Stratos® Nano

Installers' Handbook

LM80031 Issue 1

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10 0832-CPD-1312
EN 54-20:2006 Aspirating smoke detectors for fire detection and fire alarm systems for buildings Class A, B and C

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Introduction

An aspirating smoke detector uses a fan to draw samples of air from a network of pipes with sampling holes positioned as if they were point smoke detectors.

The detector incorporates a patented artificial intelligence system called ClassiFire®, which allows the unit to adjust itself to the optimum sensitivity for any environment.

This smoke detector is defined as Class III in EN 60950. It is designed to operate from Safety Extra Low Voltages and does not generate any hazardous voltages.

If this detector is to form part of an approved fire detection system, its power must be supplied from a certified power supply (typically EN 54-4).

In order for the installation to conform to EN 54-20, pipes must conform at least to EN 61386-1 Class 1131.

Please note that printed circuit boards are static sensitive and must not be handled without taking proper static precautions.

This symbol indicates that the detector is a Class 1 laser product as defined in IEC 60825-1. This unit incorporates a Class 3B embedded laser which must not be removed from the detector, as retinal damage may occur if the beam enters the eye.

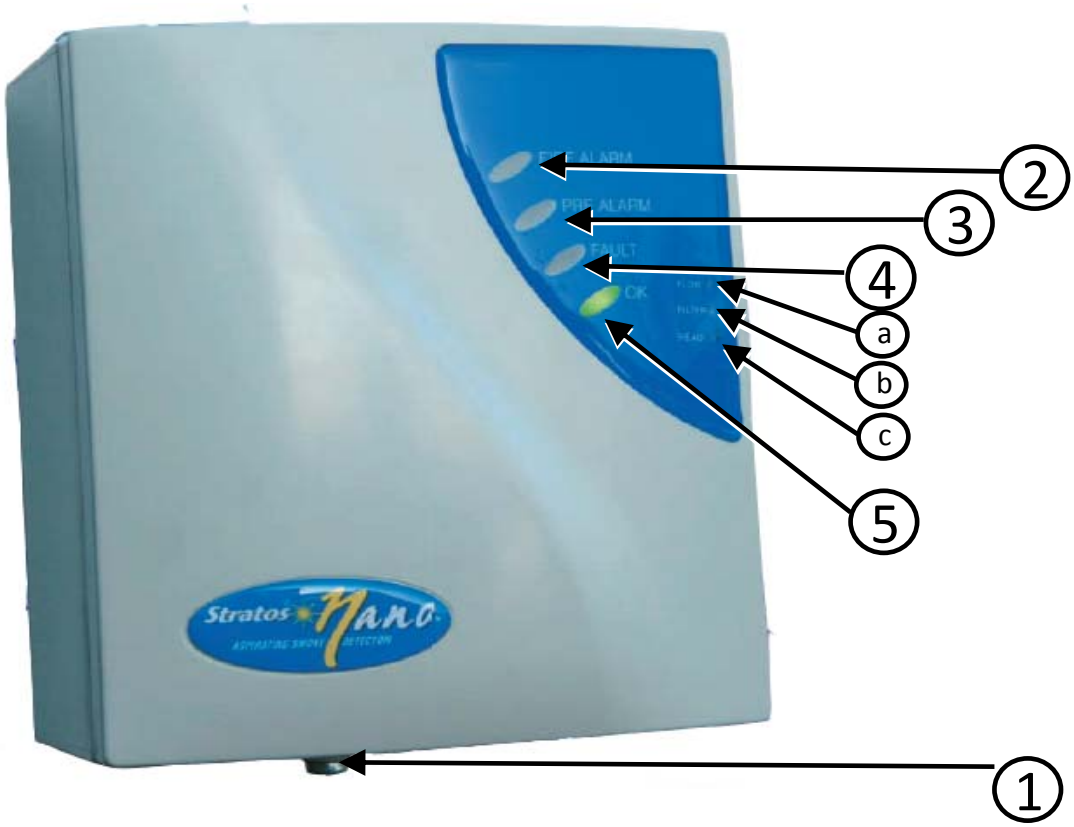
This symbol indicates that this product must NOT be disposed of with other waste. It is the user's responsibility to dispose of this product by sending it to an approved reprocessing company, or by returning it to the manufacturer for reprocessing.

Every care has been taken to ensure that the detector is as easy to install as possible by trained fire Alarm engineers. In case of difficulty, please contact the Help Line in the first instance to ensure trouble free installation and operation.

HELP LINE: +44 (0) 143-875-1296

technical@airsense.co.uk

Outside the Detector

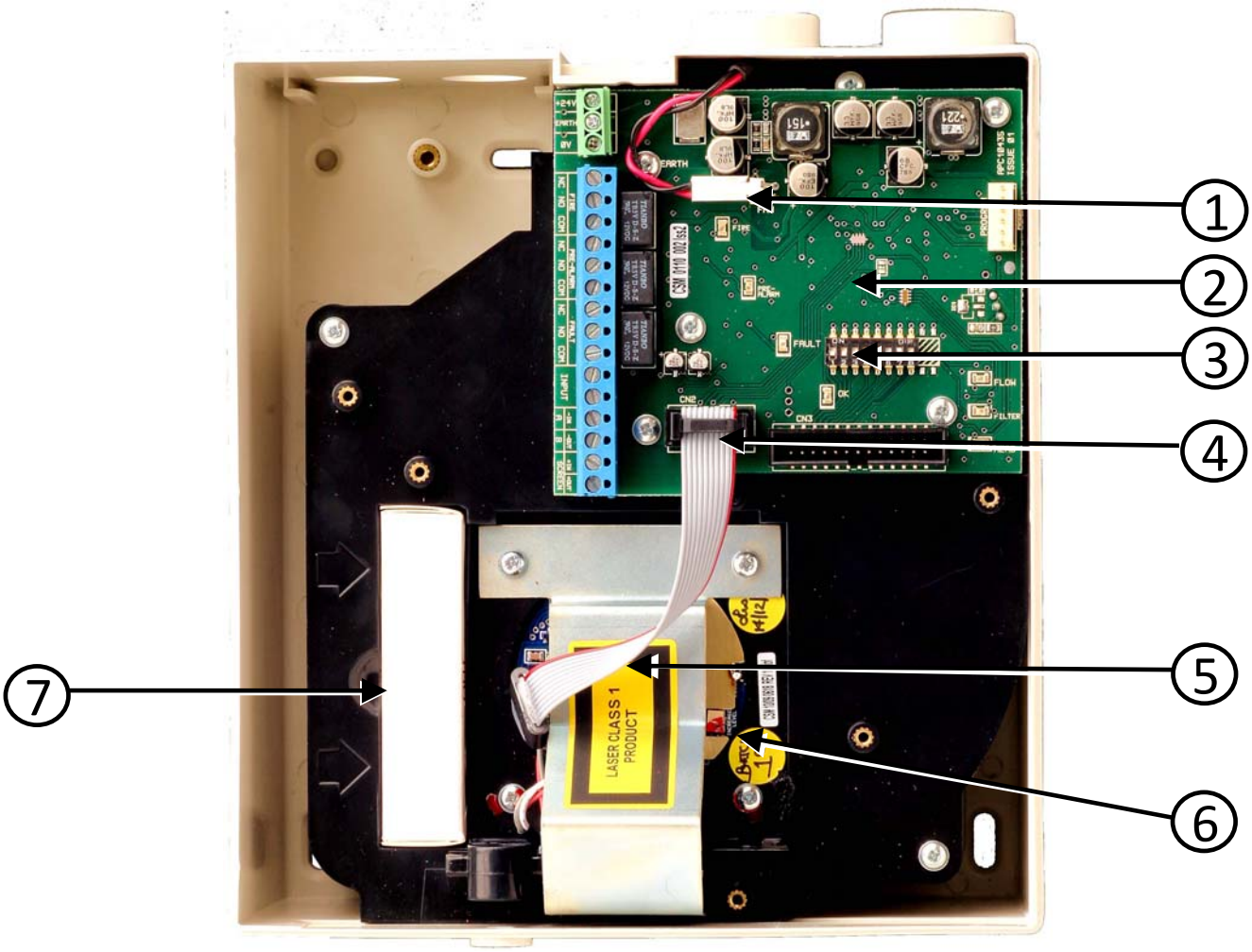


1. **Front Cover Securing Screw:** Leave sufficient clearance below the detector to allow screwdriver access to this screw.
2. **Fire Alarm**: Illuminates to indicate that the smoke level has passed the detector's Fire 1 threshold, and the normally open FIRE relay contacts have closed.
3. **Pre Alarm**: Illuminates to indicate that the smoke level has passed the detector's Pre Alarm threshold, and the normally open PRE ALARM relay contacts have closed.
4. **Fault**: Illuminates to indicate a Fault condition and that the normally closed FAULT relay contacts have opened. Three additional LEDs indicate the type of fault:
   a) **Flow:** Illuminates to indicate an airflow fault. This may be due to blocked or broken pipes, although it can also occur if, for example, factory warehouse doors are opened on a windy day, or if industrial air conditioning turns on. Another possible cause is that the aspirating fan connection cable is damaged or disconnected.
   b) **Filter:** Illuminates to indicate that the detector's air filter needs to be changed.
   c) **Head:** Illuminates to indicate a problem with the detector laser chamber, as might be caused if the laser head connecting cable is damaged or disconnected. It can also be caused by certain kinds of internal systems faults, which appear in the detector's Event Log as "process errors".

   NB: if the FAULT LED is illuminated but none of the additional LEDs are lit, it indicates a problem with the power supply if its Fault output is connected to the detector's INPUT terminals and DIL switch 7 is set to OFF (its default position). Alternatively, this can happen if the INPUT terminals are left open circuit and DIL switch 7 is OFF.

5. **OK**: Illuminates to confirm normal operation.
   NB: during initial setup, the OK LED will flash for 15 minutes while the detector learns its operating environment. This does not indicate a problem with the detector.

Inside the Detector



1. **Aspirating Fan Connector Lead:** If this lead is broken or not connected, the fan will not turn and the detector will indicate a FLOW fault.
2. **Main PCB:** No user-serviceable parts. ***NB: the PCB is fixed in place with 5 off M3 x 6 screws. The detector must not be operated with any of the screws missing, as this may cause air leaks and unreliable operation.***
3. **DIL switch:** Used to configure user-selectable detector functions.
4. **Detector Head Ribbon Connector:** If this lead is broken or not connected, the detector will indicate a "Head" Fault.
5. **Detector Head Cover Plate:** This protects the laser head. The plate should not be removed from the detector.
6. **Detector Head Assembly:** No user-serviceable parts. Do not remove this from the detector due to the risk of exposure to the laser.
7. **Replaceable Dust Filter:** This simply slides in and out of its mounting. The filter and its replacement have IN written in red on one side, and OUT on the other to indicate correct orientation. The part number for ordering spare dust filters is 30755. ***NB: as viewed above, IN should be on the left and OUT should be on the right, as indicated by the moulded-in arrows next to the filter slot.***

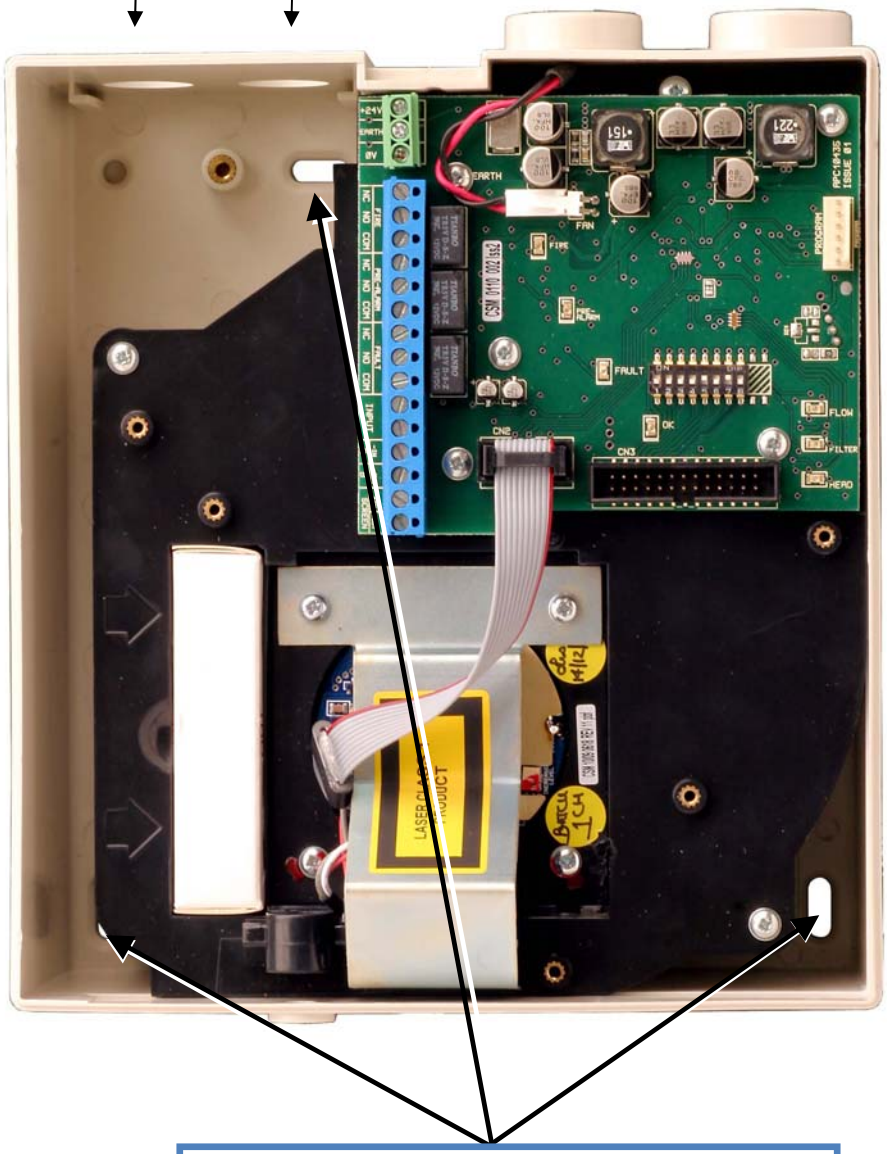
Cable Entries

- 2x 20mm Conduit Holes, e.g. for 20mm packing glands.
- Drilling guides are provided for drilling two additional 2x 20mm holes in the top and 1x 20mm hole in the bottom if needed.

Pipe Entries

- ¾" ABS Pipe.
- Use a ¾" male to 25mm female adaptor (e.g. AirSense part no. 10952) if 25mm pipe is used.

NB: Do not glue pipes into the detector, to allow for future removal.

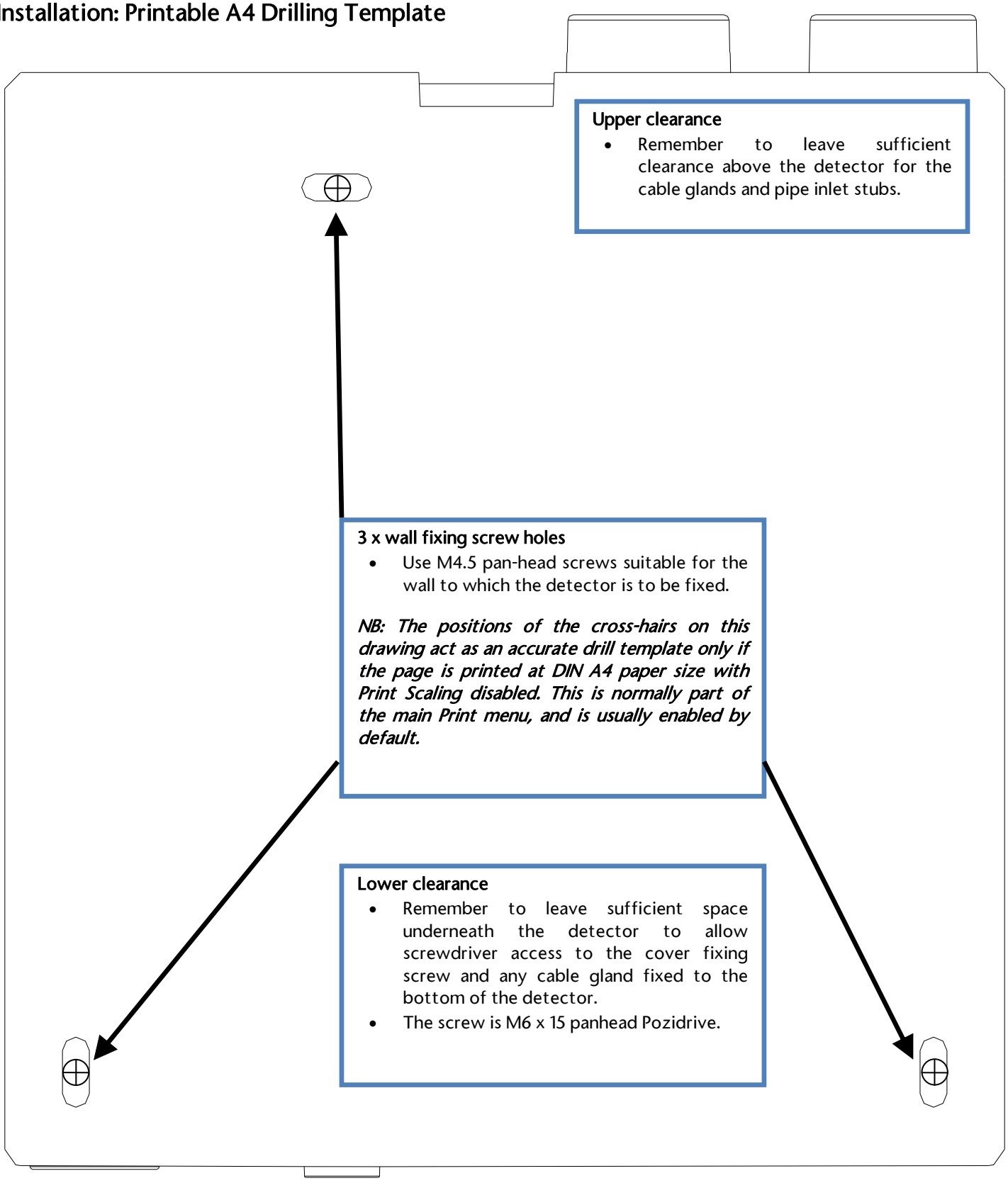


Fixing Holes (3 x M5 x 13 slots)

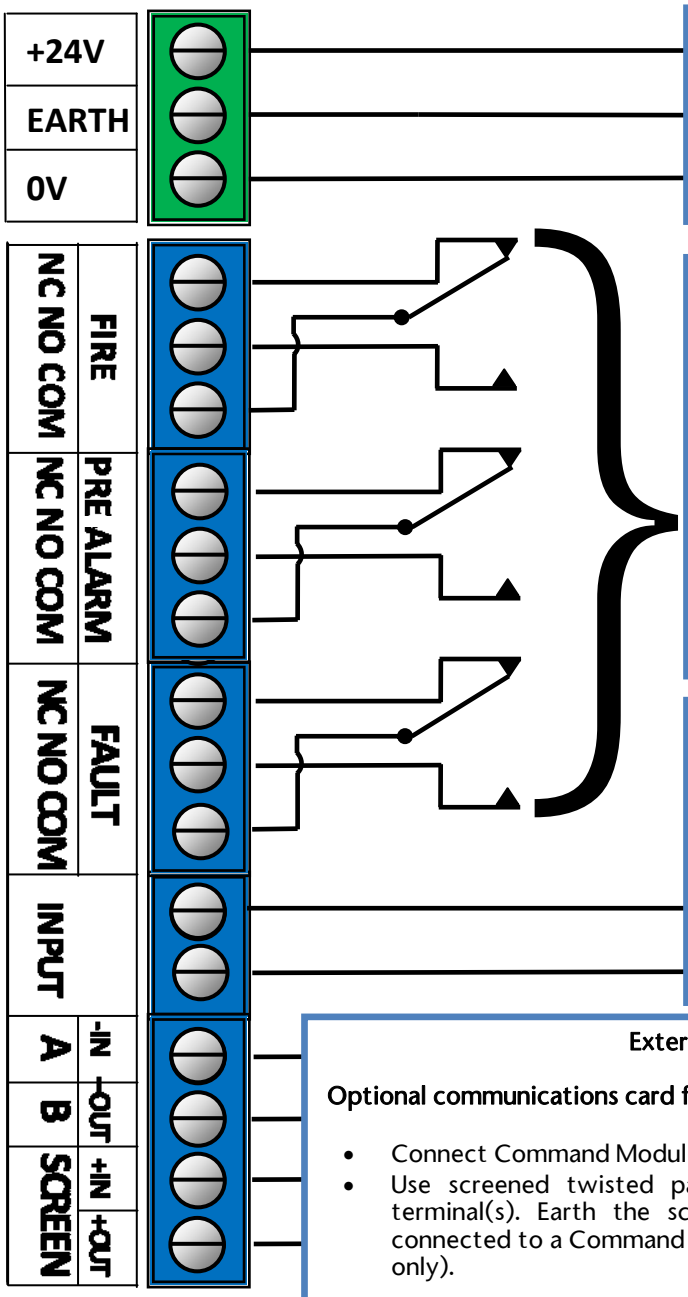
- Refer to the printable drilling template on next page for accurate positioning.

NB: Ensure the detector is fixed to a flat surface – otherwise the enclosure will twist and may be damaged.

Installation: Printable A4 Drilling Template



Installation: Electrical



Power Supply connections

- Connect "+24V" to PSU "+" terminal
- Connect "EARTH" to PSU mains earth terminal
- Connect "0V" to PSU "-" terminal

Volt-free relay contacts

NB: All relay contact positions are shown with the detector in the unpowered state.

- The FIRE and PRE ALARM relay contacts will change over when the unit enters the appropriate Alarm state.
- The FAULT relay will pull in when the detector is operating normally. The relay contacts will drop out during a Fault condition.

Remote control input

- **DIL Switch 7 OFF:** Connect to PSU Fault output contacts for PSU monitoring; N/C OK, N/O PSU Fault*.
- **DIL Switch 7 ON:** ClassiFire® Override will reduce detector sensitivity by 50% while the input terminals are shorted together, e.g. by a key switch.

External communications terminals

Optional communications card fitted (RS-485 serial communications mode):

- Connect Command Module or detector RS-485 (SenseNET™) serial bus to A and B.
- Use screened twisted pair cable. Connect screen to either of the SCREEN terminal(s). Earth the screen at one end ONLY (if one or more detectors connected to a Command Module, earth the cable screen at the Command Module only).

Optional APIC card fitted (addressable communications mode):

- Connect + and - IN and + and -OUT terminals to fire panel using an APIC compatible with the panel's communications protocol.
- When one or more detectors are connected to a Command Module, it may be easier to fit each detector with a communications card and use a single APIC in the Command Module, set to cover the range of chosen detector addresses.

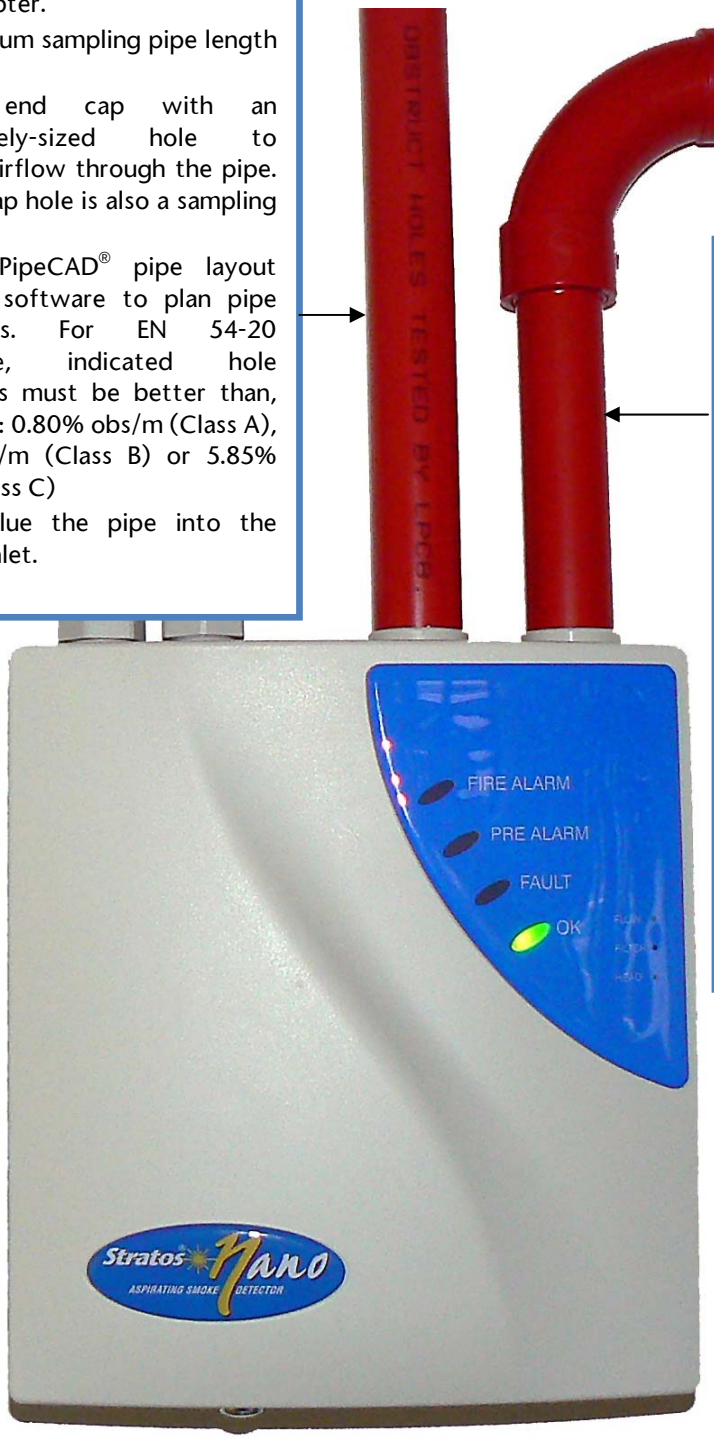
In accordance with good wiring practice, keep cables and individual bared conductors as short as possible while allowing stress-relieving cable forming. Power cables should be current-rated at 1A or greater. RS-485 cable should be screened twisted pair, e.g. Belden 9841 24AWG.

***The factory default setting of DIL switch 7 is OFF, so that the detector can monitor a power supply. If power supply monitoring and ClassiFire Override are not required, leave DIL switch 7 set to OFF and fit a wire link across the two terminals to prevent a Fault condition on power up.**

Installation: Pipework

Sampling pipe

- ¾" pipe or 25mm pipe with a ¾" sleeve adapter.
- The maximum sampling pipe length is 50m.
- Fit an end cap with an appropriately-sized hole to optimize airflow through the pipe. This end cap hole is also a sampling hole.
- Use the PipeCAD® pipe layout modelling software to plan pipe installations. For EN 54-20 compliance, indicated hole sensitivities must be better than, or equal to: 0.80% obs/m (Class A), 1.66% obs/m (Class B) or 5.85% obs/m (Class C)
- Do not glue the pipe into the sampling inlet.



Exhaust pipe

- ¾" pipe or 25mm pipe with a ¾" sleeve adapter.
- If the protected area is at a lower atmospheric pressure than the location in which the detector is installed (e.g. a closed air-conditioned room), fit a return pipe run from the detector exhaust to the protected area, in order to equalise the pressure. This will improve detector performance.
- Even if the protected area and detector are at the same atmospheric pressure, it is good practice to fit a pipe stub with a bend to the exhaust, to prevent debris falling into the detector.
- Do not glue the pipe into the exhaust outlet.

Configuration

Configuration is carried out via the DIL switch mounted on the Main PCB.

	Switch 1	Switch 2	Switch 3	Switch 4	Switch 5	Switch 6	Switch 7	Switch 8
Set Detector Sensitivity Alarm Factor 6 Alarm Factor 7 Alarm Factor 8 Alarm Factor 9	Off On Off On	Off Off On On						
ClassiFire® Enabled **Fixed Alarms Enabled**			Off On					
Flow Limit Offset ±40 ±20 ±5 ±3				Off On Off On	Off Off On On			
Flow Delay 240sec 30sec						Off On		
Input Select PSU Fault ClassiFire Override							Off On	
Auto Calibration Enable Disable								Off On

NB: Highlighted positions denote the EN 54-20 test configuration (factory default) setting

Alarm Factor: The detector calculates sensitivity relative to the ambient environmental conditions. Higher Alarm Factors provide reduced sensitivity (the Alarm threshold is maintained further away from the ambient level). Refer to the Remote Software manual for further details. ***NB: Changing the Alarm Factor starts a new FastLearn cycle: during the initial 15 minute learning period, the detector is incapable of reporting an alarm. The unit will take 24 hours to achieve optimum performance, based on the ambient conditions.***

ClassiFire® Enabled: Allows the artificial intelligence system to continuously adjust Alarm thresholds in order to avoid unwanted Alarms from environmental changes (recommended). ***NB: Enabling this feature means that nuisance alarms due to fluctuations in the ambient environment become less likely.***

Fixed Alarms Enabled: Switches the artificial intelligence system off, locking sensitivity to that set at initial setup. This de-activates the dust filter monitoring system (not recommended). ***NB: Enabling this feature means that nuisance alarms due to fluctuations in ambient pollution levels become more likely.***

Flow Limit Offset: Sets the sensitivity of the airflow monitoring system. A small offset makes the system very sensitive to air flow changes. EN 54-20 systems must react to a ±20% change in airflow, which equates to a change in flow sensor output of ±5 (this refers to a percentage of flow sensor full output and is not a direct measure of airflow). Areas with fluctuating air pressures may require a less sensitive setting. ***NB: Changing the flow limit offset starts a new flow calibration set up.***

Flow Delay: Sets the period during which abnormally high or low air flow conditions must continue before the unit indicates a "Flow" fault.

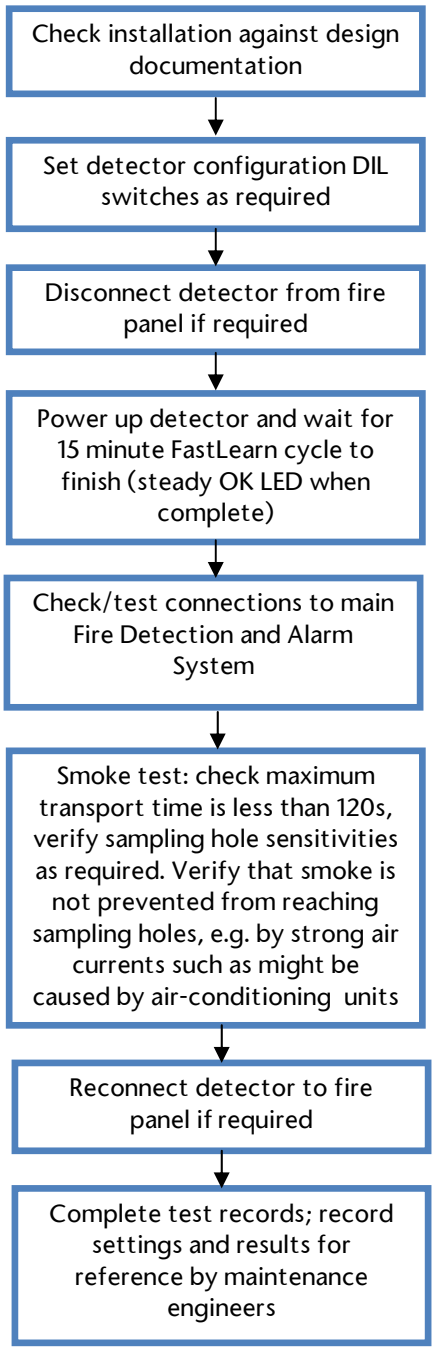
Input Select: When this switch is set to the factory default OFF position, the detector input terminals may be connected to a power supply fault output relay so as to generate a detector "Fault" condition if the power supply Fault relay contacts open. If power supply monitoring is not required, either a wire link can be placed across the input terminals, or this switch can be set to ON to remove the fault.

Setting the switch to ON enables the ClassiFire® Override feature. This reduces detector sensitivity by 50% as long as there is a short circuit across the input terminals, e.g. controlled by a key switch. This can be used to prevent unwanted Alarms during planned intervals of smoke release, e.g., incense burning during a church service. ***NB: if a wire link is fitted across the INPUT terminals, it is important that this switch be set to OFF, or the detector sensitivity will be dramatically reduced by the ClassiFire® Override function being permanently enabled.***

Auto Calibration: Automatically starts a new FastLearn cycle when the detector is powered up. This may be disabled if the previous settings need to be retained. ***NB: if this function is enabled, the unit will also recalibrate the flow sensors after power up.***

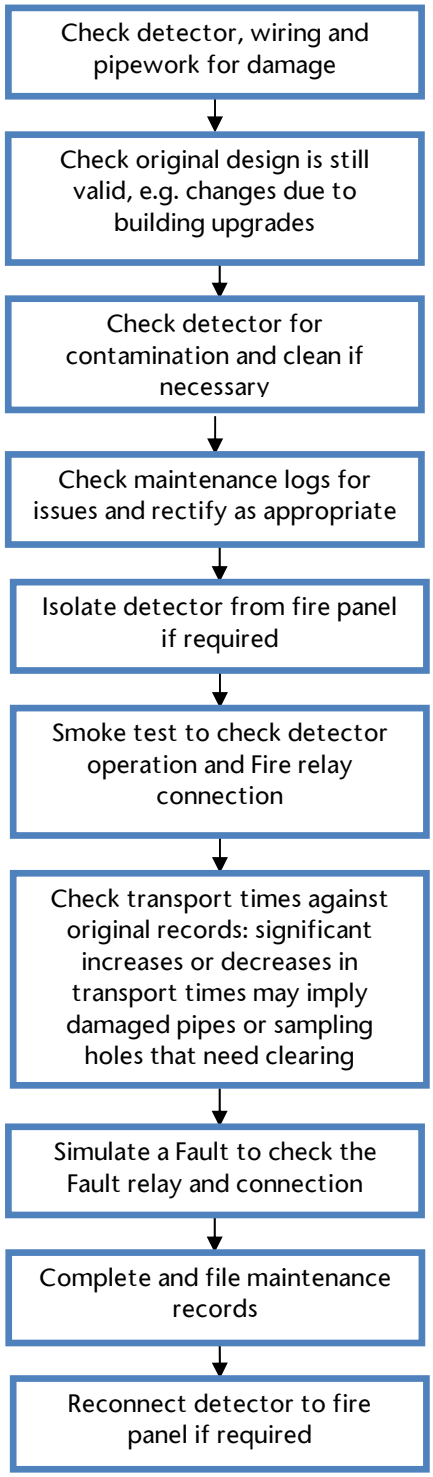
Commissioning

Local standards and specification requirements must be adhered to. A typical commissioning procedure might entail the following steps:



Maintenance

Local standards and specification requirements must be adhered to. A typical maintenance procedure could entail the following steps:



Notes:

- *It is prudent to disconnect or isolate the detector from the fire panel during maintenance to prevent unintentional alarm activations.*
- *The detector should be powered down during internal cleaning (use an air duster can or dry air gun).*

Troubleshooting

Nuisance Alarms:

- This normally indicates that the detector is set at an Alarm Factor inappropriate for the installed environment.
  Increase the Alarm Factor to reduce sensitivity.
- The sensor chamber may be contaminated.
  Return the detector for factory cleaning and recalibration.

Detector will not pass smoke a test:

- Detector may be in a FastLearn cycle.
  Check if green OK LED is on and flashing.
- The detector FastLearn cycle may have been carried out during, or immediately after, a smoke test.
  Reinitiate FastLearn with the detector in a clean environment.
- The Alarm Factor is too high.
  Change the Alarm Factor to a lower, more sensitive, setting.

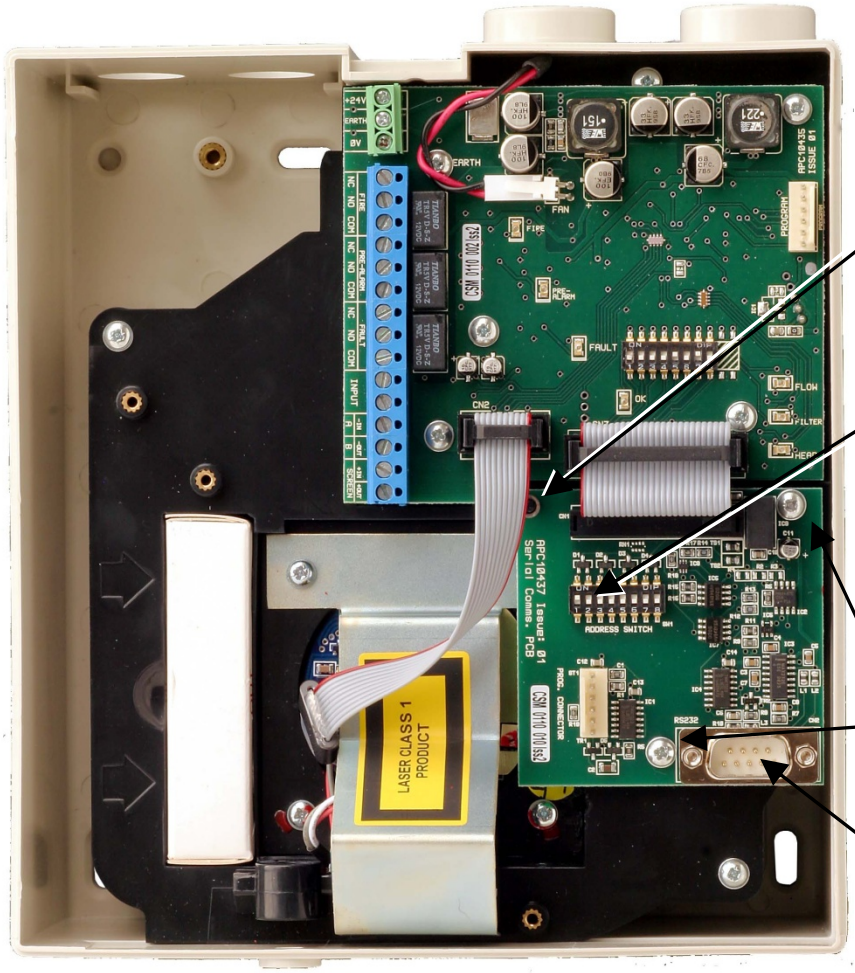
Nuisance flow faults:

- Flow monitoring is too sensitive for the environment.
  Increase the flow limit offset.
- Airflow may be subject to temporary changes (spikes).
  Increase flow fault delay.

Long transport times:

- The sampling pipe may be too long, may have too many sampling holes/capillaries, or may have incorrectly sized holes.
  Check design with pipe modelling software.
- Sampling pipes, sampling holes and/or the exhaust pipe may be partially blocked by dust or debris.
  Clean pipework with dry compressed air and/or clean the sampling holes.
- Fan may be defective.
  Send detector for repair.
- Fan lead may be disconnected
  Reconnect lead.

Optional: Communications Card



Board locating post

Detector address DIL switch

- The detector address is set using a reverse binary code, i.e. switch 1 is the least significant bit and switch 7 is the most significant bit. Switch 8 is not used.
- Set the address from 001 to 127 in order to identify the detector. Addresses in a detector network do not have to be consecutive but must be different.

2 off M3 x 6 fixing screws

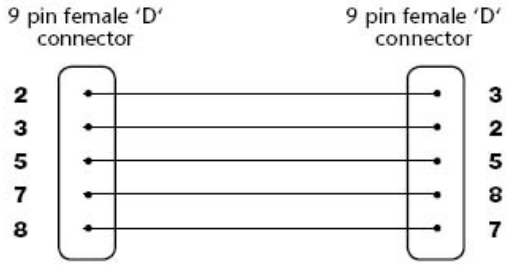
- Provided with board.

RS-232 serial port

- Use 9-pin D-type null modem cable to connect to PC.

A communications card may be fitted inside the detector.

Direct connection of a PC to the Communications Card is via a 9 pin RS-232 interface on the Communications Card, using a null modem cable configuration, as shown in the diagram below:



A connected PC may access the detector event memory to review previous or current events, such as detector Alarms or Faults. The detector internal Chart Recorder may also be accessed to allow analysis of detector behaviour (see separate Remote Software Manual for further information). The PC cannot be used to configure the detector except to enter time and date settings for the detector Event Log and Chart Recorder to be viewed in the Remote Software. The detector does not incorporate a real time clock, so the time and date need to be re-entered if the detector is powered down for any reason.

Installation of the Communications Card also provides the detector with RS-485 network communication via the A, B and SCREEN terminals on the detector main board. This can be used for simple remote display indication or integration into a larger site wide management and display system, separate from the local Fire Detection and Alarm System.

SELV Rating	EN 60950 Class III
Supply Voltage	21.6v – 26.4v DC
Current Consumption	350mA
Electrical Safety	Complies with EN 610190-1
Size (mm)	190w x 230h x 110d
Weight	1.2kg
Operating Temperature Range	0°C to 38°C (UL 268)
	-10°C to 60°C (EN 54-20)
Operating Humidity Range	0 to 90% relative humidity, non-condensing
	EN61010-1 Pollution Degree 1
	EN61010-1 Installation Category II
IP Rating	IP50
Sensitivity Range	0.4% to 25% obscuration/metre
Detection Principle	Laser light forward scattering mass detection
Maximum Number of Sampling Holes	Class A: 2
	Class B: 4
	Class C: 10
Maximum Sampling Pipe Length	50m
Sampling Pipe Inlets	2 off 3/4” pipe inlets (sampling pipe and exhaust)
Alarm / Fault Relays	Pre Alarm / Fire / Fault
Relay Contact Rating (Changeover)	1A at 24V DC (resistive load)
Programming	Internal DIL switches
PC Interrogation	Via optional Communications Card
APIC Compatible	Yes

Notes:

- *Some devices such as sounders and beacons have high inrush currents on activation, which can damage relay contacts. It is good practice to consider fitting a suitable current limiting resistor in series with the load to avoid this potential problem.*