Xtralis ICAM ILS-1

Product Guide

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Convention	Description
Bold	**Used to denote:** emphasis Used for names of menus, menu options, toolbar buttons
Italics	**Used to denote:** references to other parts of this document or other documents. Used for the result of an action.

The following icons are used in this document:

Convention	Description
	**Caution:** This icon is used to indicate that there is a danger to equipment. The danger could be loss of data, physical damage, or permanent corruption of configuration details.
	**Warning:** This icon is used to indicate that there is a danger of electric shock. This may lead to death or permanent injury.
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1 Introduction

The Xtralis ICAM ILS-1 system is an aspirating smoke system that utilizes an air-sampling pipe network to draw air towards one or two high-sensitivity laser point detectors in an aspirated enclosure. The use of the pipe network allows a larger area of coverage in comparison to traditional point detectors. Three different operating modes (Single, Redundant and Double-Knock) and three programmable alarm levels are provided enabling the system to be configured according to application.

A high performance aspirator and flow sensing system ensure a constant, monitored airflow. The amount of airflow can be displayed on a ten-element bargraph with adjustments for high and low flow thresholds. All detector configuration can be achieved with the integrated programming keys located on the side of the device.

The ILS-1 is a standalone system where faults and alarms are reported via separate volt-free contacts. These contacts may be connected to a monitoring fire alarm control panel.

Important Note: Aspirating Smoke Detectors supplied and installed within the EU from June 2009 must conform to the EU Construction Products Directive (89/106/EEC) and the related European Standard EN54-20.

This unit has been tested and certified to ensure general conformance to the above directive and standard but strict adherence to this Product Guide is required to ensure that the installation meets these requirements in all respects.

2 Mounting the Detector

Note: This equipment must be installed by a qualified installer in accordance with all local and national regulations.

Remove the transparent cover using the special tool provided to unscrew the tamper proof fasteners. Use the template provided to accurately position the holes then secure the unit to a suitable surface (wall or ceiling) through the four corner fixing points. Ensure that the correct fasteners are used for the type of surface that the unit is mounted on.

3 Wiring Connections

For correct operation of the unit it is essential that the case is fully sealed so that air can only be drawn into the system through the aspirating pipe. For this reason, all wiring must pass through the cable seals provided and no additional holes should be made. In order to pass a cable through a seal, make a small hole in the center of the seal with a pointed implement (e.g. small screwdriver) and then force the cable through the hole into the unit. The small hole will expand to accommodate cable diameters from 4 to 10 mm and then provide an airtight seal.

In order to gain access to the main circuit board for connection of the wiring, remove the display/detector mounting board held in place by the clear top cover. Care should be taken when removing the board to ensure that the ribbon cable on the underside is not strained. The ribbon cable may be removed from the connector on the underside of the board to allow the board to be fully removed.

To prevent risk of electric shock, or possible injury from the rotation of the high performance fan, the system should be isolated form the supply when the top cover is removed.

All connections to the main circuit board are to pluggable terminals that can accommodate wire sizes up to 2.5 mm^2.

3.1 Field Connections

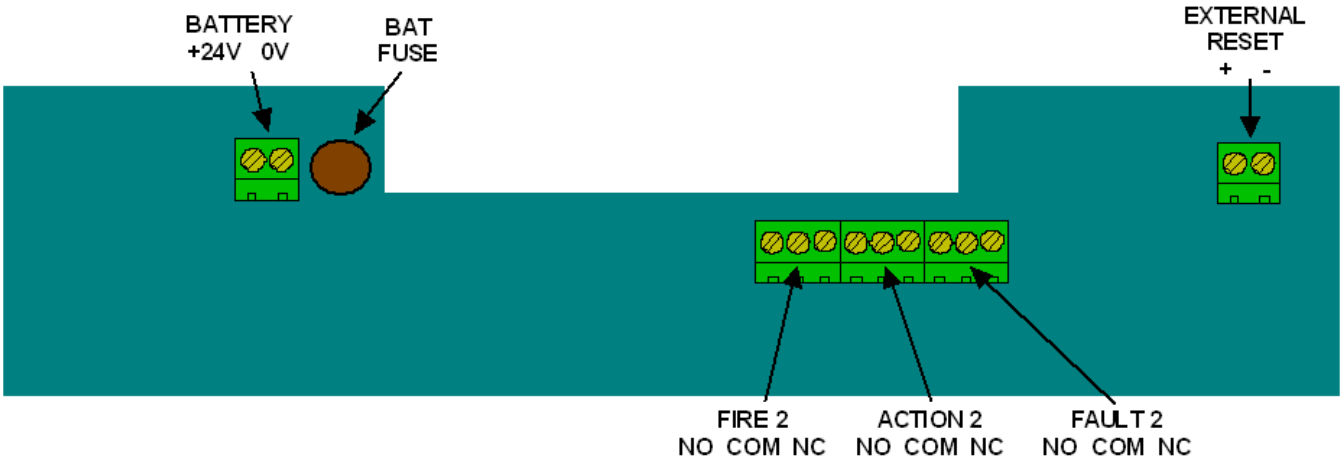


Figure 3-1: Field connections for an ILS-1 system

3.1.1 Battery / Input Power Connection

Figure 3-2: Ferrite core and battery supply wiring

The ILS-1 unit is designed to run from a 24 VDC power supply. The power supply should be connected to the two-way BATTERY terminal on the main circuit board ensuring that the wires are correctly orientated. The minimum recommended wire size is 16 x 0.25 mm (18 AWG), or larger if the supply is further than 5 m from the system.

A ferrite core is provided for EMC compliance. This should be fitted to the power supply wiring inside the unit as shown above.

The power requirements are dependant on the fan speed selected, please refer to Table 11-2: *Typical Current Consumption vs Fan Speed* for details.

3.1.2 ACTION 2 Relay Contacts

The dry relay contacts ACTION will change state when the pre-alarm level for the channel has been exceeded. The terminals provide for Normally Open (NO) or Normally Closed (NC) operation.

3.1.3 FIRE 2 Relay Contacts

The dry relay contacts FIRE will change state when the alarm level for the channel has been exceeded. The terminals provide for Normally Open (NO) or Normally Closed (NC) operation

3.1.4 FAULT 2 Relay Contacts

In the event of a fault condition, the Fault relay will change state. The terminals provide for Normally Open (NO) or Normally Closed (NC) operation.

Note: NO/NC refers to the un-powered state of the relays. Under normal, non-fault conditions, NO is closed and NC is open.

3.1.5 External Reset

The application of a nominal 24 VDC signal to these pins forces the unit into Reset clearing all faults and alarms.

3.1.6 USB Connector

A Type B USB connector is provided on the bottom of the unit to allow connection to a PC using a standard USB cable (not supplied). This communication port allows for configuration or downloading of logged data using Xtralis VSC, a comprehensive configuration software tool available as a download from www.xtralis.com. The connector is protected with a screw-fit cover and care should be taken to ensure that the cover is securely fastened when the connector is not in use to prevent the ingress of dirt or moisture.

4 Pipe Installation

A simple guide to pipe installation follows with examples of standard configurations.

Note: Xtralis ASPIRE2 may be downloaded from www.xtralis.com and should be used to calculate transport times, dilution effects etc. for all installations beyond the scope of this guide.

Use 25 mm (or ¾") Red ABS pipe with sampling point holes drilled along its length. The pipe run is terminated with an end cap that has a hole drilled in its center.

The position of each individual sampling point should adhere to guidelines for positioning point detectors. It is important to note that the smoke concentration from an individual sample point will be diluted by the clean air from the other sample points and the end cap hole.

4.1 Pipe Specification

For EN54-20 compliance, the pipe should be Red ABS to EN 50086-1 (Crush 1, Impact 1, Temp 31) with a nominal outer diameter of 25 mm (or ¾"). The sampling pipe is normally supplied in 3 m lengths and is cut as required and joined by solvent welded sockets (permanent), or socket unions (removable).

Note: The ILS-1 inlet port is tapered to allow a push fit of the sampling pipe. The pipe should be cut squarely to ensure a good, airtight seal. Solvent adhesive should not be used for this joint.

4.2 Fixings

The normal fixing methods are pipe clips, saddle clamps or even tie wraps. Fixing centers are typically 1.5 m apart.

4.3 Bends

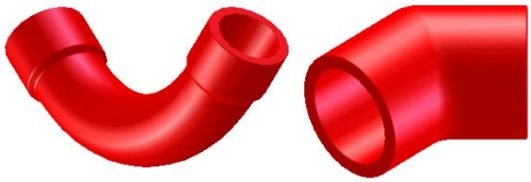


Figure 4-1: 45° bend and 90° swept bend

Bends are either 45° or 90°. For 90° bends it is very important that swept bends are used and not sharp elbows, as sharp elbows introduce unacceptable pressure losses and significantly increase the response times from holes beyond the bend.

4.4 End Cap

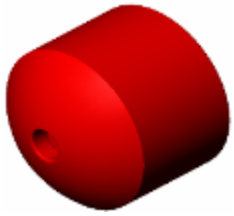


Figure 4-2: End cap with hole drilled in center

The end of the pipe is terminated with a cap, usually with a hole drilled in its center. If the end cap is not used, then almost no air will be drawn through the side holes. The end cap can be considered a sampling point if required.

4.5 Holes

The sampling pipe is perforated with sampling holes and can be drilled before or after installation. Care should be taken to avoid swarf entering the pipe. Always blow compressed air through the pipe after drilling to clear any debris before final connection to the equipment. In standard installations, with pipe hanging from ceiling, the holes should be placed underneath, so the smoke can easily rise up into the holes.

4.6 Exhaust

In most installations the exhaust should be left open but it may sometimes be necessary to connect pipe to the exhaust port to divert the exhaust away from the location of the unit e.g. to reduce noise, reduce risk of interference/deliberate obstruction, improved environmental protection etc.

Pipe of the same specification as the sampling pipe runs should be used and its length limited to a maximum of 10 m to avoid significant reduction in the air flow. Care should be taken to position the new exhaust outlet where it cannot be accidentally or deliberately blocked.

4.7 Filters

Figure 4-3: Filter at the inlet of an ILS system

The sampled air is passed through a filter (order code: FL53) before entering the detector chamber.

4.8 Standard Pipe Configurations

All configurations with maximum pipe length or number of sample holes should have the Alarm (Fire) threshold set to Level 1 and Fan Speed set to 9. The use of additional bends as described in Section 4.3 will have minimal effect on performance (e.g. response time).

Note: Stated limits are based on EN54-20 certification testing. Reductions in pipe length may allow the fan speed to be reduced and/or number of holes or alarm threshold level increased. Results of such changes, or non-standard or unbalanced configurations, should be verified by using Xtralis ASPIRE2, Pipe Design Program.

4.8.1 Single Pipe Configuration

Figure 4-4: Single pipe configuration for an ILS-1 system

The single pipe configuration can have a maximum length of 100 m with up to 18 x 3 mm sampling holes and a 6 mm end hole.

4.8.2 Double Pipe Tee Configuration

Figure 4-5: Double pipe tee configuration

The double pipe configuration can have a maximum length of 200 m (100 m per branch) with up to 9 x 3 mm sampling holes and a 6 mm end hole per branch. The distance from the unit to Tee should be at most 1 m and pipes should be balanced with equal lengths and equal number of holes. See Section 9: *EN54-20 Sensitivity Classes* for details for EN54-20 class sensitivity limits.

5 Detectors

The ILS-1 is supplied with a single laser point detector as standard with the option for a second detector (order code: LPDET) for Redundant or Double-Knock operating modes.

The detectors interface directly with the ILS-1 system. This allows the detectors status and analog smoke level output to be read and interpreted by the ILS-1 processor.

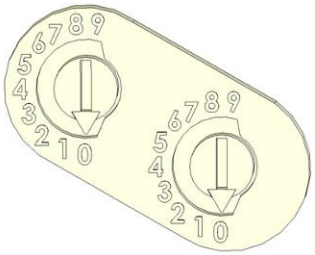


Figure 5-1: Address switches for an ILS-1 system

Each detector is identified with a two-digit address which is set on switches on the underside of the top detector part. The addresses should be left to the factory pre-set values of 1 for the default detector in the channel/detector 1 position and address 2 for the optional, second detector in the channel/detector 2 position.

Note: If the detectors are removed for maintenance they must be fitted in the positions described above - failure to do so may result in false reporting in the event of a fault or fire.

6 Setup

6.1 Display Functions

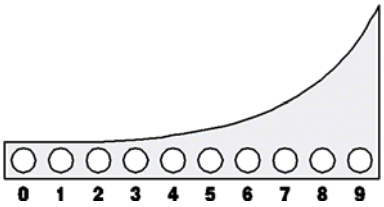
ALERT Alarm

ACTION Alarm

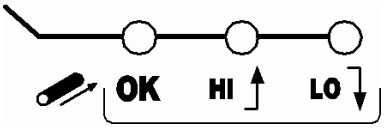
FIRE Alarm

SMOKE DETECTOR FAULT (1 per detector)

ISOLATE



BARGRAPH of Smoke level or Airflow speed



AIRFLOW OK - HIGH AIRFLOW - LOW AIRFLOW

POWER ON

GENERAL FAULT

MAINS FAILURE (Mains PSU Option Only)

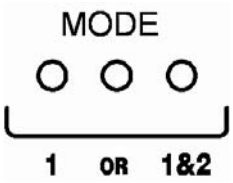
BATTERY LOW (Mains PSU Option Only)

FAN FAULT

RESET

UNLOCK

CODE ENTRY



DETECTOR OPERATING MODE

6.2 User Functions

Figure 6-1: Programming buttons on the unit

Press and hold SELECT and CHANGE keys simultaneously until the sounder beeps to initialize function selection.

Press and release SELECT key to sequentially step through functions.

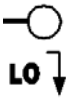
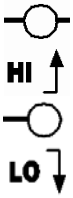
Press and release CHANGE key to modify setting.

The relevant LED flashes continuously to indicate the function selected.

To enable updates to the system, enter the three digit access code (510). To enter numbers into the system, each number must be sequentially selected in turn. For example to select 5, press the CHANGE key six times to illuminate the number 5 LED on the display then press the SELECT button. During this operation, the CODE LED flashes, then the UNLOCK LED illuminates on successful entry.

A description of ILS-1 functions are shown in the following table.

Table 6-1: User Functions for the ILS-1 System

Function	Display		Special Instructions
Reset the unit	-		To reset the unit, press CHANGE when the LED is flashing.
Isolate the system		ISOLATE LED flashes when not set and steadily illuminates when set	-
Set fan speed		POWER LED flashes. Bargraph display indicates fan speed of 0 to 9.	Please refer to Table 6.3 for more details.
Set sensitivity of bargraph to changes in airflow velocity		FLOW OK flashes. Bargraph display indicates sensitivity (0 = Minimum, 9 = Maximum).	Please refer to Table 6.3 for more details.
Select the BARGRAPH LED segment above which the FLOW HIGH LED will be illuminated		FLOW HIGH flashes.	High flow threshold can be set for Bargraph values 5 to 9.
Select the BARGRAPH LED segment below which the FLOW LOW LED will be illuminated		FLOW LOW flashes.	Low flow threshold can be set for Bargraph values 0 to 4.
Set FLOW DELAY time of both channels		FLOW HIGH and FLOW LOW LEDs both flash	Please see Section 6.3.2 for information on flow delays.
Set smoke detector ALERT alarm threshold		ALERT LED flashes.	Please refer to Table 9-1
Set smoke detector ACTION alarm threshold		ACTION LED flashes.	Please refer to Table 9-1
Set smoke detector FIRE alarm threshold		FIRE LED flashes.	Please refer to Table 9-1
Select Detector Mode ('1', '1 OR 2', or '1 AND 2')	Associated MODE LED flashes.		See 6.2.1 for detailed description of Modes.
Set SOUNDER On or Off	If it sounds short beeps, this signifies it is in the Off setting. If the buzzer sounds long beeps, this signifies it is On.		-
Set/Unset Alarm Latching function		SMOKE DETECTOR FAULT LED flashes. Bargraph display indicates alarm latching status (0 = Non Latching, 1 = Latching).	-

Function	Display		Special Instructions
Calibrate flow sensors		FAN FAULT LED flashes.	CHANGE key must be pressed for at least 2 seconds to initiate the flow calibration process. FAN and POWER LEDs flash to indicate calibration in progress. Fan is temporarily stopped as part of the calibration process. The system will reset and revert to normal operating mode when flow calibration is completed.

Pressing the SELECT key for longer than 1 second when the unit is unlocked will cause the unit to revert to normal operating mode.

Momentarily pressing the SELECT or CHANGE key when the unit is locked (UNLOCK LED is off) causes the unit to display the airflow on the bargraph. The display reverts back to the smoke level reading after a few seconds.

6.2.1 Detector Mode

The ILS-1 has three different modes which can be set to provide different types of coverage.

- **Mode 1** (1 Only): Single Detector
  The display shows the detector reading and the unit reports Alert, Action and Fire conditions when the pre-set thresholds are exceeded.
- **Mode 2** (1 OR 2): Two Detectors working independently (Redundancy)
  The display shows the higher of the two detector readings and the unit reports Alert, Action and Fire conditions when the pre-set thresholds are exceeded on either detector. This mode allows for continued operation in the event of a problem with one of the detectors.
- **Mode 3** (1 AND 2): Two detectors working together (Double Knock)
  The display shows the lower of the two detector readings and the unit reports Alert, Action and Fire conditions when the pre-set thresholds are exceeded on BOTH detectors.

Note: Mode 3 is not permitted in a VdS approved installation

The ILS-1 is supplied with a single detector as standard. Mode 2 or 3 operation is dependant upon the purchase of an optional, second detector. Selection of Modes 2 or 3 with a single detector fitted will result in a Smoke Detector Fault being reported.

6.3 Setup Notes

The Fan Speed, Flow Limits and Flow Sensitivity need to be set for each installation prior to Flow Calibration and testing. The following guidelines should assist in the commissioning of the unit.

6.3.1 Fan Speed

The Fan Speed should be set as high as possible to achieve the fastest transport time from the sampling point to the detector(s), which is especially important for longer pipe lengths and for installations that must conform to the requirements of EN54-20 (please refer to Section 4.8: *Standard Pipe Configurations*). However, a balance also needs to be achieved between performance and power requirements - please refer to current consumption figures in Table 11-1 prior to setting this value.

6.3.2 Flow Delays

When airflow limits are exceeded, a Flow Fault will appear after a programmable Flow Delay time. The default Flow Delay time is approximately 30 seconds. Once the airflow is returned to a normal level, the fault condition will be cleared within 18 seconds. Available settings for Flow Delay are shown in Table 6-2.

In environments where the sampled airflow may be affected by sudden temperature or pressure changes or if there is a risk of physical interference of the sampling point (e.g. prison cell applications) then it may be necessary to increase the Flow Delay time.

Table 6-2: Flow Delay Settings

Bargraph LED	Flow into Fault Delay (Seconds)	Flow out of Fault (Seconds)
0	15	2
1	30	18
2	60	18
3	90	18
4	120	18
5	150	18
6	180	18
7	210	18
8	240	18
9	270	18

Note: Timings are approximate.

Note: The default flow delay setting is 1.

6.3.3 Flow Sensitivity

This setting determines the units responsiveness in reporting blocked sampling points or broken pipes.

The default flow sensitivity value of 9 will configure the unit to declare a flow fault whenever there has been a change in volumetric airflow of ± 20% from the calibrated reading for at least the duration of the flow delay, see Section 6.3.2. For most installations, especially if compliance with EN54-20 is required, the default setting should be used.

In certain circumstances, such as rapid changes in ambient air pressures due to air handling units, doors opening/closing etc. the default setting may appear to be too sensitive. Under these conditions, the flow delay setting should be increased to allow time for the air pressures to stabilize after the temporary event.

Only under extreme environmental conditions or non standard pipe configurations should decreasing the flow sensitivity be considered.

7 Testing

Note: Testing should only be carried out by qualified personnel. Before undertaking any testing, ensure that the proper authorities have been informed and that the unit has been isolated from the fire control panel if necessary to prevent unwanted alarms.

7.1 Detectors

With the unit powered up and top cover removed, the detectors can be tested for functionality using a low concentration smoke source or aerosol point detector spray.

The detector can also be tested by placing a magnet against the test marker at the 7 o'clock position on the detector rim. This test electronically simulates the effect of smoke in the sensing chamber.

7.2 System

The installed system must be checked with the top cover securely fitted.

As a minimum, smoke should be introduced to the furthest sampling point from the ILS-1 unit on each branch of the pipe. The choice of smoke source is dependant on the installation but in all cases the smoke must be present for the duration of the test – aerosol sprays for point detectors do NOT work on aspirated systems.

If it is possible to get close to the sampling point then a basic, functional check can be carried out with smoke matches or lighted taper etc. but for measurable performance tests then refer to Appendix A of the BFPSA Code of Practice for Aspirating Systems to select the appropriate test for the installation.

8 Maintenance

With normal use, the filter element will eventually become contaminated with dust particles. It is recommended that the filter element (order code: FL53) is replaced and detectors cleaned every six months (more frequently for dirty environments).

Note: Maintenance should only be carried out by qualified personnel. Before carrying out any maintenance, notify the proper authorities and isolate unit from the fire control panel to prevent unwanted alarms.

Please follow these steps for performing a maintenance check on the system:

1. Remove the transparent cover using the special tool provided to unscrew the tamper proof fasteners.
2. Disconnect power from the unit.
3. Lift out the foam filter element from the filter tube (tweezers or long nosed pliers are recommended for this operation).
4. Fit the new filter element ensuring that it is not compressed during fitting and are positioned flush with the top of the filter tube.
5. Remove the detector(s) from their mounting base(s) by twisting anti-clockwise.
6. Remove the detector cover by prying away the four side tabs with a small-bladed screwdriver, and then pulling the cover from the base.
7. Vacuum the screen carefully without removing it. If further cleaning is required continue with Step 8, otherwise skip to Step 12.
8. Remove the screen/chamber cover assembly by pulling it straight out.
9. Clean the chamber by vacuuming or blowing out dust and particles.
10. Replace the sensing chamber cover, aligning the arrow on the top with arrow on the printed circuit board.
11. To replace the screen, place it over the chamber assembly, turning it until it snaps into place.
12. Replace the cover using the LEDs to align the cover and then gently pushing it until it locks into place.
13. Reinstall the detectors onto their bases ensuring that they are in the correct position i.e. detector set to address 1 fitted to detector 1 position.
14. Refit the transparent cover, apply power to unit and carry out Flow Calibration procedure.
15. Reconnect disabled circuits.

9 EN54-20 Sensitivity Classes

The detectors used in the ILS-1 have been independently tested and certified for use in EN54-20 approved Class A, B or C installations. The following information will show the requirements for compliance in each category.

Table 9-1: Sensitivity and Maximum Holes per Class

Panel Sensitivity	Maximum Number of Holes per Class			Maximum Pipe Length (m)
	Class C	Class B	Class A	
1	18	6	3	100
2	9	3	1	100
3	4	1	N/A	100
4	1	N/A	N/A	100
5 or above	N/A	N/A	N/A	N/A

Note: Table 9-1 shows the limits that should not be exceeded for the three sensitivity classes. Figures are based upon the configurations shown in Section 4.8: *Standard Pipe Configurations*. Maximum hole limits are based upon the following standard test configurations:

- Class A: 3 x 4 mm holes including 1 in end cap
- Class B: 6 x 4 mm holes including 1 in end cap
- Class C: 17 x 3 mm holes plus 1 x 6 mm hole in end cap

Note: Any changes to the standard configuration or settings shown above should be verified using Xtralis ASPIRE2 pipe modeling software. The latest version of ASPIRE2 is available from www.xtralis.com.

10 Problem Solving

Problem	Possible Solutions
Power light flashing	Ensure supply to BATTERY connector within limits.
No lights on display. Fan not running	Ensure supply leads correctly orientated. Ensure that BAT FUSE correctly seated in socket and fuse not blown.
General Fault Light & Flashing Power Light only displayed. Fan not running.	Ensure that supply voltage is within specified limits (please refer to Section 11)
No lights on display. Fan running OK.	Ensure ribbon cable fully seated into main & display boards.
Flow HI/LO light on	Ensure sampling pipes correctly installed, lid fitted and box fully sealed. Ensure flow calibration procedure has been carried out (please refer to Section 6.2). Ensure that filters are clean (Section 8).
Flow reading on Bargraph display moves erratically.	Decrease Flow sensitivity setting and re-calibrate air flows (Section 6.2).
Flow reading unresponsive to broken or blocked pipes	Increase Flow sensitivity setting and re-calibrate air flows (Section 6.2).
Smoke Detector Fault indicated	Ensure that correct address has been set (Section 5). Ensure detector fully seated into base. Ensure correct Mode setting selected (Section 6.2.1). Ensure detector optics are clean (Section 8).
Detector(s) unresponsive to smoke tests	Ensure that sampling pipe installed correctly and is undamaged (Section 4). Ensure unit cover correctly fitted. Ensure that holes and pipe length do not exceed limits and the fan speed is sufficient (Section 4.8). Ensure that recommended test method is used (Section 7). Ensure detector addresses are set correctly (Section 5).

11 Specifications

Table 11-1: General ILS-1 Specifications

Number of Detectors	1 or 2, Laser based Analog Addressable
Filtration	Single stage dust particle filter
Flow Monitoring	Thermal device, high and low thresholds. 10 element bar graph indication.
Supply Voltage	18 to 30 VDC (24 VDC Nominal)
Relay Contact Ratings	1 A at 30 VDC
Maximum Supply Current	350 mA at 24 VDC with no aspirating pipe. See table below for typical Currents/Fan Speeds.
Maximum Pipe Length	100 m + 100 m in Tee Configuration
Environmental Protection	IP65 with exhaust fitted (IP23 without)
Operating Temperature	-10 to 50ºC
Operating Humidity	10 to 95% RH (non-condensing)
Approvals	EN54-20 by VdS (G206066)
CE Certification	EN61000-6-3:2001(+A11:2004) (EMC) EN60950-1:2006 (Safety) CPD (89/106/EEC)

Table 11-2: Typical Current Consumption vs Fan Speed

Bargraph Value	0	1	2	3	4	5	6	7	8	9
Fan Speed	1	2	3	4	5	6	7	8	9	10
Current (mA)	110	120	130	150	170	190	220	235	265	300

Note: Typical current consumption figures for different fan speeds. Results are based upon an ILS-1 installation with 10 m of standard, 25 mm aspirating pipe per channel. The unit was powered from a 24 VDC power supply.