm tone will activate. When the air flow volume falls outside the Low to High Alarm Limit window the relay will also become active (unpowered). Note: the Deviation Limit can never rise above the High Alarm limit or fall below the Low Alarm limit.

4. LCD Messages

The LCD display has two distinct display types. The primary default screen is either a numeric or an alpha type. It will show the face velocity, or the a word indicating the condition of the face velocity.

Numeric: with this choice, the display shows the face velocity in the appropriate units [in

A rectangular LCD display showing the number 100.

Alpha: with this choice, the display shows the 'condition' of the hood.

A rectangular LCD display showing the word nori.

means that the face velocity is below the Hi limit and above the Alert message band (normal).

ALrt

means that the face velocity is below the lower edge of the Alert band and above the Low Alarm limit.

Numeric and Alpha During Reset of the face velocity or flow volume, the Normal LED (green) will be off, and the display will alternate (at 1/2 Hz) between the following display, and the actual measurement reading.

rEst

In the event of a face velocity alarm condition: the display will alternate (at 1/2 Hz) between either of the following two displays, and the actual numeric measurement reading.

HI or LO

XVIII. TROUBLESHOOTING

Symptom

Corrective Action

Display blank

1. Check voltage at terminals 1 and 2 for 24VAC
2. If yes and there are multiple units on same power supply, check to insure power polarity is the same.
3. If no voltage on 1 & 2 check transformer secondary, primary, and fuse or circuit breaker.
4. See if display cable is plugged in at both ends
5. If all of above check out, replace unit.

Exhaust does not go to maximum in Emergency

1. Is output device NC or NO? If NC, Configuration/Control Action Menu should be "Direct".
2. Is exhaust fan running or airflow blocked?
3. Check I/P operation

Damper always open

1. Check output wiring to I/P convertor or damper actuator for connections and polarity.
2. Check for sufficient supply air pressure at I/P convertor.
3. Check for tubing kinks or blockages.
4. If blade damper, check for damper or linkage binding.
5. If electric actuator, check wiring for proper termination and power to actuator.
6. Check that Configuration/Control/Action menu is set for proper action (NC or NO)
7. Check that operational limits set by Valve Control Min & Max are correct.
8. Check I/P output using I/P Reference Output menu.

Damper always closed

1. Check output wiring to I/P convertor or damper actuator for connections and polarity.
2. Check for tubing kinks or blockages.
3. If blade damper, check for damper or linkage binding.
4. Check that Control Action menu is set for proper action
5. Check that operational limits set by Valve Control Min & Max are correct.
6. Check I/P output using I/P Reference Output menu.

Display fluctuates greatly

1. Has sensor been calibrated? Be sure it has.
2. Set to Valve Manual Override to 'ON' and observe fluctuations (control output will be frozen). If fluctuations go away problem is control problem and proceed to trouble shoot output fluctuations. If not, problem is with venting or extreme cross currents.
3. Is sensor sufficiently vented to room? If not, move the reference probe.
4. Is supply air blowing on face of hood, Face Velocity Probe, Reference Probe, or on top of hood? If so, correct diffuser pattern.
5. If control is stable and sufficiently fast, change Display Smoothing to 'SLOW'.

Output fluctuates excessively

1. Check all items for fluctuating display. Set Valve Manual Override to 'ON' and observe fluctuations (control output will be frozen). If fluctuations do not go away problem is with venting or extreme cross currents, not control.
2. Review control tuning again. Increase SLOW integration band width. Decrease slow integration constant.
3. If blade damper, check for sticking of either the damper or connecting linkage.
4. If variable speed drive, check drive ramp rate limits (must be fast as possible).

Control action is slow

1. Check to see that length of tubing run between I/P and air valve is within two feet and is free of kinks.
2. Review tuning constants. Narrow integration band and increase fast integration constant.

Sensor calibration appears to drift

1. Is sensor properly referenced? Is Face Velocity Probe and Reference Probe properly located. Correct problem.
2. Is calibration procedure consistent? Differences of 5 to 10 FPM due to traverse procedure are not uncommon.

Display shows "EE F"

1. Indicates memory is corrupted. Memory loss, although uncommon, may result from unusually "dirty" power sources and can be prevented with the installation of a surge protector. Unit needs recalibration or an upload of original calibration data file. Call Customer Service.

Appendix

N2 POINT MAPPING TO SUPPORT JCI COMMUNICATIONS

NPT	NPA	UNITS	POINT DESCRIPTION	RANGE / VALUE	FVC MODEL (see note)					
					2100	2200	2300	2400	2500	2600
AI	1	FPM	Face Velocity	0 to 1000	✓	✓	✓	✓	✓*1	✓*1
AI	2	CFM	Exhaust Volume	0 to 5000	-	✓	-	✓	✓	✓
AI	3	%	Sash Position	0 to 100	-	-	-	✓	-	✓
AO	1	%	Valve Control Output	0 to 100	✓	✓	✓	✓	✓	✓
AO	2	FPM	Face Velocity Set point	0 to 500	✓	✓	✓	✓	✓	✓
AO	3	FPM	Face Velocity Reset point	0 to 500	✓	✓	✓	✓	✓	✓
AO	4	CFM	Exhaust Volume Set point	0 to 5000	-	-	-	-	✓	✓
AO	5	CFM	Exhaust Volume Reset point	0 to 5000	-	-	-	-	✓	✓
AO	6	%	Sash Position Reset %	0 to 100	-	-	-	-	-	✓
BI	1	*2	Local Emergency Status	0 or 1 (1= emergency)	✓	✓	✓	✓	✓	✓
BI	2	*3	Reset Status	0 or 1 (1= reset)	✓	✓	✓	✓	✓	✓
BO	1	*4	Remote Emergency Override	0 or 1 (1= emergency)	✓	✓	✓	✓	✓	✓
BO	2	*5	Reset Request	0 or 1 (1=reset request)	✓	✓	✓	✓	✓	✓

Note: The Point Map for all Models is identical. However, the following information applies:

- = point is not actually measured, and the Bit 0 in the Object Status byte will be set to 1, indicating that the data is “Unreliable”

✓ = point is a measured parameter

✓*1 = point may not actually be a measured parameter, although the Bit 0 in the Object Status byte will be set to 0, indicating that the data is “Reliable”. For this situation, the local user must be cognizant of the fact that any observed data, for a point like this, may need to be ignored. The site application determines whether the point is actually measured.

*2 = reports whether or not the fume hood controller is in Emergency mode, meaning that the air is being purged at the maximum exhaust volume limit.

*3 = reports whether or not the fume hood controller is currently operating using the Reset setpoint value (of either Face Velocity or Exhaust Volume).

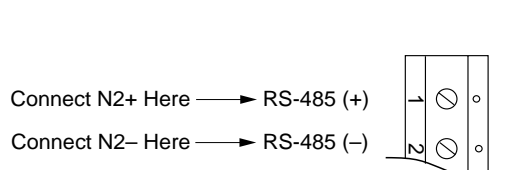
*4 = this BO allows the N2 Master device to put the fume hood controller into Emergency mode. If read, it will report what was written from this point.

*5 = this BO allows the N2 Master device to direct the fume hood controller to operate at the Reset setpoint value of either the face velocity or exhaust volume (depending on the type of air control being performed). If read, it will report what was written from this point.

AI1 ~ AI3, AO1; BI1 ~ 2: Will not accept a write command. An attempt to write to any of the points will not cause an error. The controller will continue to operate correctly.

AO1 is not commandable. An attempt to command this point will not cause an error. The controller will continue to update this point.

AO2 ~ AO6: Values outside of range/value will be set to the min. or max. allowable value.



Notes:

- 1 – No terminal connection provided for N2 Ref
Keep shield continuous; do not tie to controller gnd
- 2 – Maintain polarity of communications wires
- 3 – Use jumper P6 to connect termination
NT = no termination T = termination connection

Fig. 10 - N2 Bus Connection