



MiniLaser Aspirating Smoke Detector Installation Manual

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Manufacturer	<p>KGS Safety System (Hebei) Co. Ltd., 80 Changjiang East Road, QETDZ, Qinhuangdao 066004, Hebei, China.</p> <p>Authorized EU manufacturing representative: KGS Fire & Security B.V., Kelvinstraat 7, NL-6003 DH, Weert, The Netherlands.</p>
Firmware version	This publication is for MiniLaser detectors with firmware version 3.0 or later.
Conformity	 
European Union Directives	<p>2014/30/EU (EMC Directive): This device is in compliance with the essential requirements and other relevant provisions of Directive 2014/30/EU.</p> <div>  <p>2012/19/EU (WEEE Directive): Products marked with this symbol cannot be disposed of as unsorted municipal waste in the European Union. For proper recycling, return this product to your local supplier upon the purchase of equivalent new equipment, or dispose of it at designated collection points. For more information see: recyclethis.info.</p> <p>IEC 60825-1 This product is a Class I Laser product. The unit incorporates a Class 3B embedded laser which must not be removed from the detector.</p> </div>
Contact information and product documentation	For contact information or to download the latest product documentation, visit firesecurityproducts.com .

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Important information

Introduction

This is the installation and operation manual for the MiniLaser Aspirating Smoke Detector. Read these instructions and all related documentation entirely before installing or operating this product.

Product compatibility

Products compatible with the MiniLaser are listed in the product compatibility list. Only those products specified in the compatibility list are guaranteed to be compatible.

To download the latest product compatibility list, visit firesecurityproducts.com.

Firmware compatibility

Information in this document covers MiniLaser detectors with firmware version 3.0 or later.

This document must not be used as a guide for installation, configuration, or operation of detectors with an earlier firmware version.

To check the firmware version, see “Checking the currently installed firmware version” on page 45.

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Advisory messages

Advisory messages alert you to conditions or practices that can cause unwanted results. The advisory messages used in this document are shown and described below.

WARNING: Warning messages advise you of hazards that could result in injury or loss of life. They tell you which actions to take or to avoid in order to prevent injury or loss of life.

Caution: Caution messages advise you of possible equipment damage. They tell you which actions to take or to avoid in order to prevent damage.

Note: Note messages advise you of the possible loss of time or effort. They describe how to avoid the loss. Notes are also used to point out important information that you should read.

Chapter 1

Introduction

Summary

This chapter provides an introduction to the detector, the user interface, and the LED indications.

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System overview

Product range

The MiniLaser product range includes the detector and optional accessories shown below.

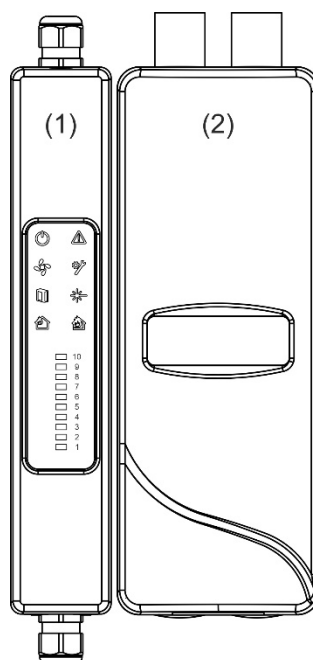
Table 1: Product range

Product	Description
9-30501-KID-ULF	MiniLaser Aspirating Smoke Detector
9-30520	MiniLaser Expansion Housing (optional accessory – not supplied)
9-30521	MiniLaser I/O Functional Module (optional accessory – not supplied)

Introduction

The MiniLaser is a highly sophisticated next generation high sensitivity smoke detector that provides all the benefits of air sampling high sensitivity smoke detection, including very early warning.

Figure 1: MiniLaser detector and user interface



1. User interface
2. Detector

ClassiFire

ClassiFire is the patented artificial intelligence system for aspirating smoke detectors that continually monitors the environment and internal contamination and automatically adjusts sensitivity to the optimum level.

ClassiFire automatically adjusts sensitivity to suit day/night levels with no need for external input.

ClassiFire automatically sets up the detector to the normal working environment so the detector sensitivity is optimized for its surroundings.

The ClassiFire automatic calibration process is as follows:

1. **FastLearn:** This stage lasts approximately 15 minutes.
During FastLearn the detector is not fully operational (accurate detection is not guaranteed).
2. **Intermediate learn:** This stage lasts approximately 24 hours.
During intermediate learn the detector is operational but is still fine tuning the detection algorithm.
3. **Normal:** Normal indicates that initial environmental learning has ended and that the detector is operating normally.

Software

The following software applications are available:

- **PipeCAD:** Models and verifies the performance of the pipe network design. All pipework designs **must** be validated using PipeCAD.
- **Remote:** Configures the detector during installation and during system maintenance if Remote configuration is selected.

Contact your local distributor for more details on these applications.

Product overview

Detector

The MiniLaser detector is a high sensitivity aspirating smoke detector. It consists of a fan, a dust filter, and a laser head with the corresponding sensors to measure air flow, temperature, and obscuration.

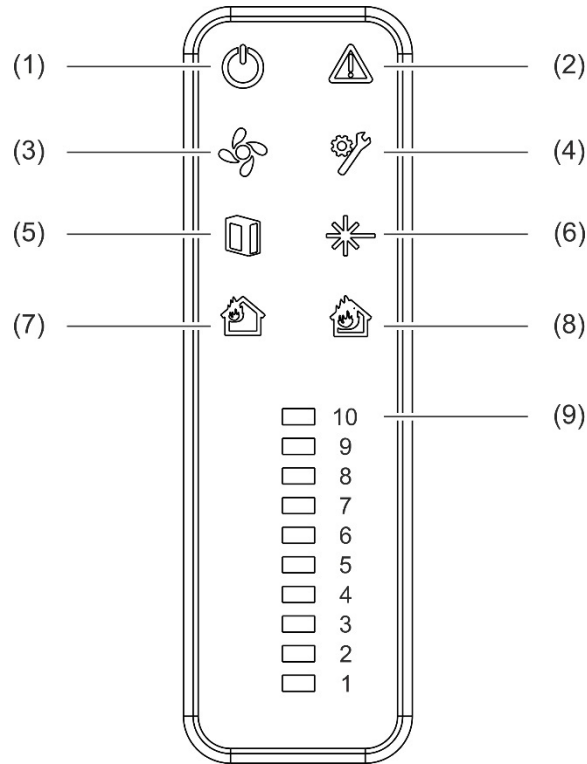
The detector uses the ClassiFire algorithms to determine alarm conditions and keeps a record of Event logs and samples.

The detector must be used with the supplied user interface.

User interface

The user interface provides LED indicators that display the status of the detector. The user interface must be used with the supplied detector.

Figure 2: User interface LED indicators



- | | |
|----------------------|---------------------|
| 1. Power LED | 6. Laser fault LED |
| 2. Warning LED | 7. Prealarm LED |
| 3. Flow fault LED | 8. Fire alarm LED |
| 4. General fault LED | 9. Smoke level LEDs |
| 5. Filter fault LED | |

LED indications

The user interface LED indications are shown below.

Table 2: User interface LED indications

LED	Colour	Indication	Description
	Green	Power	A steady LED indicates that the detector is powered up correctly.
	Yellow	Warning	<p>A steady LED indicates that detection is aborted due to a fault (fan motor, filter removed, critical temperature), that there is a flow fault, that the detector is disabled or is in power save mode.</p> <p>A fast flashing LED indicates that the detector is in FastLearn mode, is starting up, or that pipe calibration is in process.</p> <p>A slow flashing LED indicates that the detector is in test mode, that one or more features are in test mode, or that the detector is in Demo mode.</p>
	Yellow	Flow fault	A steady LED indicates a flow fault or a fan fault.
	Yellow	General fault	A steady LED indicates a general fault condition.
	Yellow	Filter fault	A steady LED indicates a filter fault.
	Yellow	Laser fault	A steady LED indicates a laser fault.
	Red	Prealarm	A steady LED indicates a prealarm condition.
	Red	Fire alarm	A steady LED indicates a fire alarm condition.
<div> <div>10</div> <div>9</div> <div>8</div> <div>7</div> <div>6</div> <div>5</div> <div>4</div> <div>3</div> <div>2</div> <div>1</div> </div>	Yellow/Red	Smoke level	<p>A steady LED indicates the current smoke obscuration level.</p> <p>A yellow LED indicates that the smoke level is less than the configured alarm level.</p> <p>A red LED indicates that the smoke level is equal to or greater than the configured alarm level.</p>

Note: If local configuration is selected, alarms and faults are latched (the alarm or fault indication remains active until a system reset is performed, even if the condition that caused the indication has ended). See “System reset” on page 45. The latched configuration can only be changed if Remote configuration is selected.

Chapter 2

Installation

Summary

This chapter provides detailed installation and connection information for your detector.

Caution: This product must be installed and maintained by qualified personnel adhering to all local or national installation requirements and any other applicable regulations.

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Electrical safety

WARNING: Electrocution hazard. To avoid personal injury or death from electrocution, remove all sources of power and allow stored energy to discharge before installing or removing equipment.

Caution: Equipment damage hazard. This product is sensitive to electrostatic discharge (ESD). To avoid damage, follow accepted ESD handling procedures.

Installation

Overview

To install the detector, follow these steps:

1. Fix the detector and user interface backplanes to the wall.
See “Installing the backplanes” on page 13.
2. Connect all field wiring to the user interface backplane.
See “Connections” on page 16.
3. Place the detector and user interface (without the covers) onto the backplanes.
See “Installing the user interface and the detector” on page 20.
4. Install piping.
See “Connecting pipes” on page 21.
5. Place the front covers onto the detector and user interface.

General guidelines

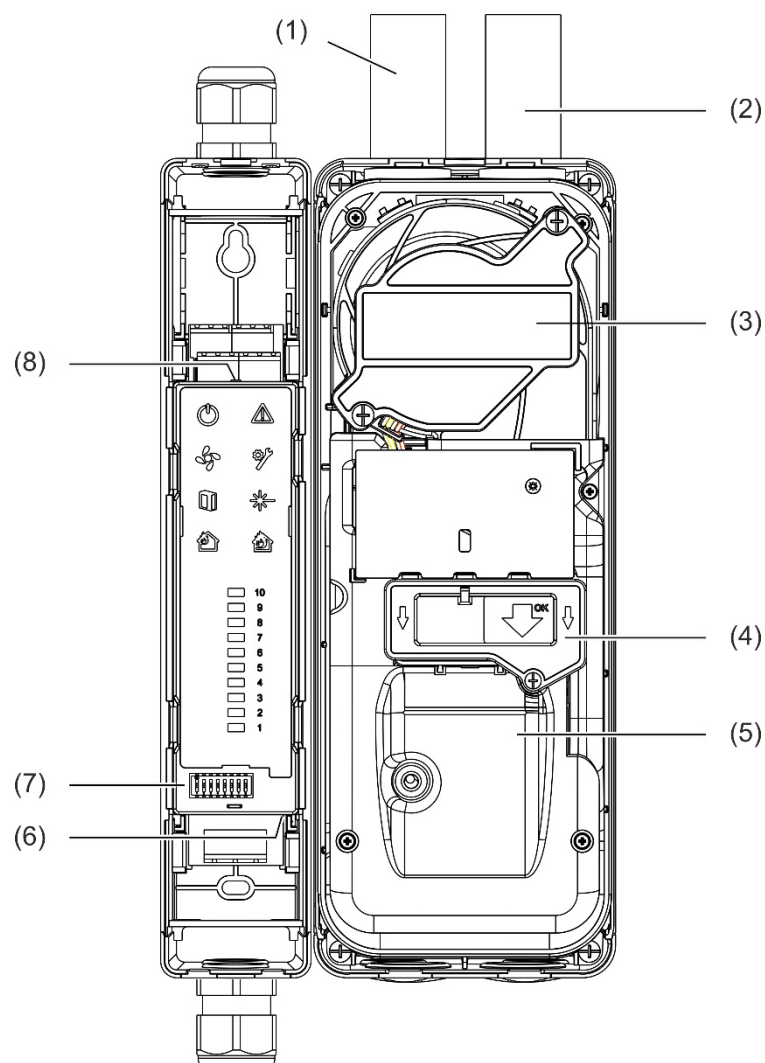
Follow these general guidelines to ensure correct placement, connection, and configuration of your product.

Table 3: Installation guidelines

DO	DON'T
DO ensure that the power and signal cables are correctly connected before powering up. Incorrect connections may damage the detector.	DON'T drop the detector.
DO ensure that all screws for wiring connections are firmly tightened.	DON'T install the detector in damp or exposed areas.
DO place sampling points so that the detector is able to detect smoke at the earliest opportunity.	DON'T remove or connect PCBs when the detector is powered up.
DO ensure that the detector exhaust is not impeded and is in an area with the same atmospheric pressure as the sample pipes (either by placing the detector physically in the protected area or by leading a pipe from the detector exhaust to the protected area).	DON'T reuse dust filter cartridges once they are removed.
DO ensure that the ambient conditions (humidity, temperature) of the protected area are suitable for the detector.	DON'T attempt to adjust or alter detector settings other than via the user-programmable functions.
DO set the appropriate ClassiFire alarm factor for the area to be protected.	DON'T install the detector close to any equipment that may generate high radio frequency levels (such as radio alarms) or units generating high levels of electrical energy (such as large electric motors or generators).
DO set the appropriate fan speed for the area to be protected.	DON'T install the detector in hard to reach areas or so close to other equipment that access and maintenance is difficult.
DO ensure that the detector is secured to the backplane.	DON'T use excessive force when fitting sampling pipes (this may damage the detector).
DO ensure that the front cover is secured to the detector.	DON'T overtighten the mounting screws.
DO use suitable external filtering to protect the detector in areas with high levels of dirt or dust (otherwise contamination may impact the performance of the detector).	DON'T introduce any external elements (fingers, fragments, etc.) into the inside of the detector or the inlet/outlet once it is operational.
DO replace the detector if the detector fan makes excessive noise or vibrates.	

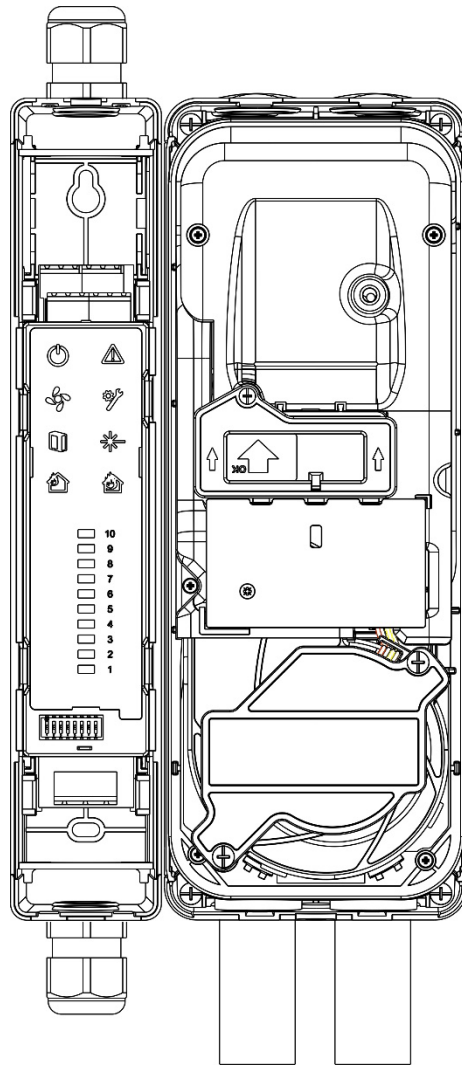
Internal views and backplane layout

Figure 3: Internal view



- | | |
|--------------------------|--------------------------------|
| 1. Exhaust pipe (outlet) | 5. Laser cover |
| 2. Sampling pipe (inlet) | 6. USB-C connector |
| 3. Fan | 7. Configuration DIP switch |
| 4. Filter cover | 8. Confirm/System Reset button |

Note: The detector may be installed onto the detector backplane at 180 degrees to enable pipe entry from below (See Figure 4 on page 11). There is no change to the installation orientation of user interface or the detector backplane.

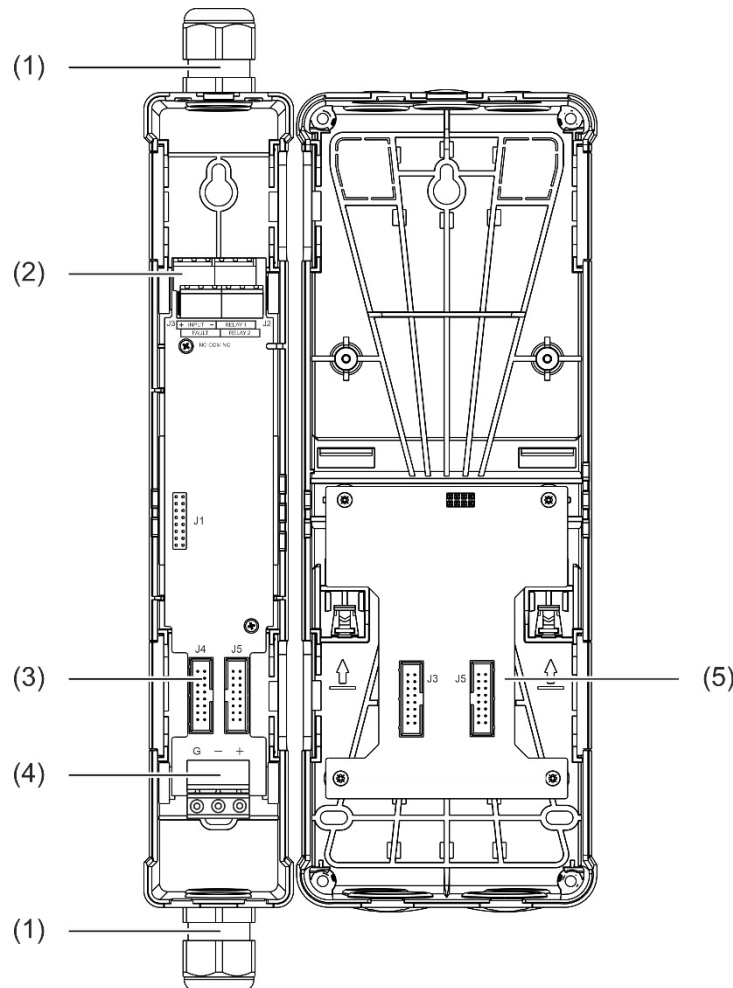
Figure 4: Detector installed at 180 degrees

User interface and detector backplanes

The user interface backplane is used to supply power and provides connections for a single input and three outputs. All wiring is connected to the user interface backplane via the cable knockouts on the top and bottom of the housing.

Note: The input can only be configured using the Remote application.

Figure 5: User interface and detector backplanes



1. Cable glands (not supplied)
2. Input and output connectors
3. J4 and J5 connectors for adjacent detectors or expansion housing
4. Power supply connector
5. J3 and J5 connectors for adjacent user interfaces or expansion housing

Installing the backplanes

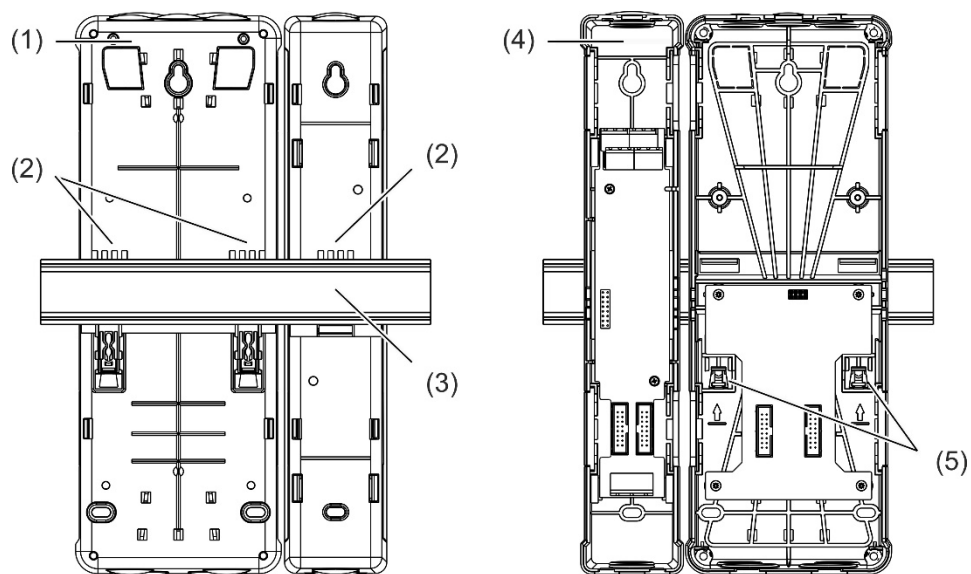
Installing the backplanes

Install the backplanes onto a DIN rail or directly onto the wall using mounting screws.

To install the backplanes onto a DIN rail:

1. Secure the DIN rail to the wall using appropriate fasteners for the mounting surface.
2. Hang the backplanes onto the DIN rail using the mounting hooks on the back of the detector and user interface and push onto the rail until the backplanes click into place (see Figure 6 below).
3. Using a screwdriver, push both of the locking clips on the detector backplane up to lock the unit to the rail.

Figure 6: Installing the backplanes onto a DIN rail

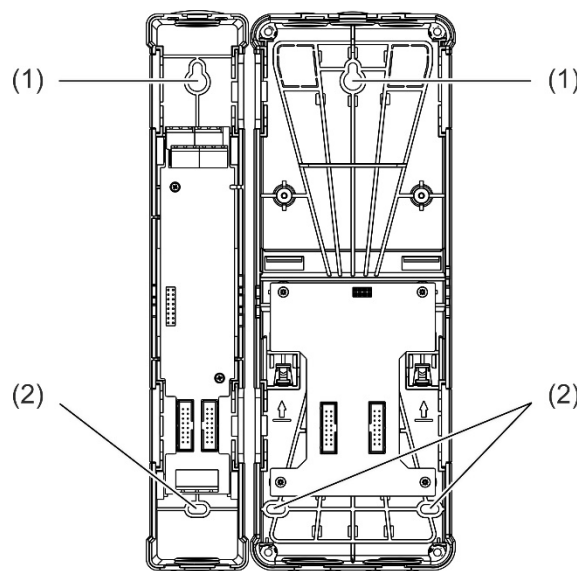


- | | |
|-------------------|------------------|
| 1. Rear view | 4. Front view |
| 2. Mounting hooks | 5. Locking clips |
| 3. DIN rail | |

To install the backplanes onto a wall:

1. Hold the backplanes to the wall at the required installation height and mark the position of the keyhole screw slots (see Figure 7 below).
2. Remove the backplanes from the wall. Drill a hole in the mounting surface where the keyhole positions were marked and insert an M4 wall plug into each.
3. Insert screws into the keyhole screw slots and hang the backplanes onto the screws.
4. Align the backplanes (ensuring that they are level) and mark the position of all other fixing holes at the holding screw slots
5. Remove the backplanes from the wall, and then drill and plug the remaining fixing holes
6. Replace the backplanes, check alignment, and then tighten all fixing screws.

Figure 7: Installing the backplanes onto a wall



1. Keyhole screw slots
2. Holding screw slots

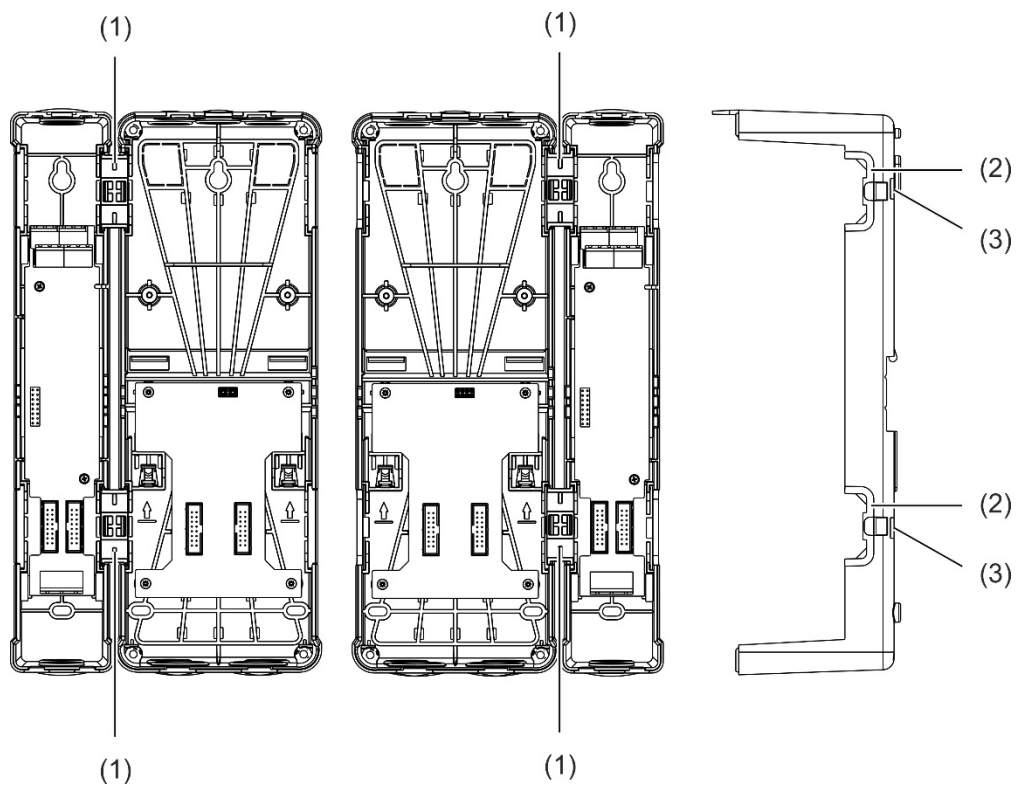
Using joining clips

Joining clips are used to attach the user interface and optional expansion housing (not supplied) to the detector.

By default the user interface is attached to the left of the detector but can be moved to the right of the detector if required, as shown below.

WARNING: To avoid personal injury, take care when inserting or removing the joining clips or protective covers from the side of the backplane. To remove these items, place the backplane face down on a solid surface and use a screwdriver to push the release mechanism, shown in Figure 8 below (this needs to be done before the backplane is installed onto the wall).

Figure 8: Using joining clips



1. Joining clips (front view)
2. Joining clips (side view)
3. Release mechanism for joining clip or protective cover

Connections

Recommended cables

Recommended cables for optimal system performance are shown in the table below.

Table 4: Recommended cables

Cable	Cable requirements	Maximum cable length
Power cable	3 × 1.5 mm ² (3 × 16 AWG)	100 m (328 ft.)
System cable	From 1.0 to 2.5 mm ² (2 or 3 cables from 16 to 14 AWG)	N/A
USB cable	Standard USB-C cable	3 m (9.84 ft.) [1]

[1] Observe maximum length to comply with the EMC requirements of EN 54-20.

Other types of cable may be used subject to site-specific electromagnetic interference (EMI) conditions and installation testing.

Securing cables

Use cable glands to ensure clean and secure connections. All cables should be fed through the cable knockouts on the top and bottom of the user interface housing and secured to eliminate movement.

Connecting inputs, outputs, and the power supply

User interface

Figure 9: Inputs and outputs

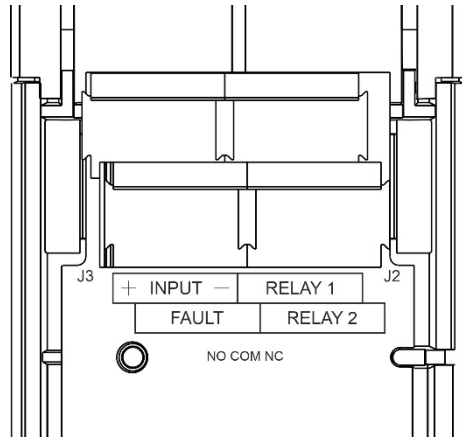


Figure 10: Power supply

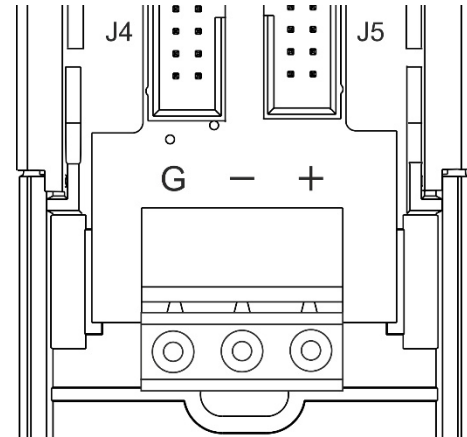


Table 5: User interface connectors

Connector	PIN	Description
Input [1]	+	Input (positive)
	-	Input (negative)
Fault relay	COM	Output (common)
	NC	Output (normally closed)
	NO	Output (normally open)
Relay output 1	COM	Output (common)
	NC	Output (normally closed)
	NO	Output (normally open)
Relay output 2	COM	Output (common)
	NC	Output (normally closed)
	NO	Output (normally open)
J4		Ribbon cable connector (to connect to a detector or expansion housing installed to the left of the user interface)
J5		Ribbon cable connector (to connect to a detector or expansion housing installed to the right of the user interface)
Power supply	G	Power supply (earth)
	-	Power supply (negative)
	+	Power supply (positive)

[1] The input can only be configured using the Remote application.

Detector

Figure 11: Detector ribbon cable connectors

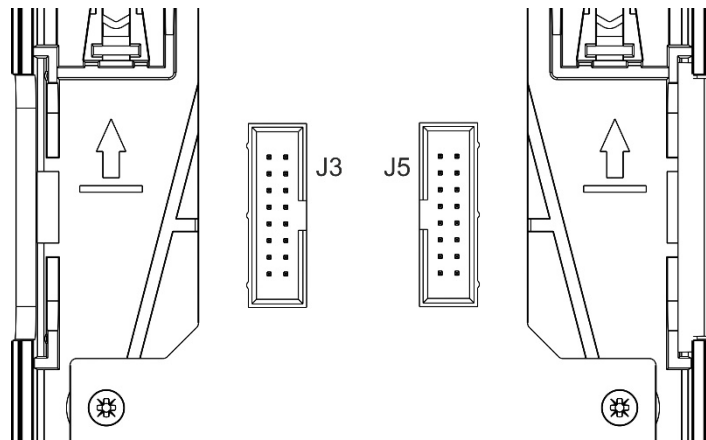


Table 6: Detector ribbon cable connectors

Connector	Description
J3	Ribbon cable connector (to connect to a user interface or expansion housing installed to the left of the detector)
J5	Ribbon cable connector (to connect to a user interface or expansion housing installed to the right of the detector)

Connecting the input

Note: The input can only be configured using the Remote application.

Connect input devices to the INPUT connector.

The input is supervised to detect open, activated, and not activated states. The input requires a 15 k Ω end-of-line resistor (provided in the accessory kit).

General input activation characteristics are shown in the table below.

Table 7: General input activation characteristics

State	Activation value
Not activated (nominal)	15 k Ω $\pm$ 10%
Short circuit (activated)	< 2.7 k Ω
Open circuit (supervision fault)	> 34.1 k Ω

Connecting the fault relay

Connect fault output devices to the FAULT relay.

Outputs are activated by a voltage free relay contact with normally open (NO), normally closed (NC), and common (COM) connections.

The default configuration is Fault.

Connecting the relay outputs

Connect output devices to the RELAY 1 and RELAY 2 connectors.

Outputs are activated by a voltage free relay contact with normally open (NO), normally closed (NC), and common (COM) connections.

The default configuration for each is shown below.

Relay	Default configuration
Relay output 1	Prealarm
Relay output 2	Fire Alarm

Connecting the power supply

Caution: Ensure that the installed power supply covers the power consumption requirements for your installation.

Connect the power supply to the power supply connector.

The detector can be powered by any EN 54-4 or UL/cUL and FM compliant monitored 24 VDC power supply of sufficient capacity for the installation requirements.

Note: For compliance with EN 54-20, the detector must be powered by a power supply approved to EN 54-4.

Connecting to a fire alarm control panel

The detector provides the following options for interfacing with fire alarm control panels.

Configuration method	Connection
Local	Connect the detector output to the fire panel input. This option allows the detector to send event notifications to the fire panel. The detector output and fire panel input require appropriate configuration.
Local or Remote	Connect the detector output to the fire panel input and the fire panel output to the detector input. This option allows the detector to send event notifications to the fire panel and the fire panel to send commands to the detector. The detector and control panel inputs and outputs require appropriate configuration.

Installing the user interface and the detector

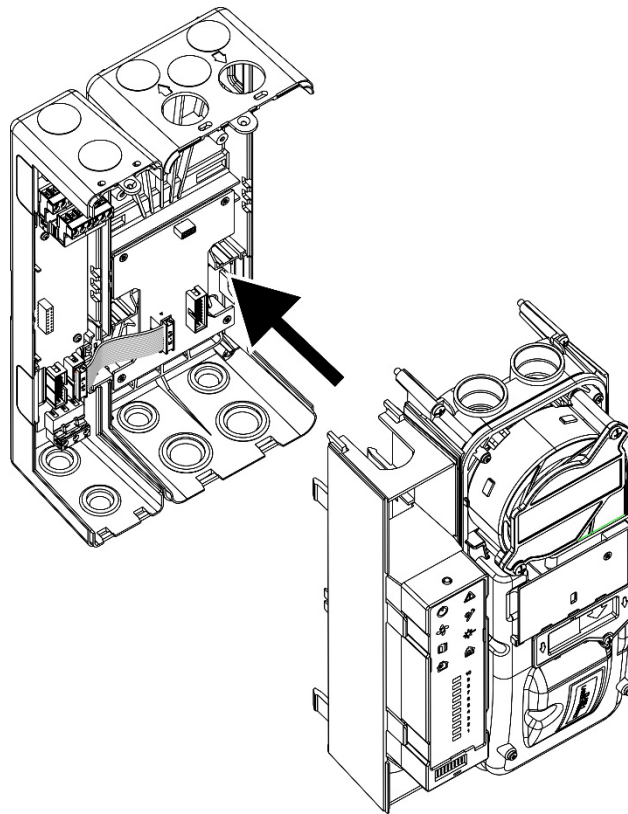
Install the user interface and the detector (without the covers) onto the respective backplanes using the screws provided (see Figure 12 below).

Each detector includes four captive screws (attached to each corner of the unit).

Caution: To avoid damaging the mounting pillars, always use a manual screwdriver to secure the user interface and detector to the backplanes. Do not use a power screwdriver.

The detector may be installed onto the backplane at 180 degrees (see Figure 4 on page 11). This allows the sampling and exhaust pipes to enter from the bottom of the unit instead of the top. There is no change to the installation orientation of the user interface or the detector backplane.

Figure 12: Installing the user interface and the detector



Connecting pipes

Caution: To comply with UL 268 or FM requirements use one of the pipe designs shown in Chapter 5 "Pipe installation examples" on page 47. For any other pipe network design, the pipe network must be designed and its performance verified using PipeCAD pipe modelling software before installing pipes. See your PipeCAD documentation for more information.

To assist pipe installation, the following pipe adaptors are available:

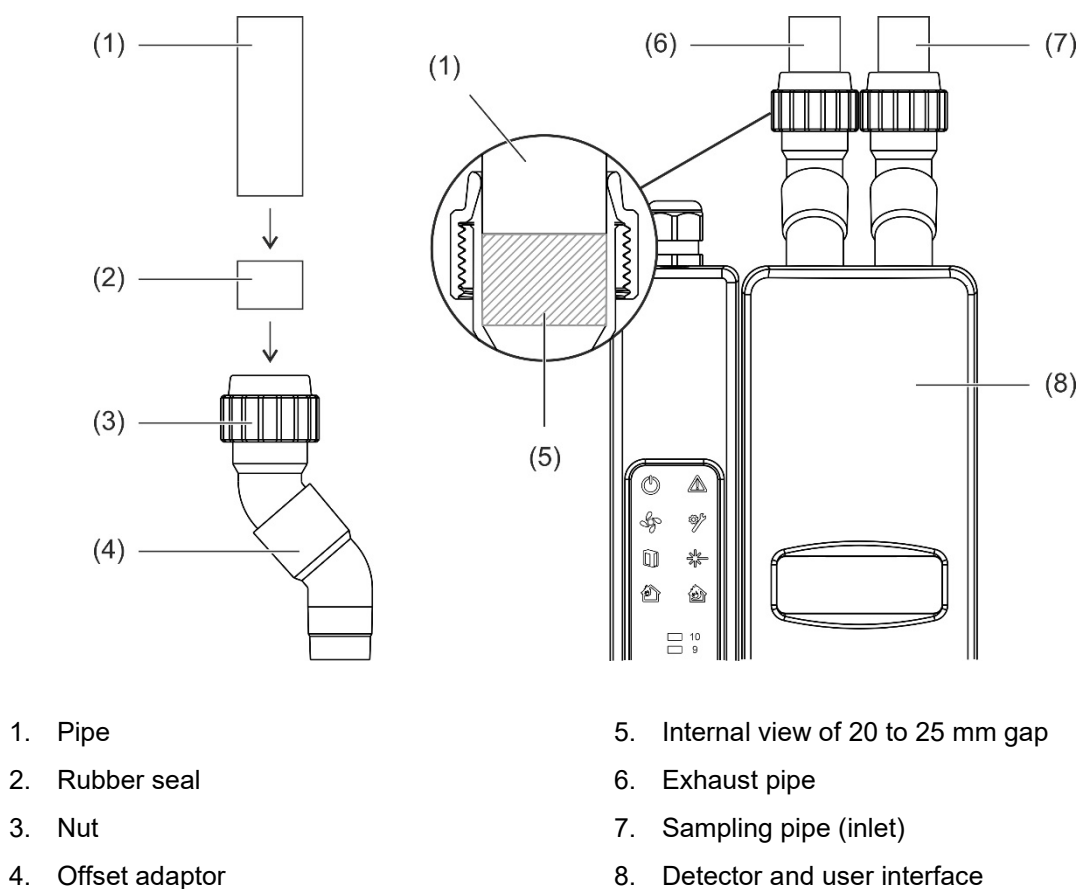
- Offset pipe adaptor (supplied)
- Straight pipe adaptor (not supplied)

The adaptors are designed to facilitate the removal of the detector from the backplane without fully removing the pipes.

Note: Do not use glue on the pipe adaptors.

The detector also supports pipe entry without the use of the pipe adaptors (for both 25 and 27 mm pipes), but this option does not allow for the easy removal of the detector described above.

Figure 13: Connecting pipes using a pipe adaptor



To connect pipes when using a pipe adaptor

1. Loosen the adaptor nut and slide the pipe into the adaptor, ensuring that the pipe is firmly enclosed by the rubber seal.

Leave a gap of approximately 20 to 25 mm (0.8 to 0.98 in.) between the end of the pipe and the end of the adaptor inlet so that the adaptor can be moved up the pipe later, if required.

2. Tighten the adaptor nut loosely (enough that the pipe does not move).
3. Push the adaptor through the backplane and into the detector (the exhaust pipe on the left, the sampling pipe on the right).
4. Tighten the adaptor nut firmly.

To remove the detector when using a pipe adaptor

1. Loosen the adaptor nut and slide the adaptor upwards, until it clears the detector and onto the pipe (using the 20 to 25 mm gap left during installation).
2. Remove the detector.

Connecting to Remote

Use the Remote application to:

- View the current configuration settings and the installed firmware version if local configuration is selected.
- Configure advanced settings when Remote configuration is selected (see “Local or Remote configuration” on page 26).

To use Remote, connect the PC to the MiniLaser user interface using a USB-C cable.

To connect to Remote:

1. Using a USB-C cable, connect your PC to the USB type C connector on the user interface (see Figure 3 on page 10 for the connector location).
2. Open Remote, and then click on Communication Settings.
3. Select USB, and then select the COM Port.
4. Click Connect, and then enter the four-digit access code.

This option may only be used for temporary connections.

Notes:

The default access code is 4444. To prevent unauthorized access, you must change this the first time you connect (access code 0000 is not permitted).

If an invalid access code is entered three times in a row, access is blocked for 10 minutes.

If you forget the access code, reset it as follows:

1. Using a USB-C cable, connect your PC to the USB type C connector on the user interface (see Figure 3 on page 10 for the connector location).
2. Open Remote, and then click on Communication Settings.
3. Select Reset Password.
4. Enter a new four-digit access code.
5. Press and hold the Confirm/System Reset button on the detector and click OK to change the access code.

Chapter 3

Configuration and commissioning

Summary

This chapter provides configuration and commissioning information for your detector.

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Local or Remote configuration

Choosing the configuration method

The detector can be configured locally (using the integrated DIP switch) or by using the Remote application. Only one configuration method can be used.

Configuration	Description
Local	<p>Select this option to configure standard presets for fan speed, alarm factor, flow fault, and alarm delay quickly and easily using the integrated DIP switch.</p> <p>See “Local configuration” on page 27 for more details.</p>
Remote	<p>Select this option to configure advanced features using the Remote application.</p> <p>See the Remote application and integrated Help documentation for more details.</p>

Setting the configuration method

Set the configuration method using DIP switch 1, as shown in the table below. The default setting is local configuration.

The DIP switch is located on the user interface (see Figure 3 on page 10).

DIP switch setting	Description
	Local configuration using the integrated DIP switch (default setting)
	Remote configuration using the Remote application

Local configuration

Caution: Only one configuration method can be used. If Remote configuration is selected (DIP switch 1 is OFF), then the detector cannot be configured locally and any settings for DIP switches 2 to 8 are ignored.

This section describes local configuration using the integrated DIP switch.

Default settings

The default settings for local configuration are shown below.

Table 8: Default settings for local configuration

Parameter	DIP Switch	Default setting
Configuration method	1	Local configuration
Fan speed	2 and 3	4
Alarm factor	4 and 5	4
Flow fault delay	6	120 seconds
Flow fault level	7	20%
Alarm delay	8	5 seconds

Configuration process

To configure the detector for the first time:

1. Set DIP switch 1 to ON to select local configuration using the integrated DIP switch.
2. Set the fan speed, alarm factor, flow fault delay, flow fault level, and alarm level DIP switches as required.
3. Press the Confirm/System Reset button on the user interface to apply the configuration.

To making changes to an existing configuration:

1. Remove the user interface cover.
2. Change the configuration method, fan speed, alarm factor, flow fault delay, flow fault level, or alarm level DIP switches as required.
3. Press the Confirm/System Reset button on the user interface to apply the changes to the configuration.

Setting the fan speed

Set the fan speed using DIP switches 2 and 3, as shown in the table below. The default setting is 4.

DIP switch setting	Description [1]
	Fan speed 2
	Fan speed 4 (default setting)
	Fan speed 7
	Fan speed 10

[1] Only four of the 10 available fans speeds can be configured by DIP switch. To set other fan speeds, select Remote configuration.

Setting the alarm factor

Set the alarm factor using DIP switches 4 and 5, as shown in the table below. The default setting is 4.

The alarm factor configures the detector sensitivity. This value affects the calculation of all alarm levels except Fire Alarm 2. A lower value configures a higher sensitivity, a higher value configures a lower sensitivity. See Table 9 below for suggested settings.

DIP switch setting	Description [1]
	Alarm factor 2
	Alarm factor 4 (default setting)
	Alarm factor 6
	Alarm factor 8

Note: The working alarm factor value may be higher than the configured value as the ClassiFire algorithm automatically adjusts the value based on the environmental conditions at the end of the FastLearn procedure.

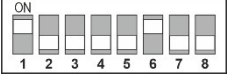
Table 9: Suggested alarm factor settings

Alarm factor	Sensitivity	Probability of nuisance alarm	Suggested protected area
0	Very high	Once per year	Semiconductor manufacturing clean room [1]
1	High	Once per 5 years	Computer room [1]
2	High	Once per 10 years	Non-smoking office
3	High	Once per 50 years	Clean factory [1]
4	Medium	Once per 1,000 years	Warehouse
5	Medium	Once per 5,000 years	Warehouse with diesel trucks operating [1]
6	Medium	Once per 10,000 years	Warehouse with diesel trucks operating
7	Low	Once per 20,000 years	Warehouse with diesel trucks operating [1]
8	Low	Once per 100,000 years	Warehouse with diesel trucks operating
9	Very low	N/A	Duct applications [1]
10	Very low	N/A	Duct applications [1]

[1] These settings are only available for Remote configuration.

Setting the flow fault delay

Set the flow fault delay using DIP switch 6, as shown in the table below. The default setting is 120 seconds.

DIP switch setting	Description
	120 seconds (default setting)
	240 seconds

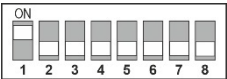
Setting the flow fault level

Set the flow fault level using DIP switch 7, as shown in the table below. The default setting is 20%.

DIP switch setting	Description
	20% (default setting)
	40%

Setting the alarm delay

Set the alarm delay using DIP switch 8, as shown in the table below. The default setting is 5 seconds.

DIP switch setting	Description
	5 seconds (default setting)
	30 seconds

Remote configuration

Caution: Only one configuration method can be used. If local configuration is selected (DIP switch 1 is ON), then the detector cannot be configured using the Remote application.

Connect your PC to the detector as described in “Connecting to Remote” on page 23.

See the Remote application and integrated Help documentation for more details.

Commissioning

Overview

Perform the following tasks when commissioning the detector:

- Inspect the installation
- Check the configuration
- Perform commissioning tests
- Check connectivity (where applicable)

Installation inspection

Inspect the installation to confirm that it has been designed and installed correctly for the intended application.

- When using the detector for high and enhanced sensitivity applications (Class A or Class B), ensure that the installation conforms to the design specification.
- When using the detector to replace point type detectors (Class C), ensure that the installation conforms to all relevant local or national standards.
- When using the detector as a primary sampling system, ensure that the pipe and sample points are installed correctly onto the air handling unit within the airflow. Ensure that the airflow in the pipe is balanced if using multiple air handling units.
- Check that the installation is clean and that no construction debris remains.
- Check that the pipe network is correctly installed that all hole positions and sizes are correct.
- Check that all sampling points are clearly identified and that there are no obstructions to the sampling points or remote capillaries.
- Check all electrical wiring and connections.
- Check that the power supply is sufficient for the installation.

Configuration check

Ensure that the following have been correctly configured before performing commissioning tests:

- Fire alarm thresholds and sensitivity settings
- Alarm delays
- Flow parameters
- Any other configuration options for the intended application

Commissioning tests

Ensure that the protected area is in its normal operational state before any commissioning tests are performed. Commissioning must include sufficient testing to verify that sampling holes are fully functional. Results from the tests should be recorded for future reference.

Commissioning tests should include (but are not limited to):

- Maximum smoke transport time
- Fault detection
- Alarm detection (smoke tests)

Acclimation period

The detector operates at a reduced sensitivity for approximately 24 hours. ClassiFire handles the appropriate day and night sensitivity settings, where required. All air handling units, thermostats, and other systems that impact the operating environment should be turned on to reflect normal operating conditions.

FastLearn starts automatically if the detector is new (or restarting). The FastLearn process lasts approximately 15 minutes and is followed by approximately 24 hours of intermediate learning.

Maximum smoke transport time

Maximum smoke transport time is measured by introducing a small quantity of smoke into the furthest sample hole and then measuring the time between first introducing the smoke and observing a response at the detector.

The results of this test and the calculated maximum transport time from PipeCAD must be recorded. Measured transport time less than the calculated time is acceptable.

To measure the maximum transport time:

1. Determine the furthest sampling point from the detector.
2. Allow test smoke to enter the pipe at the furthest sampling point.
3. Record the amount of time it takes for the detector to respond.

Notes:

Test all pipes individually to confirm full integrity.

Ensure that any measured transport time matches requirements in the installation design specification, where applicable.

Fault detection

Block and unblock all pipes to ensure that flow faults are reported correctly. There is a default delay of 120 seconds before a flow fault is reported (this delay is configurable).

Disconnect the power supply to ensure that power supply faults are reported correctly.

Power fault reporting requires the 24 VDC power supply to communicate the fault via the detector input (the input must be configured accordingly using the Remote application).

Alarm detection (smoke tests)

Caution: These tests may activate installed point detectors at the site. Always ensure that site personnel are consulted before smoke tests are performed and that all measures are taken to avoid unwanted alarm activations.

Smoke tests measure the amount of time to activate alarm states. The test should be repeated at least three times with consistent results.

Typical smoke tests include:

- Wire burn tests for Class A and Class B installations
- Smoke pellet tests for Class C installations

Use of canned smoke is not recommended to test the detector as the particles don't last long enough to travel the full length of the sampling pipe.

Wire burn test

This test is typically used for Class A and Class B installations.

The wire burn test is considered the most representative test of incipient fire hazard detection in telecommunications or computer room environments.

The test is performed by applying a voltage to a piece of PVC-insulated cable. Smoke is produced from the overheated PVC insulation by evaporation and condensation of the plasticiser.

As the wire becomes hotter, hydrogen chloride (HCl) gas is emitted from the insulation. The by-products of overheated PVC insulation can be detected by the system.

Performing a wire burn test (option 1)

The following test is considered unlikely to produce hydrochloric acid vapour. This test may be undertaken in underfloor spaces or ceiling voids.

1. Connect a 2 m (6.5 ft.) length of wire to a 6 VAC source of at least 16 A rating per wire for a period of 3 minutes.
2. The detector should respond within 120 seconds of cessation of energization. After this period, very little smoke is given off.

Notes:

The wire is subject to cooling if positioned in direct contact with air flows and may need to be shielded.

The wire cross-section should be AWG 10 with the following diameter and area:

- Diameter 2.59 mm (0.10189 in.)
- Cross-Section Area 5.0 mm² (0.00775 in.²)

Performing a wire burn test (option 2)

WARNING: The following test is likely to produce a sufficiently high temperature to generate small quantities of hydrogen chloride or hydrochloric acid gas. Be sure to maintain a safe distance from the wire while voltage is applied.

Perform this test in underfloor spaces or ceiling voids where rapid air flow may render the previous test unsuitable.

1. Connect a 1 m (3.25 ft.) length of wire to a 6 VAC source of at least 16 A rating per wire for a period of 1 minute.
2. The system should respond within 120 seconds of cessation of energization. After this period most of the insulation should be burned off.

Notes:

The wire cross-section should be AWG 10 with the following diameter and area:

- Diameter 2.59 mm (0.10189 in.)
- Cross-section area 5.0 mm² (0.00775 in.²)

Smoke pellet test

This test is typically used for Class C installations.

Performing a smoke pellet test

1. Place a 20 x 20 cm (7.87 x 7.87 in.) metal plate onto a 5.8 KW butane gas burner (or equivalent electrical heater), and then place a 7-9 g smoke pellet onto the plate.
2. Place a metal chimney over the pellet. The chimney should be 2 to 6 mm (0.08 to 0.24 in.) thick, at least 100 mm (3.94 in.) in diameter and 150 mm (5.9 in.) high.

Either the base of the chimney or the metal plate should have ventilation holes.

3. Ignite the burner and start the timer when the pellet starts to produce smoke.
4. Extinguish the burner after the required time has elapsed.

The amount of time depends on the room height and the temperature differential (the temperature difference between the level at which the test is conducted and the level at which the aspirating sampling points are mounted). See Table 10 on page 37.

Table 10: Burn times for smoke pellet tests

Height	Temperature Differential				
	<3°C (<37.4°F)	3 to 6°C (37.4 to 42.8°F)	6 to 9°C (42.8 to 48.2°F)	9 to 12°C (48.2 to 53.6°F)	12 to 15°C (53.6 to 59°F)
3 to 5 m (9.8 to 16.4 ft.)	3s	6s	9s	12s	17s
5 to 10 m (16.4 to 32.8 ft.)	7s	13s	20s	27s	34s
10 to 15 m (32.8 to 49.2 ft.)	10s	20s	30s	40s	51s
15 to 20 m (49.2 to 65.6 ft.)	13s	27s	40s	54s	67s

Connectivity check

Ensure that communications between the detector and any fire control and indicating equipment (especially alarm and fault conditions) operate correctly.

Check any other cause and effect requirements, particularly in relation to integration with automatic suppression systems.

Chapter 4

Maintenance and troubleshooting

Summary

This chapter provides maintenance and troubleshooting procedures.

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Maintenance

Visual check

Perform a visual check to verify pipe integrity every six months.

To perform the visual check, inspect the entire piping network and check for abnormalities in the pipes, including any breaks, blockages, crimps, etc.

Smoke test

Perform a smoke test when the detector is commissioned and then annually. See “Alarm detection (smoke tests)” on page 34 for more details.

Transport time verification test

Perform a transport time verification test when the detector is commissioned and then annually. The results of the annual tests should be compared to the results recorded after commissioning the detector. See “Maximum smoke transport time” on page 34 for more details.

Output level check (Remote configuration only)

Check the detector output level within one year of installation and then every two years.

The detector employs a self-monitoring, automatically-adjusting calibration for the system.

The check consists of:

- A visual inspection for any detector fault indications.
- Verifying that the output level (Dlevel) is within 5 to 30%.

If the self-monitoring feature of the system senses that the operational value of the detector head is outside its normal range, a fault is generated.

WARNING: If Remote reports that the output level value of the detector is higher than 30% during 7 consecutive days, this could be an indication that the detector is contaminated by dust and requires servicing. Investigate any changes in the environment which could explain the higher operational value. If it has been determined that the detector is contaminated, please note that normal detector operation cannot be guaranteed – contact your local supplier for more information and to arrange servicing. Also take precautions to avoid or limit any future contamination.

Cleaning the detector

The outside of the detector should be cleaned with a damp cloth when necessary.

Caution: Do not use solvents to clean the detector. Use of solvents may damage the detector.

Replacing the dust filter cartridge

WARNING: Health hazard: The dust in the dust filter will expose maintenance personnel to health hazards, due to the environment of the area being protected. It is recommended that suitable masks and protective clothing be worn when changing filters. Maintenance work must be performed in compliance with national and/or regional requirements and other applicable standards.

Caution: Use a manual screwdriver when replacing the filter to avoid damage to the filter cover and filter assembly. The maximum torque for the screw is 0.35 Nm. Do not use an electric screwdriver.

Replace the dust filter as described below, when required. Used dust filter cartridges are not intended for reuse and should be discarded.

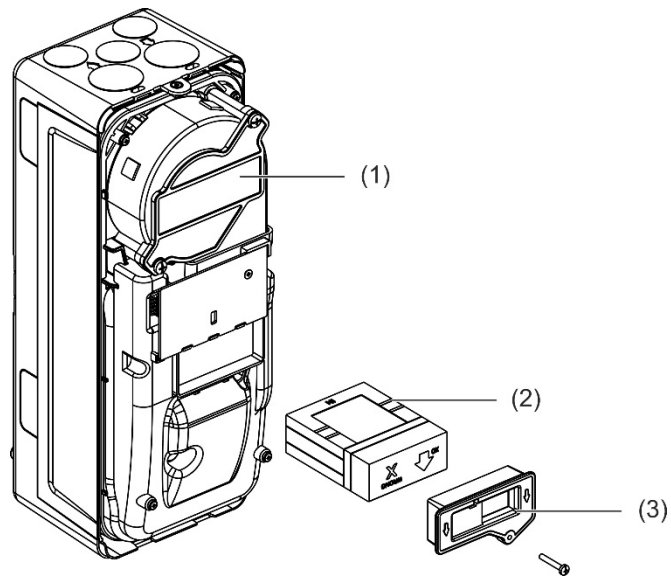
The detector will indicate a Filter fault when the filter value reaches 20%.

Caution: To avoid internal dust contamination, the detector must be powered off before replacing the dust filter.

To replace the dust filter cartridge:

1. Power off the detector.
2. Remove the detector cover to access the dust filter cartridge.
3. Remove the screw securing the dust filter, and then remove the filter assembly from the detector.
4. Remove the plastic cover from the filter cartridge and dispose of the cartridge.
5. Fit the new cartridge into the plastic cover with IN facing toward the top of the detector as shown in Figure 14. Slide the entire assembly into the detector and make sure the cartridge is correctly installed.
6. Secure the filter assembly using a screw.

Figure 14: Replacing the dust filter



1. Detector
2. Dust filter
3. Plastic cover

Troubleshooting

This section provides some possible solutions if a problem should occur with your detection system. If the problem is not included here or, if after performing the suggested actions, the problem persists, contact your technical support office.

Note: Review the Event log for advanced troubleshooting information. The Event log can only be accessed using the Remote application (see “Connecting to Remote” on page 23).

Table 11: Troubleshooting guide

Problem	Corrective action
Nuisance alarms occur too often	<p>Check that the ClassiFire alarm factor setting is appropriate for the normal working environment of the protected area. Check that the detector is not in Demo mode. This can be ascertained by viewing the Event log and checking that the entry Demo mode has a higher log entry number than the most recent FastLearn start and FastLearn end entries. Remember that the log entries are in reverse order, with the most recent entries appearing first. If the log shows that demonstration mode was invoked during the last FastLearn period, start a new FastLearn and allow it to complete its 24-hour cycle.</p> <p>From the Event log, check that at least 24 hours have elapsed since the last FastLearn end entry.</p> <p>Check that day/night switchover times are appropriately set to reflect active and non-active periods.</p>
Elevated smoke levels do not generate alarms	<p>Check that detector is not disabled or in FastLearn (if disabled, the fault indicator will be lit).</p> <p>Check that the detector sampling points are in the smoke stream.</p> <p>Check that the correct ClassiFire alarm setting has been set.</p> <p>Check that the detector has either had a 24-hour learning period or that it has been placed in demonstration mode.</p>
Low mean output	<p>Check that the dust filter does not require changing and that the air plenum chamber is clean. The chamber may become clogged when, for example, heavy building activity has occurred near the sampling pipes. If so, the chamber may require factory service. The detector is not designed to handle large quantities of coarse debris and dust.</p>
Detector sensitivity varies over time	<p>There are many reasons why particle densities may vary, and the ClassiFire system automatically compensates for this in order to replace the likelihood of nuisance alarms due to normal variations in background smoke density. Within limits set by the ClassiFire alarm factor, this is a normal part of the detector's operation.</p>

Problem	Corrective action
Flow fault errors	<p>These occur when the airflow rate into the detector exceeds the preprogrammed parameters. As the detector “learns” the flow setup from the initial installation, this usually means that there has been some change in conditions. A Flow High fault may indicate that a sampling pipe is damaged, and a Flow Low fault may indicate that the pipe has been blocked (for example, by nearby building operations).</p> <p>If the detector input is sampled from one area and the exhaust is in another area with different pressure (for example, the detector is in a roof space and sampling from an enclosed room), this may lead to flow faults. In this case, it would be necessary to lead a pipe from the exhaust to the protected area to ensure nominal flow.</p>
No LED indications	Check that the ribbon cable connecting the detector and the user interface has not been damaged.

System reset

If local configuration is selected, alarms and faults are latched (the alarm or fault indication remains active until a system reset is performed, even if the condition that caused the indication has ended).

To perform a system reset:

1. Remove the user interface cover.
2. Press the Confirm/System Reset button on the user interface (see Figure 3 on page 10).

Firmware updates

Checking the currently installed firmware version

To check the currently installed firmware version, connect to Remote as described in “Connecting to Remote” on page 23.

To check the currently installed firmware version:

1. Connect to Remote.
Remote automatically displays the detector details and firmware version

Updating the firmware

To update the firmware version:

1. Unzip the downloaded firmware folder to the root of a USB-C flash drive.
Note: The USB flash drive must be FAT32 format with a maximum capacity of 16 GB. The drive must not be partitioned.
2. Remove the user interface cover.
3. Insert the USB-C flash drive with the new firmware version into the USB-C connector (see Figure 3 on page 10).
4. Press and hold the Confirm/System Reset button on the user interface for 5 seconds.

The firmware update starts automatically.

The yellow Warning and Fault LEDs flash during the update and progress is indicated by the Smoke Level LEDs. Once the update is complete, the LEDs are steady.

5. Press the Confirm/System Reset button again to exit the update process.

Chapter 5

Pipe installation examples

Summary

This chapter provides pipe installation examples and specifications for selected fan speed and alarm factor settings.

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Overview

Pipe installations

- The total pipe length is measured from the detector.
- See Chapter 6 "Technical specifications" on page 65 for maximum pipe lengths for UL, FM, and ULC applications.
- The distance from the detector to the first sampling hole is 5 m (16 ft.).

Sensitivity classes

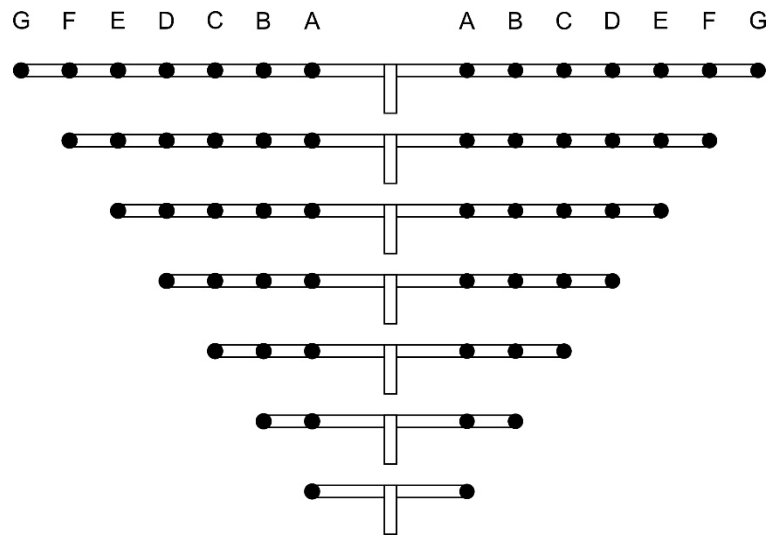
This chapter uses the following abbreviations for sensitivity classes.

Table 12: Abbreviations for sensitivity classes

Abbreviation	Description	Standard
VEWFD	Very Early Warning Fire Detection	NFPA, FM Class Number 3230
EWFD	Early Warning Fire Detection	NFPA, FM Class Number 3230
SFD	Standard Fire Detection	NFPA, FM Class Number 3230
SA	Special Application	UL 268 (Edition 7)
OAP	Open Area Protection	UL 268 (Edition 7)
ULC	ULC	ULC-S529 (Canada)

T-shaped pipe installations

Figure 15: T-shaped pipe installations



Fan speed 2

The following tables provide hole diameter, transport time, and average sensitivity values per pipe branch for fan speed 2.

Table 13: Hole diameter (in.)

Pipe length (ft.)	30	60	84	108
Hole ID	A	B	C	D
Number of holes				
2	19/64			
4	9/32	19/64		
6	1/4	17/64	5/16	
8	3/16	3/16	13/64	15/64

Table 14: Transport time and average sensitivity

Number of holes	Transport Time (s)	Average sensitivity (% obs/ft.)			
		Alarm Factor 2	Alarm Factor 4	Alarm Factor 6	Alarm Factor 8
2	14	0.04 VEWFD SA ULC	0.08 VEWFD SA ULC	0.24 VEWFD SA ULC	1.00 VEWFD SA ULC
4	30	0.08 VEWFD SA ULC	0.16 VEWFD SA ULC	0.48 VEWFD SA ULC	2.00 SFD SA OAP
6	45	0.12 VEWFD SA ULC	0.24 VEWFD SA ULC	0.72 VEWFD SA ULC	
8	73	0.17 EWFD ULC	0.34 EWFD ULC	1.02 EWFD ULC	

Fan speed 4

The following tables provide hole diameter, transport time, and average sensitivity values per pipe branch for fan speed 4.

Table 15: Hole diameter (in.)

Pipe length (ft.)	30	60	84	108	132	156
Hole ID	A	B	C	D	E	F
Number of holes						
2	11/64					
4	11/64	11/64				
6	9/64	9/64	9/64			
8	1/8	1/8	1/8	1/8		
10	7/64	7/64	7/64	7/64	7/64	
12	7/64	7/64	7/64	7/64	7/64	7/64

Table 16: Transport time and average sensitivity

Number of holes	Transport Time (s)	Average sensitivity (% obs/ft.)			
		Alarm Factor 2	Alarm Factor 4	Alarm Factor 6	Alarm Factor 8
2	18	0.04 VEWFD SA ULC	0.08 VEWFD SA ULC	0.24 VEWFD SA ULC	1.00 VEWFD SA ULC
4	28	0.08 VEWFD SA ULC	0.16 VEWFD SA ULC	0.48 VEWFD SA ULC	2.00 SFD SA OAP
6	45	0.12 VEWFD SA ULC	0.24 VEWFD SA ULC	0.72 VEWFD SA ULC	
8	63	0.16 EWFD SA ULC	0.32 EWFD SA ULC	0.96 EWFD SA ULC	
10	88	0.21 EWFD SA ULC	0.42 EWFD SA ULC	1.26 EWFD SA ULC	
12	101	0.25 SFD	0.50 SFD	1.50 SFD	

Fan speed 7

The following tables provide hole diameter, transport time, and average sensitivity values per pipe branch for fan speed 7.

Table 17: Hole diameter (in.)

Pipe length (ft.)	30	60	84	108	132	156	180
Hole ID	A	B	C	D	E	F	G
Number of holes							
2	9/64						
4	17/64	9/32					
6	9/64	9/64	9/64				
8	1/8	1/8	1/8	1/8			
10	7/64	7/64	7/64	7/64	7/64		
12	3/32	3/32	3/32	3/32	3/32	3/32	
14	3/32	3/32	3/32	3/32	3/32	3/32	3/32

Table 18: Transport time and average sensitivity

Number of holes	Transport Time (s)	Average sensitivity (% obs/ft.)			
		Alarm Factor 2	Alarm Factor 4	Alarm Factor 6	Alarm Factor 8
2	15	0.04 VEWFD SA ULC	0.08 VEWFD SA ULC	0.24 VEWFD SA ULC	1.00 VEWFD SA ULC
4	15	0.08 VEWFD SA ULC	0.16 VEWFD SA ULC	0.48 VEWFD SA ULC	2.00 SFD SA
6	32	0.12 VEWFD SA ULC	0.24 VEWFD SA ULC	0.72 VEWFD SA ULC	
8	45	0.16 VEWFD SA ULC	0.32 VEWFD SA ULC	0.96 VEWFD SA ULC	
10	62	0.20 EWFD ULC	0.40 EWFD ULC	1.20 EWFD ULC	
12	86	0.24 EWFD ULC	0.48 EWFD ULC	1.44 EWFD ULC	
14	95	0.29 SFD ULC	0.58 SFD ULC	1.74 SFD ULC	

Fan speed 10

The following tables provide hole diameter, transport time, and average sensitivity values per pipe branch for fan speed 10.

Table 19: Hole diameter (in.)

Pipe length (ft.)	30	60	84	108	132	156	180
Hole ID	A	B	C	D	E	F	G
Number of holes							
2	5/32						
4	5/32	5/32					
6	1/8	1/8	1/8				
8	7/64	7/64	7/64	7/64			
10	3/32	3/32	3/32	3/32	3/32		
12	5/64	5/64	5/64	5/64	5/64	5/64	
14	5/64	5/64	5/64	5/64	5/64	5/64	5/64

Table 20: Transport time and average sensitivity

Number of holes	Transport Time (s)	Average sensitivity (% obs/ft.)			
		Alarm Factor 2	Alarm Factor 4	Alarm Factor 6	Alarm Factor 8
2	14	0.04 VEWFD SA ULC	0.08 VEWFD SA ULC	0.24 VEWFD SA ULC	1.00 VEWFD SA ULC
4	19	0.08 VEWFD SA ULC	0.16 VEWFD SA ULC	0.48 VEWFD SA ULC	2.00 SFD SA OAP
6	30	0.12 VEWFD SA ULC	0.24 VEWFD SA ULC	0.72 VEWFD SA ULC	
8	43	0.16 VEWFD SA ULC	0.32 VEWFD SA ULC	0.96 VEWFD SA ULC	
10	62	0.20 EWFD ULC	0.40 EWFD ULC	1.20 EWFD ULC	
12	91	0.24 SFD ULC	0.48 SFD ULC	1.44 SFD ULC	
14	99	0.28 SFD ULC	0.56 SFD ULC	1.68 SFD ULC	

I-shaped pipe installations

Figure 16: I-shaped pipe installations

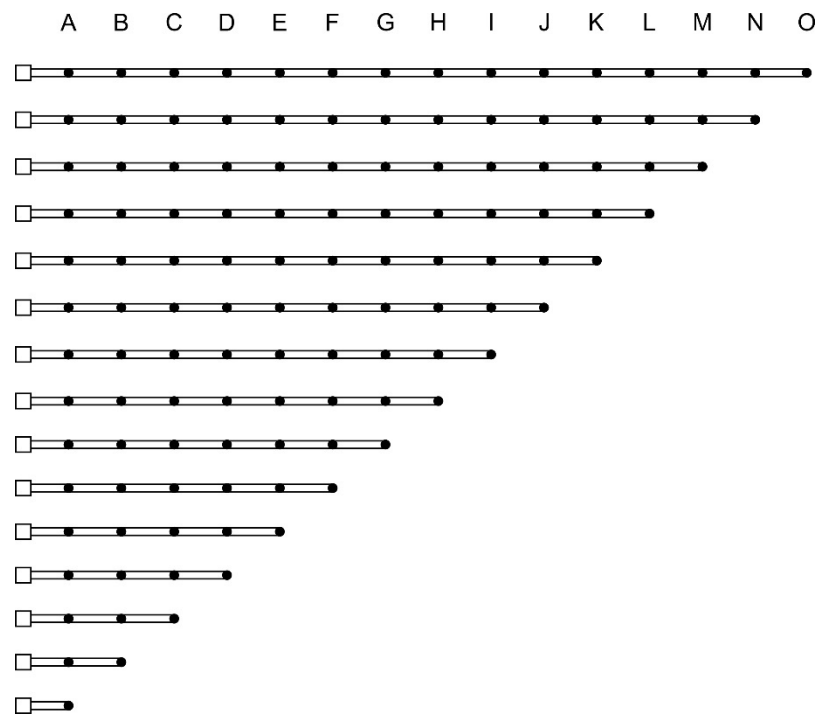
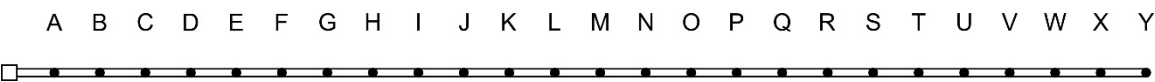


Figure 17: I-shaped pipe installations (225 ft., 25 holes)



Fan speed 2

The following tables provide hole diameter, transport time, and average sensitivity values for fan speed 2.

Table 21: Hole diameter (in.)

Pipe length (ft.)	20	40	60	80	100	120	140	160	180	200
Hole ID	A	B	C	D	E	F	G	H	I	J
Number of holes										
1	7/16									
2	17/64	17/64								
3	1/4	1/4	1/4							
4	13/64	13/64	13/64	13/64						
5	3/16	3/16	3/16	3/16	13/64					
6	5/32	5/32	5/32	5/32	5/32	11/64				
7	5/32	5/32	5/32	5/32	5/32	5/32	11/64			
8	9/64	9/64	9/64	9/64	9/64	9/64	5/32	5/32		
9	1/8	1/8	1/8	1/8	1/8	1/8	9/64	9/64	3/16	
10	1/8	1/8	1/8	1/8	1/8	1/8	1/8	9/64	9/64	5/32

Table 22: Transport time and average sensitivity

Number of holes	Transport Time (s)	Average sensitivity (% obs/ft.)			
		Alarm Factor 2	Alarm Factor 4	Alarm Factor 6	Alarm Factor 8
1	4	0.02 VEWFD SA ULC	0.04 VEWFD SA ULC	0.12 VEWFD SA ULC	0.50 VEWFD SA ULC
2	13	0.04 VEWFD SA ULC	0.08 VEWFD SA ULC	0.24 VEWFD SA ULC	1.00 VEWFD SA ULC
3	28	0.06 VEWFD SA ULC	0.12 VEWFD SA ULC	0.36 VEWFD SA ULC	1.50 EWFD SA ULC
4	34	0.08 VEWFD SA ULC	0.16 VEWFD SA ULC	0.48 VEWFD SA ULC	2.00 SFD SA OAP
5	53	0.10 VEWFD SA ULC	0.20 VEWFD SA ULC	0.60 VEWFD SA ULC	2.50 SFD
6	66	0.13 EWFD ULC	0.26 EWFD ULC	0.78 EWFD ULC	
7	75	0.15 EWFD ULC	0.30 EWFD ULC	0.90 EWFD ULC	
8	89	0.17 EWFD ULC	0.34 EWFD ULC	1.02 EWFD ULC	
9	95	0.20 SFD ULC	0.40 SFD ULC	1.20 SFD ULC	
10	113	0.23 SFD	0.46 SFD	1.38 SFD	

Fan speed 4

The following tables provide hole diameter, transport time, and average sensitivity values for fan speed 4.

Table 23: Hole diameter (in.)

Pipe length (ft.)	20	40	60	80	100	120	140	160	180	200	220
Hole ID	A	B	C	D	E	F	G	H	I	J	K
Number of holes											
1	7/16										
2	3/16	3/16									
3	5/32	5/32	5/32								
4	9/64	9/64	9/64	9/64							
5	1/8	1/8	1/8	1/8	1/8						
6	7/64	7/64	7/64	7/64	7/64	7/64					
7	3/32	3/32	3/32	3/32	3/32	3/32	7/64				
8	3/32	3/32	3/32	3/32	3/32	3/32	3/32	7/64			
9	3/32	3/32	3/32	3/32	3/32	3/32	3/32	3/32	7/64		
10	3/32	3/32	3/32	3/32	3/32	7/64	7/64	7/64	7/64	7/64	
11	3/32	7/64	7/64	7/64	7/64	7/64	7/64	7/64	7/64	7/64	1/8

Table 24: Transport time and average sensitivity

Number of holes	Transport Time (s)	Average sensitivity (% obs/ft.)			
		Alarm Factor 2	Alarm Factor 4	Alarm Factor 6	Alarm Factor 8
1	3	0.02 VEWFD SA ULC	0.04 VEWFD SA ULC	0.12 VEWFD SA ULC	0.50 VEWFD SA ULC
2	13	0.04 VEWFD SA ULC	0.08 VEWFD SA ULC	0.24 VEWFD SA ULC	1.00 VEWFD SA ULC
3	23	0.06 VEWFD SA ULC	0.12 VEWFD SA ULC	0.36 VEWFD SA ULC	1.50 EWFD SA ULC
4	34	0.08 VEWFD SA ULC	0.16 VEWFD SA ULC	0.48 VEWFD SA ULC	2.00 SFD SA OAP
5	46	0.10 VEWFD SA ULC	0.20 VEWFD SA ULC	0.60 VEWFD SA ULC	2.50 SFD
6	64	0.12 EWFD ULC	0.24 EWFD ULC	0.72 EWFD ULC	
7	77	0.15 EWFD ULC	0.30 EWFD ULC	0.90 EWFD ULC	
8	82	0.17 EWFD ULC	0.34 EWFD ULC	1.02 EWFD ULC	
9	102	0.19 SFD	0.38 SFD	1.14 SFD	

Number of holes	Transport Time (s)	Average sensitivity (% obs/ft.)			
		Alarm Factor 2	Alarm Factor 4	Alarm Factor 6	Alarm Factor 8
10	105	0.23 SFD	0.46 SFD	1.38 SFD	
11	117	0.24 SFD	0.48 SFD	1.44 SFD	

Fan speed 7

The following tables provide hole diameter, transport time, and average sensitivity values for fan speed 7.

Table 25: Hole diameter (in.)

Pipe length (ft.)	20	40	60	80	100	120	140	160	180	200	220	240
Hole ID	A	B	C	D	E	F	G	H	I	J	K	L
Number of holes												
1	7/16											
2	3/16	3/16										
3	1/8	1/8	1/8									
4	7/64	7/64	7/64	7/64								
5	3/32	3/32	3/32	3/32	3/32							
6	3/32	3/32	3/32	3/32	3/32	3/32						
7	5/64	5/64	5/64	5/64	5/64	5/64	3/32					
8	5/64	5/64	5/64	5/64	5/64	5/64	5/64	3/32				
9	5/64	5/64	5/64	5/64	5/64	5/64	5/64	5/64	3/32			
10	5/64	5/64	5/64	5/64	5/64	5/64	5/64	5/64	5/64	3/32		
11	3/32	3/32	3/32	7/64	7/64	7/64	7/64	7/64	7/64	7/64	7/64	
12	5/64	5/64	3/32	3/32	3/32	7/64	7/64	7/64	7/64	7/64	7/64	7/64

Table 26: Transport time and average sensitivity

Number of holes	Transport Time (s)	Average sensitivity (% obs/ft.)			
		Alarm Factor 2	Alarm Factor 4	Alarm Factor 6	Alarm Factor 8
1	2	0.02 VEWFD SA ULC	0.04 VEWFD SA ULC	0.12 VEWFD SA ULC	0.50 VEWFD SA ULC
2	10	0.04 VEWFD SA ULC	0.08 VEWFD SA ULC	0.24 VEWFD SA ULC	1.00 VEWFD SA ULC
3	25	0.06 VEWFD SA ULC	0.12 VEWFD SA ULC	0.36 VEWFD SA ULC	1.50 EWFD SA ULC
4	37	0.08 VEWFD SA ULC	0.16 VEWFD SA ULC	0.48 VEWFD SA ULC	2.00 SFD SA OAP
5	56	0.10 VEWFD SA ULC	0.20 VEWFD SA ULC	0.60 VEWFD SA ULC	2.50 SFD
6	60	0.12 VEWFD ULC	0.24 VEWFD ULC	0.72 VEWFD ULC	
7	74	0.15 EWFD ULC	0.30 EWFD ULC	0.90 EWFD ULC	
8	78	0.17 EWFD ULC	0.34 EWFD ULC	1.02 EWFD ULC	
9	83	0.19 EWFD ULC	0.38 EWFD ULC	1.14 EWFD ULC	

Number of holes	Transport Time (s)	Average sensitivity (% obs/ft.)			
		Alarm Factor 2	Alarm Factor 4	Alarm Factor 6	Alarm Factor 8
10	97	0.21 SFD	0.42 SFD	1.26 SFD	
11	103	0.26 SFD	0.52 SFD	1.56 SFD	
12	111	0.30 SFD	0.60 SFD	1.80 SFDd	

Fan speed 10

The following tables provide hole diameter, transport time, and average sensitivity values for fan speed 10.

Table 27: Hole diameter (in.)

Pipe length (ft.)	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300
Hole ID	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Number of holes															
1	7/16														
2	3/16	3/16													
3	1/8	1/8	1/8												
4	7/64	7/64	7/64	7/64											
5	3/32	3/32	3/32	3/32	3/32										
6	5/64	5/64	5/64	5/64	5/64	5/64									
7	5/64	5/64	5/64	5/64	5/64	5/64	5/64								
8	5/64	5/64	5/64	5/64	5/64	5/64	5/64	5/64							
9	5/64	5/64	5/64	5/64	5/64	5/64	5/64	5/64	5/64						
10	5/64	5/64	5/64	5/64	5/64	5/64	5/64	5/64	5/64	5/64					
11	3/32	3/32	3/32	3/32	3/32	3/32	3/32	3/32	3/32	3/32	3/32				
12	3/32	3/32	3/32	3/32	3/32	3/32	3/32	3/32	3/32	3/32	3/32	3/32			
13	5/64	5/64	5/64	5/64	5/64	3/32	3/32	3/32	3/32	3/32	3/32	3/32	3/32		
14	5/64	5/64	3/32	3/32	7/64	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	9/64	
15	5/64	5/64	5/64	3/32	7/64	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	9/64	9/64

Table 28: Transport time and average sensitivity

Number of holes	Transport Time (s)	Average sensitivity (% obs/ft.)			
		Alarm Factor 2	Alarm Factor 4	Alarm Factor 6	Alarm Factor 8
1	2	0.02 VEWFD SA ULC	0.04 VEWFD SA ULC	0.12 VEWFD SA ULC	0.50 VEWFD SA ULC
2	8	0.04 VEWFD SA ULC	0.08 VEWFD SA ULC	0.24 VEWFD SA ULC	1.00 VEWFD SA ULC
3	21	0.06 VEWFD SA ULC	0.12 VEWFD SA ULC	0.36 VEWFD SA ULC	1.50 EWFD SA ULC
4	32	0.08 VEWFD SA ULC	0.16 VEWFD SA ULC	0.48 VEWFD SA ULC	2.00 SFD SA OAP
5	44	0.10 VEWFD SA ULC	0.20 VEWFD SA ULC	0.60 VEWFD SA ULC	2.50 SFD
6	68	0.12 EWFD ULC	0.24 EWFD ULC	0.72 EWFD ULC	
7	73	0.14 EWFD ULC	0.28 EWFD ULC	0.84 EWFD ULC	

Number of holes	Transport Time (s)	Average sensitivity (% obs/ft.)			
		Alarm Factor 2	Alarm Factor 4	Alarm Factor 6	Alarm Factor 8
8	82	0.16 EWFD ULC	0.32 EWFD ULC	0.96 EWFD ULC	
9	90	0.18 EWFD ULC	0.36 EWFD ULC	1.08 EWFD ULC	
10	98	0.21 SFD ULC	0.42 SFD ULC	1.26 SFD ULC	
11	94	0.24 SFD ULC	0.48 SFD ULC	1.44 SFD ULC	
12	105	0.27 SFD	0.54 SFD	1.62 SFD	
13	111	0.35 SFD	0.70 SFD	2.10 SFD	
14	113	0.32 SFD	0.64 SFD	1.92 SFD	
15	113	0.35 SFD	0.70 SFD	2.10 SFD	

Fan speed 10 (225 ft., 25 holes)

The following tables provide hole diameter, transport time, and average sensitivity values for fan speed 10 for a 225 ft. pipe with 25 holes.

Table 29: Hole diameter (in.) for pipes from 9 to 135 ft.

Pipe length (ft.)	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135
Hole ID	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Number of holes															
1	5/16														
2	19/64	5/16													
3	17/64	19/64	5/16												
4	15/64	17/64	5/16	5/16											
5	3/16	3/16	3/16	1/4	5/16										
6	3/16	3/16	3/16	3/16	17/64	5/16									
7	11/64	11/64	11/64	11/64	7/32	5/16	5/16								
8	9/64	9/64	9/64	9/64	13/64	5/16	5/16	5/16							
9	9/64	9/64	9/64	9/64	9/64	13/64	5/16	5/16	5/16						
10	1/8	9/64	9/64	5/32	11/64	3/16	7/32	7/32	15/64	5/16					
11	7/64	1/8	1/8	9/64	5/32	11/64	3/16	13/64	13/64	13/64	5/16				
12	7/64	7/64	7/64	1/8	9/64	9/64	5/32	11/64	11/64	11/64	11/64	1/4			
13	3/32	7/64	7/64	7/64	1/8	9/64	9/64	5/32	11/64	11/64	11/64	3/16	9/32		
14	3/32	7/64	7/64	7/64	1/8	1/8	9/64	5/32	11/64	3/16	3/16	3/16	13/64	5/16	
15	3/32	3/32	7/64	7/64	1/8	1/8	9/64	5/32	13/64	13/64	13/64	13/64	7/32	15/64	5/16
16	3/32	3/32	3/32	3/32	7/64	7/64	1/8	9/64	5/32	5/32	11/64	11/64	11/64	11/64	3/16
17	5/64	3/32	3/32	3/32	3/32	7/64	7/64	1/8	9/64	5/32	5/32	5/32	5/32	11/64	11/64
18	5/64	5/64	5/64	3/32	3/32	3/32	3/32	7/64	7/64	9/64	9/64	9/64	9/64	9/64	5/32
19	5/64	5/64	5/64	3/32	3/32	3/32	7/64	7/64	1/8	9/64	9/64	5/32	5/32	5/32	5/32
20	5/64	5/64	5/64	5/64	3/32	3/32	3/32	3/32	7/64	1/8	9/64	9/64	9/64	9/64	9/64
21	5/64	5/64	5/64	5/64	5/64	3/32	3/32	3/32	7/64	1/8	1/8	1/8	9/64	9/64	9/64
22	5/64	5/64	5/64	5/64	5/64	5/64	3/32	3/32	3/32	7/64	1/8	1/8	9/64	9/64	9/64
23	5/64	5/64	5/64	5/64	5/64	5/64	5/64	3/32	3/32	7/64	7/64	7/64	1/8	1/8	1/8
24	5/64	5/64	5/64	5/64	5/64	5/64	5/64	5/64	3/32	3/32	7/64	7/64	7/64	7/64	7/64
25	5/64	5/64	5/64	5/64	5/64	5/64	5/64	5/64	5/64	3/32	3/32	7/64	7/64	7/64	7/64

Table 30: Hole diameter (in.) for pipes from 144 to 225 ft.

Pipe length (ft.)	144	153	162	171	180	189	198	207	216	225
Hole ID	P	Q	R	S	T	U	V	W	X	Y
Number of holes										
16	5/16									
17	3/16	5/16								
18	5/32	5/32	17/64							
19	11/64	11/64	3/16	5/16						
20	9/64	5/32	5/32	11/64	5/16					
21	9/64	9/64	9/64	5/32	11/64	5/16				
22	9/64	9/64	9/64	5/32	11/64	3/16	5/16			
23	1/8	1/8	1/8	9/64	9/64	9/64	5/32	5/16		
24	1/8	1/8	1/8	1/8	1/8	1/8	9/64	9/64	5/16	
25	7/64	7/64	7/64	7/64	7/64	7/64	1/8	1/8	3/16	5/16

Table 31: Transport time and average sensitivity

Number of holes	Transport Time (s)	Average sensitivity (% obs/ft.)			
		Alarm Factor 2	Alarm Factor 4	Alarm Factor 6	Alarm Factor 8
1	2	0.02 VEWFD SA ULC	0.04 VEWFD SA ULC	0.12 VEWFD SA ULC	0.50 VEWFD SA ULC
2	2	0.04 VEWFD SA ULC	0.08 VEWFD SA ULC	0.24 VEWFD SA ULC	1.00 VEWFD SA ULC
3	3	0.06 VEWFD SA ULC	0.12 VEWFD SA ULC	0.36 VEWFD SA ULC	1.50 EWFD SA ULC
4	5	0.09 VEWFD SA ULC	0.18 VEWFD SA ULC	0.54 VEWFD SA ULC	2.25 SFD
5	6	0.14 VEWFD SA ULC	0.28 VEWFD SA ULC	0.84 VEWFD SA ULC	
6	8	0.19 VEWFD SA ULC	0.38 VEWFD SA ULC	1.14 EWFD SA ULC	
7	10	0.21 VEWFD SA ULC	0.42 VEWFD SA ULC	1.26 EWFD SA ULC	
8	13	0.26 VEWFD SA ULC	0.52 VEWFD SA ULC	1.56 SFD SA ULC	
9	16	0.30 VEWFD SA ULC	0.60 VEWFD SA ULC	1.80 SFD SA ULC	
10	18	0.26 VEWFD SA ULC	0.52 VEWFD SA ULC	1.56 SFD SA ULC	
11	20	0.30 VEWFD SA ULC	0.60 VEWFD SA ULC	1.80 SFD SA OAP	
12	21	0.32 VEWFD SA ULC	0.64 VEWFD SA ULC	1.92 SFD SA OAP	
13	25	0.34 VEWFD SA ULC	0.68 VEWFD SA ULC	2.04 SFD SA OAP	
14	28	0.38 VEWFD SA ULC	0.76 VEWFD SA ULC	2.28 SFD	

Number of holes	Transport Time (s)	Average sensitivity (% obs/ft.)			
		Alarm Factor 2	Alarm Factor 4	Alarm Factor 6	Alarm Factor 8
15	31	0.49 VEWFD SA ULC	0.98 VEWFD SA ULC		
16	34	0.44 VEWFD SA ULC	0.88 VEWFD SA ULC		
17	37	0.46 VEWFD SA ULC	0.92 VEWFD SA ULC		
18	36	0.49 VEWFD SA ULC	0.98 VEWFD SA ULC		
19	47	0.54 VEWFD SA ULC	1.08 EWFD ULC		
20	47	0.54 VEWFD SA ULC	1.08 EWFD ULC		
21	52	0.58 VEWFD SA ULC	1.16 EWFD ULC		
22	52	0.59 VEWFD SA ULC	1.18 EWFD ULC		
23	58	0.69 VEWFD SA ULC	1.38 EWFD ULC		
24	59	0.70 VEWFD SA ULC	1.40 EWFD ULC		
25	59	0.85 VEWFD SA ULC	1.70 SFD ULC		

Chapter 6

Technical specifications

Power supply

Supply voltage	18 to 30 VDC, 24 VDC nominal 21.2 to 27.2 VDC, 24 VDC nominal (UL/cUL and FM)
Current consumption (at 24 VDC)	120 mA (fan speed 1) 134 mA (fan speed 2) 157 mA (fan speed 3) 180 mA (fan speed 4) 200 mA (fan speed 5) 230 mA (fan speed 6) 255 mA (fan speed 7) 285 mA (fan speed 8) 320 mA (fan speed 9) 365 mA (fan speed 10)

Communications

Connectivity	USB-C
--------------	-------

Inputs and outputs

Inputs	
Number of inputs	1
End-of-line resistance	15 K Ω 5% 1/4 W
Outputs	
Number of outputs	3
Contact type	C/NO/NC, voltage free
Resistive load	2 A at 30 VDC

Aspirating system

Detection principle	Laser light scattering mass detection
Laser	
Safety class	Class 1
Laser diode	Class 3B
Sensitivity range	
%obs/m	25% min. 0.03% max. FSD
%obs/ft.	7.62% min. 0.00914% max. FSD
Particle sensitivity range	0.0003 to 10 microns
Velocity range	0 to 20 m/s (0 to 4000 ft./min)
Alarm levels [1]	4 (Alert/Aux. Alarm, Prealarm, Fire Alarm, Fire Alarm 2)
Fan speed	Configurable (1 to 10)
Air flow measurement	
Range	1 to 6 m/s (3.3 to 19.6 ft./s)
Resolution	0.05 m/s (0.16 ft./s)
Note: Absolute readings of air velocity (temperature compensated)	
Sampling pipe inlets	1
Exhaust pipe	1
Pipe size (external diameter)	26.75 mm and 25.0 mm Ø (1.050 in. and 0.984 in.)
Pipe length	
NFPA	122 m max. (400 ft.)
UL 268 (Edition 7)	
Open Area Protection	91 m max. (300 ft.)
Special Application – Range 1	91 m max. (300 ft.)
Special Application – Range 2	61 m max. (200 ft.)
ULC	122 m max. (400 ft.)
Sampling holes per pipe	
NFPA	
VEWFD	10 holes max.
EWFD	20 holes max.
SFD	35 holes max.
UL 268 (Edition 7)	
Open Area Protection	24 holes max.
Special Application – Range 1	25 holes max.
Special Application – Range 2	25 holes max.
ULC	35 holes max.
Average sound pressure level	38.8 dBA (fan speed 6)
Chart record [2]	From 1 month at 1 s resolution up to 5 years at 60 s resolution
Event log [2]	20,000 events

[1] Alert/Aux and Fire Alarm 2 are only available via the relay outputs.

[2] The Chart record and Event log can only be accessed using the Remote application (see “Connecting to Remote” on page 23).

Mechanical and environmental

Table 32: Mechanical

Dimensions (W x H x D)	
Detector	110.5 × 300 × 133.5 mm (4.35 × 11.81 × 5.25 in.)
User interface	55 × 300 × 133.5 mm (2.2 × 11.81 × 5.25 in.)
Weight (including backplane)	
Detector	1.57 kg (3.46 lb.)
User interface	0.58 kg (1.28 lb.)
Number of cable knockouts	
Top	2 × Ø 20.7 mm (0.815 in)
Bottom	2 × Ø 20.7 mm (0.815 in)
IP rating	IP40
Flammability rating	UL94 V0
Dust filter replacement	Timed warning integrated.
Detector chamber maintenance	Subject to installation environment

Table 33: Environmental

Operating temperature	−10 to +60°C (0 to 38°C UL/cUL, 0 to 49°C FM)
Storage temperature	−20 to +60°C
Relative humidity	+5 to 95% noncondensing (0 to 90% for UL/cUL and FM) IEC 61010-1 Pollution degree 1 IEC 61010-1 Installation Cat. II

Appendix A

Regulatory information

Europe

European regulations for construction products

This section provides a summary on the declared performance according to the Construction Products Regulation (EU) 305/2011 and Delegated Regulations (EU) 157/2014 and (EU) 574/2014.

For detailed information, see the product Declaration of Performance (available at firesecurityproducts.com).

Table 34: Regulatory information

Conformity	CE
Notified/Approved body	0370
Manufacturer	KGS Safety System (Hebei) Co. Ltd., 80 Changjiang East Road, QETDZ, Qinhuangdao 066004, Hebei, China. Authorized EU manufacturing representative: KGS Fire & Security B.V., Kelvinstraat 7, NL-6003 DH, Weert, The Netherlands.
Year of first CE marking	25
Declaration of Performance number	3103109-ML
Standards	EN 54-20 Classes A, B, and C
Product identification	9-30501-KID-ULF
Intended use	See the product Declaration of Performance
Declared performance	See the product Declaration of Performance

EN 54-20 compliance

This product has been designed in accordance with EN 54-20.

European standards for electrical safety and electromagnetic compatibility

This product has been designed in accordance with the following European standards for electrical safety and electromagnetic compatibility:

- EN 62368-1
- EN 50130-4
- EN 61000-6-3
- EN 61000-3-2
- EN 61000-3-3

Australia

This product has been designed in accordance with AS 7240.20 Fire detection and alarm systems – Aspirating smoke detectors.

North America and Canada

This product has been designed to meet the following requirements:

- NFPA 72 National Fire Alarm and Signalling Code
- UL 268 Smoke Detectors for Fire Alarm Signalling Systems
- UL 268A Smoke Detectors for Duct Applications
- UL 864 Control Units for Fire Protective Signalling Systems
- FM 3230 Smoke Actuated Detectors for Automatic Fire Alarm Signalling
- FM 3010 Fire Alarm Signaling Systems
- CSFM California State Fire Marshal
- CAN/ULC-S529 Smoke Detectors for Fire Alarm Systems
- CAN/ULC-S524 Installation of Fire Alarm Systems
- ULC S527 Control Units for Fire Alarm Systems

System reacceptance test after reprogramming (UL/ULC and FM):

To ensure proper system operation, this system must be retested in accordance with NFPA 72 after any programming change. Reacceptance testing is also required after any addition or deletion of system components, and after any modification, repair, or adjustment to system hardware, or wiring.

UL and FM compliance

To comply with UL and FM requirements:

- The application of any pipework and hole configuration, detector sensitivity and equipment parameters must be determined using PipeCAD software. The applicable values for each application are shown in Table 35 on page 72.
- The transport time of the last sampling hole must be checked after installation and must be less than or equal to that determined by PipeCAD.
- Ensure that the configured Alarm Factor value is as defined by PipeCAD.
- The flow low and flow high settings must be set to a value not exceeding 20%.
- All modules must be powered by a suitable UL/cUL/FM approved power supply.
- All cable glands must be rated IP67 or higher.

For more information on PipeCAD, see your PipeCAD documentation.

Table 35: Hole sensitivity and transport times

Application	Hole sensitivity (% obs/ft)	Transport time (s)
UL 268 (Edition 7) Open Area Protection	1.70 to 2.18	6 to 43
UL 268 (Edition 7) Special Application – Range 1	0.05 to 1.00	3 to 60
UL 268 (Edition 7) Special Application – Range 2	0.05 to 2.18	3 to 43
UL 268A Duct Application – Range 1	0.5 to 5.00	5 to 30
UL 268A Duct Application – Range 2	0.5 to 3.00	5 to 44
ULC-S529 (Canada)	0.05 to 1.82	3 to 100
ULC-S529 (Canada) – Duct Application	0.5 to 3.00	11 to 44
FM Class Number 3230: NFPA Very Early Warning Fire Detection (VEWFD)	<1.00	<60
FM Class Number 3230: NFPA Early Warning Fire Detection (EWFD)	<1.50	<90
FM Class Number 3230: NFPA Standard Fire Detection (SFD)	<2.50	<120

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