E56-3621-003

FAAST
Fire Alarm Aspiration Sensing Technology®

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PipeIQ® Operation

SCOPE

This section provides information for pipe network designers and administrators on the use of the PipeIQ® software program for the FAAST system. It describes how to use the PipeIQ software to configure device settings, design pipe networks, and monitor FAAST detectors. The PipeIQ software also supports FAAST systems with trend graphs, reports, and data storage options.

Pipe networks and device configurations can be created using the PipeIQ software on a computer without connecting to a FAAST device. Once created, the device configuration can be transferred to the FAAST detector via the onboard Ethernet connection. Device monitoring is done either through the PipeIQ software over a LAN, via a web browser (refer to Web Server Access section) or via a Fire Alarm Control Panel.

Password protection is available to maintain a secure environment. PipeIQ can connect to a FAAST device in either Administrator or Read-Only mode. Administrator mode requires a password and is required to make configuration changes to a FAAST device. Read-Only does not require a password and restricts the user from making configuration changes. The web server monitoring system requires a password and permits read-only operations. Additionally, the device user interface offers interactive buttons, which can be locked out with a passcode that is configured through PipeIQ.

PipeIQ is a Windows® based application. The latest version may be downloaded from SystemSensor.com\FAAST.

GETTING STARTED

User Profile

Table 1 itemizes the responsibilities of the various PipeIQ users.

TABLE 1. PIPEIQ USER RESPONSIBILITIES

USER	RESPONSIBILITIES
Pipe Network Designer	Designing the floor plans using AutoCAD® software and other tools.
Field Commissioning Engineer or Administrator	Commissioning of the system at the site location with the pipe design and configuration of the system.
Facilities Manager or Distributor	Monitoring the area and taking the necessary actions in the event of faults and alarms.
Field Technician	Resolving technical flaws at the site.
Users	Monitoring of the system

PIPEIQ USER INTERFACE

The PipeIQ user interface, as shown in Figure 1, includes a title bar, a menu bar, a tool bar, left and right panes, project tabs and a status bar. Table 2 describes the use of these objects.

FIGURE 1. PIPEIQ USER INTERFACE SCREEN/OPENING SCREEN

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TABLE 2. PIPEIQ INTERFACE DESCRIPTION

OBJECT	DESCRIPTION
Title Bar	The Title Bar is the standard Windows title bar. The application can be minimized, maximized or closed.
Menu Bar	Contains pull-down menus that enable various tasks, such as creating a new project, opening an existing project, saving a project, changing the view, etc.
Tool Bar	Contains the buttons to create, open and save projects.
Left Pane	Displays all the objects in a project structure.
Right Pane	Displays the detailed information about the item selected in the left pane.
Project Tabs	These three tabs provide Configuration, Pipe Design and Monitoring functions for the project.
Status Bar	Displays the purpose of the selected menu, as indicated by the appropriate color, green for successful tasks and red for failed tasks.

MENU OPTIONS

Tables 3 through 8 list the Menu Choices available on the various menus.

TABLE 3. FILE MENU

MENU CHOICE	DESCRIPTION
New	Creates a new project.
Open	Opens an existing project.
Close	Closes the current project.
Save	Saves the current project.
Save As	Saves the current project under a different project name.
Exit	Closes the PipeIQ application.

TABLE 4. EDIT MENU

MENU CHOICE	DESCRIPTION
Cut	Content can be cut, copied, pasted, and deleted to buildings, floors or devices in the project. After an action has been completed, such as adding a floor or building, the location sensitive menu choices for adding a building, floor or device appear on the drop down menu to allow for additional objects in the project.
Copy	
Paste	
Delete	
Add Building	
Add Floor	
Add FAAST Device	
Rename	Permits the highlighted project, building, floor or device to be renamed.

TABLE 5. VIEW MENU

MENU CHOICE	DESCRIPTION
Monitoring	Changes the view of the project to the monitoring screen. (For object levels above the device level, the right pane shows the event record for the project.) The FAAST device must be connected via the Ethernet or PipeIQ to use the Monitor Screen.
Pipe Design	Changes the view of the project to the pipe design screen.
Configuration	Changes the view of the project to the configuration screen.

TABLE 6. SETTINGS MENU

MENU CHOICE	DESCRIPTION
Project Settings	When active, allows selection of different measuring systems. Options are US Customary or Metric.
Archive Events Data	Archives the list of events generated by the FAAST devices in the project to the database file on the PC.
View Archived Events Data	Opens a report window showing archived events.

TABLE 7. TOOL MENU

MENU CHOICE	DESCRIPTION
Connect Device	Connects PipeIQ to a FAAST detector. It is only active when PipeIQ is not already connected to the FAAST detector.
Send Configuration	In Configuration mode, PipeIQ sends updated configuration information to the connected FAAST detector.
Get Remote Configuration	In Configuration mode, PipeIQ receives updated configuration information from the connected FAAST detector.
Configuration Reports	In Configuration mode, PipeIQ opens the PipeIQ report viewer and generates a configuration report.
Event Log Report	In Monitoring mode, the PipeIQ report viewer is opened and a timeframe for viewing the event log can be selected.
Create Configuration Text	In Configuration mode, it creates a text file containing the device configuration information.
Device Information	In Configuration and Monitoring modes, when the FAAST detector is highlighted, it opens the Device Information window and text information (notes) about the specific detector can be added.
Disconnect Device	Disconnects the network communication between PipeIQ and the connected FAAST detector. It is only active in Configuration mode when the PipeIQ application is connected to the FAAST detector.
Upgrade Firmware	In Monitoring mode, the PipeIQ Upgrade Firmware window opens, which allows authorized users to transfer new firmware to the device.

TABLE 8. HELP MENU

MENU CHOICE	DESCRIPTION
PipeIQ Help	Opens the PipeIQ help file.
About PipeIQ	Opens a window containing the version number of the PipeIQ software.
Submit Feedback	Opens a link to a website where users may submit feedback about the software.

Starting the Application

There are no user credentials required to run the PipeIQ application. The only instances a password is required is to establish administrator level communication with a FAAST device, to establish web browser communication with a FAAST device or to unlock the buttons on the User Interface panel.

The administrator has full read/write capabilities within the application. It is highly recommended that the administrator password is changed when configuring a FAAST detector.

To start PipeIQ, select **Start > Programs > PipeIQ > PipeIQ** or double-click on the PipeIQ icon on the desktop. The application opens and a new project may be created or an existing project may be monitored or modified.

Exiting the Application

To close the current project, but allow the application to continue running, choose **File > Close**.

To quit the PipeIQ software completely, select the **X** at the upper right corner of the application window, or select **Exit** from the File menu.

CREATING A PROJECT

Typically, a project consists of a site with buildings, floors and devices. When a new project is created, the Site, Building, Floor and Device objects are automatically created. These objects must be configured before designing the pipe network.

To create a project, start the PipeIQ application and select **File > New**, or select the project icon at the upper left of the main PipeIQ window, as shown in Figure 2. The New Project window opens, as shown in Figure 3.

In the **File Name** box, type the name chosen for the project and select **Save**. A new PipeIQ project is created and displayed.

FIGURE 2. INITIAL PIPEIQ OPENING SCREEN

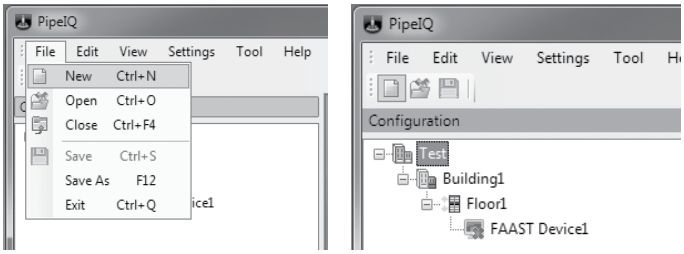

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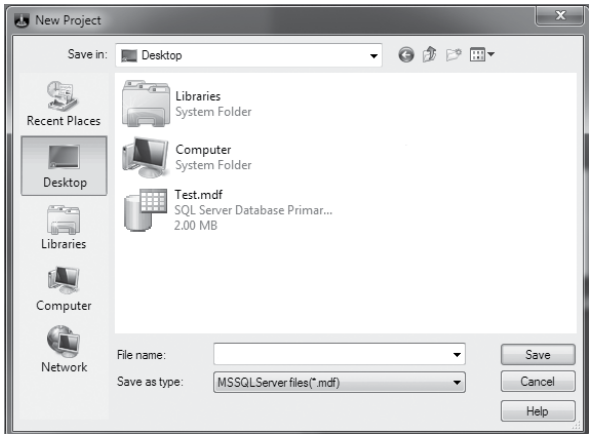
FIGURE 3. NEW PROJECT WINDOW



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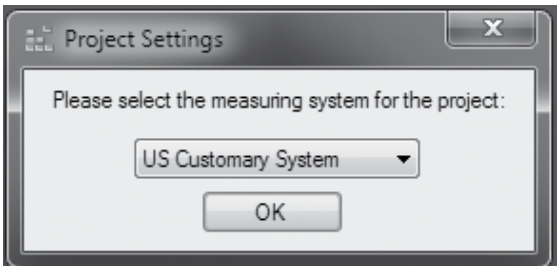
After choosing Save, the **Project Settings** pop-up window opens, as shown in Figure 4. To configure the the units of measurement, select US Customary System or Metric from the list. When the choice is complete, select **OK** to save it and close the window.

FIGURE 4. PROJECT SETTINGS POP-UP WINDOW



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SITE CONFIGURATION

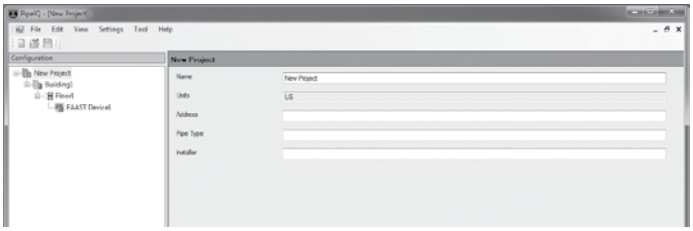
When a new project is created, the factory default settings are used to create all of the objects. Any number of buildings, floors, and devices can be created for a project. The settings can also be modified, depending on the values required to meet local codes and regulations.

Using PipeIQ, the site can be configured to install the pipe network for the FAAST system. Before installing the pipe network, the environment must be created where the pipe network is to be installed by configuring some general parameters, such as facility name, location and so on. After configuration is complete, the information is sent to the FAAST detector via the Ethernet connection. Default settings can be used for installer and application requirements.

PROJECT CONFIGURATION

In the left pane, select the Configuration tab near the bottom of the window and double-click on the name of the project, located near the top of the window. For example: New Project. The project configuration screen appears in the right pane, as shown in Figure 5. Select the **OK** button at the bottom of the window to accept the information.

FIGURE 5. PROJECT CONFIGURATION SCREEN



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Fill in the fields shown in Table 9:

TABLE 9. PROJECT CONFIGURATION FIELDS

FIELDS	DESCRIPTION
Name	Specify the name of the project.
Installer	Specify the name of the person who is installing the system.
Pipe Type	Specify the type of pipe material being used.
Address	Specify the site address.
Units	Verify the units of measure, either US Customary System or Metric. Note: This value is selected when creating the project.

Building Configuration

A specific name can be provided for the default building or any new building that is created. To name the building, double-click on **Building1** in the left pane. The Building1 screen opens in the right pane. Highlight the current name and type in the desired building name, then select the **OK** button at the bottom of the window to accept the new name.

To add a new building, right-click on the project icon and select **Add Building**. Alternatively, highlight the project name and select **Add Building** from the **Edit** menu at the top.

Floor Configuration

After finishing the building configuration, the floor must be configured by providing the necessary information. To configure the floor, double-click on the Floor name in the left pane. The Floor screen opens in the right pane. Highlight the current name and type in the appropriate floor name, then click the **OK** button at the bottom of the window to accept the new name.

Additional devices can be added to a floor, if required. To add devices to a floor, right-click on the floor icon and then select **Add FAAST Device** or highlight the floor name and select **Add FAAST Device** from the **Edit** menu.

Floors can also be added to a building depending on the requirements of the project. To add floors to a building, right-click on the building icon and select **Add Floor** or highlight the building name and select **Add Floor** from the **Edit** menu.

DEVICE CONFIGURATION

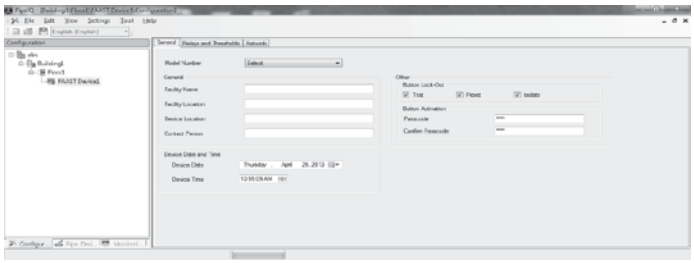
General Tab

The General tab section contains general device configuration parameters such as the site, date and time, the detection category, and button lock-out options.

To view the General tab, ensure the Configuration tab in the lower left corner of the window is highlighted and double-click on the device you wish to configure. The configuration information opens in the right pane, as shown in Figure 6. The General tab is displayed. Using the General tab, details such as the name of the facility, the location of the site, the device location, the contact person, the altitude and the nominal temperature of the area can be entered.

To configure the general device options, fill in the information specified in Table 10.

FIGURE 6. GENERAL CONFIGURABLE PARAMETERS FOR FAAST DEVICE



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MODEL SELECTION

Using the drop down menu, select the model number for the device you are configuring. This selection is used to customize PipeIQ for the model variant being programmed.

Certain intelligent models will require some configuration options be programed through the Fire Alarm Control Panel. Refer to the panel manufacturer's manual for instructions on programming a device via the Fire Alarm Panel.

TABLE 10. GENERAL DEVICE OPTIONS

FIELDS	DESCRIPTION
Facility Name	Enter the name of the facility where the device is installed.
Facility Location	Enter the address of the facility.
Device Location	Enter the name of the location where the detector is installed.
Contact Person	Enter the name of the person who is responsible for the system.

Button Lock-Out

Depending on the model selected, the button lockout feature may or may not appear. If the button lock out option is not available, this configuration must be set via the Fire Alarm Control Panel. Under Button Lock-Out, select the following options:

- Test – Select the Test check box to lock the TEST button on the User Interface during normal operation.
- Reset – Select the Reset check box to lock the RESET button on the User Interface during the normal operation.
- Isolate – Select the Isolate check box to lock the ISOLATE button on the User Interface during normal operation.
- When the buttons are locked, a passcode can be entered at the device to unlock them. Refer to the Installation and Maintenance Instructions for Passcode Access.

Button Activation

The FAAST detector user interface buttons can be configured to be either locked or unlocked. This prohibits unauthorized tampering. To unlock the buttons at the user interface, a four-digit passcode is required. The passcode can only be changed with Administrator access. To change the passcode, select the passcode text box, delete the existing passcode and type a new passcode. The default passcode is 1111.

- Passcode – Type the four-digit code to unlock the buttons on the User Interface.
- Confirm Passcode – Type the code again to verify it.

DEVICE DATE AND TIME

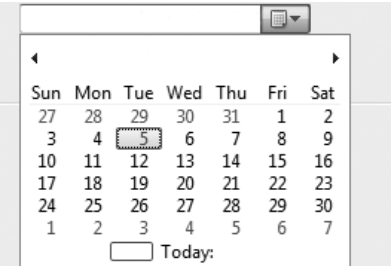
The FAAST detector contains an internal clock that is used to timestamp log entries. To set the internal clock, under **Device Date and Time**, specify the information shown in Table 11.

When configuration of parameters on the General tab is complete, select the Apply button followed by the save button to Save the changes.

TABLE 11 DEVICE CALENDAR DATA

FIELDS	DESCRIPTION
Device Date	Specify the date of configuration of the device. Select the down arrow to the right of the date. This opens the calendar, as shown in Figure 7.
Device Time	Specify the time of configuration of the device. The time is adjusted by highlighting the hour segment and clicking the up or down arrows at the right of the time. This increments the hour display up or down. Repeat this for the minute, seconds and AM/PM segments.
Once the time is set, it does not keep up in real time. Time should be set right before sending the configuration to the device	

FIGURE 7. CALENDAR POPUP MENU



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RELAYS AND THRESHOLDS SETTINGS

The **Relays and Thresholds** tab, as shown in Figure 8, provides access to alarm levels, Acclimate Mode, night mode, thresholds and delay times for alarm activation. To access these settings from the main project window, select the **Configuration Tab** in the left pane. Then in the right pane, select the **Relays and Thresholds** tab at the top of the pane. The **Relays and Thresholds** tab opens. The options displayed on the relays and thresholds tab will be customized based on the model selected on the General configuration tab. Refer to the Fire Alarm Control Panel manual for instructions on device settings that must be completed using the panel.

FIGURE 8. RELAYS AND THRESHOLDS TAB FOR FAAST DEVICE

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Alarm/Fault Relay Latching

The FAAST detector comes equipped with a number of relays that correspond to alarm and fault conditions. The latching behavior of each of the alarm conditions and the minor fault condition can be configured individually.

To configure latching behavior, check the box associated with a condition. For non-latching operation, leave the box unchecked. Depending on the model selected, the latching configuration feature may or may not appear. If the latching option is not available, this configuration must be set via the Fire Alarm Control Panel.

Acclimate Mode

The FAAST detector determines alarm conditions using one of two methods: Standard (day, night, weekend threshold) Mode or Acclimate Mode. When Acclimate Mode is enabled, the detector will continually adapt to environmental conditions by automatically adjusting alarm levels within a specified range to reduce nuisance alarms.

To activate **Acclimate Mode**, select the **Enable** radio button. This enables minimum and maximum values in the **Alarm Threshold and Delay** section. The day, night and weekend settings located in the **Alarm Threshold and Delay** section are disabled. Additionally, the start and end times for the night mode do not apply when the FAAST detector is running in **Acclimate Mode**.

In **Acclimate Mode**, the FAAST detector automatically adjusts the alarm thresholds between the specified minimum and maximum sensitivities. Using the boundaries for each alarm level, the detector starts at the upper boundary of the threshold. The detector monitors the environment for the first 24 hours of operation and then adjusts the alarm level based on readings over the initial 24-hour period. By allowing the system to operate in **Acclimate Mode**, its susceptibility to nuisance alarms is reduced. This provides maximum protection for an area that may have a higher than normal particulate background levels.

After the initial 24-hour period, the FAAST detector adjusts the alarm point based on the particulate level over a 1 hour period. The sensitivity of the system continues to slowly and continuously adjust over time, increasing and decreasing as the local environment changes.

Acclimate Mode can only be initiated through the PipeIQ software.

Night Mode

Night Mode allows separate threshold levels for day and night operation when Acclimate mode has been disabled. The start and end times are determined by the settings in this section.

To configure the Night Mode, select each segment of the time shown in the Start Time display and use the up and down arrows to set the segment to the desired time. Repeat the process for the End Time display.

If Night Mode operation is not required, set the **Start Time** and **End Time** fields to the same time and set the Day and Night Threshold fields to the same value. This disables the Night mode.

ALARM THRESHOLD AND DELAY

Threshold Levels

There are two ways to configure the **Threshold Levels**:

1. Standard mode:

   This mode allows you to configure the threshold levels for daytime, nighttime and weekends separately. If different night and weekend thresholds are not required, the night and weekend thresholds must be set to the same value as the day threshold.

2. Acclimate mode:

   In this mode, the daytime, nighttime and weekend settings are not used. You simply configure the threshold levels for minimum and maximum values.

To configure the system in Standard mode, check **Disable** in the **Acclimate Mode** section located at the top center of the window. Under **Threshold Levels**, specify the required threshold values for the system according to local codes and regulations or use the default values in Table 12.

TABLE 12. DEFAULT NORMAL MODE THRESHOLD VALUES

ALARM	SPECIFY THE THRESHOLD LEVEL IN %FT FOR NORMAL MODE		
	Day	Night	Weekend
Alert	0.012	0.012	0.012
Action 1	0.05	0.05	0.05
Action 2	0.1	0.1	0.1
Fire 1	0.25	0.25	0.25
Fire 2	0.5	0.5	0.5

To configure the system in the Acclimate mode, check **Enable** in the **Acclimate Mode** section, located at the top center of the window. Under **Threshold Levels**, specify the minimum and maximum threshold values for the system according to local codes and regulations or use the default values in Table 13.

TABLE 13. ALARM THRESHOLD LEVELS

ALARM	SPECIFY THE THRESHOLD LEVEL IN %FT FOR ACCLIMATE MODE	
	Minimum	Maximum
Alert	0.00138	0.012
Action 1	0.0028	0.05
Action 2	0.00750	0.100
Fire 1	0.010	0.250
Fire 2	0.100	0.500

Delay

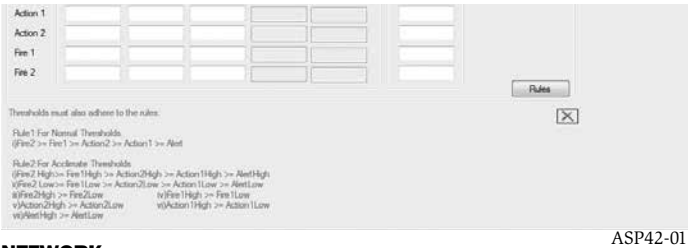
Delays are used to avoid false alarms from rapid transient conditions that are not actually alarm conditions. Delays are set in seconds and suspend the activation of the appropriate alarm level when the air sample reaches the threshold level for that alarm. By using the delay, particulate will need to be present in the sensing chamber after the specified delay before an alarm is activated.

To configure the delay, under the Delay [Secs] column, specify the time in seconds that the alarm activation should be delayed after the air sample reaches the threshold level of the alarm.

Rules Button

The **Rules button** displays the the restrictions for specifying Standard and Acclimate thresholds as shown in Figure 9. To close the Rules pop-up, select the red X to the right of the Rules button.

FIGURE 9. THRESHOLD RULES



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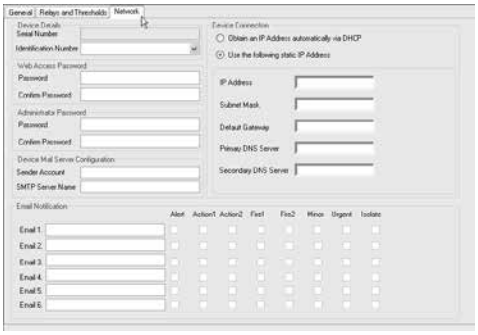
NETWORK

The **Network** tab displays the network parameters for the device. Identification numbers, passwords, Email configurations and IP addresses are all configurable from this screen.

Note: for more information see the Networking Whitepaper.

From the main project window, select the **Configuration** tab in the left pane. Then in the right pane, select the **Network** tab at the top of the pane. The Network Configuration tab opens, as shown in Figure 10.

FIGURE 10. NETWORK CONFIGURATION TAB



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Device Details

Configure the Device Details by selecting the **Identification Number**. This arbitrary number can range from 1-255 and may be useful for record-keeping. The **Identification Number** field is also used to set the device's SLC address. Refer to the Installation Manual packaged with the device for instructions on setting the device address.

Setting the Device Address

The 'Identification Number' field is also used to set the device's SLC address. Refer to the Installation Manual packaged with the device for instructions on setting the device address.

Web Access Password

Each password is set to a default value when the FAAST device is shipped. The default Web Access Password is "**1234**". It is highly recommended that the password be changed to ensure the network security of the device. Passwords can only be changed with Administrator access. To change the password, select the Password text box, delete the existing password and type a new password. The password can be up to 16 characters in length.

- **Password** -Type the password.
- **Confirm Password** - Type the password again to verify it.

Administrator Password

Each password is set to a default value when the FAAST device is shipped. The default Administrator Password is "**password**". It is highly recommended that the password be changed to ensure the network security of the device. Passwords can only be changed with Administrator access. To change the password, select the Password text box, delete the existing password and type a new password. The password can be up to 8 characters in length.

- **Password** -Type the password.
- **Confirm Password** - Type the password again to verify it.

Device Mail Server Configuration

Determine the e-mail account being used for Email communications and type the Email address of the sender account in the **Sender Account** text box.

Determine the SMTP Server used for Email communications and type the SMTP server name into the **SMTP Server Name** text box.

Device Connection

In the Device Connection box, select either the DHCP or a static IP addressing option.

If a static IP address is used, type in the **IP Address** of the FAAST device, the **Subnet Mask**, the **Default Gateway**, the **Primary DNS Server** and the **Secondary DNS Server** IP Addresses if used.

Email Notification

In the **Email Notification** text boxes, enter the Email addresses requiring notification into the field and select the appropriate alarm checkboxes for the level of notification. Up to six Email addresses may be added.

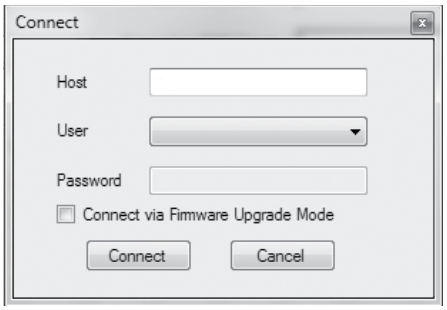
When this pane is complete, select **OK** to accept the information and close the pane.

Connect Device

Connect Device provides a means of connecting a computer to the FAAST detector via the onboard Ethernet port. Once connected to the FAAST detector, information can be transferred between PipeIQ and the FAAST device.

To connect to the FAAST detector, select the **Configuration** tab, in the left pane, right-click on the detector and select **Connect**. Alternatively, select **Tools > Connect Device** from the main menu bar at the top of the window. Selecting the **Connect Device** button opens the Connection popup window, as shown in Figure 11.

FIGURE 11. CONNECT POPUP WINDOW



ASP22-01

Enter the IP address of the Host (FAAST detector), select either **Read-Only** or **Administrator** from the User list. If Administrator is selected, the Password text box is activated. Enter the administrator password and select the **Connect** button.

If connecting to the detector is successful, the icon for the detector changes as shown in Table 14.Create

TABLE 14. DEVICE STATUS

DETECTOR STATUS	DESCRIPTION
	PipeIQ application is connected to the detector.
	PipeIQ application is not connected to the detector.

Configuration Text

The PipeIQ application facilitates creation of a configuration text file for each FAAST device in the project. The configuration file is saved with a .txt extension.

To create the configuration file, select the Configuration tab, from the left pane, right-click on the FAAST device and select **Create Configuration Text** or from the main menu bar, select **Tool > Create Configuration Text**. A message appears indicating that the file has been created.

Send Configuration

Send Configuration downloads the saved configuration from the PipeIQ application to the FAAST detector. Before downloading the configuration information, ensure that the correct FAAST device is connected to the computer.

To download configuration information, select the **Configuration** tab. From the left pane, right-click on the FAAST device, then choose **Send Configuration**, or from the menu bar select **Tool > Send Configuration**. Then select **OK**.

Get Remote Configuration

Get Remote Configuration uploads a saved configuration from the FAAST detector to the PipeIQ application. Before uploading configuration information, make sure that the FAAST device is connected to the computer.

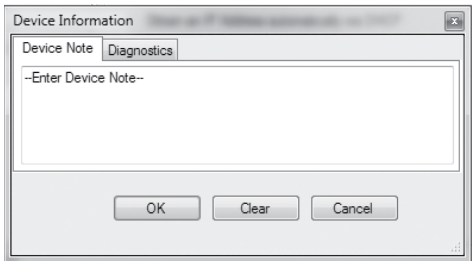
To upload configuration information from the FAAST detector, select the **Configuration** tab from the left pane, right-click on the detector and choose **Get Remote Configuration**. Alternatively, from the menu bar choose **Tools > Get Remote Configuration**.

Device Information

Additional information can be recorded using the Device Notes feature. By providing this information, administrators may help other users to understand the configuration of the FAAST system.

To edit device notes, select the **Configuration** tab. In the left pane, right-click on the detector and choose **Device Information**. An alternative way to access this window is to choose **Tool > Device Information** from the main menu bar. Selecting either item opens the Device Notes window, as shown in Figure 12.

FIGURE 12. DEVICE NOTES WINDOW



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When information is added to the system, the status icon changes, as shown in Table 15. The device will momentarily shut down, then reset after information has been downloaded from PipeIQ to the FAAST device.

TABLE 15. FAAST DEVICE STATUS ICONS

SYSTEM STATUS	DESCRIPTION
	Detector is connected to PipeIQ with additional information.
	Detector is not connected to PipeIQ with additional information.

Archive Events Data

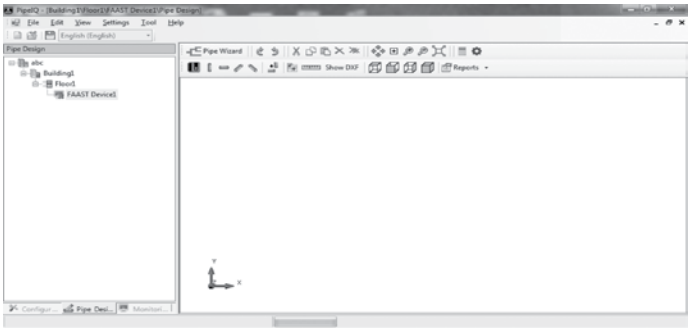
Live Event information generated by the FAAST devices in a project can be archived to the project database file.

To archive event data, select the **Configuration** tab, select a detector. From the menu bar at the top of the window choose **Settings > Archive Events Data.**

DESIGNING A PIPE LAYOUT

In order to safely deploy a FAAST system, a proper air sampling pipe network is needed. The PipeIQ software complements the design process by providing the tools necessary not only to visualize a potential network but also model its performance. To begin the design process, highlight a FAAST detector in the left pane and select the Pipe Design tab. This opens the **Pipe Design** window in the right pane, as shown in Figure 13.

FIGURE 13. PIPE DESIGN WINDOW



ASP104-00

FAMILIARIZING YOURSELF WITH THE TOOLBAR

To effectively and efficiently layout a design, the designer must have knowledge of the local codes and standards for the site, in addition to pipe network design fundamentals. Knowledge of drafting tools such as AutoCAD® software and DXF files is helpful when working with architectural drawings.

The following section describes the different tools used to manually design a pipe network. It also explains other options that help the designer speed up the design process. Table 16 shows the different buttons on the toolbar and an explanation of their usage.

TABLE 16. TOOLBAR BUTTONS

BUTTON	DESCRIPTION
	Import an existing floor plan in (.dxf) format.
	Changes the view of the pipe layout to isometric.
	Changes the view of the pipe layout to the front view of the design.
	Changes the view of the pipe layout to the top view of the design.
	Changes the view of the pipe layout to the right side view of the design.
	Used to measure and scale DXF entities
	Displays optional user-configurable pipe design settings.
Pipe Design	Used to change the pipe color
Environment	Allows user to configure the following: **Altitude(Ft.)**: Enter the altitude of the detector above sea level. Note: Altitude affects air pressure. The thinner air athigher altitudes reduces the transportation time of smoke particulate to the detector. pressure, and temperature. **Pressure(Pa):** Enter the average pressure in Pascals of the system based on the altitude above sea level. (The pressure at sea level is equal to 101.325 kPa = 1 atmosphere or 29.9 in. of mercury.) The default value is the pressure at sea level. **Temperature(°F):** Enter the average temperature of the environment in which the FAAST system will operate.
	Add Detector (FAAST detector) icon. Selecting this button adds a detector to the layout.
	Used to add a vertical or horizontal pipe.
	Used to add an angle pipe, either right or left.
	Opens the Pipe Wizard tool for step-by-step instructions through the pipe network design.
	Connect Pipe.
	Activates the Pan tool. This allows for different views of the network.
	Deactivates the Pan tool.
	Zooms in on the design.
	Zooms out on the design.
	Displays the pipe design calculations.
	Zooms the pipe network in or out to fit on the screen and displays the full network on the screen.
Reports	Bill of Materials (Individual and Consolidated): Displays a report identifying the materials required to build the pipe layout including the devices, pipe, joints and fittings, and a schematic of the layout. Pipe Layout: Displays a report regarding the performance of the pipe layout. The report provides information about the site, such as name, location, device information, configuration settings of a pipe design, different views of the pipe design, transportation time, sampling pressure, and so on.
	Copies the selected FAAST detector, pipe or other component.
	Cuts the selected FAAST detector, pipe or other component.
	Pastes a previously copied FAAST detector, pipe or other component.
	Deletes the selected FAAST detector, pipe or other component.
	Deletes the entire pipe design.

IMPORTING A FLOORPLAN

Before drawing a pipe network, the designer has the option of importing a floorplan to facilitate network design. PipeIQ supports importation of floorplans in the DXF file format.

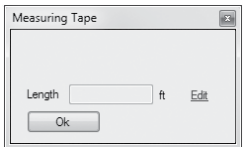
To import a floorplan, click the Import DXF button in the pipe design toolbar. Navigate to the file and choose Open.

The floorplan should now be visible in the drawing area. If not, select the Top View followed by Zoom Extents.

To scale the floorplan to the proper size, activate the Measuring Tape by clicking the button in the toolbar. The Measuring Tape button will turn blue indicating the tool is active. Find a drawing element of a known size such as a wall and click on it.

The Measuring Tape dialog box (Figure 14) will appear showing the length of the wall. If the wall is the correct length, no further scaling is needed. Choose OK. If the wall is not the correct length, choose Edit and type the correct wall length into the box. Choose OK to save the change. Click on Measuring Tape to deactivate the tool.

FIGURE 14. MEASURING TAPE WINDOW



ASP96-00

ADDING A DETECTOR

To add a FAAST detector to the design, select the drawing area, then select the Detector (FAAST detector) button on the toolbar in the right pane. A FAAST detector must be the first item added to a pipe network design.

ADDING A PIPE

TIP: Before adding a pipe to the system, always highlight the FAAST detector or pipe that will be connected to the pipe section. This keeps the components in the same plane of the design field.

Next select the pipe orientation icon (horizontal or vertical) from the toolbar that is desired to connect to the detector. The orientation of the pipe is relative to the view that you have selected. Adding a vertical pipe from the top view will add a pipe that runs vertically as you are looking at the screen, not vertically as it appears to the detector. The Pipe Details window will open as shown in Figure 15. Complete the fields outlined in Table 17. It is important to specify the direction the pipe will be extending. For example, If a vertical pipe is chosen for connection to an existing horizontal in order to run towards the top of the screen, "bottom to top" should be selected. As with adding a pipe, "bottom to top" or "left to right" are relative to the view you are using in the drawing area.

FIGURE 15. PIPE DETAILS WINDOW

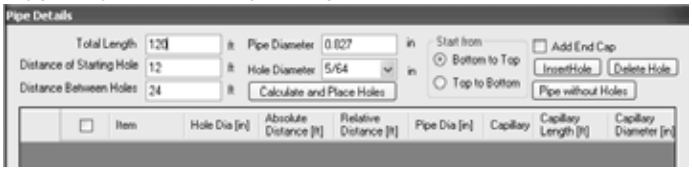


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TABLE 17. PIPE DETAILS DESCRIPTION OF FIELDS

FIELDS	DESCRIPTION
Total Length	Specify the total length of the pipe.
Pipe Diameter	Specify the diameter of the pipe.
Bottom to Top	Select the bottom as the starting point for a vertical pipe.
Top to Bottom	Select the top as the starting point for a vertical pipe.
Left to Right	Select the left side as the starting point for a horizontal pipe.
Right to Left	Select the right side as the starting point for a horizontal pipe.
Add End Cap	Check the box if an end cap is required.
Distance of Starting Hole	Specify the distance of the hole from the front end.
Hole Diameter	Select the diameter of the holes.
Insert Hole	Use to manually insert a hole in the pipe segment.
Delete Hole	Use to manually remove a hole from the pipe segment.
Distance Between Holes	Specify the distance between holes.
Calculate and Place Holes	Automatically adds holes to the segment using the specified settings.
Pipe without Holes	Use to create a pipe with no sample holes.

Select the **Calculate and Place Holes** button to automatically place the holes in the pipe. Additonal information about the length of pipe can be modified as indicated in Table 18. To add or delete a hole from the original design, check the corresponding row of the hole in the Pipe Details window and select the Insert Hole or Delete Hole button. To create a pipe without any holes, select the **Pipe without Holes** button on the right side of the window. The pipe will automatically be created to the specified length, the window will close and return to the pipe design screen.

To make manual modifications to the hole spacing or size, select the check box in the left column and modify the hole diameter or relative distance between holes for the selected hole.

TABLE 18. PIPE HOLE DETAILS

FIELDS	DESCRIPTION
Hole Diameter	Select the diameter of the hole from the pull-down menu by selecting the down arrow to the right of the field.
Relative Distance	Specify the relative distance of the hole from other holes.
Capillary	Select the check box to use a capillary tube at the location where a hole is created.
Capillary Length	Specify the length of the capillary.
Capillary Diameter	Specify the interior diameter of the capillary.

When the desired changes have been made, select the OK button to close the window.

Highlight the pipe (pipe turns from red to grey) then select and drag the pipe to the proper location and connect it to the FAAST detector. The pipe color changes from grey to green to indicate the proper connection between components.

Modifying the Pipe Information

Once the pipe information has been input, the pipe diameter and/or hole diameter can be modified.

To modify the pipe information, double-click on the pipe that needs changing. The Pipe Details window shown in Figure 15, opens for the pipe. In the **Pipe Diameter** text box, enter the new value. In the **Hole Diameter** text box, enter the new value. Select **OK** at the bottom of the window.

Adding Additional Pipes

To add additional pipes to the design, orient the view to any view **but** Iso, then highlight the section the pipe will be connected to. The receiving section will turn yellow. Select and drag the pipe to the proper location and connect it to the existing pipe. The new pipe color changes from yellow to green to indicate the proper connection between components.

Auto Connect Pipes

Pipes can be automatically connected together by selecting two pipes and clicking the 'Connect Pipes' button on the tool bar.

To select two pipes, click the first pipe then hold the CTRL button on the keyboard and select the second pipe. Both pipes will show the color of a selected entity (default color is grey). When the 'Connect Pipes' button is clicked the selected pipes will automatically join.

Note: The pipe will automatically connect based on the "top to bottom" or "left to right" orientation that was selected in the pipe details window.

TESTING THE PIPE DESIGN

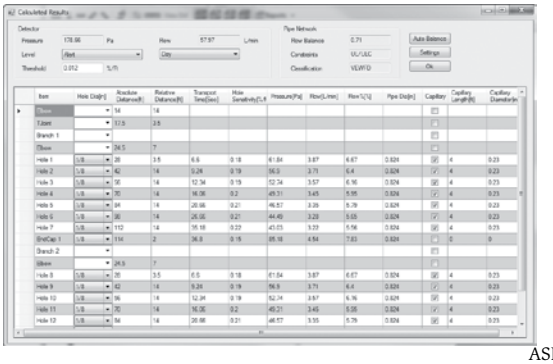
After creating a pipe design, test it to ensure that the design meets the specified criteria, such as transportation time, pressure, and flow. The values can be corrected by auto balancing them. This may be done by selecting the Auto Balance button on the toolbar.

Pipe Design Calculation

To calculate the expected performance of the pipe design, select the calculator symbol. The Calculated Results window, as shown in Figure 16 opens.

If the calculated result for the Transport Time, Pressure, or flow will show red for any value less than 25 l/min. This may be corrected by manually adjusting the sampling hole sizes or using the Auto Balance feature. The calculated Hole Sensitivity is based on the Fire 1 daytime threshold and the expected dilution from other sampling holes. To improve the effective sensitivity, reduce the number of holes or decrease the Fire 1 threshold.

FIGURE 16. CALCULATED RESULTS WINDOW



ASP105-00

REPORTS

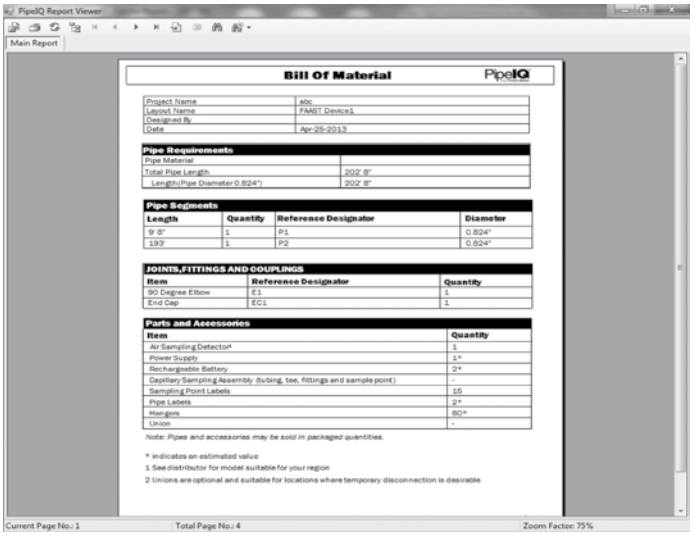
Once the pipe design is complete, Bill of Material, consolidated Bill of Materials and Pipe Layout Reports can be generated using the report button on the tool bar.

Bill of Material Report

The Bill of Material report provides information regarding a particular site. It gives detailed information regarding the materials to be used, the pipes, segment details (i.e., joints and fittings) and a schematic layout of the design.

To create a bill of material for the specific site, select the **Pipe Design** tab, followed by create the pipe layout, and select the **Bill of Material** button on the toolbar. The PipeIQ Report Viewer opens allowing the report to be viewed. A sample report is shown in Figure 17.

FIGURE 17. BILL OF MATERIAL REPORT EXAMPLE



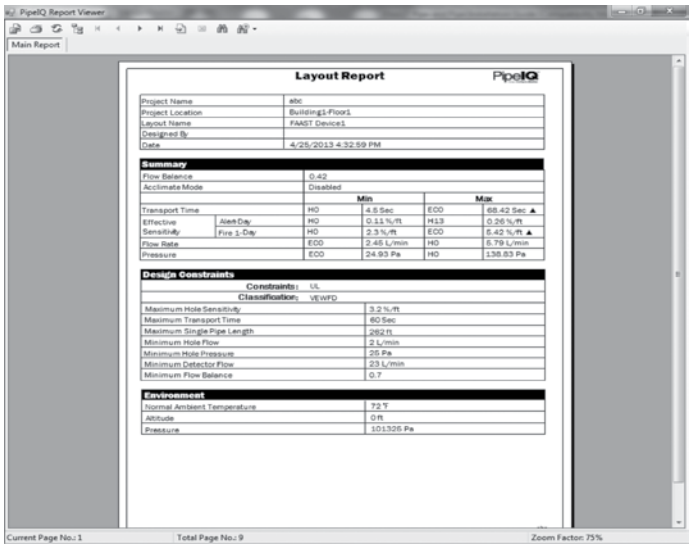
ASP106-00

Pipe Layout Report

The Pipe Layout Report generates a report about the site, including information, such as name, location detector information, configuration settings of the pipe design, different views of the pipe network, transportation times, sampling pressure, etc. A sample report is shown in Figure 18.

To generate a Pipe Layout Report, select the **Pipe Design** tab, and double-click on a FAAST device to open the pipe design window. Select the **Pipe Layout** button from the toolbar. The PipeIQ Report Viewer window opens.

FIGURE 18. PIPE LAYOUT REPORT EXAMPLE



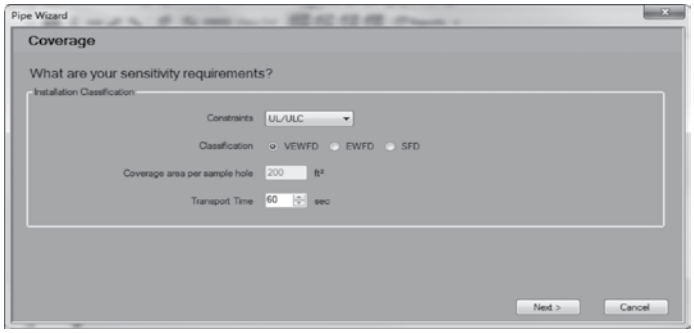
ASP107-01

USING THE PIPE WIZARD

The easiest way to design a pipe network is by using the Pipe Wizard feature of the PipeIQ software. The wizard walks through the design of a pipe network in accordance with the preset application standards.

To use the Pipe Wizard, the **Top view** must be selected. Choose the location on the layout where the FAAST detector is to be located by clicking in the right pane. Start the Pipe Wizard by selecting the Pipe Wizard button on the Pipe Design toolbar. The **Pipe Wizard** window opens, as shown in Figure 19.

FIGURE 19. PIPE WIZARD INITIAL SCREEN



ASP108-00

The PipeIQ software includes three preset application standards as follows:

- Very Early Warning Fire Detection: The VEWFD setting will generate a warning within PipeIQ for any transport times that are calculated to be greater than the required 60s.
- Early Warning Fire Detection: The EWFD setting will generate a warning within PipeIQ for any transport times that are calculated to be greater than the required 90s.
- SFD: The SFD setting will generate a warning within PipeIQ for any transport times that are calculated to be greater than the required 120s.

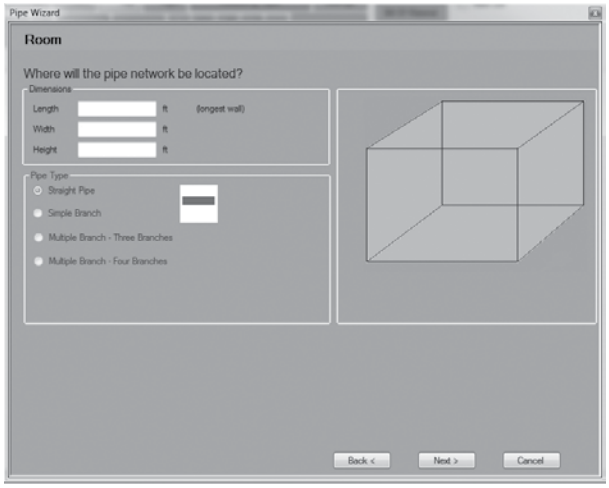
Verify that the Installation Classification shown in the window is correct. To change a class of detection select the appropriate radio button. The pipe Wizard facilitates designs to accommodate both UL/ULC and EN54-20 constraints.

PipeIQ also allows for transport times to be come more strict (shorter period of transport) for any level of protection. Transport times may not be increased past the maximum level for any given level of protection.

If the Non-EWFD Install Type is selected, the area per sample hole field is enabled and the value may be changed depending on local codes and regulations.

When all settings are correct, select the Next button to move to the next page of the wizard, the Room Screen, as shown in Figure 20.

FIGURE 20. PIPE WIZARD ROOM SCREEN

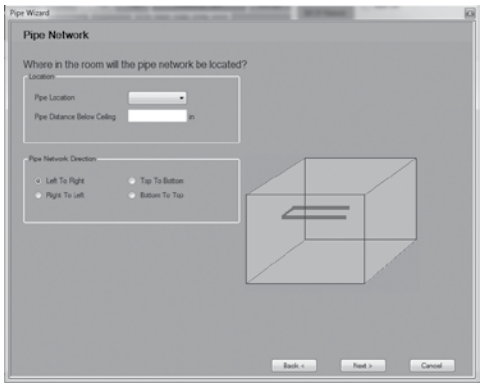


ASP50-01

This screen prompts for the length, width and height of the area being protected. If the area is wide enough to require two or more branches, the Pipe Type section of the window is activated and one of the branch types available is automatically selected. Select the radio button for the type of network desired.

When all settings are correct, select the Next button to move to the next page of the wizard, the Pipe Network Screen, as shown in Figure 21.

FIGURE 21. PIPE WIZARD PIPE NETWORK SCREEN

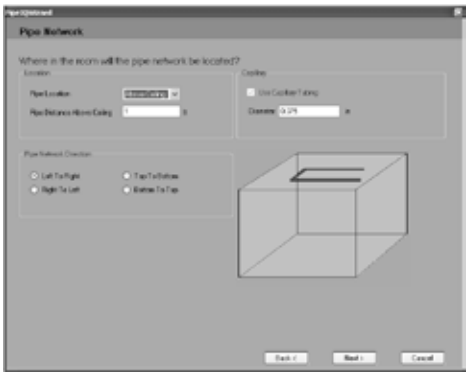


ASP51-01

The **Pipe Network Screen** prompts for the location of the pipe network within the protected area. To change the location of the network, select the down arrow to the right of the Pipe Location field and select the appropriate location (Below Ceiling, Above Ceiling or Below Floor). Next enter the distance below or above the ceiling or floor where the pipe network will be installed by highlighting the default value and typing the desired value.

If the pipe network is located above the ceiling, the screen shown in Figure 22 opens. This is where the use of capillary tubes and the diameter of the tubes can be specified.

FIGURE 22. PIPE WIZARD PIPE NETWORK SCREEN WITH CAPILLARY TUBES

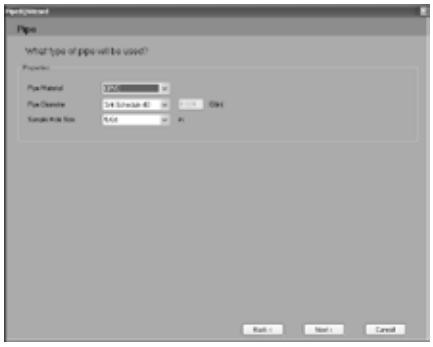


ASP-52

Next determine the Pipe Network Direction and select the appropriate radio button (Left to Right, Top to Bottom, Right to Left or Bottom to Top).

When all settings are correct, select the Next button to move to the next page of the wizard, the Pipe Screen, as shown in Figure 23.

FIGURE 23. PIPE WIZARD PIPE PROPERTIES SCREEN



ASP-45

The **Pipe Screen** prompts for the type of pipe material being used, the pipe diameter, and the sample hole size.

To select the pipe material being used, select the down arrow to the right of the Pipe material field and select the appropriate material.

The available options for pipe materials are:

- CPVC
- PVC
- UPVC
- ABS
- PE
- Other

To select the Pipe Diameter being used in the network, select the down arrow to the right of the Pipe Diameter field and select the appropriate diameter. If Other is chosen, the ID field is enabled and the diameter may be changed by highlighting the default value and typing in the value.

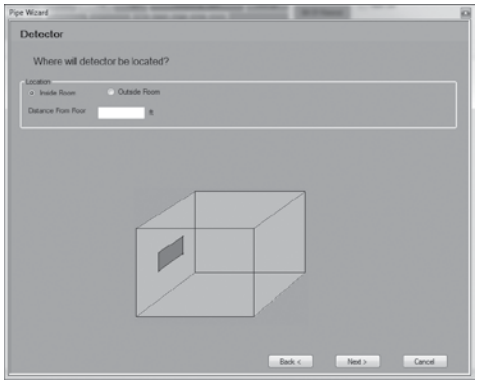
To select the proper Sample Hole Size, select the down arrow to the right of the Sample Hole Size field and select the appropriate size.

When all settings are correct, select the Next button to move to the next page of the wizard, the Detector Screen, as shown in Figure 24.

The Detector Location screen prompts for the location of the detector, either inside or outside the protected area and for the height of the detector above the floor.

To select the location of the detector, select the appropriate radio button (Inside Room or Outside Room).

FIGURE 24. PIPE WIZARD DETECTOR LOCATION SCREEN



ASP54-01

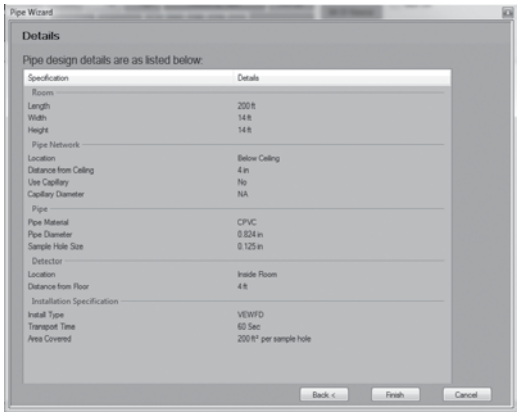
CAUTION: When detectors are located outside the protected area, the air flow should be exhausted back into the protected area, if possible, to avoid issues with pressure differentials between the locations.

To enter the distance from the floor where the detector will be installed, highlight the default value and type in the desired value.

When all settings are correct, select the Next button to move to the next page of the wizard, the **Details Screen**, as shown in Figure 25.

The **Details Screen** provides a listing of all the parameters created for the pipe network design as shown in Figure 25. Review the information carefully and press **Finish** to complete the wizard. The pipe network details are displayed in the right pane of the PipeIQ screen.

FIGURE 25. PIPE WIZARD DETAILS SCREEN



ASP55-01

MONITORING THE DEVICES

Using the PipeIQ software, users and administrators can monitor networked FAAST detectors. A FAAST detector may be monitored either using the PipeIQ software or an Ethernet connection and a web browser (see the Web Browser Access section instructions relating to the Web Access function).

PipeIQ offers the ability to check the status of the FAAST device, track events, view message logs and look for trends. The user has access to stored and live events. Graphs can be generated for the smoke level of the selected FAAST detector in real time or over a selected period of time.

Note: This section describes the Administrator level monitoring functions of PipeIQ. To connect PipeIQ to a FAAST device refer to the Connect section of this manual. In the Read-Only mode, some operating functions are restricted.

Live View

Select the Monitoring tab in the lower left corner of the window to view a Live View of the FAAST system status, as shown in Figure 26. This view shows the User Interface panel of the FAAST system. In this mode the screen refreshes approximately every 15 seconds. Therefore, there may be a slight delay between the detector user interface and the Live View in PipeIQ.

In this view the **Test, Reset** and **Isolate** buttons are live and can be used to activate the functions on the FAAST detector (as noted this applies only in administrative access in the PipeIQ software mode).

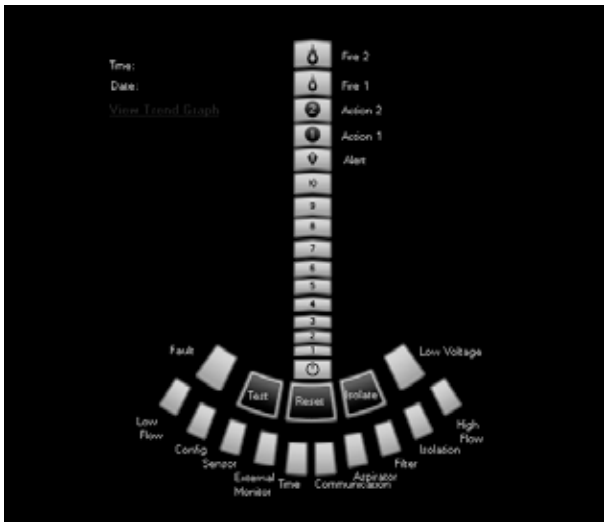
Trend Graphs

The system also allows the viewing of trend graphs. Trend graphs represent obscuration over time so that the live and stored trends of the system can be reviewed to ensure proper operation and find potential problems in the protected environment.

Select the **View Trend Graph** link to view the Trend Graph. This opens a split screen with the trend graph on the lower portion of the screen, the live view on the upper half and trend graph settings on the lower right, as shown in Figure 27.

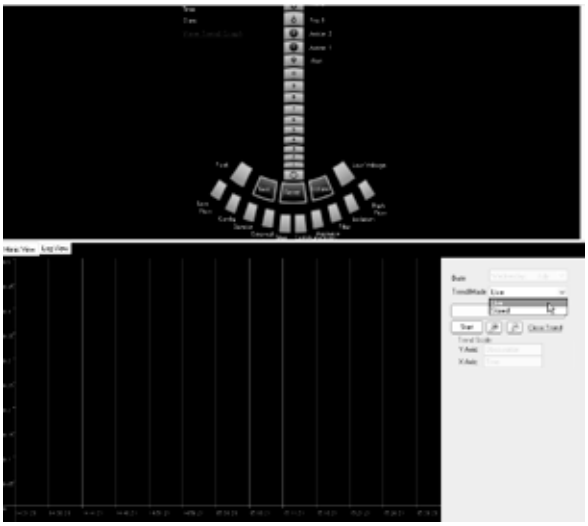
The trend graph can display either live or stored data. The settings can be modified through the interface in the lower right panel. The **Date, Trend Mode**, colors, update rates and other settings can be configured.

FIGURE 26. REMOTE MONITORING OF USER INTERFACE PANEL



ASP-56

FIGURE 27. MONITORING THE TREND GRAPH



ASP-57

TREND MODE

Trend mode indicates whether the graph is displaying live or stored data. If a live trend is chosen the Date field defaults to the current date. If stored trend is chosen then the **Date** field is required.

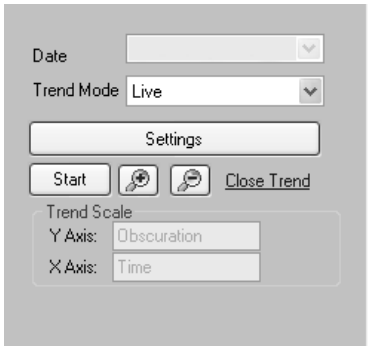
Live Trend

To review current events in the system, select **Live** in the Trend Mode field as shown in Figure 28. Choose Start to begin viewing live data. Use the Zoom In and Zoom Out controls to fit the data as desired.

Stored Trend

To view historical data, select Stored in the **Trend Mode** field on the right side of the window. Choose Start to begin retrieval of the historical trend data stored in the FAAST detector. When retrieval has completed, use the Date field and Zoom controls to fit the data on the trend graph as desired.

FIGURE 28. MONITOR TREND OPTIONS



ASP-58

Date

If the trend graph is operating in Stored mode, then a date must be entered in the date field. Use the drop down arrow to display a calendar and select the desired date.

SETTINGS

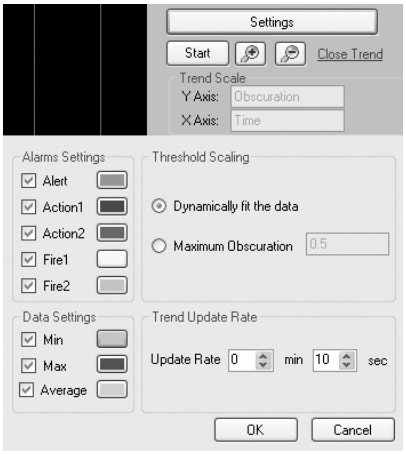
The settings for monitoring trends may be adjusted. Alarm Settings, Threshold Scaling, Data Settings and Trend Update Rates are modified from the Settings window, as shown in Figure 29. Select the **Settings** button to open the window.

The **Alarm Settings** area of the window displays the alarm levels that can be selected to be monitored. Choose the appropriate Alarm Settings by selecting the check box next to the Alarm level. To change the color of the Alarm Level, click on the color sample next to the level. The custom color palette shown in Figure 30 opens. This is where the color of each individual alarm level can be selected.

Threshold Scaling can be monitored dynamically which automatically adjusts the scale to fit the range or by using a Maximum Obscuration level, which allows scale adjustment of the graph. If Maximum Obscuration is chosen, identify the level in the field to the right of the radio button. Select the appropriate radio button in the Threshold Scaling area.

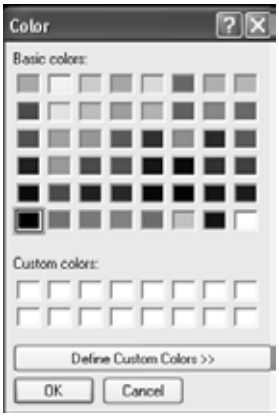
The **Trend Update Rate** can be set in five second increments up to a maximum of five minutes. Use the up and down arrows or enter numbers directly to set the number of minutes and seconds to the desired time.

FIGURE 29. TREND MONITORING SETTINGS



ASP95-00

FIGURE 30. CUSTOM COLOR PALETTE



ASP-60

START

The **Start** button begins the process of retrieving the data for the trend graph. When the button is selected, the label changes to Stop. To stop recording data for the trend graph, press the **Stop** button.

The **Plus** button gives the option to zoom in on the trend graph to view it in greater detail. The Minus button gives the option to zoom out on the trend graph and view it over a longer period of time.

CLOSE TREND

The **Close Trend** link closes the trend graph display displaying only the User Interface Panel.

LOG VIEW

The **Log View** presents the events that have occurred, such as alarm activation, fault triggers or password changes. The detector can store up to 18,000 events. Arrows allow for quick forward or backward movement within the event log. To enter the Log View, select the **Log View** tab located at the lower left corner of the bottom pane. There are three tabs, as shown in Figure 31, within the **Log View: Live Events, Stored Events** and **Messages**. The **Live Event** and **Stored Events** tabs include a **Reports** button, which opens the PipeIQ Report Viewer. This screen provides calendar fields and sort selection buttons for the report.

FIGURE 31. LOG VIEW

ASP61-01

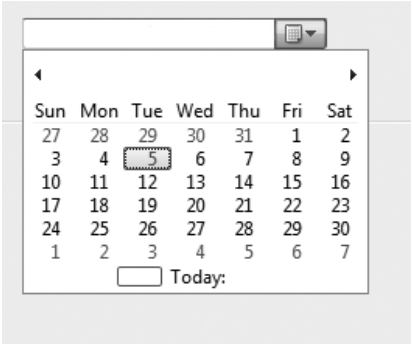
Live Events

Live Events allows the viewer to see current activities at a specific FAAST device. The log viewer provides the device ID, a description of the event and the time it occurred. The Live Events sections can generate a Report.

The report can be generated by selecting the **Report** button, which opens the PipeIQ Report Viewer. This screen as, shown in Figure 33, provides calendar fields and sort selection buttons. The report itself is first sorted by a start and end date.

To adjust the Start Date, select the down arrow to the right of the Start Date field. This opens an interactive calendar, as shown in Figure 32. Select the day and month for the start of the report. To set the Hour, Minute, Second and AM/PM time for the Start Date, highlight each element and type the required time. Follow the same process to create the End Date.

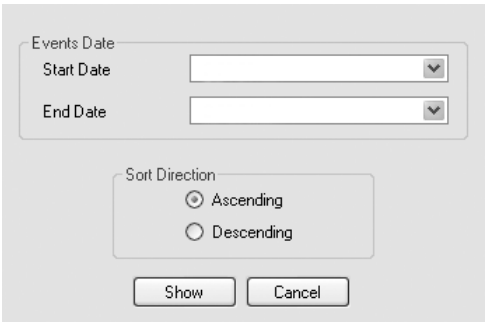
FIGURE 32. INTERACTIVE CALENDAR



ASP41-01

Additionally, the report is sorted by Ascending or Descending order by choosing the corresponding radio button. Once the report parameters have been determined, select **Show** to create the report.

FIGURE 33. PIPEIQ REPORT VIEWER SCREEN



ASP63-01

To clear the live event viewer, click the Clear Live Events button.

Stored Events

Stored events can be reviewed by selecting the **Stored Events** tab at the top of the right pane. This shows the events stored in the memory of the FAAST device and allows reports to be generated showing past activity. An example of a Stored Events report is shown in Figure 34.

Note: The **Reset** button on the **Report Viewer Screen** clears the entire Stored Events log on the FAAST device.

FIGURE 34. STORED EVENTS REPORT EXAMPLE

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Messages

User generated messages can be reviewed by selecting the **Messages** tab at the top of the right pane. This shows any messages (notes) generated by selecting the **Add Message** button. When the **Add Message** button is selected, a small text box opens at the bottom of the Messages area. Any notes may be added and stored on the FAAST detector. When the message is complete, select the **Send Message** button to store the message. To clear the messages from the device memory, select the **Clear Messages** button.

Web Browser Access

SCOPE

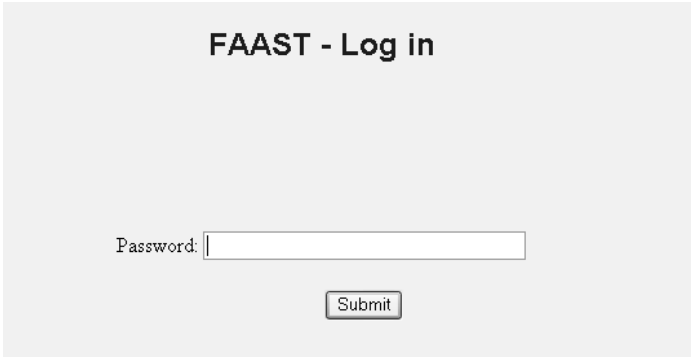
This section describes how to access the FAAST detector over a local network (LAN) via the Web interface.

The Web interface allows various personnel to monitor the FAAST detector from almost any location using a standard web browser. Each of the tabs (General, Relays and Thresholds and Network) that are configured using PipeIQ are accessible. In addition, the Live View screen provides status updates of the monitored environment as represented by the User Interface Display Panel. The Web interface is read-only. Therefore, configuration changes cannot be made using a browser.

SYSTEM LOGIN

Access to networked FAAST devices may be different for each installation site. Typically, each location has its own unique security precautions. To access the FAAST detector, first consult with the local site or building manager to determine how to gain access to the local network. Once access is obtained, the FAAST detector can be monitored by opening a Web browser window and typing in the IP address of the FAAST system (the default address is 192.168.1.10). The Log In screen shown in Figure 1 opens.

FIGURE 1: LOG IN SCREEN



ASP-27

Enter the Web Access Password for the FAAST device (the default password is 1234) and select Submit. It is recommended that the default password be changed using PipeIQ during initial FAAST detector setup. The procedure for changing the Web Access Password is described in the Network section of this manual.

GENERAL CONFIGURATION SCREEN

When the password is accepted, the General Configuration screen, as shown in Figure 2, opens and displays the General tab for the FAAST device.

All of the information displayed on the General Configuration screen is the same information that is shown on the General tab when connected via PipeIQ. This includes General information about the FAAST system: Device Location, Device Date & Time setting and Button Lock-Out information for the detector.

FIGURE 2. GENERAL CONFIGURATION SCREEN

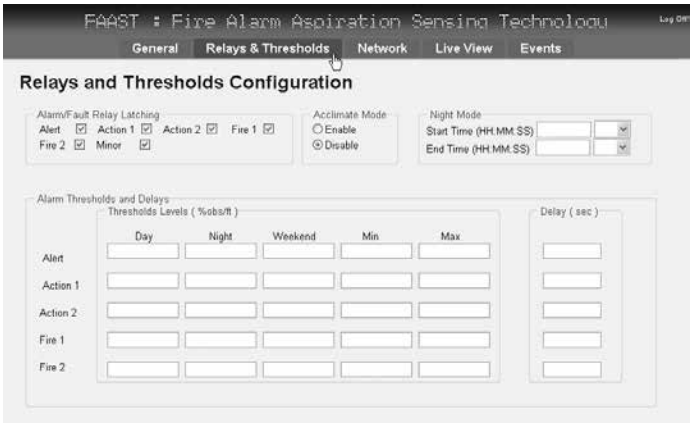
ASP-28

RELAYS AND THRESHOLDS CONFIGURATION SCREEN

To view the Relays and Thresholds settings for the FAAST detector, select the Relays & Thresholds tab. This opens the Relays and Thresholds screen as shown in Figure 3, and displays the relays and threshold settings for the FAAST system.

All of the information displayed on the Relays & Thresholds screen is the same information that is shown on the Relays & Thresholds tab when connected via PipeIQ. This includes the Alarm levels chosen, the Acclimate Mode, Night Mode and all of the Alarm Thresholds and Delay settings.

FIGURE 3. RELAYS AND THRESHOLDS CONFIGURATION SCREEN



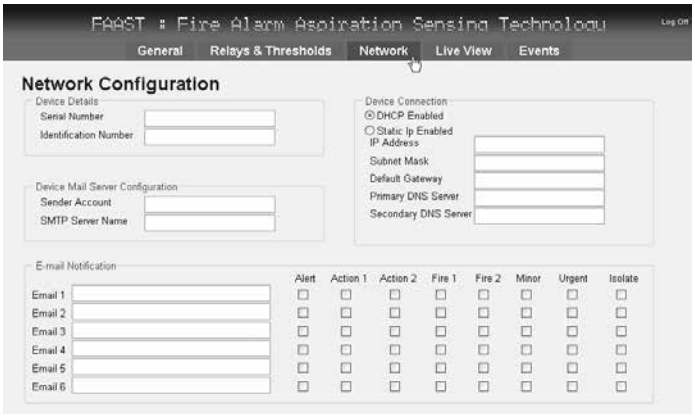
ASP-29

NETWORK CONFIGURATION SCREEN

The Network settings for the device are viewed by selecting the Network tab. This opens the Network screen, as shown in Figure 4.

The screen displays the same information as when connected via PipeIQ including Device Identification Numbers, Device Connection settings and E-mail Notification information.

FIGURE 4. NETWORK CONFIGURATION SCREEN



ASP-30

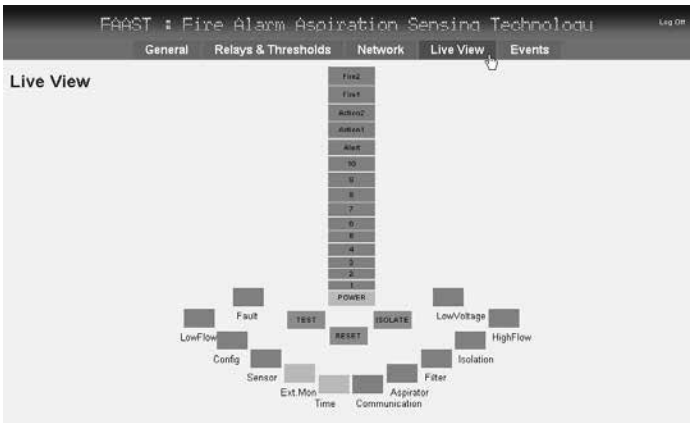
LIVE VIEW SCREEN

A live view of the User Interface Display Panel may be obtained by selecting the Live View tab, as shown in Figure 5.

The Live View screen automatically refreshes approximately every 10 seconds. To manually refresh more often, select the Live View button again. Any changes to the User Interface Display Panel on the actual detector are displayed in the Live View screen of the broswer.

NOTE: Browser settings may need to be adjusted to ensure updates are automatically refreshed. (refer to Troubleshooting section)

FIGURE 5. LIVE VIEW SCREEN



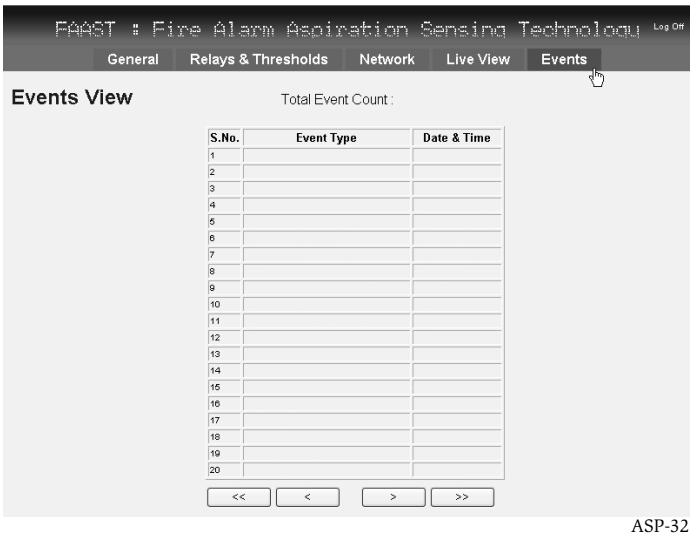
ASP-31

EVENTS VIEW SCREEN

FAAST detector events may be monitored by selecting the Events tab. This opens the Events View screen, as shown in Figure 6. The Events View provides the user with a complete history of the events for the FAAST device being monitored.

The arrows at the bottom of the Event Type list allow the user to move through the information one page at a time by using the [<] [>] buttons, or to move to the first or last page by using the [<<] [>>] buttons.

FIGURE 6. EVENTS VIEW SCREEN



ASP-32

LOG OFF

To log off and close the connection to the FAAST device, select Log Off in the upper right-hand corner of the screen to end the session.

Commissioning

SCOPE

This section provides an overview of the commissioning process for a system and describes how the commissioning papers should be completed.

The purpose of the commissioning process is to provide the owner and/or building manager with a high level of assurance that the FAAST system has been installed in the prescribed manner and is operating within the performance guidelines set in the design documents and local codes.

To use this section properly, the commissioning agent should be familiar with the FAAST detector, as well as all local codes and regulations necessary to commission the system. A typical commissioning process is shown in Table 1.

Commissioning is intended to enhance the quality of system start-up and to aid in the orderly transfer of systems for use by the owner or building manager. The commissioning agent is normally a member of the construction team that administers and coordinates commissioning activities with the design team, general contractor, subcontractors, manufacturers and equipment suppliers. The commissioning agent provides the owner with an unbiased, objective view of the systems' installation, operation, and performance.

The commissioning process validates all of the required operational functions of the FAAST system. It provides benchmarks for all of the individual site settings and generates the documents required for local codes. The documents produced by the commissioning process also provide baseline information for future maintenance and service of the system.

TABLE 1 COMMISSIONING PROCESS

STEP	ACTION
Pre-Commissioning	Gather site information; Obtain required design records; Obtain pipe network installation form; Obtain site plans and pipe network as built drawings; Begin filling in Commissioning Forms and local regulatory forms
On-Site Pre-Commissioning	Check cables and Power up detector; Verify detector Idle Operation
Configure the System	Begin initial configuration; Set detector thresholds; Record required information on Commissioning Forms
Test System	Perform a smoke test on the system; Perform pressure tests on sampling holes (if required); Verify all Alarm Relay functions; Record required information on Commissioning Forms
Document Test Results	Fill in all required information on Commissioning Forms; Forward copies of all required forms to the appropriate personnel

ROLES OF EACH PARTY IN THE COMMISSIONING PROCESS

Commissioning Agent

The commissioning agent functions as the central contact point to disseminate information. The commisioning agent assists the design and construction teams in completion of the construction process. This includes system verification, functional performance testing and conformance with the intended design of the system. The commissioning agent's duties include documenting construction activities, verifying functional testing and documenting the proper performance and operating information to the owner and/or the building manager.

The commissioning agent verifies that all prevailing local codes and regulations are met or exceeded, along with industry standards.

The commissioning agent also observes and coordinates testing, as required, to assure system performance meets the design intent. Results of the commissioning test are documented directly or by appropriate technicians. Another responsibility is compiling the commissioning forms to be used, as well as ensuring the testing process and the type of information being recorded.

Owner/Building Manager

The owner or building manager assigns maintenance personnel and schedules them to participate in any meetings, required training sessions and inspections.

COMMISSIONING PROCESS

Commissioning a system is the final stage of the installation process. It ensures that design criteria are met for the pipe network installation and that the FAAST system is correctly monitoring the proper alarms and levels for the individual installation site.

PRE-COMMISSIONING

Pre-commissioning is a set of tasks that should be performed before visiting the actual site. Assemble the following list of documents and necessary items before making a site visit.

- Obtain the original site layout drawings
- Obtain the "as built" drawings from the site
- Obtain the pipe network design records
- Obtain the pipe network installation records
- Obtain a set of the system installation documents
- Obtain a set of commissioning forms for the FAAST system
- Obtain all required local code forms
- Obtain a PC with the PipeIQ software application installed
- Obtain all materials to conduct smoke testing on the system
- Obtain a digital manometer to measure sample hole pressures (if required)

To save time at the site, portions of the commissioning forms may be filled out in advance with the customer information and any other information that can be completed ahead of the site visit.

ON-SITE PRE-COMMISSIONING

Before beginning the actual commissioning process, check the electrical and signal cabling of the FAAST system. Verify that all electrical and signaling wiring is correct. Refer to the Installation, Wiring and Cabling Requirements sections of the Installation Guide for detailed information on wiring. In addition to correctness, ensure that all wiring is in compliance with local electrical codes and standards.

Verify connection between the PipeIQ application on the PC and the FAAST system either through a local network cable or through an internet network connection to the system.

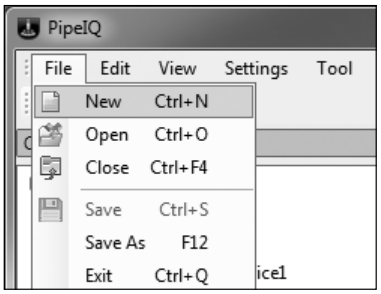
Also inspect the pipe network to ensure that it is complete and properly connected to the system before beginning the commissioning process.

CONFIGURING A NEW FAAST SYSTEM

If the FAAST detector has never been configured before, when initially powered it indicates a configuration fault. Begin the configuration process by performing the following procedure.

1. If the detector fails to power up, re-check that all power wiring is securely and correctly connected.
2. When the detector is powered, the Configuration fault is illuminated and the Urgent Fault relay is set, indicating that the detector has never been configured.
3. Open the PipeIQ application.
4. Create a project using an appropriate title, as shown in Figure 1, by selecting **File > New** from the menu in the upper left corner of the window, or by selecting the icon for a new project.

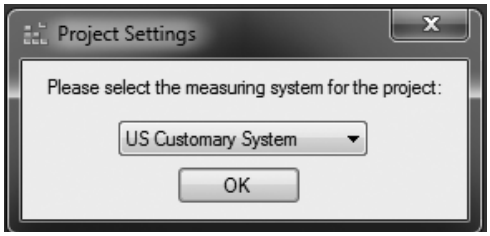
FIGURE 1. NEW PROJECT SCREEN



ASP04-01

5. The PipeIQ window on the PC shows the opening pop-up screen, as shown in Figure 2 after a new project is created.

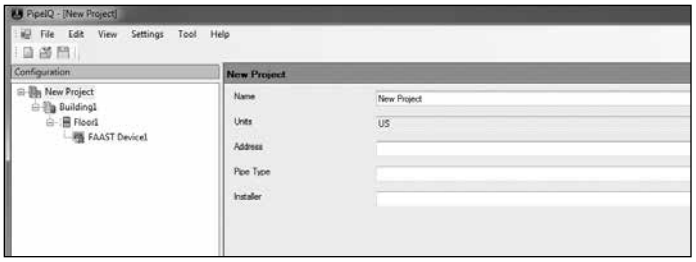
FIGURE 2. OPENING POP-UP SCREEN



ASP05-02

6. Select either US Customary System or Metric and select OK.
7. Check that the acknowledgment box on the disclamer.
8. Double click on the project name to open the project window in the right pane, as shown in Figure 3.
9. Fill in the Name, Installer, Pipe Type and Address information on the form. The name shown is the name of the project. The name is automatically created using the project name when it is created. You may change it, if desired. Enter the name of the system installer in the Installer field. Enter the pipe type in the Pipe Type field. The type of pipe is the type used in the pipe network (pvc, copper, etc.) Enter the address information for the project into the address field.

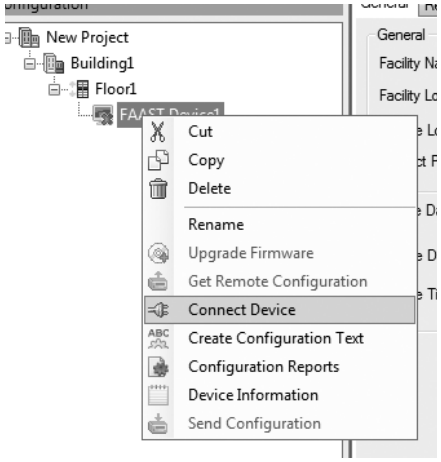
FIGURE 3. NEW PROJECT SCREEN



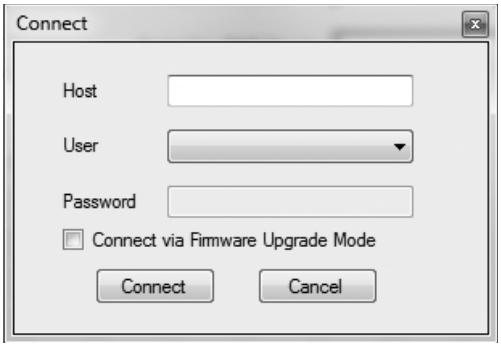
ASP20-01

10. Connect PipeIQ to the detector by selecting the device in the left pane, right-clicking and selecting "Connect Device." This opens the Connect Screen, shown in Figure 4. The text box should contain the default Host IP address of 192.168.1.10. Choose Administrator from the drop-down menu in the User field and type in the password for the detector. The default password is "password." Select the Connect button and confirm that the icon changes to green, showing that the device is connected. This step could also be performed at a later time when the data is ready to be transferred to the FAAST device.

FIGURE 4. CONNECT SCREEN



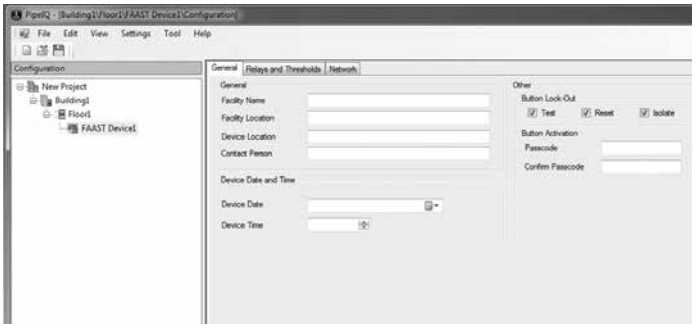
ASP21-02



ASP22-02

11. Double-click on the Device icon in the left pane to open the Configuration window in the right pane. Fill in the appropriate General information, as shown in Figure 5. Be sure that all of the information selected and entered is in accordance with local codes and regulations. Tables 2 through 6 explain the information contained in the fields of the General tab.

FIGURE 5. GENERAL CONFIGURATION TAB



ASP23-01

TABLE 2. GENERAL FIELD DESCRIPTIONS

FIELD	DESCRIPTION
Facility Name	Enter the name of the facility where the device is installed
Facility Location	Enter the address of the facility
Device Location	Enter the area or location in the facility where the system is located
Contact Person	Enter the name of the person responsible for operating and maintaining the system

TABLE 3. DEVICE DATE AND TIME FIELD DESCRIPTIONS

FIELD	DESCRIPTION
Device Date	Allows the user to set the system clock to the current date. Select the arrow to the right of the date. A calendar appears allowing the user to choose the correct month, date and year
Device Time	Allows the user to set the system clock to the current time. Highlight the hour and click on the up or down arrows to set the hour. Repeat for the minute, second and AM/PM settings

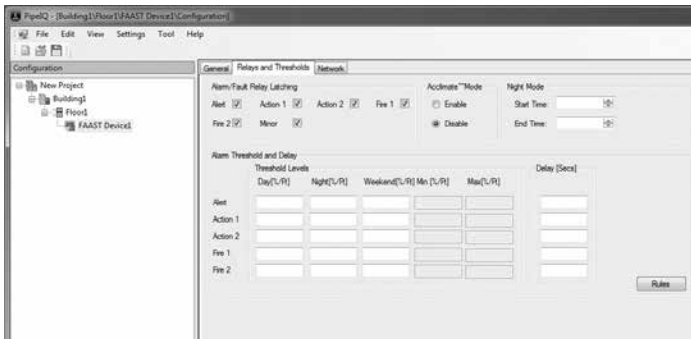
TABLE 4. BUTTON LOCK-OUT CHECK BOX DESCRIPTIONS

CHECK BOX	DESCRIPTION
Button Lock-Out	The Test, Reset and Isolate button settings allow the user to activate or de-activate the Test, Reset or Isolate buttons on the user interface

TABLE 5. BUTTON ACTIVATION FIELD DESCRIPTIONS

FIELD	DESCRIPTION
Passcode	Enter the 4-digit code to used to unlock the Test, Reset and Disable buttons on the user interface
Confirm Passcode	Enter the same 4-digit code again to confirm it

FIGURE 6. RELAYS AND THRESHOLD CONFIGURATION TAB



ASP24-02

12. When the information on this screen is complete, select the Apply button to make the changes. PipeIQ will inquire if you wish to send the changes to the device. If this is not desired, select No and select the save icon to save the changes.
13. Select the Relays and Thresholds tab at the top of the window and select the appropriate relay and threshold settings for the system as referenced in Table 7. Next, select the Acclimate mode or the start and end times for the Day, Night and Weekend modes, if desired, as shown in Figure 6.

Be sure that all of the information selected and entered is in accordance with local codes and regulations.

The Acclimate Mode area of the screen allows the user to enable or disable the Acclimate feature. This feature automatically adjusts alarm levels within user specified parameters to reduce nuisance alarms.

Acclimate mode allows the system to automatically adjust the alarm points between the specified minimum and maximum sensitivities that are selected by the user. The user chooses the boundaries for each alarm level and the system starts as close to the upper boundary of the alarm setting as it can, based on the local environment. The system monitors the environment for the first 24 hours of operation and then adjusts the alarm level based on the readings over that initial 24-hour period. By allowing the system to operate in Acclimate mode, the system's susceptibility to nuisance alarms is reduced. This provides maximum protection for an area that may have a varying or higher than normal background level.

After the initial 24-hour period, the system adjusts the alarm point based on the particulate level over a 1 hour period. The sensitivity of the system continues to slowly and continuously adjust over time, increasing and decreasing as the local environment changes.

The user can select the boundaries for each alarm level. It is also possible to have a static alarm level by adjusting the high and low boundaries for an alarm to the same level. This allows the flexibility to have acclimate levels for some alarms and static levels for others. Table 8 shows the various levels that are available.

In Acclimate mode, the Day, Night and Weekend settings are disabled and the minimum and maximum threshold levels are enabled to control the alarms. The start and end times for the system to enter night mode does not apply when the system is running in Acclimate mode.

If the Disable setting is selected under Acclimate Mode, then the Day/Night/Weekend settings must be completed in the Threshold Levels section. Values can be entered for each alarm level with a respective delay in seconds. Refer to the FAAST Maintenance and Instruction Manual for approved settings and ranges.

TABLE 6. ALARM/FAULT RELAY LATCHING CHECK BOX DESCRIPTIONS

CHECK BOX	DESCRIPTION
Alert	Selecting this box latches the Alert alarm
Action 1	Selecting this box latches the Action 1 alarm
Action 2	Selecting this box latches the Action 2 alarm
Fire 1	Selecting this box latches the Fire 1 alarm
Fire 2	Selecting this box latches the Fire 2 alarm
Minor	Selecting this box latches the Minor fault

TABLE 7. ALARM LEVEL BOUNDARY DESCRIPTIONS

ALARM LEVEL	THRESHOLD HIGH SENSITIVITY	THRESHOLD LOW SENSITIVITY	CURRENT LEVEL
Alert	Alert High	Alert Low	Acclimate Alert Level
Action 1	Action 1 High	Action 1 Low	Acclimate Action 1 Level
Action 2	Action 2 High	Action 2 Low	Acclimate Action 2 Level
Fire 1	Fire 1 High	Fire 1 Low	Acclimate Fire 1 Level
Fire 2	Fire 2 High	Fire 2 Low	Acclimate Fire 2 Level

When creating a new project, the Alarm Delay and Threshold fields contain default values. These settings may be modified to meet local codes and regulations. To modify these settings, select the field, highlight the value shown and enter the desired value.

The Alarm Delay fields are set to a default value of zero. To modify this value, highlight the value and enter the desired value.

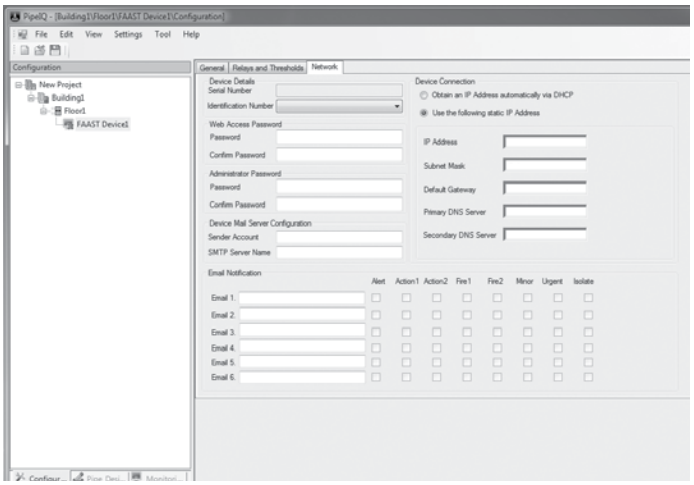
In normal operation, the Night mode allows separate start and end times, which can be set for day, night and weekend operation. To set the Night mode, highlight the hour and click on the up or down arrows to set the hour. Repeat for the minute, second and AM/PM settings for both the start and end times.

14. When the information on this screen is complete, select the save icon to save the changes.
15. Select the Network tab at the top of the window and complete the necessary information for the system, as shown in Figure 7. Be sure that all of the information selected and entered is in accordance with local codes and regulations.

The Device Details area contains the serial number of the detector and an identification number (1 – 255). The user may choose any identification number within the number range. The serial number is assigned at the factory and cannot be changed.

For more information see the networking white paper at systemseensor.com/faast.

FIGURE 7. NETWORK CONFIGURATION TAB



ASP25-01

TABLE 8. WEB ACCESS PASSWORD FIELD DESCRIPTIONS

FIELD	DESCRIPTION
Passcode	User can input up to a 16-character string
Confirm Passcode	User must enter the same character string again to confirm it

Tables 9 through 11 provide descriptions of the password and E-mail accounts. Note that the password character strings are case sensitive. Passwords may be changed in any of the password fields by typing and confirming a password once Administrative access has been acquired.

TABLE 9. ADMINISTRATOR PASSWORD FIELD DESCRIPTIONS

FIELD	DESCRIPTION
Passcode	Administrator can input up to an 8-character string
Confirm Passcode	User must enter the same character string again to confirm it

TABLE 10. DEVICE E-MAIL SERVER CONFIGURATION FIELD DESCRIPTIONS

FIELD	DESCRIPTION
Sender Account	E-mail address from which the device messages originate
SMTP Server Name	Determine the SMTP server being used and type the SMTP server name in the field. Contact system administrator if necessary

The Device Connection area allows the user to choose either DHCP or static IP addresses for device communication. Choosing the DHCP button deactivates the IP settings. If a static IP address is selected, enter the IP Address, Subnet Mask and the Default Gateway fields with the proper information (contact system administrator if necessary). Primary and Secondary DNS Server addresses are required if address resolution of the SMTP server is desired.

The E-mail Notification area allows the user to type in up to six E-mail addresses. These addresses are notified when an the selected event is triggered. The alarm levels reported to each E-mail address can be chosen by selecting the appropriate alarm level checkboxes for each address.

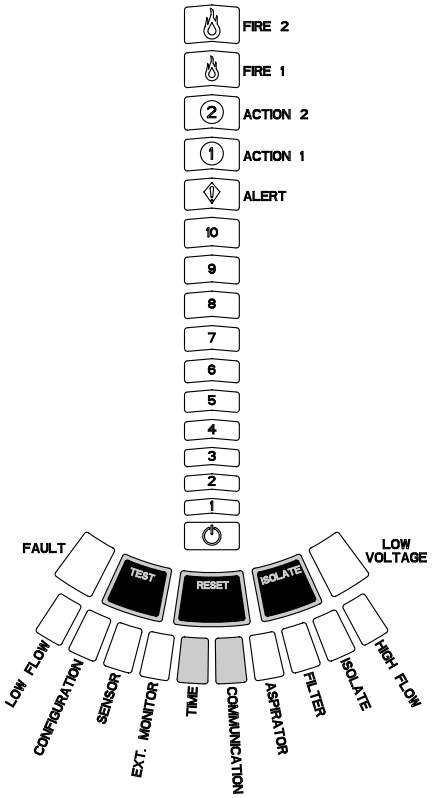
16. When the information on this screen is complete, a dialog box appears asking to transfer the configuration changes to the FAAST device. Select Yes to begin the download.
17. When the download is complete, the detector automatically resets and begins to take baseline measurements. At this time the system should be allowed to run undisturbed for at least five minutes to ensure it calculates valid air flow and filter monitoring baselines. When the system stabilizes, the front panel indicators are illuminated, as shown in Figure 8. The particulate level indicators illuminate along with the Test, Reset and Isolate buttons. The indicators at the bottom of the display indicate the air flow through the detector. If the system has normal air flow, these indicators are illuminated in green, near the center of the display.
18. If the location contains more than one FAAST system, repeat this procedure for each system being commissioned at the location.

Re-Configuring or Updating a FAAST System

When a FAAST detector is configured, certain pipe network specific parameters are erased. During the subsequent power-up, the detector will initialize these parameters for the attached pipe network. Once the parameters are initialized, the detector will operate using these parameters until the next configuration change. Therefore, it is imperative that the pipe network be inspected each time the detector is reconfigured. Perform the following procedure to properly re-commission or update a system.

1. If the system fails to power up and stabilize, re-check that all power wiring is securely and correctly connected.
2. Apply power to the system and open the PipeIQ application. Make sure that the PipeIQ application is connected to the detector either through a local network cable or through an internet network connection to the system.

FIGURE 8. TYPICAL STABILIZED FRONT PANEL INDICATORS



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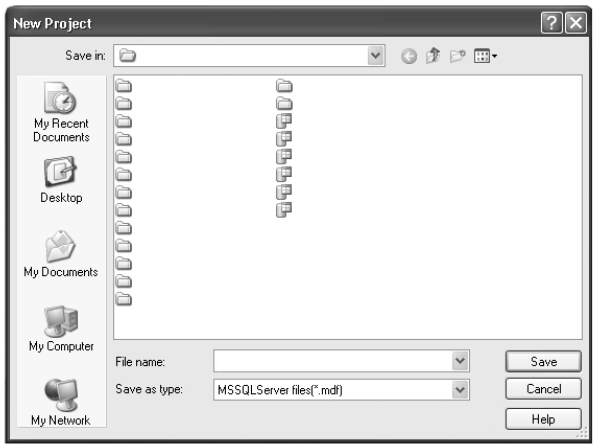
3. Create a project using an appropriate title, as shown in Figure 9, by selecting **File > New** from the menu in the upper left corner of the window, or by selecting the icon for a new project. To retain information from a previous project, open the project file associated with the system by selecting File > Open and then choosing the appropriate project name.

FIGURE 9. NEW PROJECT SCREEN



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4. Connect to the system by right clicking on the device in the left pane and selecting "Connect Device." For an existing device, the text box should have the Host IP address that was assigned to that device when it was originally configured. Select Administrator from the drop down menu in the User text box and enter the password for that device in the Password text box. Select the Connect button and the icon should change from a red X to a green connect icon showing the device made a successful connection.
5. Double click on the Device icon in the left pane to open the Configuration window in the right pane. Fill in the appropriate General information, as shown in Figure 6. Be sure that all of the information selected and entered is in accordance with local codes and regulations.

Refer to tables 2 through 7 that explain the information contained in the fields of the General tab.

6. Continue by doing the same steps described in the Commissioning a New FAAST System, starting with Step 11 of the Commissioning Section

TEST SYSTEM

TABLE 11. APPROVED SIMULATED SMOKE PRODUCTS

MANUFACTURER	MODEL
Home Safeguard Industries	25S
SDi	CHEK02 and CHEK06
SDi	SOLOA4
SDi	SMOKESABRE-01

TABLE 12. CANNED SMOKE TEST

STEP	ACTION	VERIFICATION
1	Make sure that the local fire panel and any automatic extinguishing or suppressant systems are either disconnected or isolated from external reporting equipment	
2	Establish that the system is working normally	Observe the user interface
3	Release simulated smoke (Home Safeguard Industries Model 25S or equivalent) near the sampling hole at the furthest point from the FAAST unit. Release simulated smoke for a period of 2 seconds within a distance of 6 inches directly at the sampling hole.	Use a stopwatch to measure the elapsed time between the release of the simulated smoke and the first indication of an increase in the particulate level as indicated on the Particulate Level display. Record the time on the Commissioning Form
4	Verify that the alarm relays activate when the alarm indicators illuminate	Observe the user interface
5	Make sure to re-connect the local fire panel and any automatic extinguishing or suppressant systems after successful completion of the test	

All FAAST systems must be tested after installation and periodically thereafter. Testing methods must statisfy the authority having jurisdiction. Systems offer maximum performance when tested and maintained in compliance with NFPA 72.

Preparation for Testing

Prior to any test of a building's fire alarm system, all occupants should be notified, in accordance with NFPA 72. This ensures that everyone is aware of what is going on and the testing can be conducted efficiently. Typically, a team of two performs testing of a FAAST system, with one technician remaining at the detector to verify test results, while the other technician introduces the canned smoke into the farthest sensing hole of the system.

Before these tests are carried out, ensure that the room or area being protected is in its operational state in terms of airflow, temperature and cleanliness. Any air handling units should be running, all floor and ceiling tiles should be installed and any equipment producing a heat load should be in its normal operating mode.

For proper testing, one of the simulated smoke products listed in Table 12 must be used. A canned smoke test procedure is indicated in Table 13.

System Pressure Testing

Pressure testing should be performed on as many sample holes as possible during the initial commissioning tests. This establishes a good baseline to use at a later date. During maintenance testing, only a few holes need to be tested if they continue to be close to the initial results.

During normal system maintenance, verify the current pressures versus the original pressures for the same sample holes. Any significant differences should be immediately investigated to determine the cause and potential repair of the system.

Relay Function Testing

The Relay function can be verified by setting the system into Test mode. The Test mode is initiated through the PipeIQ Live View or by depressing the TEST button on the user display when the button is enabled. The Test mode simulates a fire condition by activating all ten segments in the Particulate Level display and each segment in the Alarm display. Each corresponding alarm relay is also activated after any programmed delay associated with that relay. Activation of the RESET button removes the system from Test and resets the relays.

DOCUMENTING TEST RESULTS

All test results must be recorded in accordance with local codes and regulations. There is a Commissioning Form attached to this document to aid in documenting these tests.

Customer Acceptance

Both the team doing the testing and the customer/owner representative should be completely satisfied with all the results from the commissioning tests. They should also agree that all testing results meet the local codes and regulations for the type of system being tested. The final acceptance of the system should be a completed with a signed copy of the Commissioning Form and any other relevant documentation required.

FAAST System Validation Form

Customer Name:		
Project Name:		
Site Address:		
Installer Name/Contact information:	Date:	
Commissioning Agent/Contact information:	Date:	
Client Representative/Contact information:	Date:	
Witness/Contact information:	Date:	
Wiring Checked:	Date:	Yes / No
Detector Settings Checked:	Date:	Yes / No
Test Relays:	Date:	Yes / No
REQUIRED DOCUMENTS		
Copy of Commissioning Form		Yes / No
FAAST system Bill of Material		Yes / No
Commissioning Form for each system		Yes / No
Smoke Test results (optional)		Yes / No
Locally required forms		Yes / No
Customer's Signature:	Date:	
Commissioning Agent Signature:	Date:	

FAAST System Validation Form (CONT.)

Air Handling	Yes / No	Duct Sampling	Yes / No
Number of Sample points:		Number of Cabinets:	
Conditions:		Temperature:	
		Humidity:	
		Other:	
As-Built Installation Drawings Available?	Yes / No	Is the system installed in accordance with the design?	Yes / No
Is the power supply installed properly?	Yes / No	Is the pipe network installed and labeled properly?	Yes / No
Describe any Variations:			
Sensitivity:		% Obscuration/ft.:	
Detector Address:		Detector Address:	

		THRESHOLD	TIME DELAY	TRANSPORT TIMES	
Day	Alert:			Predicted:	Actual:
	Action 1:			Predicted:	Actual:
	Action 2:			Predicted:	Actual:
	Fire 1:			Predicted:	Actual:
	Fire 2:				
Night	Alert:			Alarm Outputs Verified:	Yes / No
	Action 1:			Fault Outputs Verified:	Yes / No
	Action 2:			Isolate Function Verified:	Yes / No
	Fire 1:				
	Fire 2:				
Weekend	Alert:				
	Action 1:				
	Action 2:				
	Fire 1:				
	Fire 2:				
Acclimate	Alert:				
	Action 1:				
	Action 2:				
	Fire 1:				
	Fire 2:				
Air Flow Fault Thresholds	Low:				
	High:				

Comments:

Maintenance and Troubleshooting

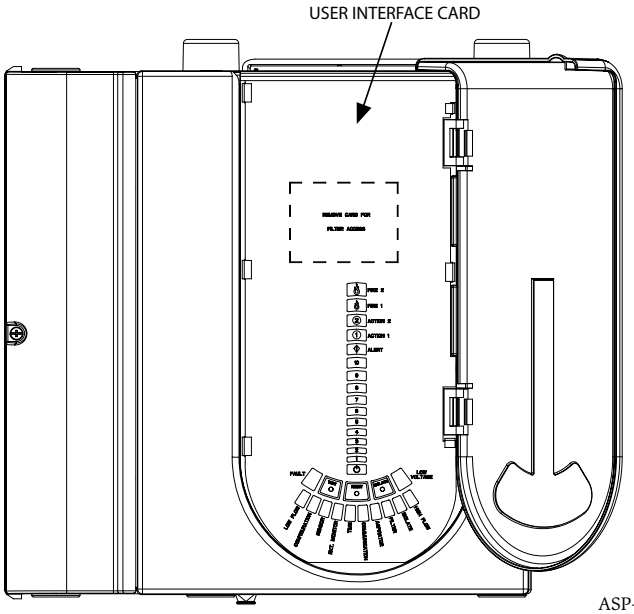
SCOPE

This section provides guidance through maintenance and troubleshooting for the FAAST detector.

FIELD MAINTENANCE

Maintenance of the FAAST detector is quick and easy. The only field maintenance recommended is changing the replaceable filter. The filter is located behind the Display Door under the User Interface Card, as shown in Figure 1.

FIGURE 1. FRONT VIEW OF DETECTOR WITH DISPLAY DOOR OPEN AND USER INTERFACE CARD IN PLACE:



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FILTER ASSEMBLY REPLACEMENT

Over a period of time the filter collects environmental dust and dirt that eventually inhibits proper air flow through the detector. If blockage is detected by the detector, a minor filter fault is activated. If the filter is not replaced within 72 hours, an urgent filter fault is activated.

To replace the filter perform the procedure in Table 1.

TABLE 1. FILTER REPLACEMENT PROCEDURE

STEP	ACTION
1	Before performing maintenance, notify the proper authorities that the system is undergoing maintenance, and will temporarily be out of service. Disable the system to prevent unwanted alarms.
2	Turn off the system by removing the 24 Volt power connector from the unit or by unplugging the converter from its power outlet. NOTE: If power is not removed, the unit automatically enters Service Mode when the screws are removed from the filter. This removes power from the fan and the sensing chamber. In addition, the filter fault indicator is illuminated and the urgent relay is set.
3	Open the Display Door, as shown in Figure 1, and remove the User Interface card in front of the filter.
4	Remove the two Philips head screws securing the filter to the unit, as shown in Figure 3.
5	Replace the entire filter assembly, as shown in Figure 2, with a new unit by pulling the old filter out and sliding a new filter assembly back into position.
6	Reinsert the two Philips head screws and tighten.
7	Carefully reinstall the User Interface card.

FIGURE 2. REMOVABLE AIR FILTER ASSEMBLY:

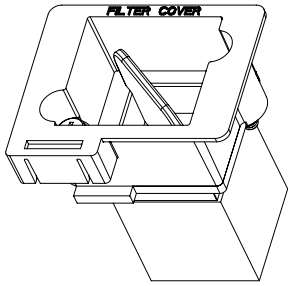

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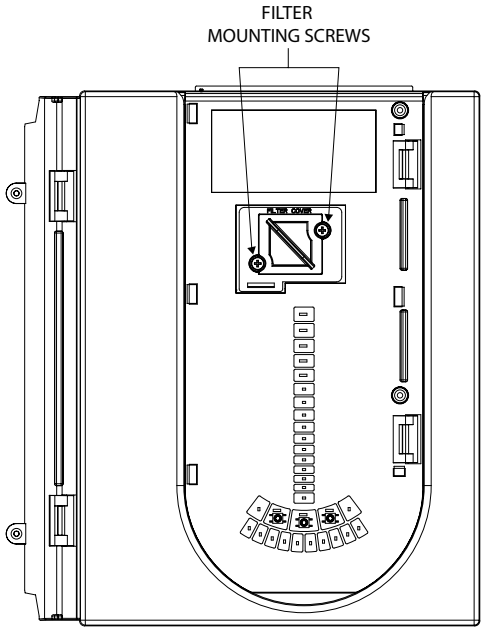
FIGURE 3. FILTER MOUNTING SCREWS WITH LANGUAGE CARD REMOVED:



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RECOMMENDED STOCK LEVEL

Filters should be kept on site so that they may be changed either on a regular schedule, or as needed. This keeps system down time to a minimum. Filters have an average life expectancy of 4 years.

TROUBLESHOOTING GUIDE

This section is intended for additional troubleshooting guidance. For general fault conditions, wiring and start up guidelines, refer to the Installation and Maintenance Instructions. Table 2 gives recommended action to possible conditions.

TABLE 2. TROUBLESHOOTING QUICK GUIDE

TYPE	CONDITION	RECOMMENDED ACTION
Fault Warning	External Monitor Fault signals, but nothing is connected to the external monitor relay.	Attach the 47 K-Ohm resistor, included with FAAST detector, to the External Monitor terminal when the external monitor function is not being used.
Fault Warning	Flow fault signals after power initialization.	Check for broken pipe connections or blocked sample holes. Repair any damage to the pipe network.
Fault Warning	Flow fault signals after power initialization.	If the FAAST system pipe network has changed or the FAAST detector was moved to another pipe network, the detector must be re-configured to reset its reference baseline.
Fault Warning	Filter fault signals after power initialization.	If the FAAST system pipe network has changed or the FAAST detector was moved to another pipe network, the detector must be re-configured to reset its reference baseline. If changes have not been made to the pipe network, replace the filter.
Pipe Network	Transport time is significantly longer than the PipeIQ design indicates.	Set ALERT and ACTION 1 delay to zero.
Pipe Network	Transport time is significantly longer than the PipeIQ design indicates.	Be certain that caps are installed in the two ports not being used.
Pipe Network	Transport time is significantly longer than the PipeIQ design indicates.	Check pipe integrity. Use electrical tape to close all sample holes and check the pipe for leaks. This can be accomplished by applying 2 psi of compressed air and measuring with a pressure gauge. The gauge should not drop more than 1 psi in 15 sec.
Pipe Network	The pipe network prevents the FAAST device from being removed from the mounting bracket.	Loosen pipe mounting brackets enough to allow the pipe to bend and remove the pipe from the top of the detector.
Pipe Network	The pipe network prevents the FAAST device from being removed from the mounting bracket.	Cut a ½ inch (13 mm)section of pipe approximately 6 inches (15 cm)above the detector. Remove the detector and steel plate from the wall. Fit a $^{5}/_{8}$ (16 mm)inch spacer behind the steel mounting plate. Permanently connect a union at the location where the ½ inch (13 mm) section of pipe was removed. The spacer behind the back plate will allow the larger diameter union to clear the wall.
PipeIQ	The web server isn't refreshing every 10 seconds.	If using the Internet Explorer® internet browser, go to Tools and select Internet Options. On the General tab under Temporary Internet Files select Settings. Set the Check for newer versions of stored pages option to Every visit to the page and click OK.
PipeIQ	Unable to connect to the device.	Verify the TCP/IP settings of your network adapter (refer to section PipeIQ FAAST Connection Troubleshooting for details). Ensure the IP address used to connect matches the IP address of the FAAST device. The IP address of the device can be determined by using the IP address blink mode.
PipeIQ	Pipes and fittings do not connect on the design page of PipeIQ.	There are two things to be aware of prior to specifying the next component in the design. First, orient the view to either FRONT, TOP or RIGHT view. Second, highlight the component to be connected such that it shows yellow. Then, add the new component. Always use one of the three views to move the new component on the screen.
PipeIQ	Cannot edit pipe.	Try using one of the three views (FRONT, TOP or RIGHT) to edit.
PipeIQ	Cannot disconnect element.	Only components with a single connection can be disconnected. In order to disconnect a component from within an assembly, all later components must be disconnected first. Note: Making all component moves/disconnect from a single view will make these components easier to reassemble.
User Interface	Front panel buttons do not work.	Buttons may be configured as locked. Follow procedure to unlock buttons or configure them in the unlock mode.

PIPEIQ FAAST CONNECTION TROUBLESHOOTING

In order to connect to a FAAST device at its default IP address (192.168.1.10) the PC network adapter must be configured to operate in the correct address range. Below are the steps required to make a direct connection to a FAAST device.

WINDOWS XP

GO TO START->CONTROL PANEL

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OPEN NETWORK CONNECTIONS

ASP-66

CHOOSE THE WIRED NETWORK ADAPTER THAT WILL BE USED TO CONNECT TO THE DEVICE.

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RIGHT-CLICK AND SELECT PROPERTIES.

ASP-69

CHOOSE INTERNET PROTOCOL (TCP/IP) AND SELECT PROPERTIES

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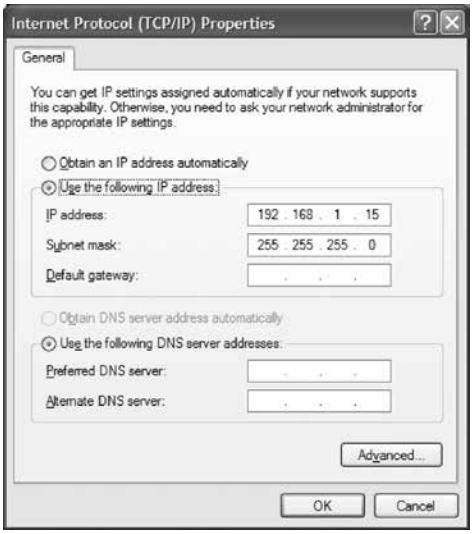
Take note of current adapter settings. They will be needed if you wish to restore your existing network connection later. To configure a direct connection to a FAAST device choose:

- Use the following IP address
- IP address: 192.168.1.15
- Subnet mask: 255.255.255.0

Select OK to close the dialog box. Select OK again to close the Connection Properties window and apply the changes.



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CHECKING CONNECTIVITY

To verify that your network settings are correct and you can communicate with the FAAST device perform the following:

CHOOSE START->RUN

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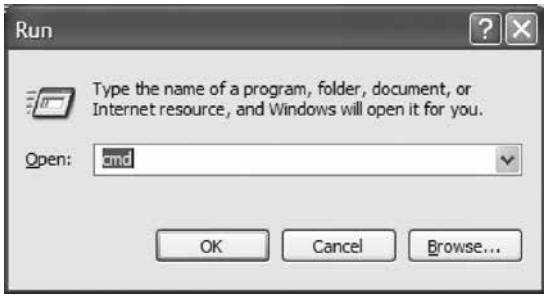
TYPE CMD AND CHOOSE OK TO OPEN A COMMAND PROMPT WINDOW



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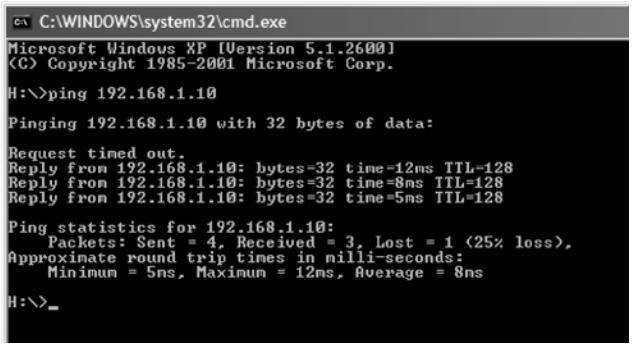
Type **ping 192.168.1.10** and select OK. The ping application will attempt to make contact with the FAAST device 4 times. The first or second request may time out, but if a reply is received your network adapter is configured correctly. If a reply is not received check the Ethernet cable. Also verify that the correct network adapter was configured and that it has the correct TCP/IP settings described above. For more information see the networking white paper at systemseensor.com/faast.



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Parts and Accessories

SCOPE

This section provides information on the parts and accessories available for the FAAST system.

Note: Not all parts and accessories are available in all markets.

PARTS AND ACCESSORIES

Table 1 lists additional Parts and Accessories available for use with the FAAST detector.

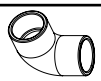
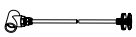
TABLE 1. PARTS AND ACCESSORIES

PART NO.	ITEM	DESCRIPTION
CMKT00100	FAAST Binder	Provides key documents for the FAAST system including the Comprehensive Instruction Manual.
I56-3620	Installation and Maintenance Instructions	Describes the installation, features and basic operation of the FAAST detector.
F-A3384-000	Air Filter	Disposable detector filter.

PIPE NETWORK COMPONENTS

TABLE 2 shows a list of the pipe fittings and accessories available for constructing a pipe network for the FAAST detector.

TABLE 2. PIPE NETWORK PARTS AND ACCESSORIES

PART NO.	ITEM	IMAGE	DESCRIPTION
P-PIPE-210	CPVC Pipe		15 ft. lengths, 3/4" Orange CPVC pipe, 14 pieces, 210 ft. Total Length
P-ELB-90	90 degree Elbow		90 degree CPVC Elbow, 3/4", Socket to Socket, qty. 20
P-ELB-45	45 degree Elbow		45 degree CPVC Elbow, 3/4", Socket to Socket, qty. 10
P-TEE	Tee		90 degree CPVC Tee, 3/4", Socket to Socket, qty. 15
P-COUPLING	Coupling		CPVC Coupling, 3/4", Socket to Socket, qty. 15
P-UNION	Union		CPVC Socket Union, 3/4", qty. 10
P-ENDCAP	End Cap		CPVC End Cap, 3/4", qty. 25
P-LABEL-P	Sampling Point Labels		Sampling Point Labels, roll of 100
P-LABEL-T	Pipe Label		Pipe Labels, roll of 100
P-SAMP-KT	Sampling Point Kit		Sampling Points with Capillary Tubing, qty. 10

Note: Pipe and Fittings are listed to UL 1887.

LANGUAGE CARDS

In addition to the standard English User Interface card, there are other languages available for use with the FAAST detector.

Table 3 lists the part numbers for ordering User Interface Cards and the languages that are available.

TABLE 3. AVAILABLE LANGUAGES FOR USER INTERFACE CARD

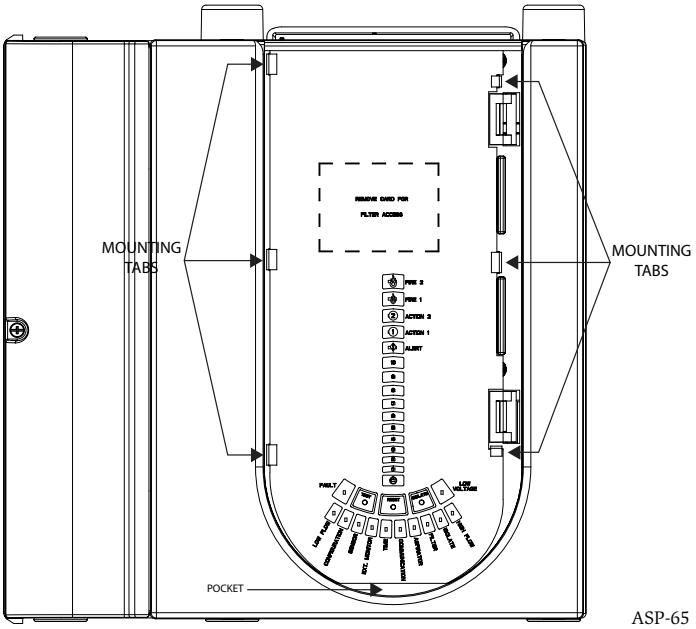
PART NO.	LANGUAGE
F-LCARD-EN	Language Card – English
F-LCARD-SP	Language Card – Spanish

The User Interface Card can be easily replaced. To remove and replace the User Interface card, follow the procedure outlined in Table 4.

TABLE 4. USER INTERFACE DISPLAY CARD REPLACEMENT

STEP	PROCEDURE
1	Grasp the top of the card and gently lift the center of the card.
2	Carefully remove the card from the 6 mounting tabs, as shown in FIGURE 1, from bottom to top.
3	When the card is removed from all of the tabs, remove the bottom of the card from the pocket.
4	Install a new card by sliding the card into the pocket. Moving from bottom to top, insert the card under each tab. If necessary, use a flathead screwdriver to gently press the card in place beneath each of the mounting tabs. The card is moderately flexible to allow for some bending during installation.

FIGURE 1. USER INTERFACE CARD MOUNTING



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The Pipe System

SCOPE

This section provides details on the physical installation of the pipe network for the FAAST system. Knowledge of local codes and regulations is required in addition to this manual.

INSTALLATION STAGES

Table 1 lists the standard installation stages for an aspiration pipe network.

TABLE 1. TYPICAL PIPE NETWORK INSTALLATION PROCEDURE

STEP	ACTION
1	Verify design documents are accurate and obtain the size and configuration of the pipes in the network. Note: If PipeIQ was used to design the network, a bill of materials can be generated from the application.
2	Mark off the area where the system is to be installed and identify the location where the FAAST detector is to be mounted.
3	Select and mark the locations for the pipe clips in accordance with the design.
4	Install the FAAST detector in its permanent location. (See Installation and Maintenance Guide for details.)
5	Mount the pipe clips according to the previous markings.
6	Dry mount and assemble the pipe network according to the pipe network design documents. CAUTION: Do not permanently connect the pipes at this time.
7	Measure and mark the sampling holes on the pipe network. Make sure that the spacing of the sampling holes is in accordance with the network design. Based upon the application, ensure that the sampling holes are at the correct orientation to the air flow, as recommended in the section on network pipe design.
8	Verify the sampling-hole positions and orientations and drill the sampling holes.
9	Drill and install end caps on all appropriate pipe ends.
10	Modify the design documents to agree with the actual network, if the physical network is significantly different from the original design documents.
11	When testing is complete and the system performance is verified, permanently bond the pipe network together. **CAUTION: Never bond the pipes to the detector.** The detector inlet and outlet are tapered to accept the piping without any bonding and provide an air tight seal.
12	Label all portions of the system according to local codes and regulations. Pipe and Sampling Point labels are available – refer to the Accessories section.
13	If additional changes are made, ensure that design documents are updated accordingly.

PIPE NETWORK COMPONENTS

The FAAST detector uses standard aspiration fire detection pipe network components, such as pipes, elbows and couplings. The components listed in this section are not an all inclusive list of components used for fire protection systems. However, they represent the most commonly used items.

PIPES

The pipes used in the pipe network can be made of various materials including copper, PVC, ABS, UPVC and CPVC. The internal pipe diameter used with the FAAST system can range from 0.591 to 0.827 in. (15 to 21 mm). Ideal dimensions vary depending on system design requirements, as well as local codes and regulations. The FAAST detector has a built in tiered insertion point for the pipes, which allows for an outside tube diameter of either 1.050 in. or 25 mm to accommodate U.S. Customary System and Metric System sized pipe.

FITTINGS

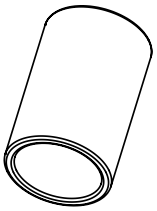
Fittings are used to connect sections of pipe together on longer network runs and are made from the same material as the pipe. There are several types of fittings to allow for various bends, straight runs, branches and connections. Common fittings are described in the following sections.

Couplings and Unions

Couplings and unions are used to connect two sections of pipe in a straight line. A coupling is used when the section is not intended to be taken apart.

A union offers the ability to screw the two pipe sections together for future access, such as areas of the pipe network that have to be periodically disassembled for maintenance or cleaning. Unions can also be used to orient sample holes correctly in a specific section of the pipe network, such as over return air grilles. Figure 1 shows a typical union and coupling.

FIGURE 1. TYPICAL UNION AND PIPE REDUCER



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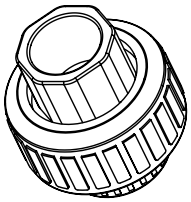

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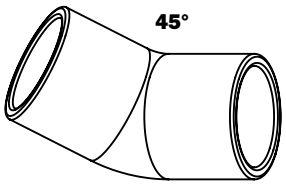
Elbows

Elbows are used to change the direction of the pipe network. Both 45 degree and 90 degree elbows may be used. Both elbow fittings are shown in Figure 2.

FIGURE 2. 45 AND 90 DEGREE ELBOWS



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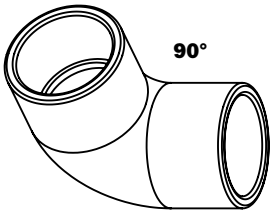
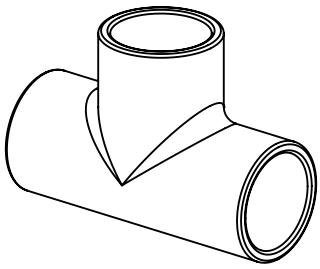


ASP-78

Tees

Tees are used for attaching drop tubes or sampling pipes in the network. A specialized tee can be used to attach a capillary tube and a sampling point. A tee is shown in Figure 3.

FIGURE 3. TEE

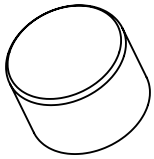


ASP-80

End Caps

The end of the pipe should be terminated with an end cap. The end cap may have a sampling hole depending upon the system design. The size of the hole in the end cap is determined by the PipeIQ software. An end cap is shown in Figure 4.

FIGURE 4. END CAP



ASP-79

CAPILLARY TUBES AND SAMPLING POINTS

A capillary tube is a length of flexible tubing that is connected to the main sampling pipe with a sampling point at the end. The purpose of these tubes is to extend the placement of the area being sampled away from the main pipe network. This may be necessary to reach into an enclosed space, such as a cabinet, or for aesthetic and security reasons. This allows the core pipe network to be hidden, while only a small sampling point is located in the main space. Figure 5 shows the capillary tube extending down from the main sampling pipe with a sampling point on the end. The sampling hole is located in the sampling point. PipeIQ allows for capillary tubes and sampling points to be added to the pipe network design and will calculate the appropriate air flow through the system.

The maximum length for capillary flexible tubing is 26 ft. (8 m). When multiple capillary tubes are used in a network, the length of each capillary tube should be approximately equal. A sampling hole is required at the end of each capillary tube. PipeIQ will provide direction when designing capillary tubes into the pipe network.

FIGURE 5: CAPILLARY TUBES WITH SAMPLING POINTS

ASP-83

MOUNTING BRACKETS

The pipe network is mounted to the ceiling or other appropriate location using pipe mounting brackets. A large variety of brackets are available. Typical brackets include clips, saddle clamps or tie wraps, as shown in Figure 6. The mounting choice will depend upon the material being mounted to, environmental conditions, as well as local codes and regulations. Mounting brackets are usually centered 5 ft. (1.5 m) apart when using ¾ inch sch40 pipe at 70°F (21°C). Open style mounting clips should not be used in an inverted position with the open section facing downward such that the pipe could drop from the clip.

FIGURE 6. TYPICAL PIPE MOUNTING BRACKETS

ASP-81

LABELS

Labels are available to identify the pipe network as a fire detection system, both at the sampling points and along the pipe itself. NFPA 72 states that the pipe should be labeled:

1. At changes in direction or branches of piping
2. At each side of penetrations of walls, floors, or other barriers
3. At intervals on piping that provide visibility within the space, but no greater than 20 ft. (6.1 m)

PIPE NETWORK INSTALLATION

This section provides the basics to installing a pipe network. Keep in mind that each system will have different characteristics, and will have variations to accommodate. The most common issues are described in the following sections.

Cutting Pipe

Proper tools must be used when cutting pipe. Pipe shears or a wheel type plastic tubing cutter can be used for PVC or CPVC pipe. Always keep the cutting edge of the tools sharp. Ensure that cuts are made perpendicular to the pipe length keeping the cuts square. Square cuts ensure maximum bonding area and help provide a good seal when joining the components.

Remove all loose material and any burrs from the end of the pipe after a cut. Debris and shavings from cuts must be removed in order to keep sampling holes free of obstructions.

Joining Components

The pipe network must be permanently connected once the system has been installed and tested. The method to accomplish a permanent connection depends upon the material of the pipe and fittings.

NOTE: The immediate connections between the inlet pipe and exhaust pipe and the FAAST detector SHOULD NOT be permanently connected.

When bonding components together, never place solvent on the inside of a pipe or other component. Apply the solvent only to the outside of the pipe that is being inserted into a coupling or other component. If solvent is applied to the inside of a pipe or other component, the solvent can build up. This build-up can affect the air flow within the pipe network and may cause abnormal behavior within the pipe network.

Make sure that pipes are inserted completely and butted against the lip of the coupling or other component. If this is not done, turbulence can be created due to the gaps, which can cause problems with system pressures and air flow.

Mounting the Pipe Network

The following recommendations should be taken into consideration when mounting the pipe network.

- Minimize flexing of the pipes by securing them at proper intervals with appropriate mounting brackets.

Maximum support spacing

PIPE DIAMETER	60°F	100°F	140°F
½ in. (15mm)	4½ft. (1.3m)	4ft. (1.2m)	2½ft. (0.7m)
¾ in. (20mm)	5ft. (1.5m)	4ft. (1.2m)	2½ft. (0.7m)

- Typically, the pipe network should be mounted between one and four inches (25 – 100 mm) below the ceiling, subject to local codes and regulations.
- Allow for expansion and contraction of the pipe network in areas of extreme temperature fluctuations, especially on long straight runs of pipe.
- In areas of extreme temperature fluctuations, never place mounting brackets adjacent to couplings, unions or tees. This can lead to interference with expansion or contraction of the pipe network.
- To minimize the effect of pressure differentials, the sampled air should be returned to the protected environment wherever possible. This eliminates any pressure differentials that might reduce the air flow in the pipe network.

Pipe Bends

Never bend pipes, unless absolutely necessary. Use elbows, tees or other fittings to change the direction of the pipe.

If bending is necessary, determine how much bending the pipe can tolerate before beginning the process. Always use bending springs and pipe benders. Never heat the pipe or bend it around sharp objects. If a pipe is kinked while bending, replace it with a new section of pipe. Conform to all local codes and regulations for bending of pipes.

Drilling Sample Holes

Each hole in the sampling pipe represents a smoke detection location. Hole placement and size are determined using the PipeIQ software. Sample holes should be drilled after the pipe network has been installed. To prevent sampling holes from being blocked by dust and dirt, place the holes on the bottom side of the sampling pipes, not on the top of the pipe. This ensures that any falling debris does not clog the sampling holes. This hole positioning should also be followed for voids in the ceiling or floor.

The following guidelines should be followed when drilling the sample holes in the pipe network.

- Holes must be drilled perpendicular (90 degrees) to the pipe. If the drill is not held perpendicular, the hole is not round and may affect air flow.
- Sampling holes must be drilled exactly at the positions marked on the pipe with the exact size determined by the PipeIQ software.
- Holes must not be drilled through both sides of the pipe.
- Holes should be drilled with a slow speed drill with a sharp drill bit. This minimizes dust and burrs entering the pipe network.

It is always good practice to blow compressed air through the pipe after drilling to clear any debris before final connection to the FAAST detector. Alternately, a shop vacuum can be used to remove debris from the pipe network. Remove the end cap and use the vacuum to draw the debris through the end of the pipe near the FAAST system connection.

DILUTION IN ASPIRATION SYSTEMS

Air from an aspiration system is drawn in from several sampling points along the pipe network. Because of this, air from a single point in the system is diluted by the combination of air from the entire system. This affects the concentration of smoke particles in the air that reaches the detector. The dilution effect must be accounted for when designing the overall FAAST system. PipeIQ automatically calculates the primary factors contributing to the effects of dilution on the system.

A general guideline for the effect of dilution on the pipe network is given in the following example. A smoke source of 2% obscuration/ft is introduced at the far end of a pipe having 10 sampling holes. No other smoke is entering any of the other sampling holes. As the smoke passes each hole, the smoke filled air is added to with clean air. When the sample reaches the detector it is now at 0.2% obscuration/ft. or 1/10th of its starting density. Therefore if the first alarm threshold is set at 0.2% obs/ft., the smoke outside the hole must exceed 2%/ft. to sound the alarm.

The longer the pipe and the greater the number of sampling holes, the more susceptible the system will be to dilution. It is better to operate on the conservative side of the situation due to the variable influences on the system. In actuality, the calculation of dilution is not as straightforward as above and more factors are involved. Each system will have different characteristics, meaning precise calculation is complicated. Issues that will affect the dilution rate include size, location and number of holes, tees, elbows and joints, diameter of the pipe itself, as well as, outside elements such as air temperature, pressure and humidity.

Application and Design

SCOPE

This section is intended to provide general design and application guidelines for designing pipe networks in conjunction with the FAAST system. It contains relevant design considerations and recommendations on how the FAAST system may be installed in various applications.

DESIGN

There are basic requirements that must be followed for a good site design. The more information that is obtained up front, the easier the process will be. The following items are provided to aid the design process.

- Understand local codes and standards.
- Gather all relevant information about the site, including the floor plan for the protected space. The floor plan must also include existing or proposed fixtures, fittings, air handlers, vents and other equipment that requires special consideration.
- Determine the uses of the protected area to establish any special requirements.
- Verify the protection level required for the area, i.e. standard fire detection, early warning fire detection, very early warning fire detection.
- Use the PipeIQ® software to design the pipe network for the FAAST detector.

Regulatory Requirements

Local codes and regulations can determine the size and spacing between the sample holes in a network, making them a critical part to any pipe design. These requirements change depending on the type of environment being monitored. Local codes and standards take precedence over any parameters suggested by this document for the FAAST system.

Site Layout And Measurements

Planning of fire protection zones and relevant FAAST system locations are needed to begin the planning process. The plan should include measurements of the area to be protected and any areas designated for a different use. The plan should also show any obstacles to the free flow of air in the space, i.e. partitions or other large objects. Areas requiring special protection should also be noted.

Locations of large machinery, equipment, cabinets or any other large items that may affect the pipe network design also need to be indentified on the plan. The pipe design can be overlaid onto an existing CAD drawing of the site plan using the PipeIQ software.

Site Details

When designing the fire protection system, there are a number of site details that need to be taken into account:

- Air flow and the location of air handling units, returns, exhaust systems, etc.
- Construction of areas being monitored – high ceilings, ceiling and floor voids
- Obstructions to the pipe layout – beams, walls, furniture
- Placement of equipment requiring any special protection – electrical cabinets
- Monitoring requirements – on site, remote
- Activities within the environment – public space, office space, clean room, warehouse, etc.

Environmental Conditions

Identify as many ambient conditions that exist within the protected area of the site. Typically different areas have different conditions. This includes information such as temperature, humidity and altitude. The more accurate the information about the protected areas, the better the FAAST system can be designed to meet those needs.

The environment, both internally and externally of the protected environment (especially if air is being pulled in for heating or cooling), may have an effect on the operation of the FAAST detector. High pollution levels may cause background levels of particulate matter in the protected area. The Acclimate feature of the FAAST system helps to compensate for this background level. This setting may be chosen during configuration. Or, if the environmental changes are better defined by days of the week, the FAAST detector offers a day/night/weekend mode.

In locations that are normally subjected to difficult environmental conditions, such as loading docks or warehouse spaces, the FAAST detector is typically located within a controlled environment, while the pipe network is located in the harsh environment.

System Design

PipeIQ is designed to take the information gathered during this initial phase and assist in designing the pipe network. There are two design methods within the PipeIQ software. One offers a design wizard to create a simple layout based on the parameters provided. The other allows for customization throughout the process. Both methods provide the opportunity to go back and modify the system as needed to accommodate the environment being protected. For complete directions on the operation of PipeIQ refer to the section titled PipeIQ.

SAMPLING METHODS

There are two general types of sampling methods: standard pipe network sampling and capillary tube sampling. From these sampling methods several design configurations can be used to meet the needs of a particular site environment. Local codes and standards along with site requirements will help determine the best air sampling method.

Standard Pipe Network Sampling

The following guidelines are used for any pipe network design. Also, some additional guidelines specific to different sampling methods may apply.

1. Local codes and standards always take precedence over any values specified in this documentation.
2. Recommended pipe network material is nominal ¾ in. schedule 40 internal diameter (25 mm OD) CPVC, PVC, ABS or UPVC pipe.
3. There should be a minimum of 20 in. (500 mm) of straight pipe at the FAAST detector input.
4. Sharp bends decrease airflow and performance.
5. All pipe designs must have an end cap.
6. Multiple shorter pipes provide better performance than a single longer length pipe.
7. Symmetrical designs both in pipe length and hole size and distribution are preferred to optimize FAAST system performance.
8. To prevent sampling holes from being blocked by dust and dirt, place the holes on the bottom side of the sampling pipes, not on the top of the pipe. This ensures that any falling debris does not clog the sampling holes.
9. To minimize the effect of pressure differentials, the sampled air should be returned to the protected space wherever possible. This eliminates any pressure differentials that might reduce the air flow in the pipe network.

Capillary Tube Sampling

Capillary tube sampling is a method of locating sampling points remote from the main sampling pipe. This is particularly useful where the main sampling pipe cannot be routed through the area requiring protection for either technical or aesthetic reasons. Capillary tubes are also used to sample equipment cabinets or enclosures within the protected area.

In the absence of any other guidance, it is recommended that a minimum of two capillary sampling points are sited in a room. This allows a degree of redundancy should any one hole become obstructed. PipeIQ will allow sampling points and capillary tubes to be added as part of the design parameters. Local codes and standards differ on issues, such as the minimum distance detection points that can be positioned from walls and ceilings. It is important that the specific local regulatory requirements are observed.

The following guidelines are recommended for capillary tube use.

1. Try to keep the length of capillaries the same.
2. Capillary tube length should not exceed 26 ft. (8 m).
3. When sampling equipment cabinets or other enclosures, the sampling point is typically placed at or close to the top of the interior of the enclosure.

OPEN AREA PROTECTION

Ceiling Sampling

In typical ceiling installations, the pipe network is suspended from 1 in. to 1 ft. (25 mm to 300 mm) below the ceiling level in the protected area. This type of installation is the most common installation. It could be used in offices, warehouses, equipment rooms and a variety of other types of installations. The pipes and hence the air sampling holes are exposed to the protected environment. The PipeIQ software can also provide guidance for the design.

Concealed Pipe Networks

Capillary tubes are typically used for concealed pipe networks. This type of network is normally used for either aesthetic or security purposes. The main pipe network is installed in a ceiling void and capillary tubes are branched off at regular intervals. These capillary tubes are used to monitor the protected area by projecting through the ceiling covering while the main pipe network remains hidden.

Inter-Beam Sampling

When large ceiling beams are used in construction, pockets of space are created between the beams. In normal circumstances, the pipe network is mounted on the bottom of the beams and does not sample the large spaces between the beams. If it is necessary to cover this space, a rigid pipe in the shape of an inverted "L" can be extended vertically from the pipe network up into the area between the beams so that the pipe reaches up towards the ceiling in these locations. The sampling hole should be drilled just before the end cap on the horizontal portion of the pipe. The ends of these sampling pipes should be capped with an end cap. The end cap may or may not have a sample hole, depending on the pipe network design.

UNDER FLOOR PROTECTION

Floor Void Sampling

The FAAST system is well suited to protect concealed voids, either in the ceiling or under the floor. Some locations use either ceiling and/or under floor voids as return air plenums (ducts). To monitor the return air in these areas, a pipe network must be designed to monitor the flow through these areas. Some ceiling and floor voids are used for cable runs or for small equipment installation. Monitoring of these areas must be done using a pipe network designed for operation in these areas. When installing pipe in a floor void, keep in mind that the air sampling holes are still located at the bottom of the pipe. This means that the pipe would be located towards the upper portion of the void.

OBJECT PROTECTION

Cabinet Sampling

Equipment cabinet sampling may be accomplished in two ways: pipe networks and sampling points can be installed directly inside the equipment cabinet or directly over the equipment cabinets being monitored, if the cabinets have ventilation grills.

In-Cabinet Sampling

For in-cabinet sampling, capillary tubes can be used to enter the equipment cabinet. The capillary tube is connected to the pipe network via a tee connection with an adapter. The maximum length of these capillary tubes is 26 ft. (8 m). PipeIQ can help create an appropriate design.

An alternative to capillary tubes is a rigid drop tube. In this application, the pipe network is run over a row of cabinets and drop tubes are run down to each cabinet. This tube or pipe should be less than or equal to the network pipe diameter and is connected to the top of the cabinet and to the pipe network via a tee connection. Or the pipe could come up from under a floor void into the cabinet.

Cabinets with extractor fans may cause sampling problems when the sample point is on top of the cabinet. The extractor fan creates a low pressure area within the cabinet that can stop air from being drawn into the detector system at the sampling point. This type of installation must be checked carefully for proper sampling operation. This can be accomplished using canned smoke at the sample point location.

Above Cabinet Sampling

In above cabinet sampling, the pipe network should be installed directly over the cabinets that will be protected. Sampling holes are placed over the cabinet ventilation grills. Holes should be oriented so that they face into the air stream coming from the cabinet. If there is more than one exhaust from a cabinet, a sampling hole should be installed over each opening.

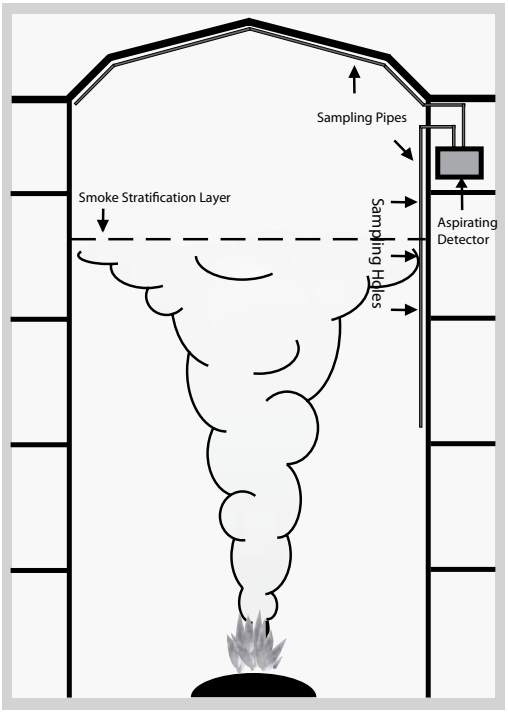
NOTE: With either application it is best to locate the sampling hole in the path of the air flow, near the top of the cabinet.

LARGE AREA PROTECTION

Large volume areas and areas with high ceilings require special design considerations for the pipe network design. Stratification occurs when smoke is heated by smoldering or burning materials and becomes less dense than the surrounding cooler air. The smoke rises until there is no longer a difference in temperature between the smoke and the surrounding air. (See NFPA 72-2007, A.5.7.1.10.) Stratification, therefore, may occur in areas where air temperature may be elevated at the ceiling level, especially where there is a lack of ventilation. When stratification is likely to occur, conventional pipe network sampling may not be effective.

One method to overcome the stratification problem is to create a vertical sampling pipe in addition to the horizontal pipe network on the ceiling. The vertical sampling pipe has sampling holes at various heights to sample within any stratification layers present in the area, as shown in Figure 1.

FIGURE 1. VERTICAL SAMPLING PIPE



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COLD AREA PROTECTION

The FAAST detector is approved for operating temperatures ranging from 32°F (0°C) to 100°F (38°C) and sampled air temperatures ranging from -4°F (-20°C) to 140°F (60°C). However, special considerations should be taken when operating at the extreme end of these ranges, especially the cold end. Refer to the section titled The Pipe System for recommendations on handling the pipe itself in cold environments.

The temperature in a cold area is typically just at or above 32°F (0°C). In designing a pipe system, the pipes should be kept out of the immediate airflow from a chiller unit, if used, as its air is often significantly colder than the room itself, in order to maintain the correct temperature. In a cold room application it is not usually necessary to use a heater element, but only a water trap to remove condensation. For more information see the cold storage white paper at systemsensor.com/faast.

HIGH AIR EXCHANGE AREAS

Typically, high air exchange areas have some form of mechanical ventilation to maintain constant or cyclical air flow for heating, cooling or maintaining some other sort of special environment. Smoke tends to travel with the air flow, so positioning sampling pipes near the return of an air handling unit or heating/air conditioning unit ensures early detection of particulate in the area. NFPA classifies air exchange area as: medium – 6 air exchanges per hour; high – 12 air exchanges per hour.

Normal sampling methods for high air exchange areas are a combination of return air and ceiling sampling. The return air sampling provides protection when the air flow is present. The ceiling network provides protection when the air flow is off. Local codes typically require smaller sample areas (closer spacing of sample holes) as the air flow rate increases.

Return Air Sampling

Return air sampling provides an effective means of very early warning in a high air velocity environment, such as a mechanical air conditioned area or an area equipped with an Air Handling Unit. Placing the pipe network sampling holes directly in the air stream at a return air grill allows the system to monitor air that has circulated throughout the protected area.

The following guidelines should be reviewed and followed to ensure proper sampling by the detector system.

1. More than one sampling location may be required for large air grills. NFPA 76 recommendations specify that each sampling hole can cover a maximum of 4 sq. ft. (0.4 m2).
2. Sampling holes should be aligned at an angle of 20 to 45 degrees to the direction of the maximum air flow.
3. Sampling pipes should be placed in the path of greatest air flow.
4. The number of bends in the pipe network should be kept to a minimum.
5. Pipe ends should be capped with an end cap. Depending on the pipe design and PipeIQ recommendations, the end caps may or may not have a sampling hole.
6. Socket unions should be used in locations where the pipe network requires the removal of the pipes on a regular basis for maintenance purposes.
7. Use standoff fittings to keep the pipe network at least 2 to 8 in. (50 to 200 mm) in front of the grill for high velocity air flow locations. Installing the network any closer to the input grill locates the sample point in an area of negative air pressure.
8. Always keep in mind that the monitored environment should still ensure coverage if the manufactured air flow gets disrupted.

Generally, the FAAST detector should not monitor more than one air handler. The number of air handlers monitored is limited by the maximum length of the pipe network runs. However, the degree of particulate dilution and air movement that occurs with multiple air handlers can adversely affect system response times. Final system testing should be done to confirm actual response times.

IN-DUCT SAMPLING

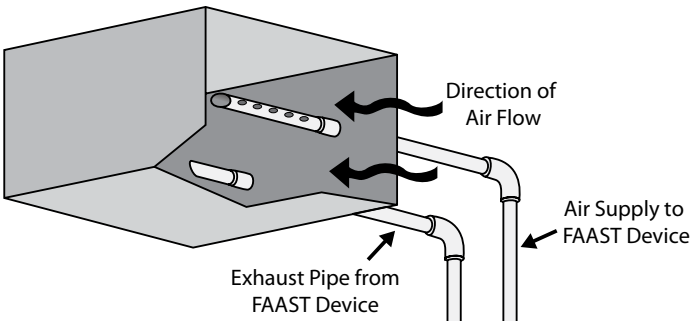
The FAAST detector is approved for in duct applications. National and local safety standards and codes recognize the ability of air duct systems to transfer smoke, toxic gases, and flame from area to area. Sometimes smoke can be of such quantity as to be a serious hazard to life safety unless blowers are shut down and dampers are actuated. The primary purpose of duct smoke detection is to prevent injury, panic, and property damage by reducing the spread (recirculation) of smoke. Duct smoke detection also can serve to protect the air conditioning system from fire and smoke damage, and can be used to assist in equipment protection applications, for example, in the ventilation/ exhaust duct work of mainframe computers and tape drives. For additional information relating to duct applications refer to the System Sensor website.

Design Considerations for In-Duct Sampling

The following guidelines are necessary to obtain the best installation results.

1. Pipes should always be supported at both duct walls – rubber grommets can be used. Silicon sealer must also be used to ensure an airtight seal in the duct walls.
2. Inlet pipes must be inserted between six and ten duct widths or diameters (for round ducts) from any disturbances to the flow generated by sharp bends, plenums, nozzles or branch connections, etc.
3. Position the sampling hole at either end of the sampling pipe at least 2 in. (50 mm) from the duct walls.

FIGURE 2. IN-DUCT PIPE ORIENTATION



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4. Holes on the inlet pipe should face 20-45° into the air flow with the holes concentrated at the center of the duct as shown in Figure 2.
5. The exhaust pipe must have 4, $^{3}/_{8}$ in. (9.5 mm) holes. Holes should be concentrated in the middle of the duct's width and spaced evenly. Holes on the exhaust pipe should be oriented such that they face away from the air flow.

Small Duct Sampling

For ducts with a width less than 3 ft. (1 m), the inlet pipe should be installed at the midpoint of the duct height or diameter. Exhaust pipes should be inserted 18 in. (0.5 m) downstream from the input pipe. The exhaust pipe should be at one quarter of the duct height or diameter, as shown in Figure 3. To avoid dilution, sampling pipes should be located before fresh air intakes and before the exhaust air output.

FIGURE 3. SMALL DUCT SAMPLING PIPE PLACEMENT

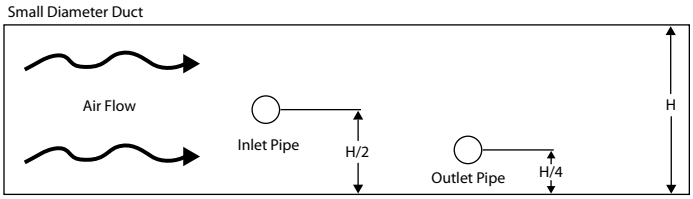

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TABLE 1. HOLE SIZES FOR SMALL DUCTS

DUCT WIDTH	NO. OF HOLES	HOLE SIZE	NOMINAL PIPE FLOW RATE (CFM)
12 in. (300 mm)	2	1/4 in. (6.5 mm)	1.84 cfm (52.0 L/min)
20 in. (500 mm)	3	1/4 in. (6.5 mm)	1.83 cfm (51.9 L/min)
28 in. (700 mm)	4	11/64 in. (4.5 mm)	1.70 cfm (48.1 L/min)
36 in. (900 mm)	5	5/32 in. (4 mm)	1.81 cfm (51.2 L/min)

Large Duct Sampling

For ducts with a width of 3 ft. to 7 ft. (1 m to 2 m), two branch pipes are recommended for the inlets. Inlet pipes should enter a quarter of the way from the top and bottom of the duct, as shown in Figure 4.

The exhaust pipe should be inserted approximately 18 inches (0.5 m) from the inlet pipes and half way up the height of the duct.

To avoid dilution, sampling pipes should be located before fresh air intakes and before the exhaust air output.

FIGURE 4. LARGE DUCT SAMPLING PIPE PLACEMENT

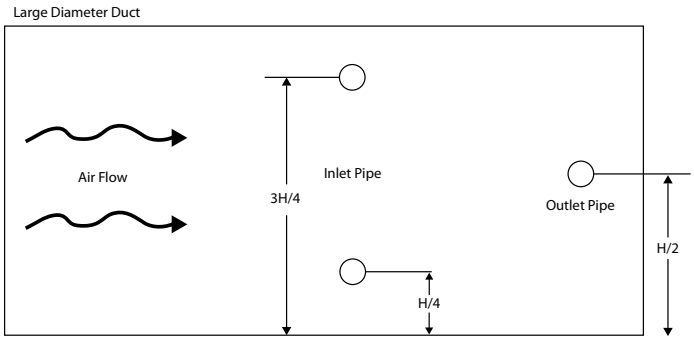

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TABLE 2. HOLE SIZES FOR LARGE DUCTS

DUCT WIDTH	NO. OF HOLES	HOLE SIZE	NOMINAL PIPE FLOW RATE (CFM)
3 ft. 4 in. (1 m)	6	9/64 in. (3.5 mm)	1.77 cfm (50.2 L/min)
5 ft. (1.5 m)	8	1/8 in. (3 mm)	1.80 cfm (50.9 L/min)
6 ft. 6in. (2 m)	10	1/8 in. (3 mm)	2.10 cfm (59.6 L/min)

The information shown in Table 1 and Table 2 applies to a 15 ft. (4.6 m) inlet pipe and a 10 ft. (3 m) exhaust pipe. Always check with local codes and standards for hole size and spacing.

Hole Orientation

Sampling response time can also be improved by avoiding low and high velocity air flows. Holes on the inlet pipes should be facing into the airflow. Holes on the exhaust pipe should be facing away from the airflow.

MONITORING VOIDS

In these high air exchange environments, detection systems should be installed in any void, unless the void is completely empty and presents no fire risk. If the void contains cabling and/or equipment that can initiate or contribute to a fire, monitoring for combustion is highly recommended. The sampling-hole spacing for these areas is the same as the requirements for the rest of the area, in accordance with the relevant local codes and standards.

When sampling pipes are installed in shallow voids having poor ventilation, special care should be taken to position the piping as close to the top of the void as possible. This gives the best early warning due to the likelihood of the initial smoke layer taking up only the top 10% of the void height.

Local codes and standards normally recommend the area of coverage per sampling hole. Most standards define different pipe and hole spacing, depending on certain criteria, such as air exchange rates, etc. Careful adherence should be made to relevant local codes and standards.

For more information see the cold storage white paper at systemsensor.com/faast.

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