SIEMENS

BACnet Programmable Fume Hood Controller

Application 6741 and 6742: Vertical Sash Configuration with Damper or Venturi Air Valve

Start-up Procedures

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Restricted

Building Technologies

CPS

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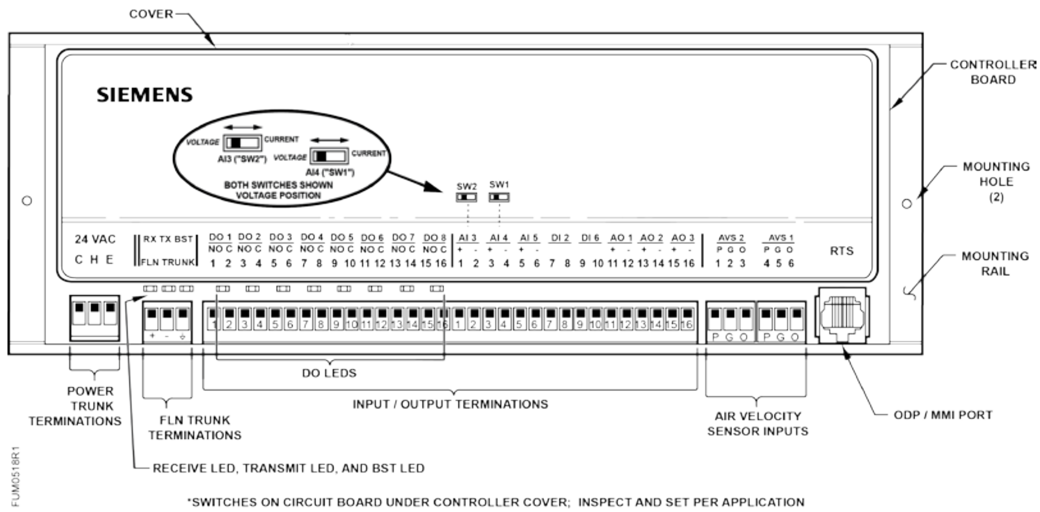
Before You Begin

	⚠ WARNING
	A fume hood is a safety device. Anyone attempting to start up a Fume Hood Controller and its related equipment should have completed Operations Training.

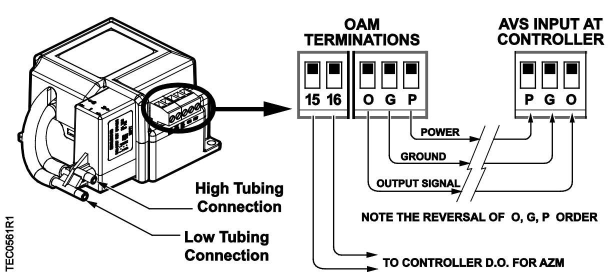


Generic Controller I/O Layout. See Wiring Diagram for application specific details.

At the job site, locate the major control system and the mechanical and electrical drawings. These components include valves, motors, and any other components working in conjunction with the BACnet Fume Hood Controller (FHC).

Verify that the FHC input/output (I/O) points are wired per the installation instructions.

NOTE:
You should read and understand the sections on Venturi Air Valve Calibration and Table Statement Editing in the *Application Note* documentation for Applications 6741 and/or 6742 before performing the Start-up Procedures. This is especially important if you need to edit the Venturi table statement during start-up. *Venturi Air Valve for Critical Environments Technical Specification Sheet* (149-425), has extensive information regarding Venturi air valves for critical environments.



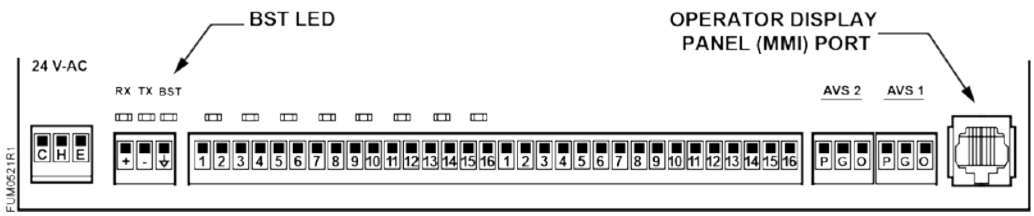
Offboard Air Module Wiring.

	⚠ CAUTION
	The FHC-OAVS has two terminal blocks with terminations numbered identically (terminations 1 through 16). DO NOT mix these up with each other. If the FHC-OAVS is not connected as shown, it is not resistant to electrical surges. It is also susceptible to interference from other equipment.

	⚠ CAUTION
	A separate power supply is required if a 4-20 mA sensor is used. Failure to follow wiring precautions will result in equipment damage.

Verifying Power

1. Verify that the controller has 24 Vac power and that the fuse has been inserted into the trunk or that power to the transformer is ON.
2. Verify that the Basic Sanity Test (BST) LED on the controller flashes once per second.

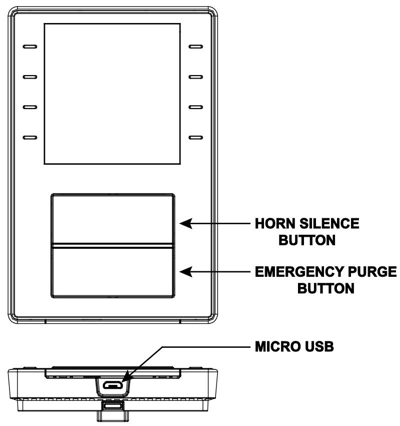


Verifying Slave Mode Application Number

1. Plug the cable into the micro USB port.

   NOTE:
   Drivers for the ODP II port must be loaded to your computer prior to being able to communicate with the ODP II. Drivers can be found on the Technical Support Website.

2. Verify that Application 6700 (Slave Mode) is running at the controller.



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Setting Controller Address

1. In WCIS, select **View > Edit/View Reports**.
2. Select a report from the list and click **Apply**.
3. Set CTLR ADDRESS to the BACnet MS/TP MAC address. (0 through 127 for Master; 128 through 254 for Slave).

NOTE:
See the *WCIS Online Help* for instructions on auto-addressing on the network. Otherwise, set the controller address and MS/TP network baud rate prior to connecting the controller to the network. See Configuring BACnet Parameters [→ 34].

Setting the Application

1. Add the controller to your job database and select the desired application.

- 6700 Slave Mode
- 6741 with 2 Vertical Sash Sensors with Damper
- 6742 with 2 Vertical Sash Sensors with Venturi Air Valve

At the start of the calibration cycle, the controller automatically sets CAL AIR to YES. When the cycle is complete, CAL AIR returns to NO.

The air velocity sensor calibration cycle begins within three minutes of an application start-up or initialization, depending on the controller's address.

Setting Display Units

Set ENG UNITS to English or System International (SI) units (default is English units) depending upon which unit (fpm or m/sec) you want displayed at the Operator Display Panel.

NOTE:
All measurements entered during the start-up sequences may be entered as either English or SI values (listed in parentheses after the English unit), depending upon which unit has been selected using the Metric/English Units button on the appropriate tool.

Testing the Operator Display Panel

Test the Operator Display Panel (ODP) as follows:

1. Set LAMP TEST to **ON**.
2. Verify that all visual display functions of the ODP appear and that the audible alarm sounds continuously.
3. Set LAMP TEST to **OFF**.

Setting Duct Area

If provided, enter the duct area (sq ft or sq m) into DUCT AREA.

If you do not know the duct area, use the appropriate tool to calculate it, or use one of the following equations to calculate it manually:

Area =	Round Duct	Rectangular Duct
Area in Sq. Ft. (Dimensions in inches)	π x R^2/144 (where R = radius of duct)	Width x Height/144
Area in Sq. M (Dimensions in centimeters)	π x R^2/10,000 (where R = radius of duct)	Width x Height/10,000

NOTE:
When entering the controller definition for a controller at the field panel, do not enter a duct area. (Choose **N** for none when prompted for the duct shape.) This controller does not send the value of air volume to the field panel in velocity (fpm). Instead, it uses volume (cfm) so a conversion is not necessary.

Setting Airflow Sensing Input

The controller allows the exhaust volume to be measured in several different methods.

- Differential pressure on AVS-1 (default)
- Differential pressure signal on AI3
- Linear flow signal on AI3

When not using the default method, refer to the *Setting Airflow Input Type* section.

Setting Flow Coefficients

	⚠ CAUTION
	It is extremely important that the flow readings are accurate. Inaccurate flow readings will cause control problems.

NOTE:
The *Laboratory Room Exhaust Air Terminal Technical Specification Sheet* (149-320), has a full listing of the latest coefficients for multiple setups. Those coefficient values are initial values only. Actual values must be verified by the balancer.

NOTE:
Make sure the airflow sensors are calibrated before determining flow coefficients. This is done by setting CAL AIR to **YES** and waiting for it to switch back to NO on its own.

1. Set FLO COEF to initial values that match your hardware configuration.
2. Work with a balancer to obtain the exact value(s) for FLO COEF using the following formula to fine-tune the flow coefficient:

New Flow Coefficient = (Actual Volume ÷ Controller Volume) × Old Flow Coefficient

The actual volume is the value obtained from the balancer's measurements. The controller volume is the value obtained from EXH VOL. If the controller volume is not within 5% of the actual volume, repeat the procedure until it is. Loose or kinked flow sensor tubes, tubing connected backwards, and improper actuator and/or Damper or Venturi Air Valve operation can cause inaccurate readings.

Automatic Calibration Option

This only functions when using the OAVS. To set CAL SETUP, select the automatic calibration option that best meets the job's requirements from the following table. It is highly recommended that Option 4, the factory default mode, be used.

At the start of the calibration cycle, the controller automatically sets CAL AIR to **YES**. When the cycle is complete, it sets CAL AIR to **NO**.

NOTE:
The air velocity sensor should be calibrated at least once every 24 hours. Make sure that the sensor has been calibrated before balancing takes place, as this will affect the balancer's results.

CAL SETUP Options.	
CAL SETUP Option Values	**Description**
0	Calibration occurs ONLY when CAL AIR is set to YES.
1	Calibration occurs with an occupied to unoccupied mode changeover.
4 (factory default mode)	Calibration occurs on the time interval set in CAL TIMER. **Example:** If CAL TIMER = 12, then the calibration period is 12 hours. In this option, actual calibration is subject to a time delay of up to 10 minutes to prevent it from interfering with a response to fume hood flow change(s). This is the recommended option when using a controller with an Autozero Module.

Setting Blank Display

Set BLANK DSPLY to NO in order to display airflow readings at the ODP.

NOTE:
If BLANK DSPLY is set to YES, alarms will still display at the ODP.

Setting Display Weight

Set DISPLAY WT to a value of 0 through 100% (default is 100%). The suggested value is 30%.

NOTE:
If DISPLAY WT is set to 100%, the face velocity displayed at the ODP may fluctuate rapidly. This rapid fluctuation is due to the constant adjustments of the FHC. When DISPLAY WT is set to a value less than 100%, the face velocity displayed at the ODP is a weighted calculated value. This value is used to stabilize the ODP displayed value only; it has no effect on the control sequence.

If you set DISPLAY WT to zero, the Operator Display Panel will "freeze" at the last read value. Setting DISPLAY WT to a value other than zero (suggested value is 30%) allows the Operator Display Panel to update the displayed face velocity.

Setting Display Resolution

Set DISPLAY RES to a value of 0 through 255 fpm (0 to 1.3 m/s). The default is 5 fpm (0.025 m/s). This value is used as a COV limit for face velocity readings displayed at the ODP only; it has no affect on the control sequence and has no effect on values going across the network.

NOTE:
If you set DISPLAY RES to zero, the Operator Display Panel will “freeze” at the face velocity setpoint FVEL STPT. Resetting DISPLAY RES to a value other than zero displays the face velocity incrementally. The factory default is 5, fpm values display in increments of 5. For example, 80, 85, 90, 95, 100, and so on. If the actual filtered fpm is 84, 85 will be displayed.

Changing Exhaust Minimum

The actual value for this point should be found on a schedule included with the mechanical drawings for the job or from the Siemens job submittal.

The value of EXH MIN should be changed to a flow minimum as desired.

NOTE:
When controlling at a duct velocity less than 350 fpm (1.778 m/s), duct velocity measurement errors will increase.

The equation relating airflow to air velocity is: Airflow (cfm) to Velocity (fpm) × Duct Area (sq. ft.) × Flow Coefficient.

For best results: Airflow ÷ (Duct Area × Flow Coefficient) should be > 350.

Example

FLOW MIN ÷ [DUCT AREA × FLO COEF] > 350

Changing Exhaust Maximum

The actual value for this point should be found on a schedule included with the mechanical drawings for the job or from the Siemens job submittal.

The default EXH MAX is 3500 cfm (1651.65 lps). The value of EXH MAX should be changed flow maximum as desired.

NOTE:
Do not use a duct velocity less than 350 fpm (1.778 m/s), duct velocity measurement errors will occur at duct velocities less than 350 fpm (1.778 m/s).

The equation relating airflow to air velocity is: Airflow (cfm) to Velocity (fpm) × Duct Area (sq. ft.) × Flow Coefficient.

Changing Face Velocity Setpoints and OCC Delay

Most jobs require a single face velocity setpoint of 100 fpm (0.05 m/s). If this fume hood has more than one setpoint required, then perform the steps, otherwise skip this section.

1. Change Report to **OCC.UNOCC**.
2. Set OCC FV STPT and UNOCC FV STPT to the desired face velocities. Values are in 1 fpm (0.005 m/s) increments. The defaults are 100 and 90 respectively. The default of 100 fpm (0.05 m/s) is the recognized industry standard. When using lower values, verify that the hood still contains all the fumes. Valid values are 0 through 255.
3. Set OCC DELAY to the desired time delay between when OCC.UNOCC changes to the UNOCC state and when the face velocity is changed to UNOCC FV STPT. OCC.UNOCC is controlled by the DI, when it is in OCC mode (DI open) the face velocity is controlled to OCC FV STPT and when it is in UNOCC mode (DI closed) the face velocity is controlled to UNOCC FV STPT. Values are in 1 fpm increments. Valid values are 0 to 255.

Face Velocity Setpoint Control

When there are multiple occupied face velocity setpoints, the ODP buttons can be used to change between the different setpoints.

1. Enter values for OCC LOW FV, OCC FV STPT and OCC FV HIGH.
   - Values must be entered in ascending order; non-ascending values will not be accepted by the controller.
   - Values that are the same are acceptable (that is, 100, 100).
2. Once the values are entered, you can change between the setpoints by pressing the LEFT and RIGHT lower middle ODP buttons.
   - When the left button is pushed, lower the face velocity setpoint (from high to med or med to low).
   - When the right button is pushed, raise the face velocity setpoint (from low to med or med to high).

Setting Hi and Low Warn Limits

Skip this step unless there is a special requirement on the job; the default will be used.

1. Change report to **STARTUP**.
2. Set HI WARN LMT and LOW WARN LMT.
   These limits are defined as a percentage of the controlled setpoint, meaning that the alarm limits will be closer as the face velocity setpoint decreases. The default values are 135% and 85% respectively. These points may be adjusted to meet customer requirements.

Setting Hi and Low Alarm Limits

Skip this step unless there is a special requirement on the job; the default will be used.

1. Change report to **STARTUP**.
2. Set HI ALM LMT and LOW ALM LMT.
   These limits are defined as a percentage of the controlled setpoint, meaning that the alarm limits will be closer as the face velocity setpoint decreases.

   The default values are 150% and 70% respectively. These points may be adjusted to meet customer requirements.

Setting Alarm Timer

Skip this step unless there is a special requirement on the job; the default will be used.

- Set ALARM TIME to a value of 1 through 255 seconds.
  This is the time the flow must be in an alarm or warn condition before the alarm will sound. The alarm clears immediately upon returning to normal operation. The default for ALARM TIME is 5 seconds.

Setting Emergency Setpoint

Skip this step unless there is a special requirement on the job, the default will be used.

- Set EMER STPT to a value of 0 through 255%; default value is 150%.
  This percentage, multiplied by the face velocity setpoint, (or MIN FLOW in the minimum flow condition), is used to set the fume hood to a safe operating level during the second phase of the emergency purge sequence.
  NOTE: If EMER STPT is set to a value less than 100%, the exhaust flow will be reduced during the emergency purge sequence.

Setting Emergency Timer

Skip this step unless there is a special requirement on the job, the default will be used.

- Set EMER TIMER to a value of 0 through 32,767 seconds; default is 300 seconds.
  This is the time the fume hood will be at full exhaust during the first phase of the emergency purge sequence.
  NOTE: If EMER TIMER is set to zero, the FHC immediately sets the exhaust flow to EMER STPT when the emergency purge button is pushed.

Setting Remote Purge

Skip this step unless there is a special requirement on the job, the default will be used.

- Set EMER DI 6 to YES when it is desired to have the shorting of DI6 causing an EMERGENCY PURGE of the fume hood.

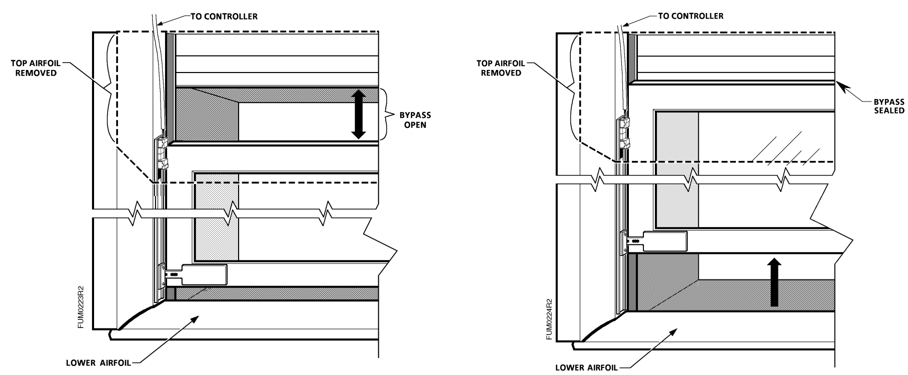
Fume Hood Specific Sash Setup and Calibration

This section presents the steps for calibrating the FHC sash sensors for Application 6741 and Application 6742.

Single Vertical Sash (Setup and Calibration)

This section includes steps for setting up and calibrating a single vertical sash fume hood.

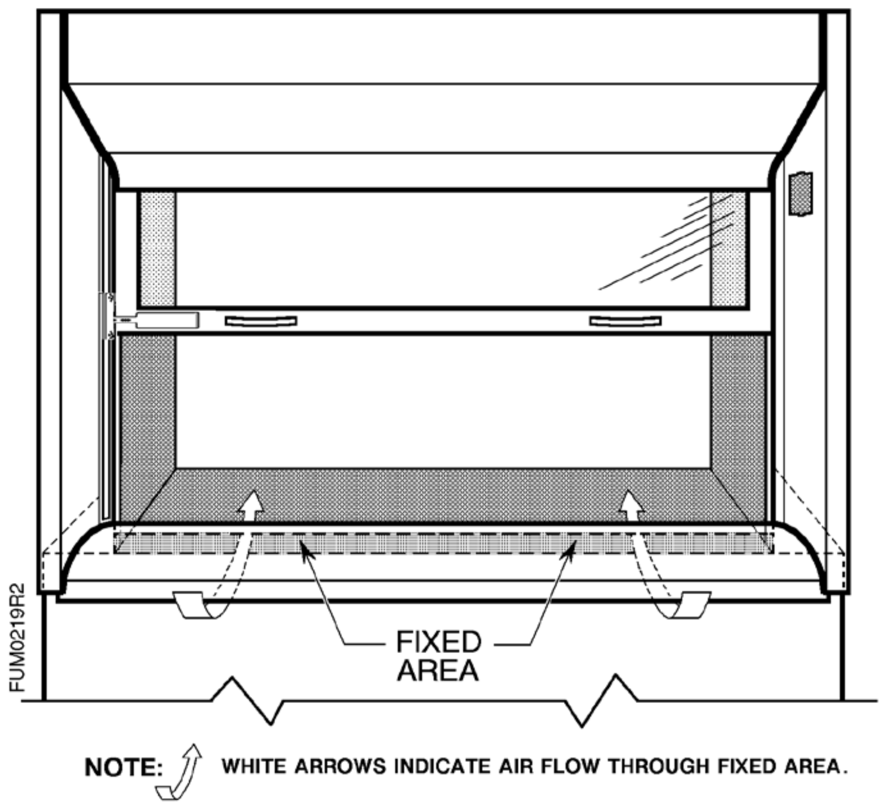
1. Set REPORT to **SINGLE VERT**.
2. Measure the width of the sash opening in inches (cm). Set VERT WIDTH1 to this value.
3. Measure the height of the vertical sash in inches (cm). Set VSASH HGHT1 to this value.
4. Measure the distance that the vertical sash can travel in its track in inches (cm). This value does not have to be equal to VSASH HGHT1. Set TRACK HEIGHT to this value.



Vertical Sash Fume Hood with Bypass Area Open and Closed.

5. Open the sash until its top edge covers the bypass opening. Measure the height of the sash opening in inches (cm). Set BYPASS HGHT to this value. **NOTE:** The bypass area of the fume hood is an opening that increases when the sash closes and decreases when the sash opens.
6. Skip Step 6 unless there is a special requirement on the job, the default will be used.
   If the bypass area has an airflow restrictor covering and flush with the open area, such as a perforated grille or louvers, estimate the percentage of the bypass area that is open. Set BYPASS OPEN to this value. If there is no restrictor, set BYPASS OPEN to 100, this value applies to the majority of fume hoods
7. Measure the fixed area of the fume hood in square feet (m2). Any fume hood leakage must be accounted for in this measurement. Set FIXED AREA to this value.

NOTE: The fixed area of the fume hood is an area that remains open regardless of sash position or movement. For example, most fume hoods have an intake gap under the lower airfoil and above the cabinet of the fume hood (typically a 1 inch gap). Also include 1% of the maximum open face area in this calculation for other open areas, such as the space between the sash and the track, and leakage.



Vertical Sash Fume Hood with Fixed Area.

8. Set CAL SASH NUM to **1**.

9. Set CAL SASH LOC to **MIN** for minimum opening.

10. Close the sash door.

11. Set CAL SASH POS to **0** inches (minimum) unless a physical stop prevents the sash from fully closing. If a physical stop is present, measure the distance from the lower end of the vertical track to the bottom of the sash in inches (cm). Set CAL SASH POS to this value.

12. Set CAL SASH LOC to **MAX** for maximum opening.

13. Open the sash to the fully opened position.

14. Measure the distance from the lower end of the vertical track to the bottom edge of the sash in inches (cm). Set CAL SASH POS to this value (maximum).

15. Set CAL SASH NUM to **0** to turn the calibration sequence OFF.

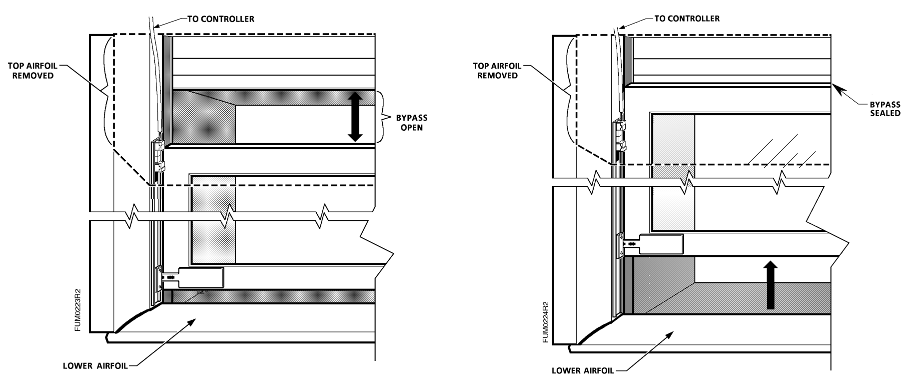
16. Close the sash fully and verify that the value displayed at VERT SASH1 is at the minimum set in Step 9. Open the sash half way and verify that the value displayed at VERT SASH1 is equal to the measured value. Open the sash fully and verify that the value displayed at VERT SASH1 is at the maximum set in Step 12.
17. Set FAIL AREA to a desired fail-safe value for the face area. The default value is 0 square feet. This value is used in the event of a sash sensor failure as the default face area opening. When a sash sensor fails, this value will be used to calculate what the exhaust flow should be. It is typically set to 1/2 of the maximum open area.
WARNING: Pay careful attention to the value entered in FAIL AREA. A value too low may not provide enough exhaust flow for safe operation of a Fume Hood should a sensor fail.
18. Proceed to *External Face Area Input Setup*.

Dual Vertical Sash (Setup and Calibration)

WARNING

The application cannot detect a broken wire to the analog input for the second sash.
An external sash aggregating device should be used to calculate the face area for all fume hoods with more than one sash.

1. Set REPORT to **DUAL VERT**.
2. Measure the width of sash 1 in inches (cm). Set VERT WIDTH1 to this value.
3. Measure the height of the vertical sash in inches (cm). Sash 1 and Sash 2 must be the same height. Set VSASH HGHT1 and VSASH HGHT 2 to this value.
4. Measure the distance the vertical sash can travel in its track in inches (cm). This value does not have to be equal to VSASH HGHT1. Set TRACK HEIGHT to this value. The TRACK HEIGHT must be the same for both vertical sashes.
5. Measure the width of sash 2 in inches (cm). Set VERT WIDTH2 to this value.



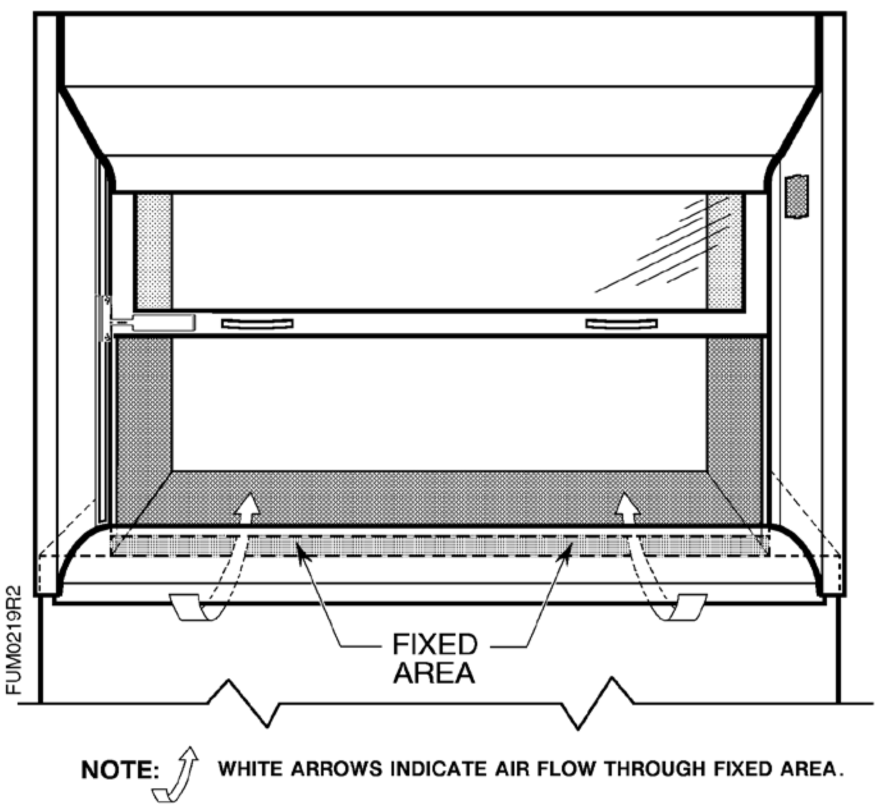
Vertical Sash Fume Hood with Bypass Area Open and Closed.

6. Open the sash until its top edge covers the bypass opening. Measure the height of the sash opening in inches (cm). Set BYPASS HGHT to this value.

NOTE: The bypass area of the fume hood is an opening that increases when the sash closes and decreases when the sash opens.

7. Skip this step unless there is a special requirement on the job - the default will be used.
   If the bypass area has an airflow restrictor covering and flush with the open area, such as a perforated grille or louvers, estimate the percentage of the bypass area that is open. Set BYPASS OPEN to this value. If there is no restrictor, set BYPASS OPEN to **100**, this value applies to the majority of fume hoods
8. Measure the fixed area of the fume hood in square feet (m2). Any fume hood leakage must be accounted for in this measurement. Set FIXED AREA to this value.

   NOTE: The fixed area of the fume hood is an area that remains open regardless of sash position or movement. For example, most fume hoods have an intake gap under the lower airfoil and above the cabinet of the fume hood (typically a 1 inch gap). Also include 1% of the maximum open face area in this calculation for other open areas, such as the space between the sash and the track, and leakage.



Vertical Sash Fume Hood with Fixed Area.

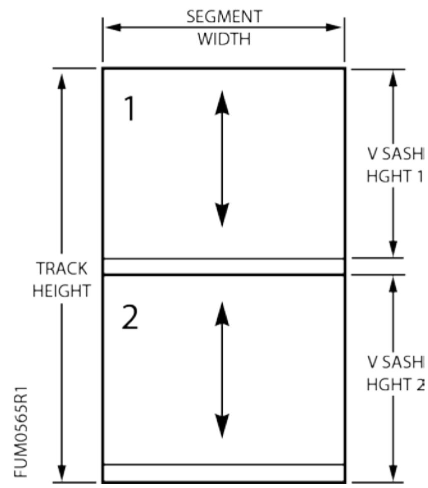
9. Set CAL SASH NUM to **1**.
10. Set CAL SASH LOC to **MIN** for minimum opening.
11. Close the sash door.

12. Set CAL SASH POS to **0** inches (minimum) unless a physical stop prevents the sash from fully closing. If a physical stop is present, measure the distance from the lower end of the vertical track to the bottom of the sash in inches (cm). Set CAL SASH POS to this value.
13. Set CAL SASH LOC to **MAX** for maximum opening.
14. Open the sash to the fully opened position.
15. Measure the distance from the lower end of the vertical track to the bottom edge of the sash in inches (cm). Set CAL SASH POS to this value (maximum).
16. Set CAL SASH NUM to **0** to turn the calibration sequence OFF.
17. Close the sash fully and verify that the value displayed at VERT SASH1 is at the minimum set in Step 9. Open the sash half way and verify that the value displayed at VERT SASH1 is equal to the measured value. Open the sash fully and verify that the value displayed at VERT SASH1 is at the maximum set in Step 12.
18. Repeat Steps 10 through 18 for CAL SASH NUM = 2 for calibrating VERT SASH2.
19. Set FAIL AREA to a desired fail-safe value for the face area. The default value is 0 square feet. This value is used in the event of a sash sensor failure as the default face area opening. When a sash sensor fails, this value will be used to calculate what the exhaust flow should be. It is typically set to 1/2 of the maximum open area.
WARNING: Pay careful attention to the value entered in FAIL AREA. A value too low may not provide enough exhaust flow for safe operation of a Fume Hood should a sensor fail.
20. Proceed to *External Face Area Input Setup*.

Vertical Sash Setup and Calibration

⚠	⚠ WARNING
	The application cannot detect a broken wire to the analog input for the second sash. An external sash aggregating device should be used to calculate the face area for all fume hoods with more than one sash.

1. Set REPORT to **VERT WALKIN**.
NOTE: Numbers on the sashes show how the sashes are wired. Sash 1 is wired to VERT SASH1; Sash 2 is wired to VERT SASH2.



Walk-In Vertical Sash Configurations.

2. Measure the width of the sash opening in inches (cm). Both vertical sashes must be the same width. Set VERT WIDTH1 to this value.
3. Measure the full height of the vertical track in inches (cm). This is the distance the vertical sash can travel in its track. If this value is different for both sashes, use the longer of the two measurements. Set TRACK HEIGHT to this value.
4. Measure the height of the individual sash panels in inches (cm). Set VSASH HGHT1 and VSASH HGHT2 to their respective values.
5. Open the sash until the top edge of the covers the bypass opening. Measure the height of the sash opening in inches (cm). Set BYPASS HGHT to this value.
   NOTE: The bypass area of the fume hood is an opening that increases when the sash closes and decreases when the sash opens. See the Figure *Vertical Sash Fume Hood with Bypass Area Open and Closed*.
6. Skip this step unless there is a special requirement on the job - the default will be used.
   If the bypass area has an airflow restrictor covering and flush with the open area, such as a perforated grille or louvers, estimate the percentage of the bypass area that is open. Set BYPASS OPEN to this value. If there is no restrictor, set BYPASS OPEN to **100**.
7. Measure the fixed area of the fume hood in square feet (m2). Any fume hood leakage must be accounted for in this measurement. Set FIXED AREA to this value.

   NOTE: The fixed area of the fume hood is an area that remains open regardless of sash position or movement. For example, most fume hoods have an intake gap under the lower airfoil and above the cabinet of the fume hood (typically a 1 inch gap). Also include 1% of the maximum open face area in this calculation for other open areas, such as the space between the sash and the track, and leakage.
8. Set CAL SASH NUM to the number of the sash panel to be calibrated.
9. Set CAL SASH LOC to **MIN** for minimum opening.

10. Slide the sash panel to be calibrated to the closed position. Measure the distance from the lower end of the vertical track to the bottom of the sash in inches (cm). Set CAL SASH POS to this value.
11. Set CAL SASH LOC to **MAX** for maximum opening.
12. Slide the sash panel to be calibrated to the open position. Measure the distance from the lower end of the track to the bottom edge of the sash panel in inches (cm). Set CAL SASH POS to this value.
13. Repeat Steps 9 through 13 for the remaining sashes.
14. Set CAL SASH NUM to 0 to turn the calibration sequence OFF.
15. Slide sash panel 1 to the middle of its range. Verify that the change in value of VERT SASH1 matches the change in sash panel position. Repeat this verification procedure for the remaining sash panels using the appropriate corresponding points. See the Table *Multi-Vertical Sash/Point Wiring*.

Multi-Vertical Sash/Point Wiring.		
Sash Panel	**Point**	**Descriptor**
1	50	VERT SASH1
2	51	VERT SASH2

16. Set FAIL AREA to a desired fail-safe value for the face area, the default value is 0 square feet. This value is used in the event of a sash sensor failure as the default face area opening. When a sash sensor fails, this value will be used to calculate what the exhaust flow should be. It is typically set to 1/2 of the maximum open area.
WARNING: Pay careful attention to the value entered in FAIL AREA. A value too low may not provide enough exhaust flow for safe operation of a Fume Hood should a sensor fail.
17. Proceed to *External Face Area Input Setup*.

Setting External Face Area Input

AI3 can be setup for different functions. Only one function can be used at a time. When using the input as external face area, the input can’t be used for measuring the exhaust volume signal.

1. Set MAX EXT AREA to the area corresponding to 10 volts from the input signal source.
   ⇨ The next step allows the minimum voltage to bet set to a value other than 1 (default). The minimum voltage is output when the area is equal to 0.
2. Set MIN EXTVOLTS to the voltage corresponding to 0 area from the input signal source. (default is 1.0 Vdc)

⇨ The resulting area displays in point EXTERNAL A.

NOTE:
If no external area input will be connected to AI 3, make sure MAX EXT AREA = 0 (default). This disables the alarm feature that would fail the FACE AREA point the input signal dropped below 1 Vdc. When MAX EXT AREA = 0, AI 3 is then available for other uses.

Setting Sash Area Alarms

The fume hoods can be set up to chirp if the sashes are opened beyond a certain limit. It is used to remind the user to keep the sashes closed to save energy. Skip this step unless there is a special requirement on the job; the default will be used.

1. Change Report to **ATTN.UNATTN**.
2. Set UN ALRT AREA and AT ALRT AREA. These values correlate to the open face area. ATTN.UNATTN is connected to DI2. When DI2 is open, the controller is in ATTN mode and the alarm limit uses the area AT ALRT AREA, and when the controller is in UNATTN mode the alarm limit uses the area UN ALRT AREA.
3. Set the OPEN TIME to the desired attended time delay between when the user presses the horn silence button and restarting of the ODP beeps. Values are in 1 SEC increments. Valid values are 0 through 1023.
4. Set SASH TONE to **OFF** in order to disable the audible beeping of the sash alarm function. This only disables the horn while in ATTN mode only. To disable this feature, set the AT ALERT AREA to a value larger than the maximum face area.

(Optional) Setting Damper Control — Application 6741

Skip this step if you are using high speed actuators from Siemens Industry, Inc.

The application has the option of not inverting DO2 operation. An inverted RETC DO2 means that to hold a position, the RETC DO2 must remain on.

- Set INVERT DO2 by selecting one of the following:
  - **YES** to invert RETC DO2 (default).
  - **NO** for non-inverted operation.

Checkout of Damper — Application 6741

1. Set DMPR CMD to **100.0**. The damper moves to the fully opened position.
2. Set DMPR CMD to **-100.0**. The damper moves to the fully closed position.
3. If the damper moves opposite of the way it should, reverse the wires on EXTN DO1 and RETC DO2 on the FHC terminal block.
4. Release DMPR CMD. Verify the point has been released.

(Optional) Setting Airflow Input Type

If you are using a Siemens terminal box/Venturi valve with an OAVS sensor, you can skip this section.

Otherwise, if the job uses differential pressure sensors, Vortex shedders or another linear device made by others, perform the steps in this section.

NOTE: When using AI-3 to input the airflow, the input can't be used as an input for External Face Area.

Setting Transmitter Range

1. Set TRANS RANGE to the value printed on the differential pressure transmitter, typically: 0.1 in. WC (25.3 Pa), 0.25 in. WC (62.275 Pa), 0.5 in. WC (124.55 Pa), or 1.0 in. WC (249.1 Pa). Any value from 0.0 to 2.55 in. WC is acceptable. The default value is 0 in. WC.
2. Zero the transmitter by doing one of the following:
   – If an Autozero module is not present, proceed to *Calibrating the DP Transmitter without an Autozero Module*.
   – If an Autozero module is present, proceed to *Calibrating with an Autozero Module*.

NOTE:
If the milliamp reading from the transmitter is less than 3.7 mA or more than 4.3 mA with the high and low ports disconnected, you must zero the DP transmitter using the zero screw on the DP transmitter.

Linear Flow Input Signal

This section is used if the job has Vortex shedders or another linear device made by others. CAL SETUP does not function in this mode.

1. Set TRANS RANGE to = **0** (default value).
   ⇨ TRANS RANGE must be 0 for the linear input function to work.
2. Enter the velocity range of the linear device into LINEAR FL RG.
3. Set FLOW COEF to **1.**

Proceed to *Flow Accuracy Verification*.

(Optional) Calibrating the DP Transmitter without an Autozero Module

This section applies for fume hoods with an external pressure sensor and without an Autozero module. If the DP Transmitter is slightly out of adjustment, you can compensate for that within the controller.

1. Set REPORT to **AIRFLOW IN**.
2. Remove the tubing connected at the HI and LO ports of the DP transmitter (the tubing can be disconnected at the flow sensor if desired). Both ports must be disconnected to calibrate the transmitter.

3. Set CAL AIR to **YES**. The calibration will take approximately 3 seconds. When calibration is completed, this point will automatically change back to NO.
4. When **CAL AIR** changes back to NO, reconnect the HI and the LO tubing to the transmitter (or to the flow sensor if you disconnected it there).

(Optional) Calibrating with an Autozero Module

This section is for fume hoods with an external pressure sensor and an Autozero module. If the DP Transmitter is slightly out of adjustment, you can compensate for that within the controller.

1. Set REPORT to **AIRFLOW IN**.
2. Set CAL AIR to **YES**.
   When calibration is completed, this point will automatically change back to NO.

AVS FAILMODE

AVS FAILMODE is a point that describes how the Venturi Air Valve will respond if the Air Velocity Sensor (AVS1) fails.

Set AVS FAILMODE to the desired value.

AVS1 failure and AVS FAILMODE values.	
	AVS FAILMODE
OPEN (default)	Exhaust fails Open
HOLD	Exhaust Holds current Position

Setting Airflow Control — Application 6742

Refer to the chart below. If you have a setpoint that will fall below the value in this chart, you must perform the steps outlined in the *Low Flow Operation* section.

Airflows below 350 fpm are difficult to sense precisely.

Venturi Airflow @ 350 fpm		
Valve Size in Inches	**cfm**	**lps**
6	69	32
8	122	58
10	191	90
12	275	130
Dual 10	380	174
Dual 12	550	259
Triple 12	825	389

Range of Airflow Control – Application 6742

CAUTION

You must confirm that the correct, specified minimum and maximum airflows can be reached before the Venturi Air Valve is calibrated.

Otherwise, calibration could be wrong, in which case the valve will not work correctly once proper airflow is achieved. If the min/max flows cannot be reached, the fan system must be adjusted.

Example:

The schedule shows a maximum flow of 2000 cfm. If you can only get 1000 cfm out of the Venturi (because there is not enough fan static) and calibrate, then your controller will never let the Venturi go to 2000 cfm, even after the static is increased. You must calibrate it again.

NOTE:
Set FLOW MIN AND FLOW MAX to the desired values as described earlier in the document.

1. Make sure that the exhaust Air Velocity Sensors are operating normally (EXH AIR VOL has a status of NORMAL), and that the Air Velocity Sensor has been calibrated.
2. Set EXH AO3 to 10 volts and verify that EXH AIR VOL can reach EXH MIN.
3. Set EXH AO3 to 0 volts and verify that EXH AIR VOL can reach EXH MAX.
4. Release EXH AO3.

Configuring Airflow Control - Application 6742

Before setting up airflow, you should read and understand the sections on *Venturi Air Valve Calibration* and *Table Statement Editing* in the Application Note document; *Fume Hood Controller* Application 6742 (140-1344) this information is located on InfoLink or Asset Portal. This is especially important if you need to edit the Venturi table statement during start-up.

Venturi Operational Modes

Mode 1 – Operates with both a PID loop and a Venturi table.

This mode provides the best control and is the most commonly used mode for these applications. In this mode, the embedded Venturi table statements work together with a PID feedback loop to operate the Venturi air valve so that the measured air velocity is maintained at setpoint. The following sections describe this mode.

Mode 2 - Operates with a PID loop, but no Venturi table.

In this mode, the controller operates with PID control based on a flow sensor input, but the Venturi table is not used. See the *PID Only Mode* section for specific information on this mode.

Mode 3 - Operates with Venturi table, but no PID loop

In this mode, the controller operates open loop (without a flow sensor). There is no PID control. Positioning of the actuator is based solely on a Venturi table consisting of command voltages and their resultant corresponding airflows. See the *Open Loop Operation (Mode 3)* section for specific information on configuring the application for open loop control.

Before setting up airflow control, you should read and understand the sections on *Venturi Air Valve Calibration* and Table *Statement Editing* in the Application Note documents; *Fume Hood Controller 2-Position* (140-1341), *Fume Hood Controller* Application 6741 (140-1343) or *Fume Hood Controller* Application 6742 (140-1344) this information is located on Info Link or Asset Portal. This is especially important if you need to edit the Venturi table statement during start-up.

Calibrating the Venturi Air Valves (Modes 1, 3)

If operating without an Air Velocity Sensor, see the *Open Loop Operation (Mode 3)* section.

This step builds a lookup table in the controller that represents actuator signal versus airflow. If you airflow readings are not steady (± 10%) when you calibrate, it will probably fail.

- Set CAL EXH VLV to **YES**. After approximately three minutes, calibration will finish and the application will automatically set CAL EXH VLV back to NO. If the calibration was successful, EXH VLV STAT will be set to CAL OK. If it reads NOTCAL, the calibration was rejected and the valve must be calibrated again. Check for loose or kinked flow sensor tubes as well as proper actuator and valve operation, then recalibrate.

NOTE:
The factory default value of EXH VLV STAT is NOTCAL. The value is set whenever a calibration or table transfer is performed as the last step of the calibration/table transfer. ("Table transfer" is explained later in the document) EXH VLV STAT is never used for active control decisions.

Information on how to edit the Venturi table statement is in *Venturi Table Evaluation and Editing* section. After you have manually set the voltage/flow values of the second supply or exhaust table element equal to the original low flow values, you must then reset the original low flow point back to these same original values. The end result is that the first and second table elements (the low flow point and the one immediately following it) of the affected Venturi Air Valve(s) will have the same voltage and flow values.

Low Flow Operation - Below 350 fpm (Mode 1)

1. Make sure that both the Air Velocity Sensor is operating normally (EXH AIR VOL has a status of NORMAL), and that the Air Velocity Sensor has been calibrated.
2. Read the minimum cfm flow values from the room schedule or from the exhaust Venturi air valve housings. Write down this value.
3. Using the Table *Venturi Airflow @ 350 fpm* and the values from Step 2, determine whether your Venturi air valve will be operating below 350 fpm. If operating below 350 fpm, continue with the following steps. Otherwise, skip to *Verifying Flow Range*.

4. Adjust the voltage to the exhaust actuator, EXH AO3, until the desired minimum flow is reached. Verify the flow value with a balancer and write down the voltage value.
5. Set V TABLE PT to **31**. (Setting V TABLE PT to 31 allows the flow (cfm) and voltage values from the first element of the active exhaust table to be displayed in TABLE FLOW and TABLE VOLTS where they can be edited.)
6. Enter the minimum cfm flow value for the exhaust Venturi air valve into TABLE FLOW.
7. Enter the minimum voltage value for the exhaust Venturi air valve actuator into TABLE VOLTS.
8. Set V TABLE PT to **0**.

Venturi Airflow @ 350 fpm.	
Valve Size in Inches	**Cfm**
5	48
6	69
8	122
10	191
12	275
Dual 10	380
Dual 12	550
Triple 12	825

Editing the Venturi Table (Modes 1, 3)

NOTE:
This procedure does not apply when running Venturi actuators in the PID Only Mode. See *PID Only Mode* for more information.

Normally, there is no need to view or edit the Venturi table statement. However, if the Venturi air valve(s) seem to be reacting incorrectly, or if calibrating the Venturi air valves resulted in an overwrite of the supply or exhaust low flow point, then you may need to view or edit the Venturi table statement. You can do this using the following points: V TABLE PT, TABLE FLOW and TABLE VOLTS. See Table *Venturi Air Valve Table Statement*.

A Venturi Air Valve table statement consists of two sets of voltage/flow values—one set is active and the other inactive. When you run the calibration, the first thing that happens is that the inactive table values are filled in with new values generated by the calibration. Then the application checks these new values to make sure they are good. If they pass (that is, if enough increment correctly), these new values become the active values, and the old active values become inactive. However, if the new values don’t pass, then the old active values remain active.

Running a successful calibration sequence is one way of changing or updating the active values. You can also edit the table manually. Normally this is not necessary, but if you are having flow control problems you may need to edit the table.

In order to manually edit the table statement, you must first know which points in the active table need adjusting. This is done by setting V TABLE PT to the appropriate active point values found in Table *Venturi Air Valve Table Statement* in order to gather and view the active voltage/flow curve for the Venturi Air Valve and its actuator. By gathering and analyzing the active voltage/flow values (for example, you can plot them on a graph as in Figure *Problematic Venturi Air Valve Voltage/Flow Curves*), you can decide which one(s) need adjusting. The flow curve should be smooth and incremental.

You can change the active values using the following steps:

1. Set V TABLE PT to a “swap” value that tells the application to exchange active table values with inactive table values (see Table *Venturi Air Valve Table Statement* for swap value).
   - ⇨ This step is necessary because the application does not allow active values to be manually overridden.

NOTE:
An exception to this rule is the first element in the active portion of the table—the low flow point—can be edited directly. Table *Venturi Air Valve Table Statement* explains this in more detail.

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2. Edit the inactive table values.
   - ⇨ Since you have just switched the active and inactive portions of the table in Step 1, the inactive values are now identical to what the active values were moments ago. You can now edit these new inactive values by using V TABLE PT to reference them in TABLE FLOW and TABLE VOLTS. Table *Venturi Air Valve Table Statement* explains this in more detail.
3. Set V TABLE PT once again to the swap value. This places the newly edited inactive values back into the active portion of the table statement (again, the active and inactive portions of the table are simply swapped). However, before the swap is finalized, the application analyzes your proposed values using the same logic as in a regular calibration sequence.
   - ⇨ If your proposed values are good, then the swap is made and the edited values are accepted into the active portion of the table. EXH VLV STAT is set to CAL OK for exhaust calibration and control of the Venturi Air Valve resumes.
   - ⇨ However, if either point is set to NOTCAL, you must gather and view the voltage/flow values to see where the problem lies.

The following table lists all values for V TABLE PT and describes their use.

Venturi Air Valve Table Statement		
	V TABLE PT	Description
	0	Default value for **V TABLE PT**. When **V TABLE PT** equals 0, changes to **TABLE FLOW** or **TABLE VOLTS** are ignored. Setting **V TABLE PT** to 0 cancels an edit session.
Active	31	Setting **V TABLE PT** to 31 takes the flow (cfm) and voltage values from the first element of the active supply table and displays them in **TABLE FLOW** and **TABLE VOLTS** where they can be edited. (This is the only active supply element (or "point") that can be directly edited.) Flow and voltage values are not allowed to exceed those in active supply point 32. To operate in the range below minimum readable flow (less than 350 fpm), a low flow value in cfm from either the room schedule or the supply Venturi Air Valve housing is entered into **TABLE FLOW**, with the correct corresponding actuator voltage determined/confirmed by the balancer and entered into **TABLE VOLTS**. **NOTE:** This point is only necessary for supply Venturi Air Valve operation in the range below minimum readable flow (below 350 fpm). Otherwise it can be ignored. This low flow point must be entered only after other non-zero points exist in the table as a result of manual edits, or as the result of a prior Venturi auto calibration sequence.
	32 - 46	This portion of the table (32 through 46) can be viewed but not edited directly. When a point is selected (that is, when **V TABLE PT** is set to a value 2 through 16), the corresponding flow and voltage values are displayed in TABLE FLOW and **TABLE VOLTS**. Setting **V TABLE PT** to 32 will result in the smallest readable flow and associated voltage for the supply Venturi Air Valve to be displayed in **TABLE FLOW** and **TABLE VOLTS**; setting V TABLE PT to 46 will result in the maximum flow and associated voltage for the supply Venturi Air Valve to be displayed in TABLE **FLOW** and **TABLE VOLTS**. The in between values (33 through 45) are for the range of flow between min and max. **NOTE:** The table swap will fail if valid flow and voltage values are not entered in Point 46. Table entries marked as failed display FAIL for both flow and voltage.
Inactive	91 – 106	This portion of the table can be viewed and edited. By entering a point (any value 91 through 106) **into V TABLE PT**, the corresponding cfm and voltage values display in **TABLE FLOW** and **TABLE VOLTS** where they can be edited.
Swap	121	Setting **V TABLE PT** to 121 instructs the controller to evaluate the values in the inactive portion of the table using standard calibration pass/fail logic. If they pass, they are exchanged with those in the active portion of the table.

- If **FLOW COEF** is 0, the table edit feature uses a flow coefficient of 1.
- If **DUCT AREA** is 0, the table edit feature uses a duct area of 1 square foot.

PID Loop Only Operation (Mode 2)

NOTE:
The default P gain value is intended for PID operation in conjunction with the Venturi table. When operating without the Venturi table the application is slower to respond. Therefore, you should adjust the P gain as needed when operating in PID Only mode to ensure acceptable performance.

The Venturi calibration table initially contains all zeros by default, that is, it contains no calibration information. When the application detects a zero flow for the sixteenth entry (the table entry with the highest flow), the application does operate, but runs with **only** PID control. If PID Only control is satisfactory for a given job, there is no need to populate the Venturi tables.

Open Loop Operation (Mode 3)

To operate open loop control with manual entry of Venturi table:

1. Set **OPEN LOOP** to **YES** to indicate that the actuator is to operate open loop.
2. Use the *Venturi Table Evaluation and Editing* procedure. For additional information on the open loop table values, see appropriate application manual.

To operate open loop control with automatic entry of Venturi table:

1. Temporarily connect an AVS flow sensor to the application.
2. Temporarily set OPEN LOOP to NO.
3. Initiate the Venturi calibration sequence as described earlier in this document
4. Remove the flow sensor.
5. Set OPEN LOOP to YES to indicate that the respective actuator is to operate open loop.

Tuning the Flow Loops (Mode 1, 2)

NOTE:
This procedure does not apply to Venturi actuators that are configured to run open loop.

CAUTION

Adjusting P gains (supply and/or exhaust) to values greater than 0.1 may cause system instability.

- Change the flow by commanding EXH VOL STPT and examine the response. If the airflow oscillates or overshoots significantly, or if the actuator oscillates, reduce the gain (EXH P GAIN). If it takes too long to reach the setpoint, increase EXH P GAIN. Try different values—it should move accurately and with stability. When the desired performance is achieved, release EXH VOL STPT.

Stabilizing Unsteady Control (Mode 1, 2)

NOTE:
This procedure does not apply to Venturi actuators that are configured to run open loop.

HI LIMIT and LO LIMIT can be configured to keep the controller from hunting around the exhaust airflow setpoints.

By increasing the HI LIMIT and decreasing the LO LIMIT, a deadband is set up around the setpoints. For example, if the values for HI LIMIT and LO LIMIT are set to 1.10 and 0.90 respectively, and the flow is within 10% of setpoint, the airflow PID loop stops controlling and leaves the actuator in its last position. Active control resumes once the flow leaves the deadband. (Setting both points to 1.0 disables this feature. Setting LO LIMIT greater than or equal to HI LIMIT also disables this feature.)

- Set HI LIMIT and LOW LIMIT to the desired values.

Setting AO2 Range

1. Set REPORT to **AIRFLOW IN**.
2. Do one of the following:
   – For a single Fume Hood wired to an LRC:
   Set AO2 RANGE to the maximum expected flow for the fume hood, plus approximately 10%. For example, if the maximum flow is 900, set it to 1000.
   – For two to six Fume Hoods wired to an LRC using a Fume Hood Averaging Module:
   Set AO2 RANGE to the maximum expected flow for the largest fume hood, plus approximately 10%.
   The AO2 RANGE point must be set to the same value for all fume hoods connected to the Fume Hood Averaging Module.
   ⇨ AO2 is now active and a proportional 1 to 10V signal can be read on AO2.
3. Set AO2 DEADBAND to the desired value.

NOTE:
AO2 DEADBAND can be set from 0 to 102% in 0.4% increments. 0% will give the actual flow all the time. This signal may be too bouncy to give a stable output and will cause short-term room instability during fume hood sash movements. A 10% deadband is equal to ±5% of the flow. Any value over 100% will turn the feature off and revert to standard control.

For stable pressure reading, lower the AO2 DEADBAND. For unstable pressure readings, raise the AO2 DEADBAND until the output signal stabilizes.

Setting AO2 Voltage Minimum

This section can be skipped, if the FHC is connected to a room controller or field panel from Siemens Industry, Inc.

This function allows the minimum voltage to be set to a value other than 1 (default). The minimum voltage is output when the flow is equal to 0 cfm.

- Set AO2 V MIN to the desired value.

Start-up/Decommission Mode

The Fume Hood Controller contains different modes controlled by STARTUP MODE (default is 3). These modes of operation allow the controller to be started up without the sound of nuisance alarms at the hood. These modes are useful at different stages of construction and after decommissioning.

The FHC also contains decommission modes and allow some or all of the functionality of the controller to be turned off.

The modes are described as an enumerated point:

STARTUP MODE	Mode	Description
0	Normal	The controller is fully functional.
1	Decommission	The controller is fully functional, except the flow setpoint is set to 0, alarming is limited and the ODP displays “Out of service” and “OFF”. If the sash is opened, control is returned and you are notified that the hood is “Out of service”.
2	Non-functional Decommission, closed	The controller is fully functional, except the flow setpoint is set to 0, alarming is limited and the ODP displays “Out of service” and “OFF”. If the sash is opened, nothing changes.
3 (default)	Non-functional Startup	The controller is fully functional, except alarming does not work and the ODP displays “Controller – Startup” and “OFF”.

To enter modes 1 and 2, the fume hood sashes must be in the closed position, and FACE AREA must be smaller than UN ALRT AREA.

The digital output DO6 can be used for local indication that the sash was opened after the hood entered Out of Service mode. The output will remain ON until STARTUP MODE is changed.

Loop Tuning Procedures

Set REPORT to TUNING.

General Information

The FHC uses one Proportional, Integral, and Derivative (PID) loop. It is similar to the LOOP in a PPCL statement except gains are smaller by a factor of 1000. The process variable (PV) is EXH VOL. The setpoint is EXH STPT. The control variable (CV) is DMPR CMD.

You can evaluate loop performance and do loop tuning by observing the display at the Operator's Display Panel. The displayed face velocity is related to the exhaust flow, which is directly controlled by the loop.

However, the most reliable way to evaluate loop performance is to collect trend data on the exhaust volume and the exhaust setpoint.

When using the Operator Display Panel for loop evaluation or tuning, set DISPLAY WT to 100%.

Loop Time

Commanding LOOP TIME controls the speed of the loop calculations. The value of LOOP TIME controls how often the loop calculations are performed. The default value is 0.1 seconds and can be increased to slow the response of the system.

Steady State Performance

Steady state performance is the ability of the loop to maintain its setpoint. Variation of the EXH VOL from setpoint (with the sash position fixed) can be a sign of poor loop tuning. However, if the exhaust flow measurement is very noisy, even with a perfectly tuned loop, the exhaust volume display may still fluctuate.

Steady state performance is the ability of the loop to maintain its setpoint. Variation of the face velocity from setpoint (with the sash position fixed) can be a sign of poor loop tuning. However, if the exhaust flow measurement is very noisy, even with a perfectly tuned loop, the face velocity display may fluctuate 5 to 10 fpm (0.025 to 0.05 m/s).

To distinguish measurement noise from control loop hunting, set the DMPR CMD output to a fixed value (0%). This locks the actuator; any remaining variation is probably measurement noise.

Remember to release DMPR CMD when you are done.

Dynamic Performance

Dynamic performance is the speed and the overshoot involved in the response of the face velocity to a movement of the sash. The face velocity display should return to within 10% of the setpoint in three seconds or less with minimal overshoot.

Setting P-Gain

The loop should work well with P-only control. For any steady-state flow, the loop output settles at 0% to maintain the actuator at a fixed position.

Trial and Error Method

If the loop responds too slowly to sash movement, double the EXH P GAIN and reevaluate it.

If the face velocity overshoots a lot or swings back and forth after a sash movement, decrease the EXH P GAIN and reevaluate it again.

Face Velocity Accuracy Verification

This section presents the steps for verifying the face velocity accuracy.

NOTE:
It is recommended that this procedure be performed with the balancer so that the flow coefficient is coordinated with the measured face velocity.
If hood performance verification is required for job completion, use Siemens Industry, Inc. *Form Number 2396 Fume Hood Performance Test Report*. Complete all or part of the form in accordance with the job requirements.

Vertical Sashes

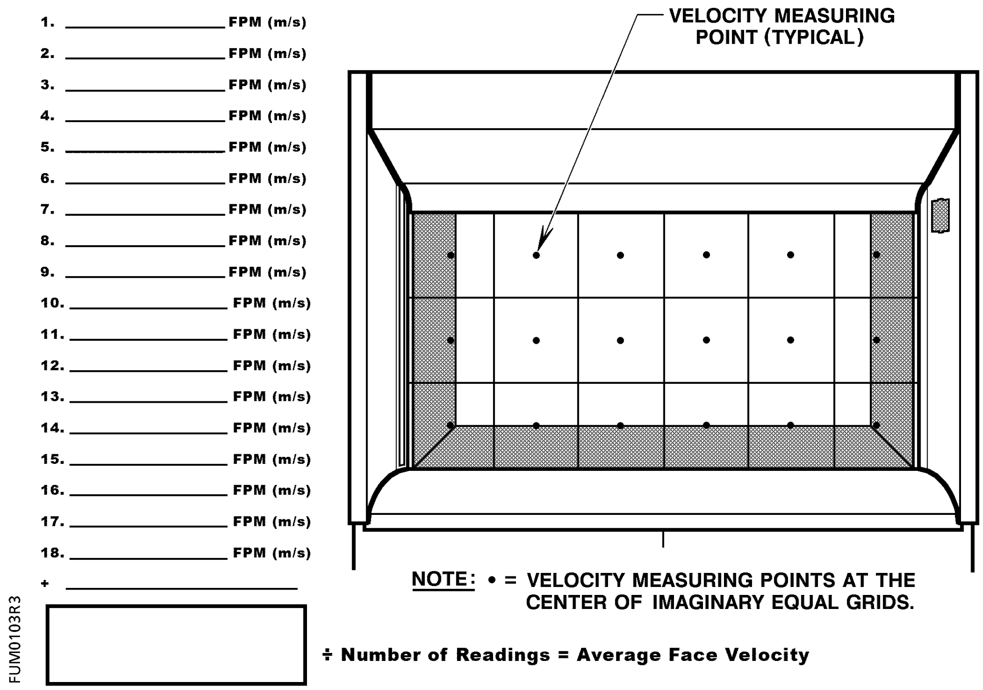
Verify the face velocity as follows:

1. Move the sash to the fully opened position. If there is more than one sash, the other sashes must be in the closed position.
2. Using a hand-held air velocity meter, perform a grid measurement of the face velocity. (Divide the face of the fume hood into 1’ × 1’ squares.) Calculate the average face velocity. See Figure 15.
3. Move the sash so that it is half open and repeat Steps 1 and 2.
4. Repeat Steps 1 through 3 for the remaining sashes.
5. Verify that the measured face velocity for each sash is within 10% of the face velocity setpoint, FVEL STPT.

NOTE:
If the face velocity accuracy does not verify accordingly with the previous sash tests, check to see that only the following points are set given the desired setup:

Sash Specific Setup	Operator Defined Points
All	BYPASS HGHT; BYPASS OPEN; FIXED AREA; EXTERNAL A, FAIL AREA
Single Vertical	VSASH HGHT1; TRACK HEIGHT; VERT WIDTH1
Vertical Floor-mounted	VSASH HGHT1; VSASH HGHT2; TRACK HEIGHT; VERT WIDTH1
Dual Vertical	V SASH HGHT1; V SASH HGHT2; TRACK HEIGHT; VERT WIDTH1, VERT WIDTH2

Start-up is now complete. Set **STARTUP MODE** to **0**, to enable the FHCs full functionality.



Calculating Average Face Velocity

Configuring BACnet Parameters

Using WCIS, do the following:

1. From the **Device** menu, select **Device Properties** to configure BACnet parameters.
2. In the **Object** section, enter information for the following fields:
   – **Instance Number** – unique to BACnet network (valid values are 0 through 4,194,303).
   – **Object Name** – unique to BACnet network (30 alphanumeric character limit in RAD50).
   – **Device Description** – description of controller (60 alphanumeric character limit).
   – **Device Location** – physical location of controller (60 alphanumeric character limit).
3. In the **BACNet Communication Settings** section:
   – **Set the CIS/MMI Command Priority to the desired value.**
   – Set **Baud Rate** to the MS/TP network baud rate. Options are; 9600, 19200, 38400 or 76800.
4. In the **MSTP Slave** section do one of the following:
   – Check the **MS/TP Slave** check box if the controller is to function as a slave device (when address range is 0 through 127).
   – Set the **Max Master Node** number.

5. In the **Device Settings** section (configuring the Room Unit port), do one of the following:
   – If using a sensing only Room Unit, the baud rate can be 1200 to 38400. Use **38400** for optimal use with WCIS.
   – If using a communicating digital Room Unit, the baud rate uses whatever rate the network is using or sets it to 19200 after the controller address is configured.
6. In the **Device Settings** section:
   – Set **MMI Baud Rate** to **38400**.
7. Press the **Write** button. The controller accepts the configuration values and then resets.
   ⇨ When the BACnet MS/TP TEC is successfully installed, the RX and TX LEDs continuously flashes On/Off rapidly. This indicates a proper communication with other devices on the network.

Auto Discover and Auto Addressing

An improved commissioning workflow has been designed for all BACnet PTEC controllers (standard 66*xx* applications) along with WCIS (Revision 4.0 and later). This provides the option to use the MS/TP network (using the field panel or a router) and the WCIS tool to discover and auto-address each controller. For more information, see the *WCIS Online Help*.

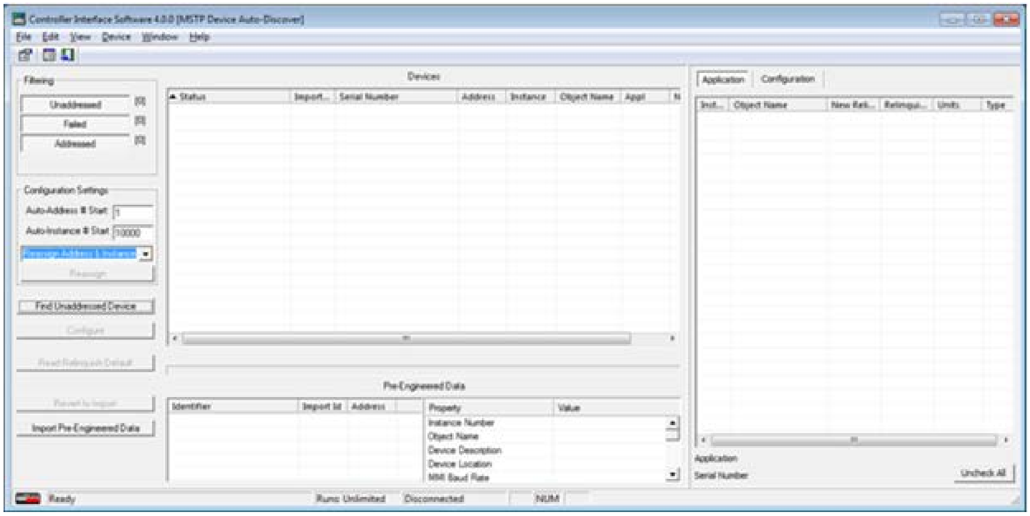
NOTE:
The current workflow will continue to support setting the baud rate and address for each controller using the HMI port or at the room unit.

▷ All BACnet PTEC controllers (standard 66*xx* applications) have an internal unique serial number and a two part serial number label.

1. Connect WCIS to the field panel or use a router connected to the MS/TP network.
2. Assign one PTEC a valid address (using the serial number). This will establish and set the baud rate for the entire network.

Auto Discovery allows you to automatically discover and identify PTEC/ATEC controllers on the BACnet MS/TP Network. There are two basic configurations:

- Devices not configured with an address. (Devices are discovered by their unique serial number.)
- Devices configured with an address and available for modification.



Filtering

These buttons allow you to select what you see in the **Auto-discovery** window. All three buttons are selected by default.

- **Unaddressed** - Displays unaddressed devices
- **Failed** - Displays failed devices
- **Addressed** - Displays addressed devices

Configuration Settings

- **Auto Address # Start** - Beginning address number. An address is reserved for each discovered device starting with this number.
- **Auto Instance # Start** - Beginning instance number. An instance number is reserved for each discovered device starting with this number.
- **Reassign Address and Instance** drop-down menu - Reassigns the address and instance number of the selected device(s).
- **Reassign Address Only** drop-down menu - Reassigns the address of the selected device(s).
- **Reassign Instance Only** drop-down menu - Reassigns the instance of the selected device(s).

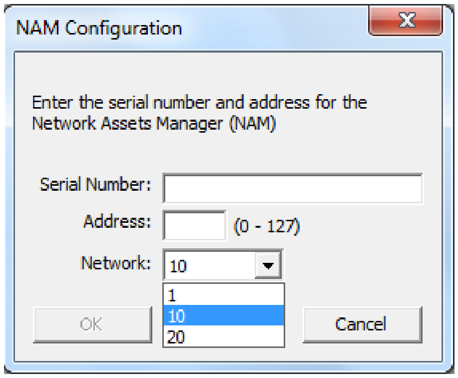
Auto-Discovery

- **Find Unaddressed Device** - Searches the connected network for all devices (addressed and unaddressed).
- **Configure** - Sends modified application data to the controller(s).
- **Read Relinquish Default** - Refreshes relinquish default column of the Application tab with values from the controller.
- **Revert to Import** - Returns to Pre-Engineered Data after changes have been made.
- **Import Pre-Engineered Data** - A .csv file can be used to set initial values in the controller. The file can be taken from Commissioning Tool or exported from Excel. See Commissioning a Controller [→ 38].

Auto-Discovery Procedure

- Click **Find Unaddressed Device**.

  ➪ If a NAM (Network Asset Manager) device is not defined, the **NAM Configuration** window displays. All new TECs can be assigned as a NAM.

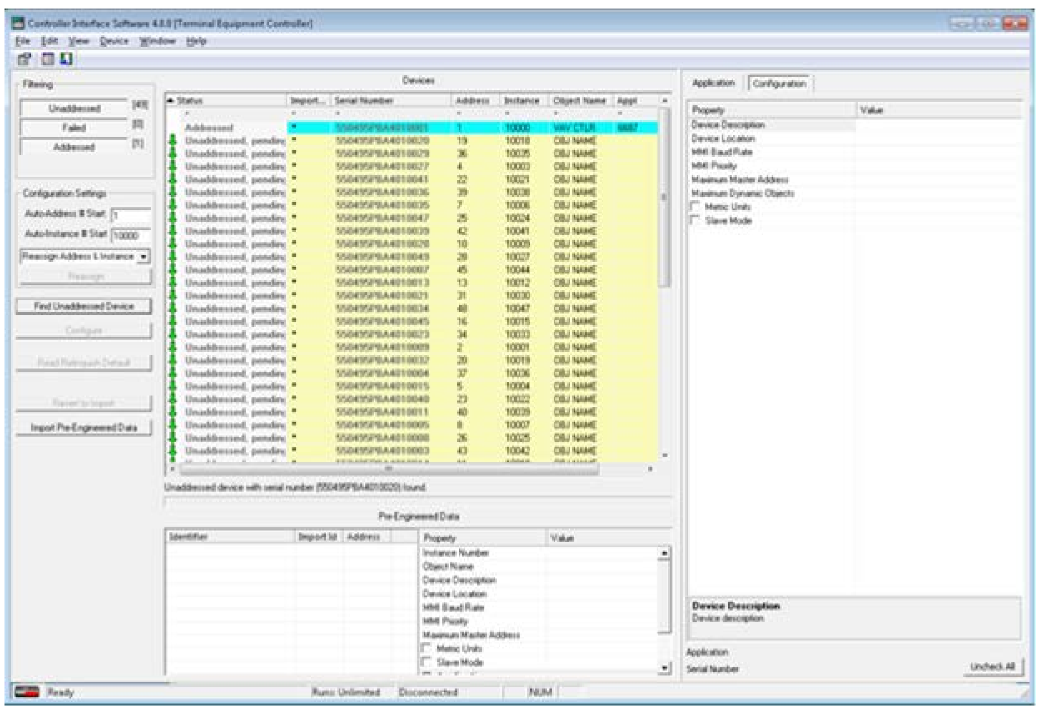


  – Enter the serial number (found on print from electrician).
  – Enter a unique (unused) address (0 through 127).
  – Click **OK**.

➪ The device is assigned as the NAM for the network with the address you specified.

➪ The NAM device auto-discovers all other devices on the network.

➪ WCIS displays all devices.

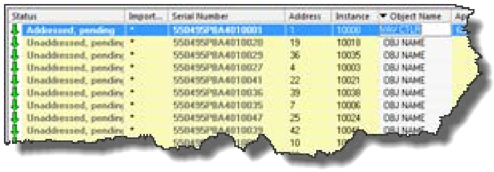


Configuring Discovered Devices

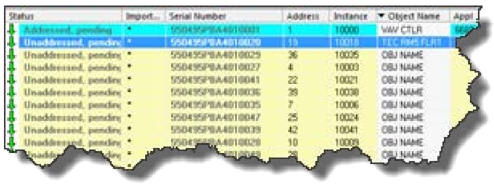
Each device on the network must have unique identifiers in the following fields:

- Address
- Instance
- Object Name - 30 alphanumeric character limit for Siemens field panels.

1. To change any of these fields, click in that field and enter the desired value.

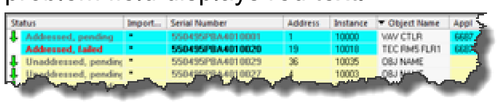


2. When all fields are defined, click **Configure**.



   ⇨ All devices defined properly displays `Addressed`.

   ⇨ If a device has not been defined properly, it displays `Unaddressed` and the problem field displays red text.



3. Correct any issues and click **Configure**.

Commissioning a Controller

Learning the Application Point Team

Once a device has been addressed, select your application.

- Do one of the following:
  – Right-click in the **Application** column and select the desired Application.
  – Click **Configure** to load the device for your application.
  – Right-click on the controller and select **Learn Point Team Descriptor**.

Import Data

1. Click the **Import Pre-Engineered Data** button.
   ⇨ The **Import Configuration Data** dialog box displays.
2. Browse to the desired .csv file and click **Open**.

⇨ The imported files are listed in the **Pre-Engineered Data** section of the **Auto-Discovery** window.

Each line in the window is a grouping of data for a controller. For more information see .csv File Format [→ 39].

Assigning Import Data to Controller

1. Click in the **Import ID** column of the desired controller in the devices section.
2. Select the appropriate **Import ID number** of the **Pre-Engineered Data** you want to assign.

⇨ The **Application** and **Configuration** tabs are updated with the new (Pre-Engineered) data. You can manually change/update any data.

Assigning Import Data to Multiple Controllers

1. Click on the desired **Import Data** from the list in the Pre-Engineered Data section.
2. Select all desired controllers in the Devices window.
3. Right-click the selection in the Devices window and then select **Assign Import Data from Import ID x**.
4. Click **Configure**.

⇨ The Application will load into each controller selected. The **Application** and **Configuration** tabs are updated with the new (Pre-Engineered) data.

Commissioning Multiple Controllers

If you're commissioning multiple controllers with the same application all values can be loaded to each controller selected.

You can select multiple controllers by holding down either the **SHIFT** or **CTRL** key and clicking on multiple controllers listed.

You can configure values for multiple controllers with different applications by first selecting and making changes to one controller and then selecting all controllers and clicking **Configure**.

NOTE:
Once you select multiple controllers with different applications the Application tab goes blank. However, WCIS retains all changes and send the data for all selected controllers.

.csv File Format

The .csv file is auto generated from CT (is the old manufacture installed output file) and can be imported into WCIS. It has the following format and must be manually created.

First line must be – **IDENTIFIER**, **FIELDID**, **FIELDVAL;** all additional lines will be data in that format.

IDENTIFIER

This field is used to create groupings of data. Each group can be thought of as a collection of information (configuration data and point initial values) that will be loaded into one or more TEC's. The groups cannot be subdivided into smaller collections.

FIELDID

This is the specific data that will be set. All configuration data will have a key word associated with it and all points will be referenced by their point number (object ID). The following is a list of fields:

- ObjectName – Sets the device object name.
- Instance – Sets the device instance number.
- Description – Sets the device description.
- Location – Sets the device location.
- MaxMaster – Sets the device max master.
- MMIBaud – Sets the baud rate of the MMI tool port.
- MMIPriority – Sets priority for P1 commands received through the MMI tool port.
- IsMetric – Sets the units to SI.
- IsSlave – Sets the unit to a MSTP slave device.
- Comment – Creates comments in the file to make it more readable and are not imported into the tool.

FIELDVAL

This value must be set to the FIELDID. The format of this data is specific to the ID.

Description	Acceptable Values
ObjectName	30 RAD50 characters
Instance	0 – 4194302
Description	60 ASCII characters
Location	60 ASCII characters
MaxMaster	1 – 127
Point numbers	Depend on the specific points
MMIBaud	1200, 2400, 4800, 9600, 19200, 38400
MMIPriority	8 – 16
IsMetric	0 – No, 1 – Yes
IsSlave	0 – No, 1 – Yes

The Pre-Engineered Data file can be used in different ways. For example, you can create a group or collection of information for every TEC. You can then assign the correct group to the TEC based on the location as indicated by the job schedule. The schedule will display the serial numbers for all TEC's and the location where the TEC was installed. The groups of data are set up for a specific location and you simply select the correct group for the TEC that has the serial number associated with that location.

You can also set up groups that contain information that must be set in multiple TEC's. Select all TEC's that need the specific data and assign the ID.

Sample .csv file:

IDENTIFIER,FIELDID,FIELDVAL

Building100_TEC_VAV001,ObjectName,VAV in Building 100

Building100_TEC_VAV001,Instance,5400

Flashing Controller Firmware

NOTE:
When re-loading/flashing firmware, existing PPCL may no longer function correctly.

FLT Procedure

Use the Firmware Loading Tool (FLT) for this procedure.

1. Connect to the RTS port of the PTEC.
2. Set Communications to **38400 baud**.
3. Click the **Identify** button.
4. Browse to the folder where the new firmware is saved.
5. Double-click the firmware file and then click **Load**.

WCIS Procedure

1. Connect to the RTS port of the PTEC.
2. From the **Device** menu, select **Load TEC Firmware**.
   ⇨ The **Load TEC Firmware** dialog box displays.
3. Click the **Browse** button.
4. Browse to the folder where the new firmware is saved.
5. Double-click the firmware file and then click **Load**.

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