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Document Colour Code Key: (refer to Page 24)

Black: applies to both 8251BPI and 8100 Devices
Orange: applies to 8251BPI FAAST XM Only
Green: applies to 8100 FAAST XM Only

SPECIFICATIONS:

Electrical Characteristics

External Supply Voltage	18 – 30VDC
Remote Reset Time	External monitor must be pulled low for a minimum of 100msec.
Power Reset	10 secs (FAAST 8251BPI); 1 sec (FAAST 8100)
Average Operating Current	500mA @ 24VDC
Alarm Current	650mA – All relays active, all alarm levels displayed. Voltage @ 24VDC
Average Loop Driver Operating Current:	700uA
Loop Driver Voltage Range:	15 – 32VDC
Relay Contact Ratings	3.0A @ 30VDC, 0.5A @ 125VAC

Environmental Ratings

Operating Temperature	0°C to 38°C	(32°F to 100°F)
Sampled Air Temperature	-20°C to 60°C	(-4°F to 140°F)
Humidity	10 to 95% (non-condensing)	
IP Rating	IP30	
Coverage Area	1000m^2	(8,000ft^2)
Air Movement	0 - 1,219.2 m/min.	(0 – 4,000 ft./min.)

Mechanical Characteristics

Exterior Dimensions	337 x 330 x 127	H x W x Dmm
Cable Access	4 x 25.4mm cable entry holes on top and bottom of unit.	
Wire Gauge	2.0mm (12 AWG) max to 0.5mm (24 AWG) min.	
Shipping Weight	5.26 kg, includes packing material	
Nett Weight		
Pipe Network Size	Up to 1000m^2	
Maximum single pipe length	80m	
External pipe diameter	25mm	
Internal pipe diameter	15 - 21mm	

INTRODUCTION

Scope of this Manual

This manual is intended as a guide for technicians to install, set up and provide preliminary system checks for the FAAST (Fire Alarm Aspiration Sensing Technology) aspirating smoke detection system. Before installing, please read the Comprehensive Instruction Manual for the FAAST aspiration detection system (available on PipeIQ CD or at SystemSensor.com/faast), which provides detailed information on pipe design and system configuration.

⚠WARNING

The performance of the system depends on the designed pipe network for the site. Any alteration to the pipe network will alter the performance of the system and must be verified by a technician. The PipeIQ® design tool can be used to verify the suitability of any pipe network design and subsequent alterations. The PipeIQ software program is available from your distributor or can be downloaded from systemsensor.com/faast.

DESCRIPTION

The 8000 Series FAAST XM aspirating smoke detection system is an advanced particulate detection system for use in early warning and very early warning applications.
The system continuously draws air from the controlled environment through a series of sampling holes to monitor the environment for smoke particulate.
FAAST system conditions are displayed at the user interface and at a fire alarm control panel via relays. System conditions can also be displayed remotely in two ways through the network interface: integrated Web server or PipeIQ software. The display provides a clear indication of the system status, particulate levels, alarm levels, air flow and faults. Additionally, e-mail notification can be sent upon status changes. These can all be discerned by monitoring the user interface at either the local or remote display.

Features

- Clip intelligent protocol (8251BPI only)
- Advanced detection using blue LED and IR laser technology
- Monitors up to 1000m^2 (dependant on local code and ordinances)
- Wide sensitivity range of 0.0015% to 20.5% obs/m.
- Programmable alarm thresholds and delays
- Six (8251BPI) or eight (8100) sets of relay contacts
- Advanced dust discrimination for reduced false alarms
- Air filtration
- Particle separation for increased filter life
- Electronic filter life monitoring
- Ultrasonic air flow sensing
- Field service access door
- Easy access filter maintenance door
- Event, service and trend logs
- PipeIQ pipe modelling software
- Acclimate mode operation for auto-adjustment of sensitivity
- Remote monitoring via Ethernet/IP
- Remote reset/dry contact input
- Multi-lingual support
- Email notification of alarm, fault or isolate conditions

INSTALLATION

This equipment must be installed in accordance with all local and national codes and regulations.

Pipe Installation

The pipe layout is designed using the PipeIQ software package. Refer to the Comprehensive Instruction Manual that comes with the PipeIQ software package to design the pipe network. All pipe must be installed in accordance with local and national codes and regulations.
The pipe network should be complete before proceeding with the physical and electrical system installation.

Physical Unit Installation

⚠WARNING

Make sure that there are no pipes or electrical wires within the wall before drilling any mounting holes.

Securing the Mounting Bracket

The typical mounting location for the FAAST unit is on a wall. The unit is mounted to the wall using the enclosed mounting plate. Figure 1 shows the wall mounting plate. For easier access to the FAAST unit, it is preferred to position the mounting plate in an easily accessible location.

1. Place the mounting bracket on the wall in the desired location and use it as a template to locate the necessary mounting holes.
2. Mark the hole locations and remove the bracket. It is recommended to secure the bracket using the 4 outer mounting holes.
3. Using a drill and the proper size bit for your mounting hardware, drill the necessary holes.
4. Use appropriate fasteners to accommodate the mounting surface and FAAST device weight.
5. Secure the bracket to the wall.

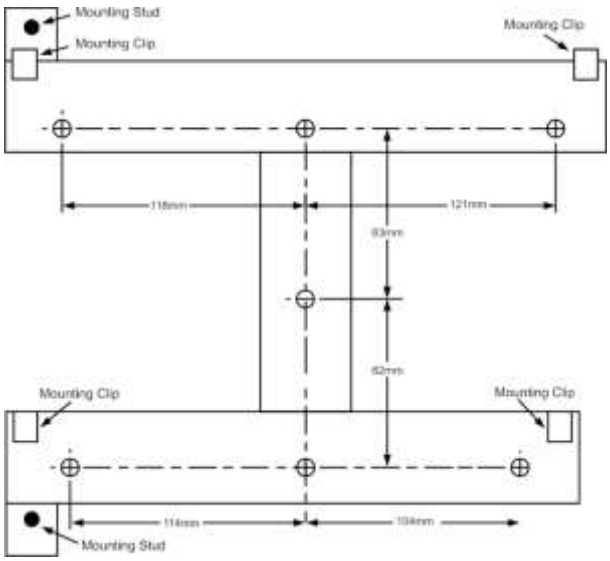


Figure 1: Wall Mounting Plate

Items Included with Unit

- FAAST XM device
- Mounting bracket
- Mounting nuts (2) and washers (2)
- 3-pin terminal block — 6 (8251BPI) — 9 (8100)
- 4-pin terminal block — 2 (8251BPI) — 1 (8100)
- 47KΩ EOL Resistor — 2 (8100 only)
- Installation and Maintenance Instructions
- PipeIQ software and a comprehensive instruction manual. An advanced networking white paper may be downloaded at www.systemsensor.com/faast

Mount the Detector to the Bracket

Once the mounting plate is attached, the unit is ready to be mounted onto the plate.

1. before installing the unit onto the bracket, remove the appropriate conduit cap from the top or bottom-left side of the unit to match the orientation of the wiring. See Figure 19 for location of the wiring access plugs.
2. line up the unit with the four mounting clips and the mounting studs on the left side.
3. push the unit down onto the mounting clips and secure it with the supplied washer and nut on at least one of the two mounting studs protruding through the mounting slots shown in Figure 2.

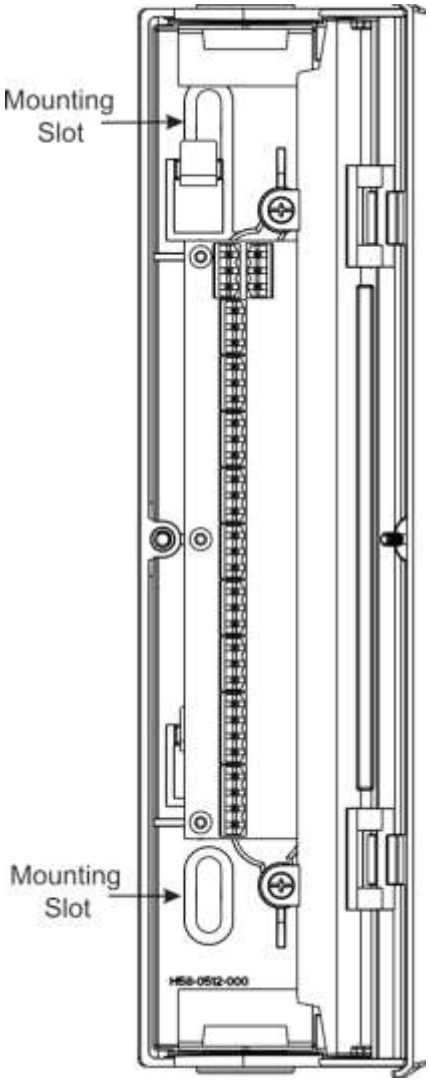


Figure 2: Mounting Slots for Mounting Studs

Connecting the Air Sampling Pipe

The input and output ports are designed to accept standard one inch pipe (25 mm) OD. The input ports are tapered to provide fast, easy, push-fit connection of the sampling pipe to the unit. Perform the following procedure to connect the air sampling pipe to the unit.

1. square off and de-burr the end of the sampling air pipe. Ensure that the pipe is free from any particles that might interfere with the pipe connection.
2. remove the input plug from the input port being used (either the top or bottom of the unit).
3. insert the sampling air pipe into the input port, ensuring a snug fit. DO NOT glue these pipes.

Exhaust Pipe

The device should always be exhausted into the space that it is monitoring. There are some circumstances when it may be necessary to connect a pipe to the exhaust port to divert the exhaust away from the location of the unit. The output ports are tapered the same as the input ports, to provide fast, easy, push-fit connection of an exhaust pipe to the unit. Perform the following procedure to connect the exhaust pipe to the unit.

1. square off and de-burr the end of the exhaust pipe. Ensure that the pipe is free from any particles that might interfere with the pipe connection.
2. remove the exhaust plug from the output port being used (either the top or bottom of the unit).
3. insert the exhaust pipe into the output port, ensuring a snug fit. DO NOT glue these pipes.

Wiring

WARNING

Before working on the FAAST system, notify all required authorities that the system will be temporarily out of service. Make sure all power is removed from the system before opening the unit. All wiring must be in accordance with local codes.

Power Cables

Use the power ratings of the unit to determine the required wire sizes for each connection. Use the power ratings of the connected products to determine proper wire size.

Conduit Usage

If electrical conduit is used for system wiring, terminate the conduits at the cable entry ports on the top or bottom of the unit, using the appropriate conduit connectors.

1. run all wiring, both power and alarm, through the conduit and into the left side of the unit enclosure, as shown in Figure 3.
2. attach the appropriate wires to the supplied Euro connector. Follow appropriate local codes and electrical standards for all cabling.
3. plug the appropriate connector into the mating connector on the unit.

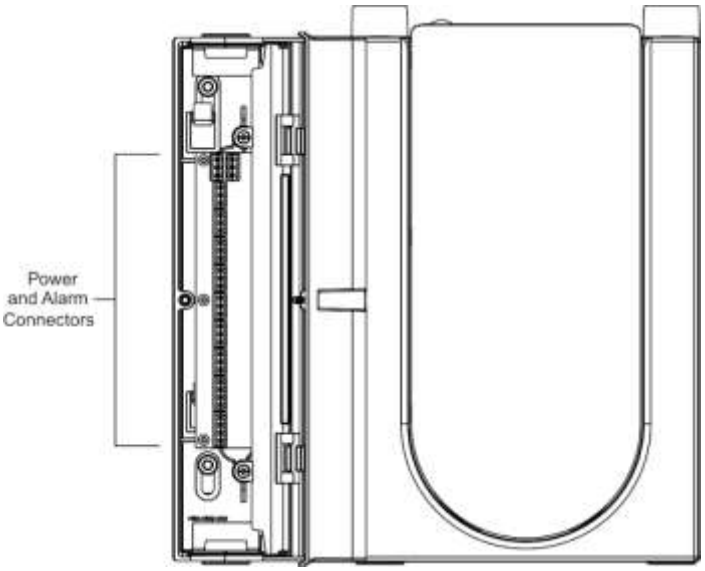


Figure 3: Power and Alarm Connector Block

FAAST 8251BPI Cabling Requirements

The FAAST 8251BPI provides a series of Euro style pluggable terminals, located behind the left side door of the unit.

Refer to Table 1 for the proper electrical connections to the unit and Figure 4 for typical connection for monitoring a Stand-Alone FAAST system at a Fire Alarm Control Panel (FACP).

Number	Name	Terminal Block
26	Fault N/C	T8
25	Fault COM	
24	Fault N/O	
23	Fire 2 N/C	T7
22	Fire 2 COM	
21	Fire 2 N/O	
20	Fire 1 N/C	T6
19	Fire 1 COM	
18	Fire 1 N/O	
17	Action 2 N/C	T5
16	Action 2 COM	
15	Action 2 N/O	
14	Action 1 N/C	T4
13	Action 1 COM	
12	Action 1 N/O	
11	Alert N/C	T3
10	Alert COM	
9	Alert N/O	
8	Analogue Loop -	T2
7	Analogue Loop -	
6	Analogue Loop +	
5	Analogue Loop +	
4	External Power +	T1
3	External Power +	
2	External Power -	
1	External Power -	

Table 1a: FAAST 8251BPI Terminal Designations

Notes:

a) The Terminal Blocks are numbered with T8 to the top and T1 at the bottom
b) Terminal blocks T9 to T11 are unused

FAAST 8251BPI to FACP Wiring Diagram

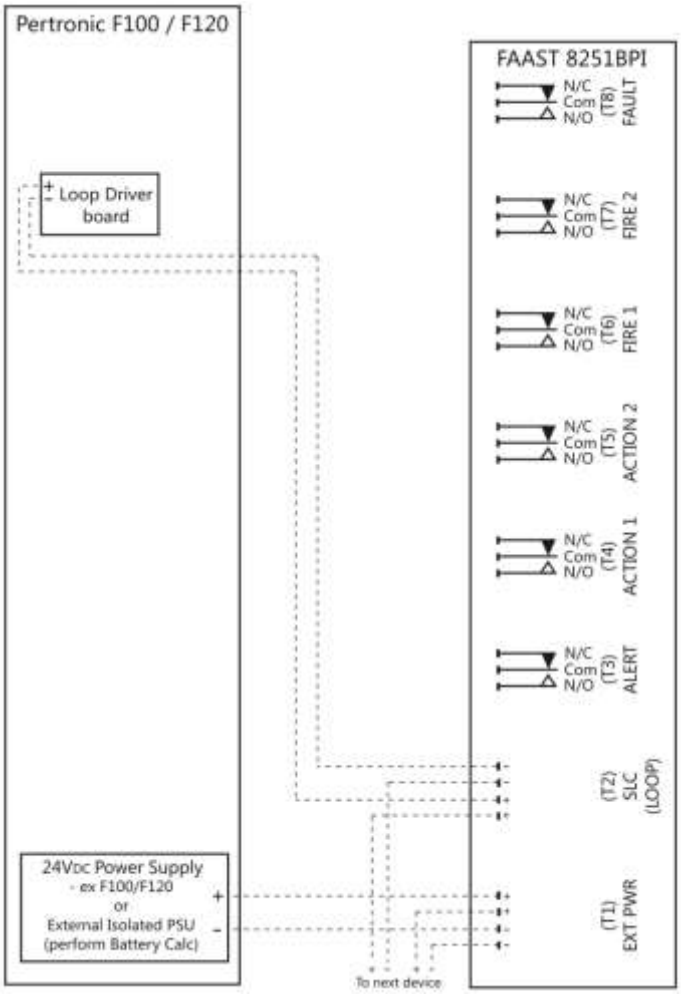


Figure 4a: 8251BPI to FACP Wiring Diagram

FAAST 8251BPI System Powering

The following procedure describes how to initially power up the FAAST system.

1. unplug the unit's power connector before turning the power ON.
2. turn the power ON.
3. check the voltage at the connector - ensure it is within the required voltage range.
4. if the voltage is within the proper range, reconnect the power connector to the unit.
5. connect the Loop connector to the SLC terminal – connections: 5/7
6. verify the system fan starts up and air begins to flow out of the exhaust port.

FAAST 8100 Cabling Requirements

The FAAST 8100 provides a series of Euro style pluggable terminals, located behind the left side door of the unit.

Refer to Table 1 for the proper electrical connections to the unit and Figure 4 for typical connection for monitoring a Stand-Alone FAAST system at a Fire Alarm Control Panel (FACP).

Number	Name	Terminal Block
35	Ext Monitor/Reset +	T11
34	Ext Monitor/Reset -	
33	Ext Monitor/Reset -	
32	Isolate N/C	T10
31	Isolate COM	
30	Isolate N/O	
29	Urgent Fault N/C	T9
28	Urgent Fault COM	
27	Urgent Fault N/O	
26	Minor Fault N/C	T8
25	Minor Fault COM	
24	Minor Fault N/O	
23	Fire 2 N/C	T7
22	Fire 2 COM	
21	Fire 2 N/O	
20	Fire 1 N/C	T6
19	Fire 1 COM	
18	Fire 1 N/O	
17	Action 2 N/C	T5
16	Action 2 COM	
15	Action 2 N/O	
14	Action 1 N/C	T4
13	Action 1 COM	
12	Action 1 N/O	
11	Alert N/C	T3
10	Alert COM	
9	Alert N/O	
8	N/A	T2
7	N/A	
6	N/A	
5	N/A	
4	External Power +	T1
3	External Power +	
2	External Power -	
1	External Power -	

Table 1b: FAAST 8100 Terminal Designations

Notes:

a) the Terminal Blocks are numbered with T11 to the top and T1 at the bottom

b) Terminal Block T2 is unused (SLC)

FAAST 8100 to FACP Wiring Diagram

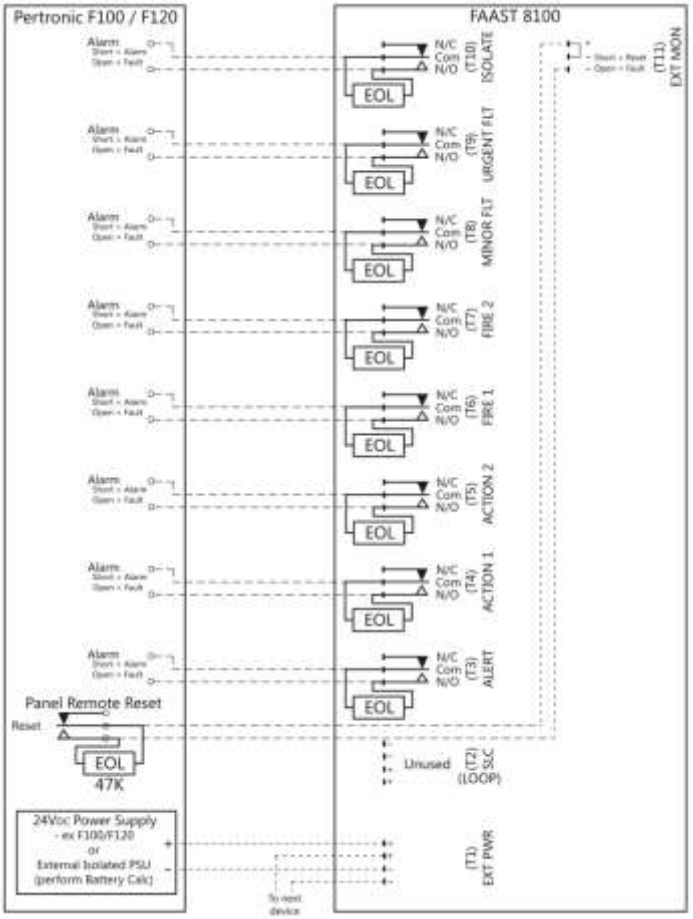


Figure 4b: 8100 to FACP Wiring Diagram

FAAST 8100 System Powering

The following procedure describes how to initially power up the FAAST system.

1. Unplug the unit's power connector to the unit before turning ON the power.
2. Turn on the power.
3. Check the voltage at the connector. Make sure it is within the required voltage range.
4. If the voltage is within the proper range, reconnect the power connector to the unit.
5. Verify the system fan starts up and air begins to flow out of the exhaust port.
6. Connect a computer, with the PipeIQ software installed, to the unit using the Ethernet connection on the bottom of the unit.
7. Use the PipeIQ software to set up the unit configuration required for the particular application.
8. When the configuration is complete, remove the Ethernet connection to the unit.

FAAST 8125BPI USER INTERFACE

The user interface, shown in Figure 5a, provides the following information:

- Detector Status: Normal, Alarm, Fault or Isolate
- Alarm Level; Alert, Action 1, Action 2, Fire 1 and Fire 2
- Particulate Levels; 1-10 relative to user programmable scale
- Fault Status
- Flow Level
- Test, Mode and Isolate Buttons

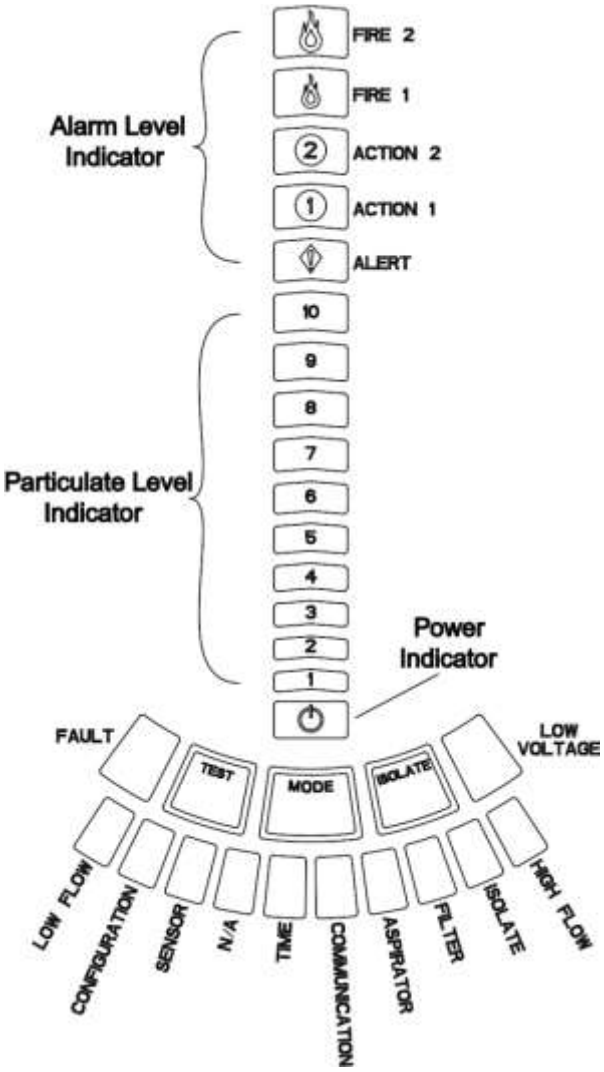


Figure 5a: FAAST 8251BPI User Interface Display

FAAST 8100 USER INTERFACE

The user interface, shown in Figure 5b, provides the following information:

- Detector Status: Normal, Alarm, Fault or Isolate
- Alarm Level; Alert, Action 1, Action 2, Fire 1 and Fire 2
- Particulate Levels; 1-10 relative to Alert
- Fault Status
- Flow Level
- Test, Reset and Isolate Buttons

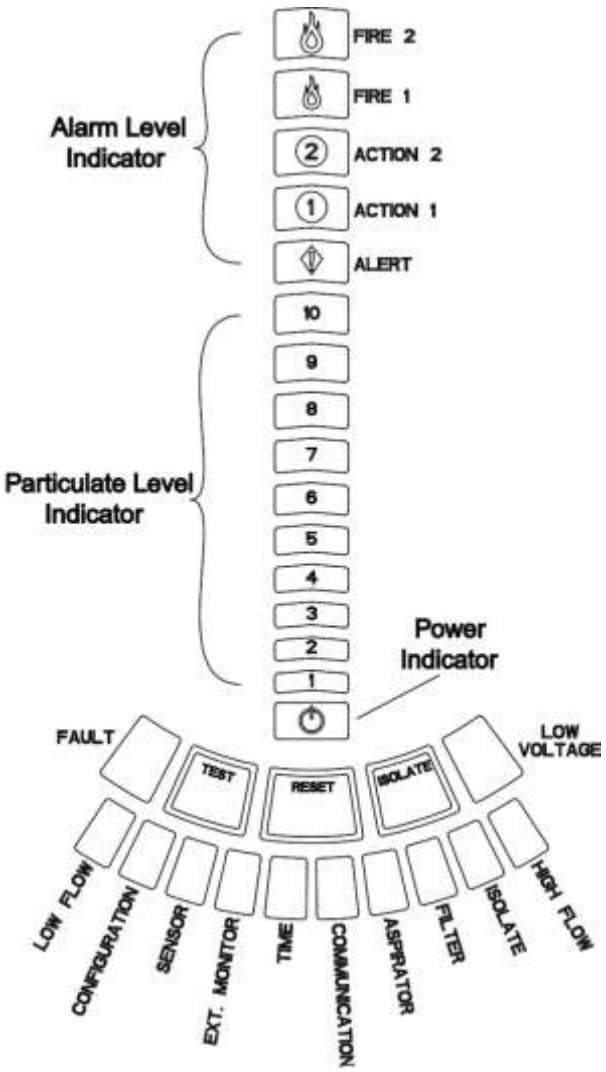


Figure 5b: FAAST 8100 User Interface Display

User Interface Card Installation

The user interface card must be installed on the front panel of the FAAST aspirating smoke detection system. For installation, first slide the card into the bottom pocket, then beneath each of the mounting tabs. 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. The user interface card is available in various languages.

Particulate Level Display

The particulate level display, shown in Figure 6, consists of ten amber LEDs that correspond to the current level of the particulate detected. The LEDs illuminate in order from Level 1 to Level 10, starting from the bottom of the display and moving up as the particulate level increases. Each LED represents a ten percent increase in the particulate level necessary to reach the Alert Alarm Level (FAAST 8100) or the level programmed by the User (FAAST 8251BPI).

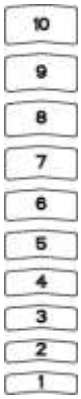


Figure 6: Particulate Level Display

Alarm Level Display

The Alarm Level Display consists of five red LEDs that correspond to the current Alarm level, shown in Figure 9. These LEDs are located directly above the Particulate Level LEDs. They illuminate sequentially upward as the severity of the Alarm increases.

These Alarm levels are configured at default levels when shipped and each Alarm level controls a set of Form-C relay contacts.

Control of the Alarm level is:

- 8251BPI : from the F100/F120 Configuration
- 8100 : modified using PipeIQ

When an Alarm level threshold is crossed, the corresponding level LED illuminates and the relay activates a signal. These Alarm levels and associated relay outputs can be programmed for either latching or non-latching operation, in addition to a programmable delay for each level from 0 to 60 seconds.

The programmable ranges for each level are shown in Table 2.

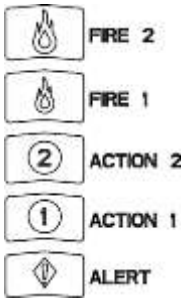


Figure 7: Alarm Level Display

Alarm Level Programmable Ranges

Alarm Level	Default Threshold (% Obs/m)	Programmable Range (% Obs/m)
Alert	0.0396	0.0015 – 20.5
Action 1	0.165	0.0033 – 20.5
Action 2	0.33	0.0102 – 20.5
Fire 1	0.825	0.039 – 20.5
Fire 2	1.65	0.039 – 20.5

Table 2: Alarm Level Programmable Ranges

AirFlow/Fault Display

The FAAST system uses ultrasonic airflow sensing and displays the status in real time on the User Interface. The air flow/fault display consists of 10-bicolor LEDs and operates in one of two modes. A fault warning occurs when airflow increases or decreases by 20% or greater. The green segments indicate how close the current air flow is to either of these thresholds. During normal operation two adjacent indicators are green and correspond to the current airflow entering the detector. When airflow is at a balanced level the two green segments are centred on the graph at levels 5 and 6, see Figure 8. As airflow rises and falls, the green segments move right and left accordingly. The segment on the far left represents a decrease in airflow of 20%. Conversely, movement to the segment on the far right represents an airflow increase of 20%. A flow fault occurs within 3 minutes of reaching either of these levels and a Fault relay operates:

- 8251BPI: the sole Fault relay de-activates
- 8100: for an airflow change exceeding 20-30% of Normal the Minor Fault relay operates.
  - for an airflow change exceeding 50%, the Urgent Fault relay operates

During a fault condition, the Fault LED as well as the corresponding High or Low Fault segment is lit in amber.

Labels

Detector faults are labelled adjacent to the indicators on the Air Flow Fault graph.

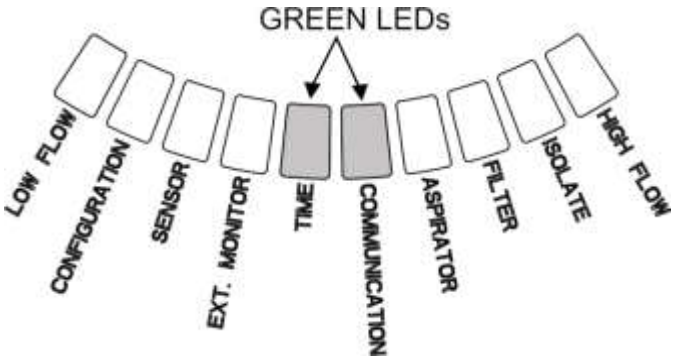


Figure 8: Balanced Air Flow

User Interface Buttons

The User Interface has three buttons, shown in Figures 9a (8251BPI) and 9b (8100) that are used to operate the unit. Functionality of these buttons are locked out by default from the factory and require a Passcode to enable them (refer to Passcode Access section). The passcode can be programmed from PipeIQ.

Figure 9a: 8251BPI User Interface Buttons

Figure 9b: 8100 User Interface Buttons

MODES OF OPERATION

Initialisation

When the FAAST system is first installed it is not configured and gives a fault indication by illuminating the configuration fault LED indicator. This indicates that the device has not had its initial configuration loaded and remains in this state until it is initially configured (refer to the Configuration section below for further instructions). Once configuration has started, the device performs an automatic initialization. This initialization sets the air flow baseline, the filter clogged baseline and the particulate level baseline. It is important that the system is connected properly and the filter is installed correctly when the device is initialized. These initial readings are used as a reference baseline to indicate when a fault occurs. Initialization may take up to five minutes to complete.

Startup

Once powered, the FAAST system scrolls the particulate display in green for one second and then initializes using its stored configuration. The device checks and establishes its initial airflow, filter and fan settings. If all measurements are normal it begins normal operation. If any fault is detected the appropriate Fault LED illuminates.

Configuration

The FAAST system is configured using the software included in PipeIQ. Data is sent via the built-in Ethernet connection. The device receives the configuration and performs a validation before the configuration becomes active. After validation of the data, the device performs an initialization with the new configuration.

Address Assignment

The loop address for a FAAST 8251BPI unit is set using the PipeIQ software. Each unit uses one loop address.
To assign the device a loop address, navigate to the 'Network' tab in the 'Configuration' portion of the PipeIQ project. Use the 'Identification Number' drop box at the top of the page to assign an address of 1 through 99. Each loop can support a maximum of 99 x analogue addressable FAAST devices.

Failure of Configuration Validation

If configuration validation fails, the software configuration tool indicates a failure and the FAAST system illuminates the amber CONFIGURATION fault LED on the user interface. The device will not accept any of the data as valid.
If a configuration fault occurs during the initial configuration or the device is unable to operate due to the configuration, the Urgent Fault relay will be set. The device must be re-configured using PipeIQ. If the configuration fault occurs after the initial configuration has been accepted, the Minor Fault relay will operate and the device reverts back to its last valid configuration.

Power or Network Loss during Configuration

During an upload of configuration data, the FAAST system keeps the last known valid configuration in memory until a complete validation is completed on the new configuration data. This prevents data corruption in the event of a power loss or network failure. When power is restored the device performs a Startup with the last valid configuration. The device also indicates a CONFIGURATION fault on the user interface and sets the Minor Fault relay. This occurs only once - when the next Reset or Power On Reset is performed the device continues to use the last valid configuration.

Normal Mode

In Normal operating mode the FAAST system displays the air flow and current particulate levels on the user interface. The particulate level is compared to the threshold levels programmed into the device and activates the appropriate alarm as particulate levels exceed that threshold. If any fault occurs it activates the corresponding fault LED and relay.

Test Mode

8251BPI: Test mode is initiated through the F100/F120 or by depressing the TEST button on the user interface, when the button is enabled (refer to passcode access section for activation details).

8100: Test Mode is initiated through the PipeIQ Live View tab or by depressing the TEST button on the user interface, when the button is enabled (refer to passcode access section for activation details). Test mode simulates a fire condition, 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 device from TEST mode

Reset Mode

FAAST 8100 Reset Mode is initiated through the PipeIQ Live View tab or by depressing the RESET button on the user interface, when the button is enabled (refer to passcode access section for activation details). When RESET is activated all relays are Reset. The device then enters Normal mode operation. If any Fault or Alarm states remain, the device re-activates the state automatically.

Acclimate

The FAAST system includes an Acclimate mode. Using Acclimate mode, a device's susceptibility to nuisance alarms can be reduced providing maximum protection for a device located in changing environments. The sensitivity of the unit continuously adjusts over time, within the set limits as the local environment changes. Acclimate mode must be activated and configured using PipeIQ

In Acclimate mode the device automatically adjusts the alarm point between a specified minimum and maximum sensitivity, programmed by the user. For the first 24 hours of operation the device monitors its environment. After the initial 24 hour period, the device adjusts the alarm point based on the particulate levels over a rolling 1 hour period. It then adjusts the alarm level starting from the insensitive boundary, based on the stability of the environment being monitored.

Setting Acclimate Mode

The user chooses the boundaries for each alarm level in the Acclimate mode. The FAAST system starts from the insensitive boundary and adjusts itself to stay within the sensitive boundary. It is also possible to have a static alarm level by adjusting the high and low boundary to the same level. This allows the flexibility to maintain acclimating levels for some alarms and static levels for others. Table 3 shows the various levels that are available.

Each Acclimate level is also available for monitoring with the PipeIQ tool. This allows the user to read the current Acclimated alarm level for each alarm.

Alarm Level	Threshold High Sensitivity	Threshold High 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

Table 3: Alarm Level Programmable Ranges

Day, Night and Weekend Mode

If Acclimate mode is not desired, the FAAST system can operate in a simple Day, Night and Weekend mode. This allows the device to have separate threshold levels for each state. Times can be configured for entering and leaving day and night time operation. The device has an internal time reference (clock) and automatically switches to the weekend mode for Saturday and Sunday.

Isolate

Isolate mode is initiated by pressing and releasing the ISOLATE button on the user interface when the button is enabled (refer to the passcode section). When the ISOLATE button is activated the FAAST system resets the Fault and Alarm relays. It then sets the Isolate relay and the ISOLATE Fault indicator illuminates on the user interface. In this mode the device operates normally but will not activate relays for any Alarm or Fault levels (except the Isolate relay). Fire and Fault events can still be seen on the user interface and the web server sends email notification of events, if enabled. Isolate mode will be held through Resets and power outages. The device will remain in Isolate mode until removed by pressing the ISOLATE button. Isolate mode may be enabled and disabled using Monitoring mode in PipeIQ.

Disable

Disable mode is initiated by pressing and holding the ISOLATE button on the user interface for 3 seconds when the button is enabled (refer to the Passcode section). When the ISOLATE button is activated, the FAAST system resets the Fault and Alarm relays. It then sets the Isolate relay and the ISOLATE Fault indicator illuminates on the user interface. In this mode the fan switches off and the device does not report any Alarm or Fault levels on the user interface or activate any relays (except the Isolate relay). This mode should only be used when the system needs to be taken off-line. This mode will be held through Resets and power outages. The device will remain in Disable mode until removed by pressing the ISOLATE button. Disable mode cannot be enabled or disabled using Monitoring mode in PipeIQ.

User Button Alternate Functions

Passcode Access

The user interface has an option that requires users to enter a security code before the front panel functions become active. All passcodes must be 4 digits in length using numbers 1 through 9 (0 cannot be used).
Passcodes may only be changed using PipeIQ software. PipeIQ is also capable of locking out buttons individually, so that certain buttons may be accessed without a passcode, if desired.
The default passcode is '1111'.
The TEST button enters digits, the MODE/RESET button is used to enter the unlock mode and the ISOLATE button increments the current digit.
To enter the passcode mode, press and hold the MODE/RESET button for 8 seconds - the first segment on the flow indicator first illuminates yellow, then green.
When the segment illuminates green, release the MODE/RESET button. The first segment on the airflow display blinks green, indicating the device is ready to accept the first digit.

Figure 10: 8000 Series User Interface Buttons

To enter the passcode, use the ISOLATE and TEST buttons, shown in Figure 10.
The ISOLATE button is used to increment the current digit. As the current digit is incremented the segments of the Particulate Bar Graph illuminate accordingly.
To complete entry of the digit, press the TEST button. As each digit is entered the airflow segment illuminates solid green and the next segment begins to flash, indicating the next digit is ready to be entered. After the 4th digit is entered, the Fault indicator illuminates green, if the passcode was accepted and remains green as long as the detector is "unlocked". If the passcode was not accepted, the Fault indicator illuminates amber for 3 seconds then the device returns to its previous state. Once the passcode is accepted, the locked out button(s) become active. After 45 seconds of inactivity the Fault indicator begins to blink green. After an additional 15 seconds the detector re-locks the button(s) and returns to Normal operation.

Note: If the RESET button is chosen as a locked button, and a Reset is initiated, the device requires the passcode to regain access to the RESET button.

Address Blink Mode

- 8251BPI

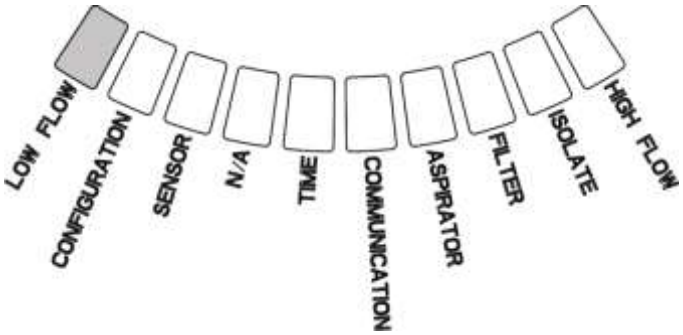


Figure 11a: 8125BPI Address Blink Mode

The FAAST 8251BPI can output its' 3-digit address through the user interface. This can be accessed from the user interface by pressing and holding the MODE button for 3 seconds. After 3 seconds the first segment on the airflow display turns amber indicating the device is in Address Blink mode. Release the MODE button and the device gives the 3-digit address by lighting the particulate bar graph the appropriate number of segments for each digit. The current digit displayed is indicated by the 6 left-most indicators on the airflow graph. The first 3 segments are the loop.

- 8100

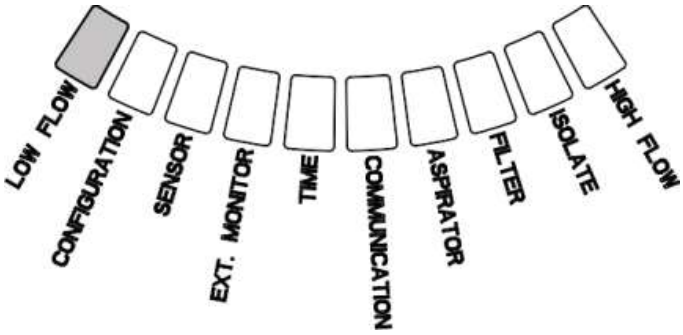


Figure 11b: 8100 Address Blink Mode

The FAAST 8100 has two types of addressing capabilities. In addition to the IP Address, the FAAST system can also have a local address that is assigned through the configuration software. The address can be between 1 and 255. This address can be accessed from the user interface by pressing and holding the RESET button for 3 seconds. After 3 seconds, the first segment on the airflow display illuminates amber, shown in Figure 10, indicating the device is in address blink mode. Release the RESET button and the device shows the 3 digit number assigned by lighting the particulate bar graph with the appropriate number of segments for each digit. The current digit displayed is indicated by the 3 left most indicators on the air flow graph. The first digit is the 100's and illuminates for 2 seconds. Next, the tens digit illuminates for 2 seconds, followed by the ones digit illuminating for 2 seconds. If one of the numbers is zero, then no lights will illuminate for that number on the particulate graph.
The device then returns to Normal operating mode.

IP Address Blink Mode

If the device IP has been lost or is unavailable, it is possible to obtain the address using the IP address blink mode. The IP address can be accessed from the user interface by pressing and holding the MODE/RESET button for 30 seconds. The digits are displayed using the method as described in the Address Blink mode, except that the FAULT and LOW VOLTAGE indicators are used to show the 1st and 12th digit, respectively. The device gives the 12 digit number by illuminating the particulate bar graph to the appropriate number of segments for each digit, as shown in Figure 12. This example shows that the 5th number of the IP address is 7. The current digit displayed is indicated by the FAULT, FLOW / FAULT and VOLTAGE indicators (Figure 13) starting with the FAULT for the 1st digit, progressing through the HIGH FLOW, and ending with the LOW VOLTAGE for the 12th digit. If one of the numbers is zero, then no lights will illuminate for that number on the particulate graph. The device will return to Normal operating mode.

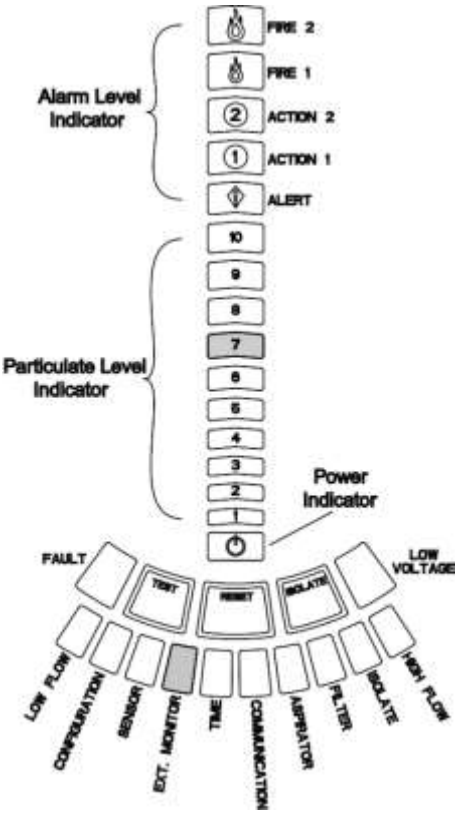


Figure 12: IP Address Blink Mode

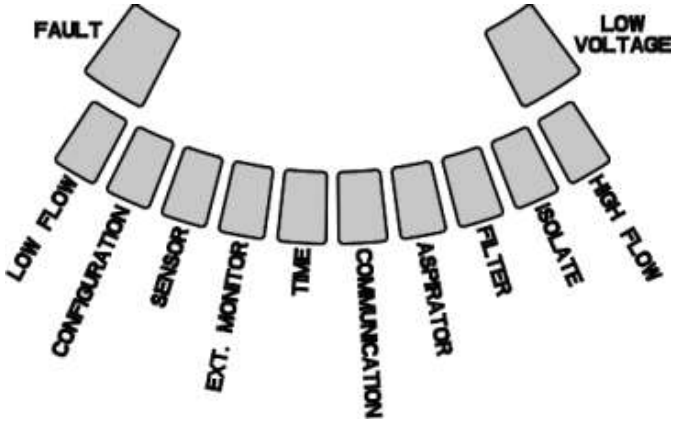


Figure 13: IP Address Indicator Lights

Real-Time Clock

The unit is equipped with a real-time clock and power supply that allows the FAAST system to maintain the date and time for up to 72 hours after a loss of power. Date and time are configured through PipeIQ. The real-time clock is used to maintain a time base for the device. This time base is used to time stamp all log entries, as well as determine when it is time to transfer from Day, Night and Weekend modes. If the device loses power for more than 72 hours the device sets the TIME fault indicating the time needs to be updated.

Logs

Event Log

The FAAST system is equipped with internal memory that can be configured to log detector events. Up to 18,000 events can be stored. Events that are tracked include Alarms, Faults and User Actions. Event tracking data may be accessed via the network through the PipeIQ software or the Web server interface.
Configuration and management of the log are done using the PipeIQ software.

Data Trend Log

The FAAST system tracks trend data for each 24 hour time period, up to 1 year. The device records the minimum, maximum and average reading of the sensor and flow values for each day.

Message Log

The message log allows the user to enter generic text messages into the system's memory. Messages may be retrieved for viewing at a later time. These messages may be used to track service history, configuration changes, etc. 300 messages maximum may be stored.

External Monitor / Reset

The FAAST 8100 has an external monitor that can detect an open or short when the 47KΩ End of Line resistor supplied is used. When the device senses an open-circuit it sets the External Monitor fault indicator and sets the Minor Fault relay. When a short-circuit is detected the device performs a Reset, providing the ability to Reset latched Alarms remotely.

Ethernet Connection

The FAAST is a network capable device compatible with standard Ethernet networking equipment. Connectivity is provided by an on-board RJ45 connector located on the base of the unit – refer to Figure 15. The network interface is required for initial configuration of the FAAST 8100. Once initial setup is complete, the Ethernet connection provides optional remote access, monitoring and email notification using the unit's Web server and SMTP client.

Faults

Number	Name	Description	8100 Activated Relay
1	Low Flow	8251BPI : Device has decreased airflow	Fault
		8100 : Device has decreased airflow of 20%	Minor Fault
		8100 : Device has decreased airflow of 50%	Urgent Fault
2	Configuration	Configuration of device with Configuration software has failed	Minor Fault
		Device was interrupted with a power loss during configuration. Reset clears this fault and the device reverts to last good configuration	Minor Fault
		Device is new and has not been configured	Urgent Fault
		Device has corrupt configuration and is unable to operate	Urgent Fault
3	Sensor	Device has problem with the particulate sensor and needs immediate replacement	Urgent Fault
4	N/A	8251BPI : Not Applicable	Fault
	Ext. Monitor	8100 : External Monitor detects open	Minor Fault
5	Time	Internal Time Base needs updating	Minor Fault
6	Communication	8251BPI : Device has failed to communicate to Loop and cannot function correctly	Fault
		8100 : Device has failed to communicate to one of its peripherals and cannot function correctly	Urgent Fault
7	Aspirator	The Fan has stopped operating and requires immediate attention	Urgent Fault
8	Filter	8251BPI : Device Filter is clogged and requires replacement	Fault
		8100 : Device Filter is clogged and requires replacement	Minor Fault
		8100 : Device filter is clogged and has not been replaced 72 hours after giving the Filter Fault with minor Fault relay set	Urgent Fault
9	Isolate	Device has been put into Isolate mode	Isolation Fault
10	High Flow	8251BPI : Device has increased airflow	Fault
		8100 : Device has increased airflow of 20%	Minor Fault
		8100 : Device has increased airflow of 50%	Urgent Fault
11	Low Voltage	Device Input Voltage is Low	None

Table 4: Fault Description

Fault Display

Whenever a fault occurs, the general FAULT indicator illuminates amber and the Flow status bar oscillates between Flow status (green) and a detailed fault status (amber).
Table 4 shows the number, name, description and the relay activated for each fault. Note that the 8251BPI has a single Fault relay, while the 8100 has two Fault relays – Minor and Urgent
The fault display on the user interface is shown in Figure 14a (8251BPI) and Figure 14b (8100)

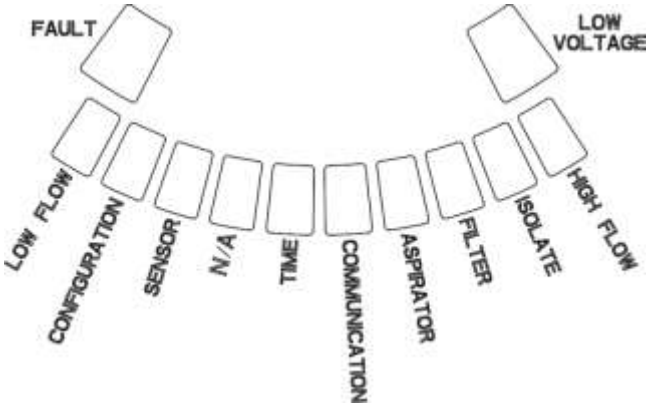


Figure 14a: 8251BPI Fault Display

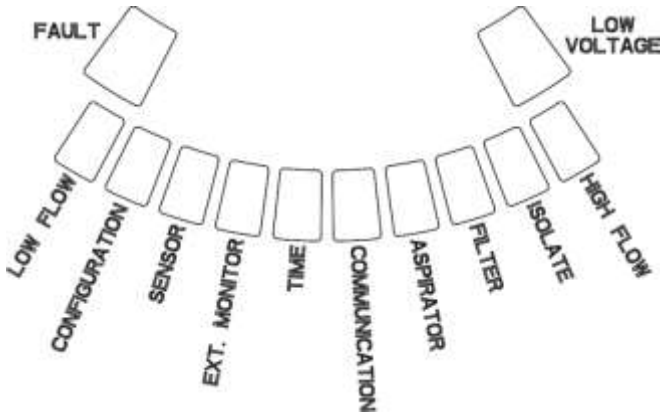


Figure 14b: 8100 Fault Display

Pipe Network

The unit can monitor up to 1000m^2 with a properly designed pipe network. The pipe network must be properly configured using the PipeIQ software.

- The pipe network accommodates a maximum single pipe length of 80m. If two branches are used, the maximum single pipe length is 50m.
- The device uses 25mm outside diameter (OD) pipe without the use of an adaptor. The internal pipe diameter can range from 15-21mm.
- Only 1 inlet and 1 outlet pipe are used at a time.
- Pipe networks may be constructed of various materials such as uPVC, cPVC, PVC, ABS, copper or stainless steel pipe.
- Travel time from the furthest hole depends on the application of the device, but is limited to a maximum of 120 seconds by the PipeIQ software.
- Refer to local agency requirements and PipeIQ software for proper configuration.

Web Server

The FAAST system contains an integrated Web server which is used to observe detector configuration and may be used to remotely monitor the unit.
The Web server features include:
• Intuitive interface for remote monitoring of faults, relays, particulate level, air flow, and power supply
• Facility location and contact information
• Configuration settings display
• Multi-Lingual support
• Event log viewer

Email Notification

The FAAST system has the ability to send e-mail notifications to an individual or organization. Up to 6 different email addresses may be stored for notification.
Each email address can be configured to be notified of a specific Alarm level, Fault level or Isolate condition through the PipeIQ software. E-mails from the device indicate a device's ID, location and Alarm or Fault type.
A comprehensive networking guide may be downloaded at www.systemsensor.com/faast.

Canned Smoke Tests

All FAAST systems must be tested after installation and periodically thereafter.
Test methods must satisfy the (AHJ) authority having jurisdiction. Systems offer maximum performance when tested and maintained in compliance with NFPA 72. Pertronic Industries recommends the use of Smoke Pens (PN: SMOKEPEN) however tested and approved aerosol smoke products are listed in Table 5.

UL Listing	Company	Aerosol
UL	Home Safeguard	25S
ULC	No Climb	SOLOA4
		SMOKE SABRE-01
UL	SDI LLC	CHEK02, CHEK06
		SOLOA3
		SMOKE SABRE-01

Table 5 Canned Smoke Testing

Maintenance

The only periodic maintenance required is to replace the filter assembly when the Filter light is illuminated. Perform the following procedure to replace the filter assembly.

1. Remove power from the system.
2. Open the door on the right side of the device that covers the LED system indicators.
3. Remove the plastic name card over the LEDs.
4. Remove the two screws holding the filter assembly into the device.
5. Remove the filter assembly and replace it with a new assembly.
6. Torque the two Philips head screws to 0.7N-M or ¼ turn past "lightly snug."
   PLEASE DO NOT OVERTIGHTEN.
7. Replace the plastic name card over the LEDs.
8. Close the door and return power to the system.

Other system checks may need to be performed in accordance with local or national codes and regulations.

FAAST XM Detector Base

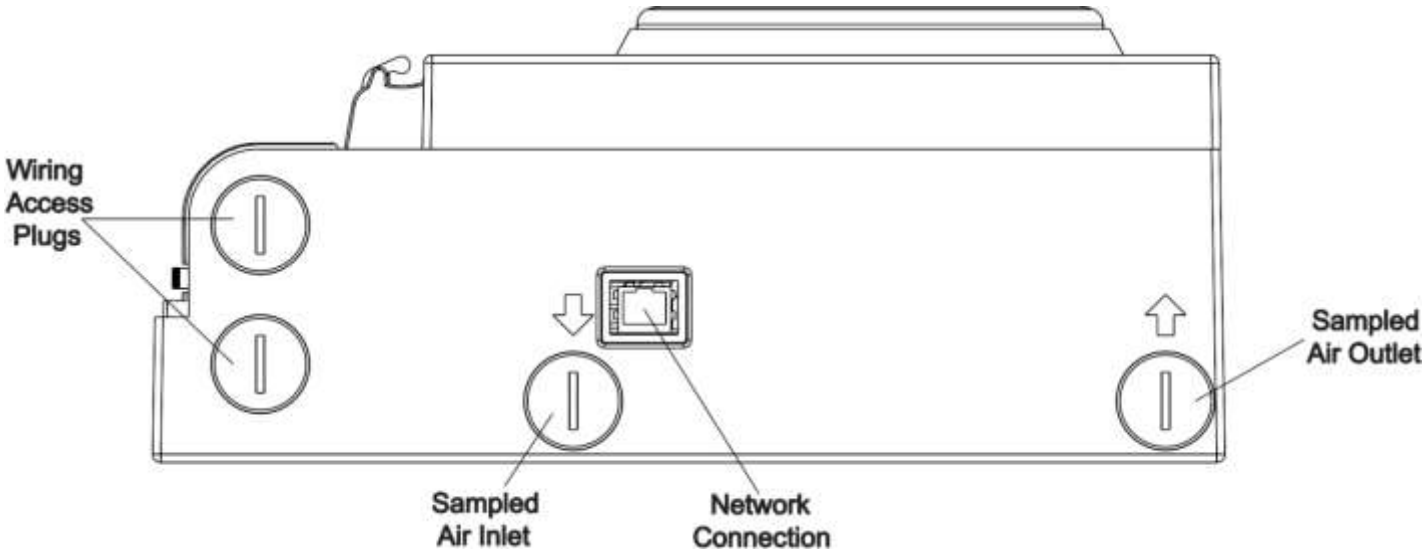


Figure 15: Detector Base

Section B : CONNECTING to FAAST XM from PipeIQ

Ethernet Connection:

EtherNet connectivity is provided by an RJ45 socket located beneath the detector – refer to Figure 15 on Page 13. The EtherNet interface allows access to a range of additional options, via the **PipeIQ** application software, when connected to a PC. The EtherNet connecting cable should be removed during normal operation.

PipeIQ™ QUICK START INSTRUCTIONS

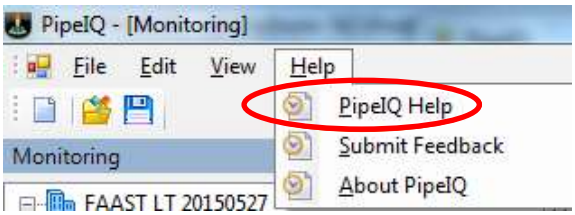
Overview: the PipeIQ software program is a convenient and powerful Windows® based application used to quickly and accurately design pipe networks, generate configuration parameters for correct set-up and operation and facilitate commissioning and monitoring of the performance of FAAST XM Aspiration devices.

PipeIQ provides a graphical interface on a PC to:

- design and verify the performance of pipe network solutions.
- draw and view pipe designs in 3D
- configure the design parameters to suit local fire codes and standards.
- generate Pipe Layouts, BOMs, Configuration and Event Log Reports.
- test relays and alarms, perform smoke test, and fans speed test
- retrieve and view logs in graph and tabular form
- control, test and monitor FAAST aspirating detectors.

A comprehensive **Help** Menu is available from the Menu Bar to guide the user through the different windows and options : **Help\PipeIQ Help**.

The contents have a detailed index and a versatile search facility to locate relevant topics.



Refer to **I56-3888-001P FAAST LT PipeIQ Configuration Guide** for detailed instructions on configuring the FAAST LT ASD detector

QUIK-START GUIDE

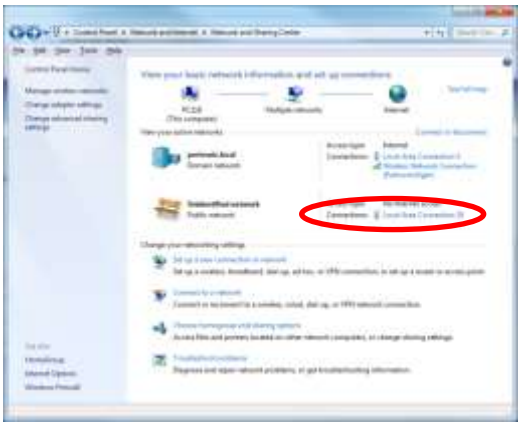
Equipment Required:

a) RJ45 EtherNet connector: the FAAST XM series detectors use an RJ45 socket.

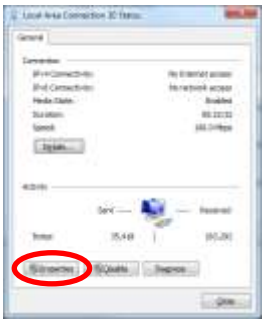
b) USB – EtherNet Adaptor : this sequence is based upon configuration of a Digitus DB-3023 USB 3.0 EtherNet Adapter

   a. Install the Driver software

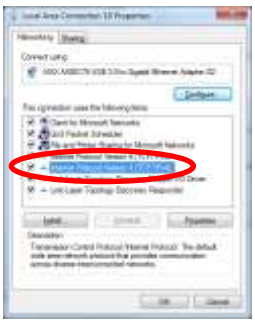
   b. Configure the USB – EtherNet Adapter:



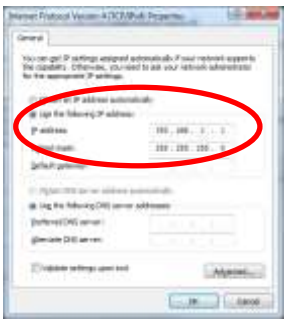
i. Control Panel\Network and Internet\ Network and Sharing Center



ii. Local Area Connection - Properties



iii. Internet Protocol Version 4



iv. IP Address

c) PC with PipeIQ v2 or greater installed. PipeIQ software is available for download from:
https://www.systemsensor.com/en-us/Pages/PipeIQ.aspx

You will be requested to register and login to the site to gain access to the software.

Caution: DO NOT use PipeIQ v1, available from the CD included with the FAAST detector or available from :
http://www.faast-detection.com/contact-us/download-pipeiq/

Connection to the FAAST XM:

a) Open PipeIQ (v2 or greater) on the PC – by default, PipeIQ opens in **Configuration** mode
b) Open a project file (*.mdf) to continue – use one of the following methods:
   i. open an existing project configuration (*.mdf) file for the FAAST XM or
   ii. start a New Config and add a FAAST detector of the type to be installed or being maintained
      - save this Config file : use a filename which will readily relate to the detector under test
        eg. 8251BPI-3 20150528 for the third Analogue Addressable FAAST detector on the site
c) Power up the FAAST XM - wait until the FAAST has completed initialisation (the Power LED turns green):
d) Select **View \ Configuration** from the Menu bar, right click the detector configured in Section b) above and then select **Connect Device**

e) Select the detector at the appropriate Host / IP. select Admin and enter the password (default – *password*), then Connect:
f) Align the detector and PC Configurations by either:
   i. b) i. above. Right click the device and select Send Configuration to a new detector or a detector which is being updated
   ii. b) ii. above. Right click the device and select Get Configuration for an existing detector being maintained

Section C : CONFIGURING FAAST XM (8000 Series) in PipeIQ

A. Configuration: the following screen shots identify the parameters which are configurable on the 8000 Series FAAST XM devices. Review all parameters to ensure they are appropriate, taking particular care to ensure the coloured parameters are correct

a) General:

(i) Model Number: select 8251BPI or 8100

(ii) General: complete the details for identifying the Name and Location of the detector

(iii) Device Details:
- **Serial Number:** this will self-complete after connection to the detector
- **Identification Number:** enter the detector's Loop Address (8251BPI)
- **Enable DayLight Saving:** if required, select Custom, then:
  Starts On: last Sunday September 02:00
  Ends On: 1st Sunday April 03:00
  Time Saved: 60 min
- **Date and Time:** should ONLY be updated when connected to the FAAST detector.
  Either complete the actual time at Device or if the PC time is correct, simply select the arrow to download the PC time to the detector
- **Time Format:** select either 12 Hour or 24 Hour format
- **Trend Log:** select the Frequency for logging the detector functions to the Trend Log – note that as the frequency increases, the duration of the Log reduces (Capacity/Frequency=Duration of Log)

b) Sensor:

(i) Alarm Threshold and Delay:

Enable or Disable Acclimate Mode:

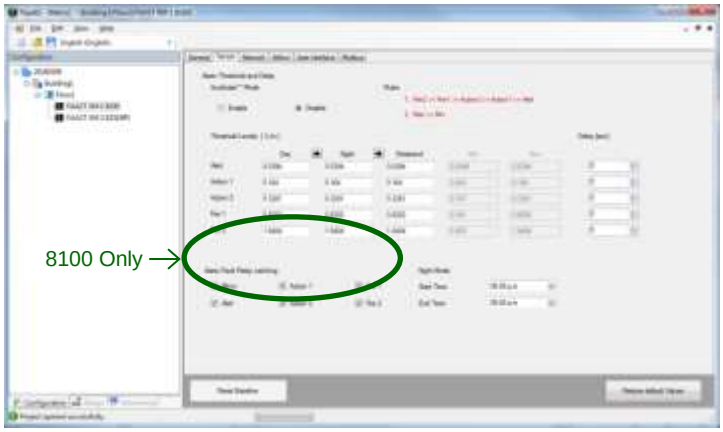
Acclimate Mode:

- **Enable :** enter the **Min** and **Max** Sensitivity Level for each activation level
- **Disable :** enables **Threshold Mode**

Threshold Levels (%/m):

- enter the required **Day**, **Night** and **Weekend** Sensitivity Level for each activation level

  Note: the Threshold Levels may alternatively be set during Design – refer to **Design**



Delay (sec): introduces a specified delay and verifies if the alarm condition still exists before triggering the Alarm

(ii) Night Mode: select Start Time and End Time

(iii) Alarm/Fault Relay Latching: Alarms and Minor Fault can be individually configured to be Latching or Non-Latching

c) Network:

(i) Passwords:

FAAST XM devices have two types of password:

- **Web Access Password:** required to access remote monitoring available via a web browser
  - the default **Password** is *1234*
- **Administrator Password** - required to reconfigure FAAST devices using PipeIQ software
  - the default **Password** is *password*

Caution: if a Default Password is changed and then lost, there may be a delay before Pertronic can identify the password so that it can be accessed or changed

(ii) Device Mail Server Configuration:

- **Sender Account:** enter the email ID for the **Sender Account**
- **SMTP Server Name:** enter the **SMTP Server Name** to use for email communication
- **SMTP Port**: default Port = 25 - contact the site IT department to confirm the correct Port

(iv) Device Connection: select an IP Address automatically via DHCP or use a Static IP Address:

- Obtain an IP Address automatically via DHCP
  - contact the site IT department to obtain the information required to connect to the site's ethernet
- Use a Static IP Address:
  - IP Address: Default = 192.168.1.10
  - Subnet Mask: Default = 255.255.255.0
  - Default Gateway: Default = 192.168.1.1
  - DNS Server: Primary and Secondary - contact the site IT department to obtain the information required

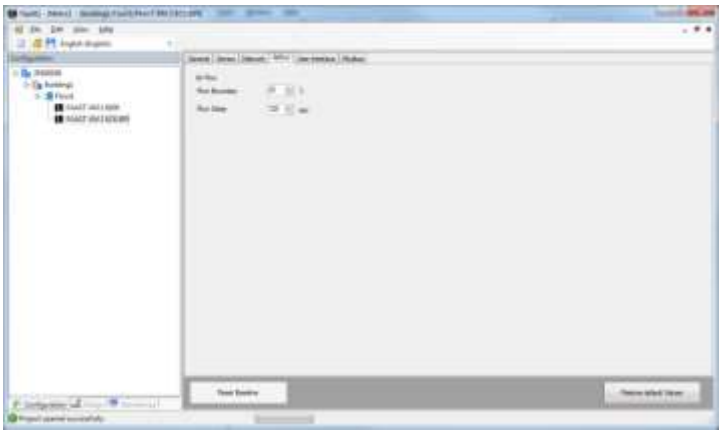
(v) Email Notification:

- enter the Email addresses of the Users to whom to send the Alarm notifications. Email addresses may be a Group of addresses
- select the notifications each user should receive using the check boxes

d) AirFlow

(i) Flow Boundary: specifies the set limit for the Air-flow
- applicable settings are 0 to +/-50%
- Default setting is +/-20%
- Note:

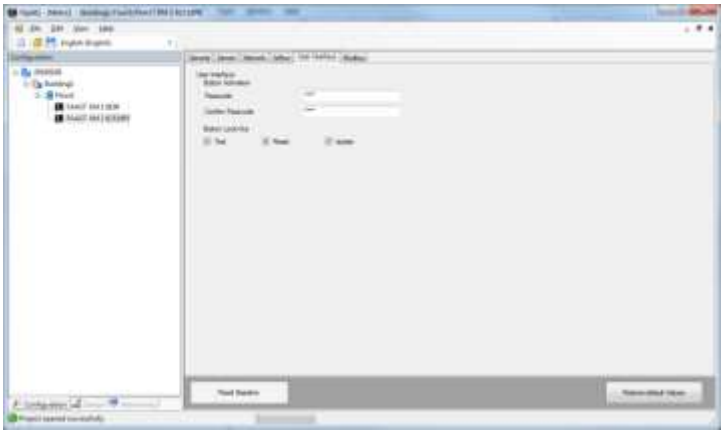
(ii) Flow Delay: specifies the time set for the Air Flow Defect
- applicable settings are 0 to 255 seconds
- default setting is 120 seconds



e) User Interface:

(i) Button Activation: sets the Passcode to make the buttons available at the user interface
- default Passcode is 1111

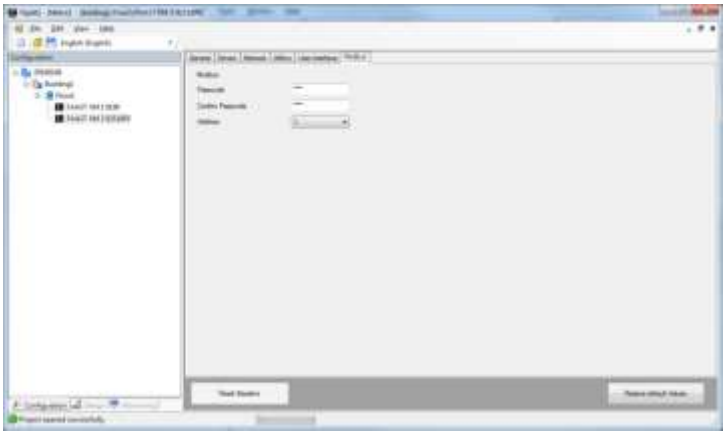
(ii) Button Lock-Out:
- **Test:** initiates the self-test mode and simulates a Fire 2 Alarm condition. The Alarm relays are also latched after the programmed delay
- **Reset:** to Reset latched Alarms and Defects
- **Isolate:** initiates Isolation mode - the device is temporarily disabled and does not report Alarm conditions



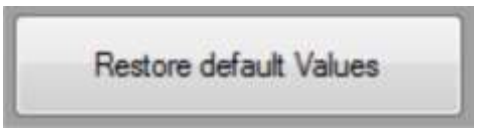
f) ModBus

(i) ModBus: sets the Passcode to unlock the buttons on the device user interface
- default Passcode is 1111

(ii) Address: sets the address for the TCP port
- default Address is 1



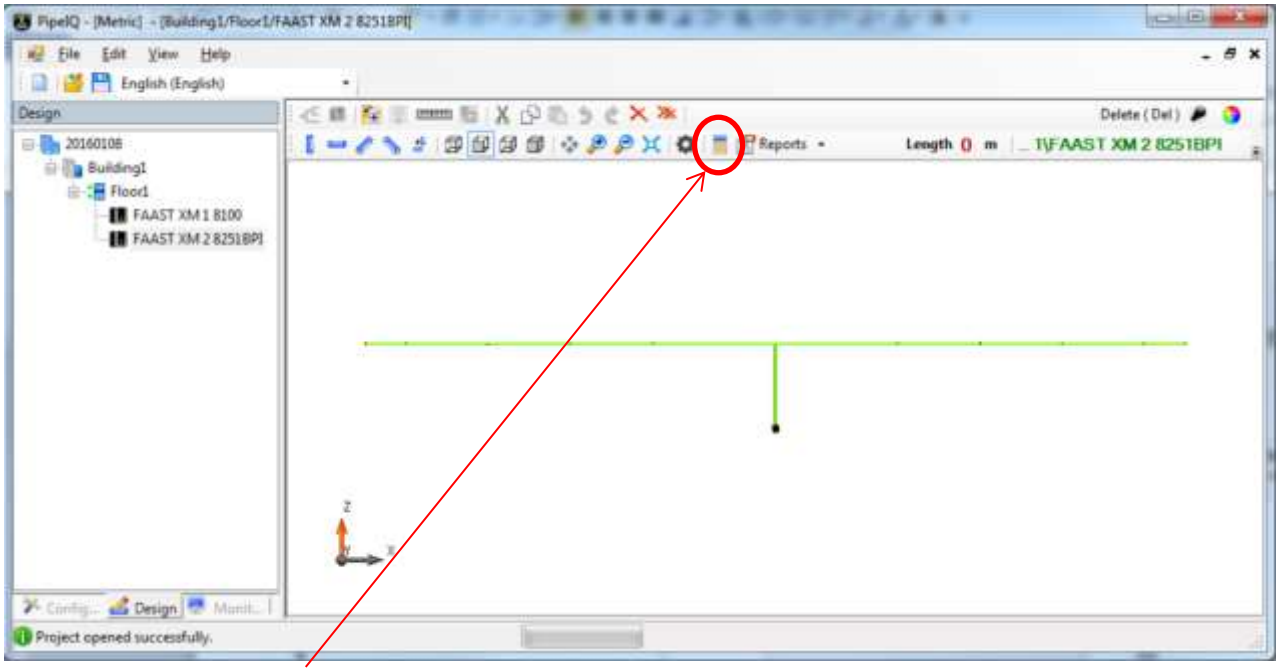
g) Restore Default Values: select to restore all configuration parameters with Default values



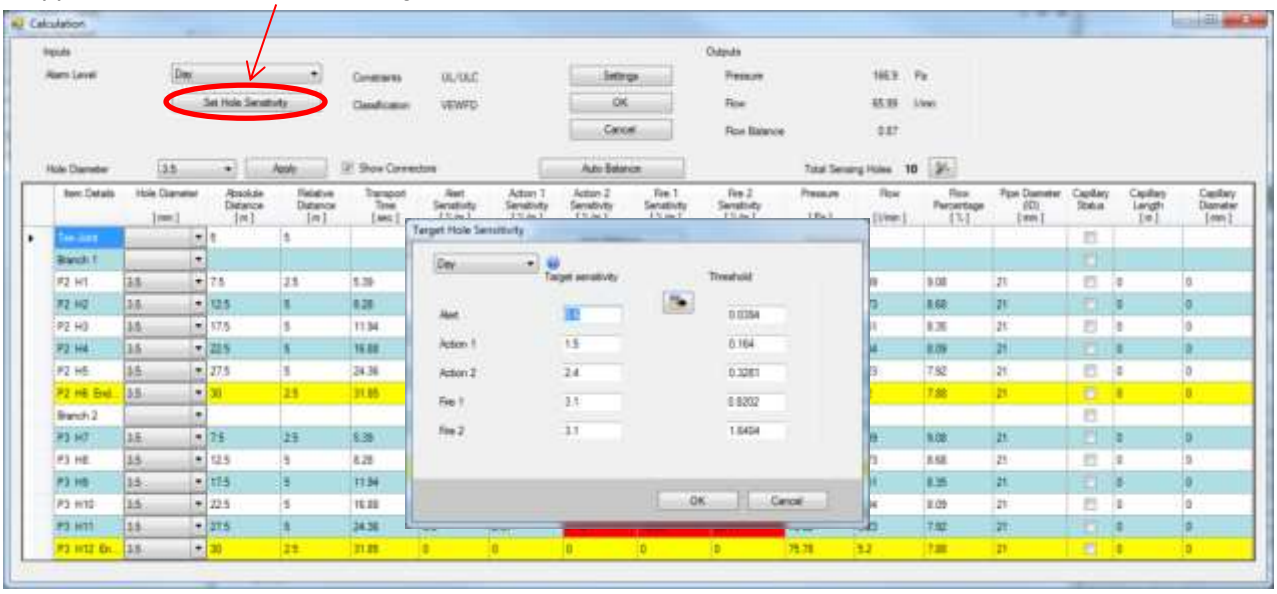
h) Reset Baseline: establishes an AirFlow baseline for the detector, displaying the true measured airflow status.

B. Design: the following screen shots illustrate how to set the Hole Sensitivity from the Calculation window in Design

a) **Setting Hole Sensitivity:** design the required pipe layout to meet the system requirements



(i) select the **Calculation** icon
(ii) select **Set Hole Sensitivity**

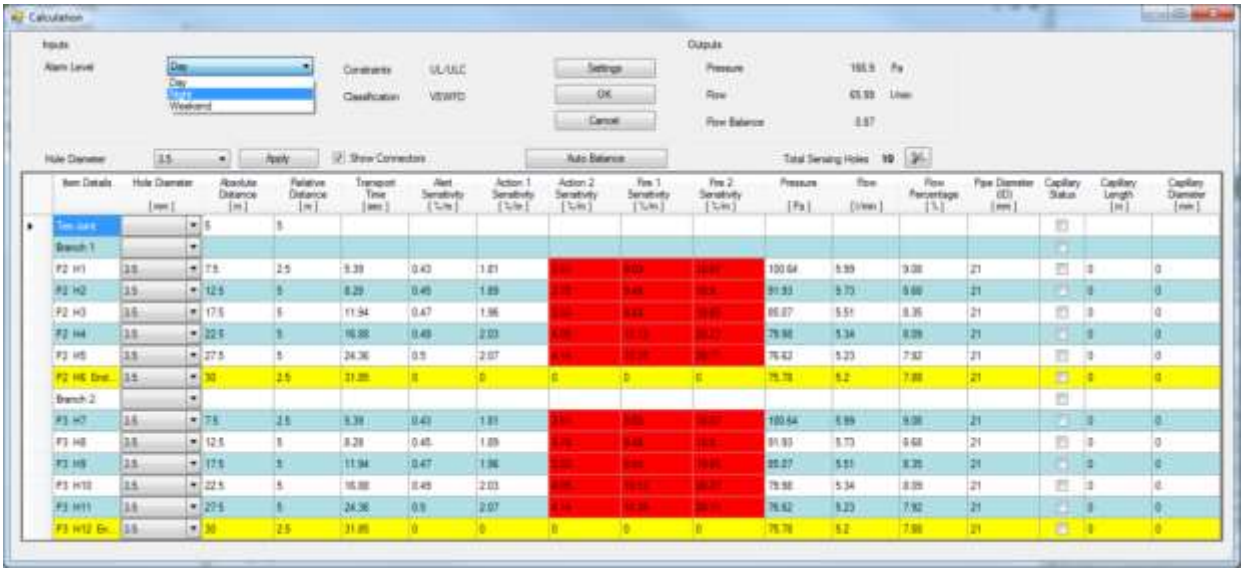


(iii) set the Target Sensitivity for each of the activation levels: Alert; Action 1; Action 2; Fire 1 and Fire2
- the Target Sensitivity represents the sensitivity at the Sampling Point and equates to the sensitivity of a point detector, eg. an OPT detector
- typical **Target Sensitivity** levels may be:

Activation Level	VEWFD	EWFD	SFD
Alert	0.1	0.3	0.6
Action 1	0.6	0.9	1.5
Action 2	1.2	1.5	3
Fire 1	2.5	3	6
Fire 2	3	4.5	8

press the arrow to convert each **Target Sensitivity** to **Threshold**, then **OK** to accept
- this is the value used by **Threshold Values (%/m)** in **Configuration \ Sensor**

(iv) identify cells which do not meet the system constraints – highlighted in red

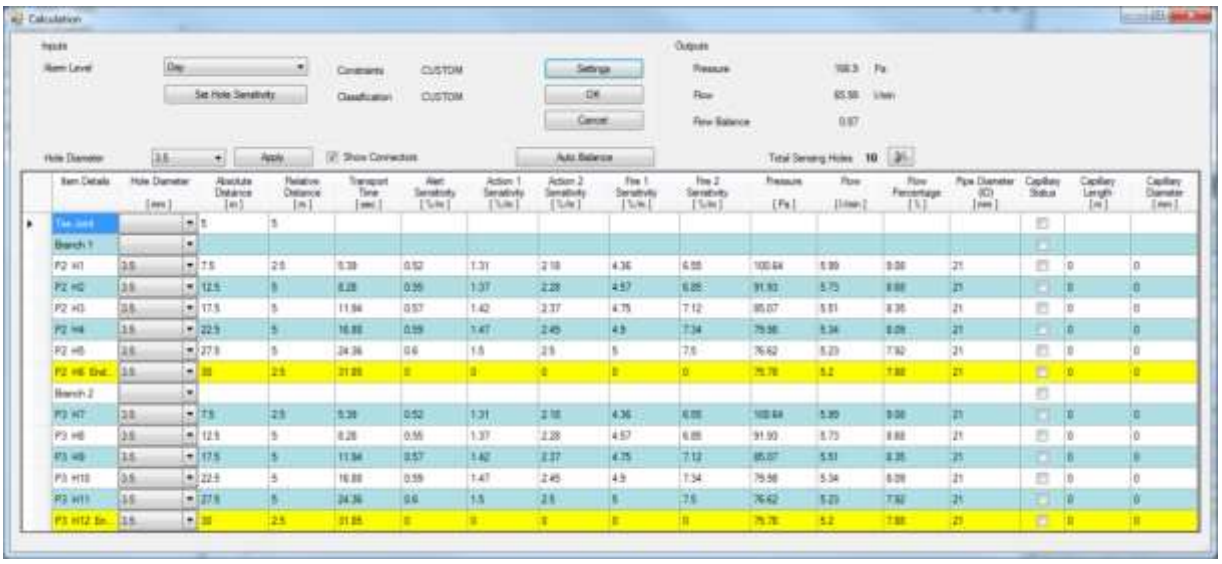


(v) select **Settings \ Constraints**, then **CUSTOM**

- first review the **Sensitivity** settings used by **VEWFD**, **EWFD** or **SFD** to identify appropriate settings for the system being configured, then apply settings suitable to the **CUSTOM** constraints

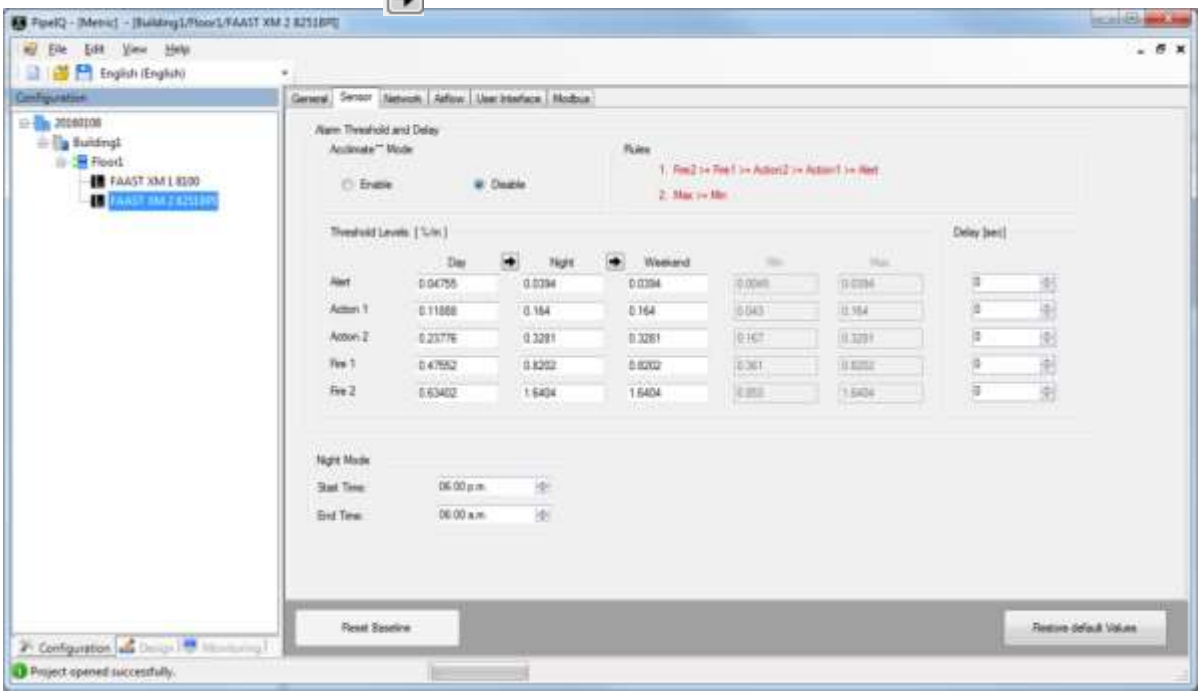
(vi) accept any advisory notices, then verify all Settings meet the Constraints

- verify **Flow Balance**: should be =>0.70
- select Auto Balance to maximise **Flow Balance** and manually adjust **Hole Diameters** if required to achieve **Flow Balance** =>0.70



(vii) the amended Sensitivity settings will be reflected in the Sensor settings in Configuration – refer to **Threshold Levels (%/m)** under **Alarm Threshold and Delay** in **Configuration \ Sensor**

- in the screenshot below, the **Day Threshold Levels** reflect the fact the **Day** Sensitivity has been amended, while **Night** and **Weekend** are default values
- **Night** and **Weekend** Threshold Levels can be sequentially updated to match the **Day** values simply by pressing the arrow 



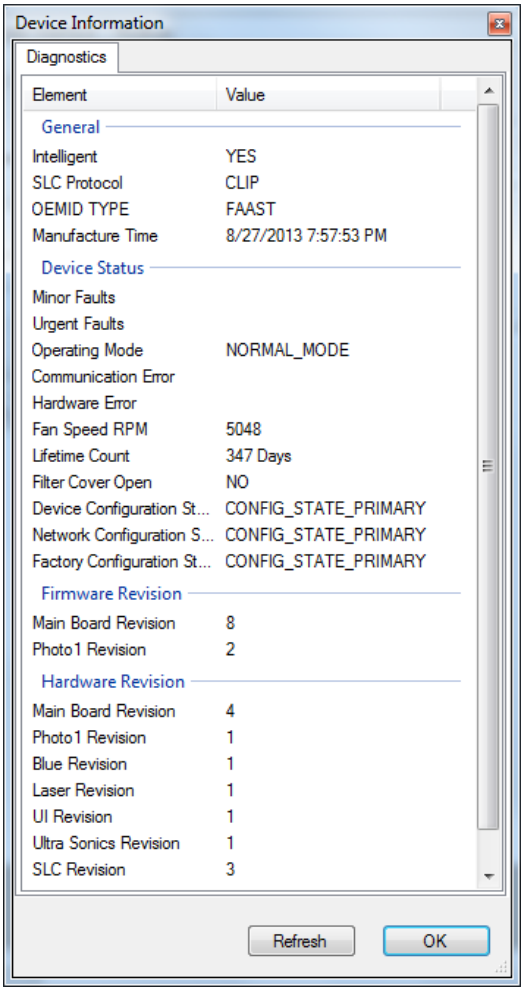
(viii) Select the device from the tree, right click and select Device Information.

- record the following details in Section H : FAAST XM System Validation Form:

a. Fan Speed RPM
b. Flow Velocity Inlet 1
c. Flow Velocity Inlet 2
d. Flow Velocity Inlet 3
e. Flow Velocity Inlet 4
f. Flow Base Inlet 1
g. Flow Base Inlet 2
h. Flow Base Inlet 3
i. Flow Base Inlet 4

- Flow Velocity values represent the current flow rate through each Inlet
- Flow Base values represent the flow rates as measured during the BaseLining process

Flows are measured in m/s, while PipeIQ calculates flow rates in l/min - a Flow Rate Conversion Table is available at Section G



Section D : CONFIGURING Pertronic Fire Alarm Panels

Analogue Addressable F100 / F120:

8251BPI Loop-Addressable

Type: the Loop Address set by the FAAST detector address wheels is configured as **TYPE = FAST**

- since only the Base Address can activate the Fire (F100) or Brigade (F120) relay, this address will generally be configured for **FIRE 1** activation, though the Base Address may be configured for **FIRE 2** activation
- more sensitive activation levels are configured as **TYPE = vFAST**
  - three virtual addresses are available, so these will typically be selected from **Alert, Action 1, Action 2** or **Fire 1**, if **Fire 2** is configured for the Global Alarm.

Sensitivity: the FAAST 8251BPI detector **Threshold Levels** are configured at the detector:

Configuration \ Sensor

- the **Threshold Levels** are converted to five **Activations Levels** in the panel: **ALERT, ACTION 1, ACTION 2, FIRE 1** and **FIRE2**. Set the Sensitivity for each Activation Level per the Table below.

Activation Level	Type	PW4	F100	F120
			Day = Night	Day = Night
Alert	vFAST	≥1280	1	+1
Action 1	vFAST	≥1648	2	0
Action 2	vFAST	≥1968	3	-1
Fire 1	FAST	≥2400	4	-2
Fire 2		≥2784	5	-3

Flags and Outputs: the remaining Flags and Outputs should be configured as required for each activation level

- Each Activation Level provides individual Threshold Levels (sensitivity) for **Day**, **Night** and **Weekend** use
- the F100 / F120 may also have Day/Night mode active to provide different Sensitivity levels for Point detectors and other functions on site, however these should not be applied to FAAST detectors – set DAY sensitivity = NIGHT sensitivity.
  The F100 / F120 simply recognise the state (Activation Level) of the FAAST detector - the various Sensitivity levels are provided by the FAAST detector as configured in PipeIQ

8100 Stand-Alone

Type: the FAAST 8100 Stand-Alone detector provides clean-contact relay outputs - these generally connect to Loop Addressable Input Modules (eg M500MB or similar) to connect to an F100 / F120 panel
- all activation relays are configured as **TYPE = SW (Module)**
- generally the **FIRE 1** relay will be configured to activate the **Fire** (F100) or **Brigade** (F120) relay, though the **FIRE 2** relay may be configured to activate the Fire (F100) or Brigade (F120) relay where two Local Alarm level actions are required
- as many Activation Levels (1 – 5) as required may be used, since each uses a separate Input Module.

Sensitivity: the FAAST 8100 detector Threshold Levels are configured at the detector :
Configuration \ Sensor
- five **Activations Levels** are available: **ALERT**, **ACTION 1**, **ACTION 2**, **FIRE 1** and **FIRE2**
- each level provides individual Threshold Levels (sensitivity) for **Day**, **Night** and **Weekend** use

Conventional F16e / F4 / Loop Responder (NZS4512:2010):

8100 Stand-Alone

Sensitivity: the FAAST 8100 detector Threshold Levels are configured at the detector :
Configuration \ Sensor
- five **Activations Levels** are available: **ALERT**, **ACTION 1**, **ACTION 2**, **FIRE 1** and **FIRE2**
- each level provides individual Threshold Levels (sensitivity) for **Day**, **Night** and **Weekend** use
- clean-contact relay outputs are provided for each Activation Threshold - these connect to one or more individual circuits, depending upon the number of Activation Levels required

FIRE 1 (or FIRE 2): terminate with a 10K EOL resistor to Normalise the circuit
- switch a 470R resistor to activate as a Smoke Alarm or switch a 180R resistor to activate as a Heat Alarm
- generally the FAAST **FIRE 1** relay will be configured to activate the panel's **Fire** relay, though the **FIRE 2** relay may activate the **Fire** relay

ALERT, ACTION1 or ACTION2: terminate with a 10K EOL resistor to Normalise the circuit
- switch a 470R resistor to activate as a Smoke Alarm
- FIRE 1 and one of the pre-Alarm thresholds (ALERT, ACTION 1 or ACTION 2) may be combined on a single circuit on the F16e provided the circuit is configured for Residential mode and the 8100 FIRE 1 relay switches the 180R resistor (Heat Alarm) and the pre-Alarm switches the 470R resistor (Smoke Alarm)

DEFECT: switch a 1K8 resistor or an open or short-circuit to activate a Defect.

Conventional F16e / F16 (with FW=v8.0) / F4 / Loop Responder (NZS4512:1997):

8100 Stand-Alone

Sensitivity: the FAAST 8100 detector Threshold Levels are configured at the detector :
Configuration \ Sensor
- five **Activations Levels** are available: **ALERT**, **ACTION 1**, **ACTION 2**, **FIRE 1** and **FIRE2**
- each level provides individual Threshold Levels (sensitivity) for **Day**, **Night** and **Weekend** use
- clean-contact relay outputs are provided for each Activation Threshold - these connect to one or more individual circuits, depending upon the number of Activation Levels required

FIRE 1 (or FIRE 2): terminate with a 10K EOL resistor to Normalise the circuit
- switch a 470R resistor to activate as a Smoke Alarm or switch a 180R resistor or open-circuit to activate as a Heat Alarm
- generally the FAAST **FIRE 1** relay will be configured to activate the panel's **Fire** relay, though the **FIRE 2** relay may activate the **Fire** relay

ALERT: ACTION1 or ACTION2: terminate with a 10K EOL resistor to Normalise the circuit
- switch a 470R resistor to activate as a Smoke Alarm
- FIRE 1 and one of the pre-Alarm thresholds (ALERT, ACTION 1 or ACTION 2) may be combined on a single circuit on the F16 provided the circuit is configured for Apartment mode and the 8100 FIRE 1 relay switches the 180R resistor or open-circuit (Heat Alarm) and the ALERT switches the 470R resistor (Smoke Alarm)

DEFECT: switch a 1K8 resistor or a short-circuit to activate a Defect.

F16: functionality of a FAAST detector with an F16 is limited because of the restrictions of the F16 in Apartment mode

BELL Link	FIRE Link	Apartment Mode	Bell relay	Brigade relay	Fire LED	Zone LED	Latch	Clear
In	Out	Smoke	Yes	No	No	Yes	Yes	Ext BCO Reset
		Heat	Yes	Yes	Yes	Yes	Yes	

Section E : MONITORING FAAST XM using PipeIQ

This section identifies options for testing the FAAST XM and monitoring its environment:

Actions:

The PipeIQ™ **Actions** tab enables:

- **Mimic View:** replicates the FAAST XM front panel interface to provide remote monitoring and control

- **Log View:**
  - Live Events:
    - Monitor Live Events as they occur
    - Search for Live Events
    - Produce Reports in pdf, doc or xls format
    - Clear Live Events
  - Stored Events:
    - Retrieve Stored Events
    - Search for Stored Events
    - produce Reports in pdf, doc or xls format
    - Clear Stored Events
  - Messages: facility to add notes for future reference and/or advice to colleagues regarding issues or tasks performed or required
    - Add Messages
    - Send Messages
    - Retrieve Messages
    - Search Messages
    - Clear Messages

- **Trend View:**
  - Trend Mode
    - Live
      - Start
      - Stop
      - Settings
    - Stored
      - Retrieve
      - Settings
  - Trend Scale
    - X Axis: Time
    - Y Axis: Obscuration (%/m)

Section F : SYSTEM TEST AND COMMISSIONING:

F1. Ensure the following items are available:

a) FAAST System Pipe Layout Report:- allows the measured values to be referenced to the values calculated in PipeIQ.
b) FAAST System Bill of Materials Report
c) As-built Installation Drawings
d) Smoke Pen or other source of smoke with a particulate life cycle of greater than 120 seconds
e) Timer or stop-watch - to measure the maximum Transport Time
f) Blue-Tak or similar to block holes during Flow tests
g) Locally Required Forms

F2. Commissioning and Handover (reference: FIA Code of Practice for ASDs, Issue 3, Feb 2012)

F2a Commission Testing

The Commissioning Tests to be performed depend on the ASD system application but should be carried out only when the building is in its normal, intended running state. Appropriate commissioning tests should also be performed after modifications and/or additions to the ASD system.

Commissioning

The commissioning process has several stages which should be performed, recorded and checked as necessary:

- Inspection of Installation – verify conformity to design, definition of system (see section 5) including mechanical and electrical installation.
- Power Up/Configuration – required checks and configuration
- Commissioning Tests – to include mechanical, functional and performance testing.
- Signalling - to verify the connections between the ASD and other connected systems (e.g. FAP, BMS).
- System Check - to verify the detector settings are appropriate for the site
- System Handover – include relevant documentation and recorded drawings.

F2b Inspection of Installation

Inspect the installation to confirm that it has been designed and installed correctly for the application and conforms to the design documentation - in particular;

- ASD used to replace point-type detectors (Class C) - ensure the installation (particularly Sample Point spacing) conforms to the relevant standard (eg. NZS4512:2010) and the ASD Sensitivity/Alarm thresholds are correctly set to ensure that the sensitivity of individual holes meets the minimum performance requirements for individual points. Note that this may require reference to the approval compliance notes for the particular ASD system and should also take into account any potential automatic adjustments of the Sensitivity/Threshold settings, which may occur after commissioning.
- ASD used for high and enhanced sensitivity (Class A/B) - ensure that the installation conforms to the design specification (eg. if necessary, measure the air velocities in the protected area to ensure that the design spacing is appropriate.
- ASD used as a Primary Sampling System (refer to Table: ‘Sensitivity Class vs Detection Requirements’ on page 26), ensure the pipe and sample points are installed correctly onto the Air Handling Unit (AHU) within the airflow. If monitoring more than one AHU, it is important to ensure different running speeds do not cause an unbalanced airflow in the pipe, which may affect ASD performance.
- ASD used for other installations (cabinet, duct work or other specialist protection) - confirm that the ASD system is in accordance with the design.
  Perform a thorough inspection of the mechanical and electrical installation - include;
  - pipe network including correct supports.
  - clear identification of Sampling Points.
  - no obstructions to Sampling Points or remote capillaries.
  - all internal and external electrical wiring has been installed correctly.
  - power supplies are correctly rated and provide the correct emergency battery standby period.
  - correct hole position and sizes.

Before the ASD is powered up, it is very important to check that the pipe is clear of any foreign articles eg. swarf, dust, etc that will impede or stop the ASD performance.

F2c Power Up/Configuration

It is very important that the ASD manufacturer’s technical documentation is followed during system set-up. If there is any doubt refer back to the manufacturer for clarification.

The system should be powered up in accordance with the manufacturer’s recommendations. Prior to carrying out any functional and performance tests the ASD equipment should be configured for:

- Fire signal Alarm thresholds and detector sensitivity settings to give required sampling point sensitivity.
- Alarm and Fault delay periods.
- Airflow parameters.
- any other defined parameters.

F2d. Commissioning Tests

Before performing these tests ensure the area being protected is in its fully operational state – both in terms of airflows and cleanliness. For example, any air handling units (AHUs) should be running, all floor and ceiling tiles should be installed and any equipment producing a heat load should be in its normal operational mode.
Results from all tests, particularly details of the test positions, should be recorded so that they can be repeated during Maintenance.

(i) Prescribed Standard : for ASD systems designed to prescribed standards, commissioning tests should include but are not limited to: -

- Maximum Smoke Transport Time from last sampling hole in system.
- Fault detection, including blockage and rupture of the pipe.
- Tests to confirm that Sampling Points are functioning.

(ii) Performance Based : for ASD systems designed to a performance requirement additional performance tests should be performed. They should be conducted in accordance with the design requirements.

a) Transport Time Measurement

Maximum Transport Time is measured by introducing smoke into the furthest Sample Point (or a dedicated test point) and measuring the time between first introducing the smoke and observing a “reaction” at the detector.

b) Smoke Test:

The system Alarm response MUST be tested for functionality using smoke

- the choice of smoke source is dependent on the installation - Pertronic Industries recommends the use of a Smoke Pen (PN: SMOKEPEN). Aerosol smoke is not recommended as it may leave residue inside the pipe

The procedure for this test depends upon whether the FAAST detector is Loop-Based or Stand-Alone:

Loop-Based:

(i) at the F100 or F120 panel, access Menu \ Status (\ Device) : Loop Address of the FAAST detector
- Note the PW4 value

(ii) on each Pipe of a multiple branch system, introduce smoke into the Sampling Point furthest from the detector –if the End Cap is configured as a Non-Sensing Point, use the penultimate Sampling Point

(iii) start the Timer as the smoke enters the Sampling Point, then move to the panel and note the PW4 value.
- the smoke must be present for the duration of the test

(iv) stop the Timer as the PW4 value begins to rise indicating smoke has been detected – this is the Transport Time for this Sample Point.
- the Maximum Transport Time shall be less than the maximum time specified within the design documentation/ engineering specifications but must not exceed 90 seconds (NZS4512:2010).

Stand-Alone:

(i) at the FAAST detector, verify the Particulate Level LEDs are all OFF

(ii) on each Pipe of a multiple branch system, introduce smoke into the Sampling Point furthest from the detector – if the End Cap is configured as a Non-Sensing Point, use the penultimate Sampling Point

(iii) start the Timer as the smoke enters the Sampling Point, then move to the FAAST detector and stop the Timer when Particulate Level 1 LED lights – this is the Transport Time for this Sample Point.
- the smoke must be present for the duration of the test
- the Maximum Transport Time shall be less than the maximum time specified within the design documentation/ engineering specifications but must not exceed 90 seconds (NZS4512:2010).

Where an Alarm indication is used it does not generally include any Alarm delays, which are temporarily set to zero for the measurement of Transport Time.
Measured Transport Time should be compared to the predicted design Transport Time.

c) Fault Detection

Simulate the following faults on the detector and check that the fault is signalled at both FAAST detector and at the Fire Panel.

(i) **Pipe Flow :** for each sampling pipe connected to the FAAST unit:

- block the pipe and ensure a Low Flow Defect is reported
- remove the Endcap and ensure a High Flow Defect is reported
- block a single Sampling Point and confirm the Air-Flow indicator responds
- block a series of Sampling Points and record the identity of each hole and number (quantity) required to produce a Low Flow Defect – identifying the holes individually provides the ability to replicate later during Maintenance
- record Flow readings for later reference during Maintenance.

Note: A 20% reduction in volumetric flow (EN54-20) is considered an appropriate Defect condition. Sampling Points do not usually block individually but all become contaminated at similar rates.

(ii) **External Monitor :** 9400X Only (T13)

- open-circuit the External Monitor and verify that a Minor Fault is reported
- short-circuit the External Monitor and verify the device performs a Reset

(iii) **Power Supply** :

- disconnect the battery and verify that a PSU fault is reported
- disconnect the Mains supply and verify that a PSU fault is reported.

d) Functional Tests

Commissioning must include sufficient testing to verify that Sampling Points are fully functional. Careful inspection/validation of the sampling holes to confirm that they are correctly drilled and comparison of measured transport times to predicted transport times is often considered sufficient validation, particularly where performance tests are specified.

- identify and inspect a sample of Sampling Points and verify they are drilled to the correct size and spacing
- measure the actual current drawn from the power supply – record this and use the Battery Calculator (http://www.pertronic.co.nz/engineering/battery_calc/welcome.php) to ensure the PSU and Battery are appropriate to achieve the required Standby period

F2e Signalling

All signalling between the ASD system and Fire Alarm Panel/CIE should be verified in accordance with the design. In particular the signalling and response to each Alarm level and Fault conditions should be checked and verified.
Where an ASD system provides local Disablement or Isolation it should be verified that this condition is signalled to the Fire Alarm Panel/CIE
Any “cause and effect” requirements, particularly in relation to the integration with automatic suppression systems should be verified

F2f System Check

After initial commissioning, it is prudent to monitor detector performance by turning Trend Log ON for an appropriate period, then review the log to verify the settings are suitable for the site (refer to Section C, Device Details)

F2g System Handover

During the commissioning all results shall be recorded. These along with all configuration data shall be submitted as part of the commissioning certificate.
All relevant drawings shall be submitted to include the pipe layout, hole sizes, sampling point positions and detector locations, and shall be deemed part of the system handover.
All the collated documentation along with a signed certificate should be issued to the customer.

Sensitivity Class vs Detection Requirements:

Class (EN54-20)	**Class A**	**Class B**	**Class C**
	Very High Sensitivity	Enhanced Sensitivity	Normal Sensitivity
TF2x End of Test Condition	1.15% obs/m (0.05dB/m)	3.4% obs/m (0.15dB/m)	36.9% obs/m (2dB/m)
Description:	Smoke is not visible due to low quantity and/or high dilution due to air movement	Smoke is visible but insufficient to be detected by Point or Beam detectors	Smoke is visible and sufficient to be detected by Point or Beam detectors
ASD Sampling Type			
Primary Detection: sampling where smoke is likely to travel	Best	Small Areas Only	Not Appropriate
Secondary Detection: sampling holes positioned according to Point detector code	Early Warning	Challenging Applications	Appropriate (prescriptive design may be used)
Localised Sampling: customised protection of specific equipment	High Risk	Low Risk	Not Appropriate
In-Cabinet Sampling: localised sampling	High Risk	Low Risk	Not Appropriate
Duct Sampling:	High Risk	Low Risk	Not Appropriate
Other Motivators: • extreme environments • restricted/difficult access • exceptional ceiling height • heat barriers • aesthetics • risk of mechanical damage • anti-vandal systems • hazardous environment			

SECTION G: FLOW RATE CONVERSION TABLE

This Flow Rate Conversion Table is valid for Pipes of 21mm Internal Diameter (ID) only.
- for Pipes other than 21mm ID, use the formulae at the end of the Table

Inside Diameter (ID) (mm)	Velocity (Vel) (metre/sec)	Flow Rate (Flow) (litre/min)
21	0.90	**18.7**
	0.95	**19.7**
	1.00	**20.8**
	1.05	**21.8**
	1.10	**22.9**
	1.15	**23.9**
	1.20	**24.9**
	1.25	**26.0**
	1.30	**27.0**
	1.35	**28.1**
	1.40	**29.1**
	1.45	**30.1**
	1.50	**31.2**
	1.55	**32.2**
	1.60	**33.3**
	1.65	**34.3**
	1.70	**35.3**
	1.75	**36.4**
	1.80	**37.4**
	1.85	**38.4**
	1.90	**39.5**
	1.95	**40.5**
	2.00	**41.6**
	2.05	**42.6**
	2.10	**43.6**
	2.15	**44.7**
	2.20	**45.7**
	2.25	**46.8**
	2.30	**47.8**
	2.35	**48.8**
	2.40	**49.9**
	2.45	**50.9**
	2.50	**52.0**
	2.55	**53.0**
	2.60	**54.0**
	2.65	**55.1**
	2.70	**56.1**
	2.75	**57.1**
	2.80	**58.2**
	2.85	**59.2**
	2.90	**60.3**
	2.95	**61.3**
	3.00	**62.3**
	3.05	**63.4**
	3.10	**64.4**
	3.15	**65.5**
	3.20	**66.5**
	3.25	**67.5**
	3.30	**68.6**
	3.35	**69.6**
	3.40	**70.7**
	3.45	**71.7**
	3.50	**72.7**
	3.55	**73.8**
	3.60	**74.8**
	3.65	**75.9**

Flow Rate (Flow) (litre/min)	Velocity (Vel) (metre/sec)
20	**0.96**
21	**1.01**
22	**1.06**
23	**1.11**
24	**1.15**
25	**1.20**
26	**1.25**
27	**1.30**
28	**1.35**
29	**1.40**
30	**1.44**
31	**1.49**
32	**1.54**
33	**1.59**
34	**1.64**
35	**1.68**
36	**1.73**
37	**1.78**
38	**1.83**
39	**1.88**
40	**1.92**
41	**1.97**
42	**2.02**
43	**2.07**
44	**2.12**
45	**2.17**
46	**2.21**
47	**2.26**
48	**2.31**
49	**2.36**
50	**2.41**
51	**2.45**
52	**2.50**
53	**2.55**
54	**2.60**
55	**2.65**
56	**2.69**
57	**2.74**
58	**2.79**
59	**2.84**
60	**2.89**
61	**2.94**
62	**2.98**
63	**3.03**
64	**3.08**
65	**3.13**
66	**3.18**
67	**3.22**
68	**3.27**
69	**3.32**
70	**3.37**
71	**3.42**
72	**3.46**
73	**3.51**
74	**3.56**
75	**3.61**

Formulae:	**Flow Rate** = 0.25 x Pi x ID^2 x Vel x 0.001 x 60	**Velocity** = (4 x Flow) / Pi x ID^2 x 0.001 x 60

GLOSSARY:

Key Terms:

Configure:
To set up a program or computer system for a particular application.
FAAST Fire Alarm Aspirating Sensing Technology®:
High sensitivity aspirating smoke detection system.
IP Address:
An Internet Protocol (IP) address is a numerical label that is assigned to devices participating in a computer network utilizing the Internet Protocol for communication between its nodes.
PipeIQ®:
A software program designed to work with the FAAST unit for system configuration, monitoring and pipe design.
Web server:
A Web server is a computer program that delivers (serves) content. The device contains an integrated Web server which is used to observe detector configuration and may be used to remotely monitor the system.

Document Colour Code Key:

When using this manual, apply the information which applies to the particular FAAST XM model being installed

Black: applies to both 8251BPI and 8100 FAAST XM Series detector
Orange: applies to FAAST XM Model 8251BPI Only - apply this information if installing a Loop-Based detector.
Green: applies to FAAST XM 8100 Only – apply this information if installing a Stand-Alone detector.

LASER SAFETY INFORMATION

This aspiration detector does not produce any hazardous laser radiation and is certified as a Class 1 laser product under the U.S. Department of Health and Human Services (DHHS) Radiation Performance Standard according to the Radiation Control for Health and Safety Act of 1968. Any radiation emitted inside the smoke detector is completely within the protective housings and external covers.

The laser beam cannot escape from the detector during any phase of operation. The Center of Devices and Radiological Health (CDRH) of the U.S. Food and Drug Administration implemented regulations for laser products on August 2, 1976. These regulations apply to laser products manufactured after August 1, 1976. Compliance is mandatory for products marketed in the United States.

WARRANTY

System Sensor warrants its enclosed smoke detector to be free from defects in materials and workmanship under normal use and service for a period of three years from date of manufacture. System Sensor makes no other express warranty for this smoke detector. No agent, representative, dealer, or employee of the Company has the authority to increase or alter the obligations or limitations of this Warranty. The Company's obligation of this Warranty shall be limited to the repair or replacement of any part of the smoke detector which is found to be defective in materials or workmanship under normal use and service during the three year period commencing with the date of manufacture.
After phoning System Sensor's toll free number 800-SENSOR2 (736-7672) for a Return Authorization number, send defective units postage prepaid to: System Sensor, Returns Department, RA #_____, 3825 Ohio Avenue, St. Charles, IL 60174.

Please include a note describing the malfunction and suspected cause of failure. The Company shall not be obligated to repair or replace units which are found to be defective because of damage, unreasonable use, modifications, or alterations occurring after the date of manufacture.
In no case shall the Company be liable for any consequential or incidental damages for breach of this or any other warranty, expressed or implied whatsoever, even if the loss or damage is caused by the Company's negligence or fault Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This Warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

FCC STATEMENT

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
NOTE: This equipment has been tested and found to comply with Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

– Reorient or relocate the receiving antenna.
– Increase the separation between the equipment and receiver.
– Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
– Consult the dealer or an experienced radio/TV technician for help.

Section H : FAAST XM System Validation Form:

	Name	Contact Information	Date
Installer:			
Commissioning Agent:			
Client Representative:			
Witness:			

Required Documents	
Commissioning Form for Each System (this document):	Yes / No
FAAST System Pipe Layout Report	Yes / No
FAAST System Bill of Materials Report	Yes / No
As-Built Installation Drawings:	Yes / No
Smoke Test Results (optional):	Yes / No
Locally Required Forms	Yes / No

Air Handling Units:	Yes / No	**In-Cabinet Sampling:**	Yes / No	**Duct Sampling:**	Yes / No
Number of Sample Points:		**Number of Capillary Points:**			

Conditions:					
Temperature:		Humidity:		Other:	

Power Supply Installed correctly?	Yes / No
Pipe Network Installed in Accordance with the PipeIQ design (per Pipe Layout Report)?	Yes / No
Pipe Network Labelled correctly?	Yes / No
Describe Any Variations?	
Wiring Checked:	Yes / No
Detector Settings Checked:	Yes / No
Relays Tested:	Yes / No

General:						
Model Number:	8251BPI	8100	**Serial Number:**			
	Identification Number (Loop Address)					
Contact Person:						
Customer Name:						
Facility Name:						
Facility Location:						
Device Location:						
Site Address:						
Night Mode:	**Start Time:**		**End Time:**			
Daylight Saving:	**Starts On**		**Ends On**			
Time Format	12 Hour	24 Hour	**Time Saved:**	60	min	
Trend Log	**Frequency:**		Mins / Hrs			

Sensor:						
Threshold Levels:	**Day**	**Night**	**Weekend**	**Acclimate Min**	**Acclimate Max**	**Delay (sec)**
Alert:						
Action 1:						
Action 2:						
Fire 1:						
Fire 2:						
Night Mode:	**Start Time:**			**End Time:**		

Relay Latching:		
Minor	Action 1	Fire 1
Alert	Action 2	Fire 2

Section H : FAAST XM System Validation Form (continued):

Network:									
Web Access Password:				Administrator Password:					
Device Mail Server Configuration:									
Sender Account:		SMTP Server Name:			SMTP Port:	25			
Device Connection:									
DHCP Generated IP Address:				Host Name:					
Static IP Address:				DNS Server:					
IP Address:	. . .			Primary:	. . .				
Subnet Mask:	. . .			Secondary:	. . .				
Default Gateway:	. . .								

Email Notification:									
Email Address:	All	Alert	Action 1	Action 2	Fire 1	Fire 2	Urgent	Isolate	Minor

AirFlow:			
Flow Boundary (%):		Flow Delay Sec):	

User Interface:						
Button Activation:	Passcode:					
Button Lock-Out:	Test:		Reset:		Isolate:	

ModBus:			
Passcode:		Address:	

System Tests:		
Transport Time:	Actual:	Predicted
Air-Flow:		
Block the Exhaust Pipe:	- Lo Flow Defect Indicated?	Yes / No
Remove End-Cap:	- Hi Flow Defect Indicated?	Yes / No
Block a Single Sampling Point:	- reduced Flow Indicated?	Yes / No
Block Sampling Points to produce Defect:	- list the Holes Blocked	
Outputs:		
Alarm Outputs Verified:		Yes / No
Fault Outputs Verified		Yes / No
Isolate Function Verified		Yes / No

Comments:

Signatures:	
Customer: Date:	Commissioning Agent: Date: