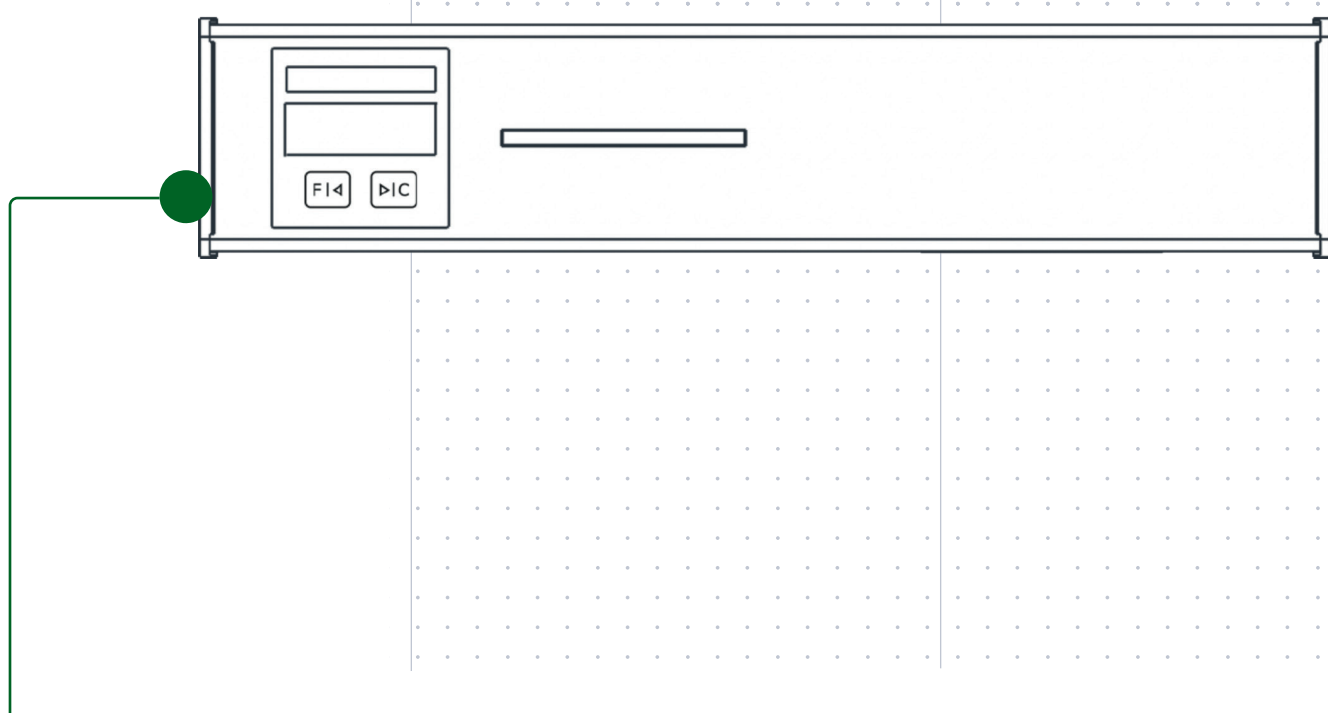




Sensis Indigo CSD-H Series Cabinet Smoke Detector User guide



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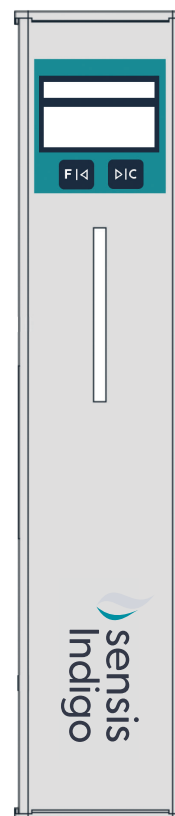
1. Introduction



Indigo CSD-H is an aspirating smoke detector developed by FFE for in-cabinet detection and small areas up to 100m².

Most early warning aspirating smoke detectors are designed to protect a large area, for example, a full fire zone of up to two thousand square meters. Typically, air sampling systems utilise many sampling holes over large areas, which means that identifying the source of smoke in a large open space is relatively straightforward. However, smoke that is generated in a closed equipment cabinet or concealed space can be challenging to identify. Deploying the Sensis Indigo local to the risk alleviates such problems and allows detection within critical spaces with pinpoint accuracy. This enables operators to quickly manage the situation at source.

The design of the Indigo CSD-H aims to protect a small number of cabinets. In fact, it is recommended to use one Indigo CSD-H for the protection of one cabinet. In this case, every cabinet is specifically monitored, allowing speedy identification of the source of any smoke and the intervention required.



2. Features

Indigo CSD-H uses High Power Blue LED as the detection light source. Blue light technology is very sensitive to small smoke particles generated during the incipient stage of a fire, at which time the smoke is invisible to human eyes. The highest alarm sensitivity of the Indigo CSD-H is 0.1%/m, which is 50 times more sensitive than a conventional point type smoke detector.

PART NO.	DESCRIPTION
4010-100	Indigo H10. Single pipe 100 m ² , small area smoke. Fire & Fault only.
4011-100	Indigo H11. Single pipe 100 m ² , small area smoke and CO. Fire & Fault only.
4800-002	Sensis In-Line Filter 25 mm (use with Indigo and Cobalt) they have no internal filter
4800-003	RS485 to USB Converter – for programming and commissioning

FEATURES
Smoke detection range: 0.02-25%/m
Fire 1 alarm sensitivity: 0.1-12.5%/m
Four alarm levels: Alert, Action, Fire1, Fire2
Up to 40 m capillary tube/pipe total length, rigid (not flexible) for most applications
Up to 4 sampling holes
2 relay outputs
Mini 3-in-1 display
CO sensor (optional)
3-in-1 control/display/programmer remote display (Optional)
RS485 network
Supports Modbus RTU open protocol

3. Specification



INDIGO CSD SERIES

Sensitivity	High sensitivity
Smoke sensor	0.02%/m smoke sensor
CO sensor	In CSD-H11 only

SUFFIX: Add suffix P for option of detector without aspirator (flow of sampled air introduced into Indigo CSD-H from separate aspirating detection system – not EN54-20 approved).

SPECIFICATION	INDIGO CSD-H10	INDIGO CSD-H11
Smoke detection light source	High power blue LED	
Smoke detection principle	Forward light scattering mass detection	
Smoke detection range	0.02-25%/m	
Alarm sensitivity	0.1- 12.5%/m	
Sampling pipe/tube	Pipe: OD 25 mm; Capillary tube: OD 8 mm	
Max. capillary tube/pipe length	40 m*	
Max. no. of sampling holes (Class A/B/C)	2/4/4*	
Alarm levels and time delay	Alert (0-60 sec.) Action (0-60 sec.) Fire-1 (0-60 sec.) Fire-2 (0-60 sec.)	
Numerical display	Yes (4-digit)	
LED indicators	5-colour (Green/Yellow/Blue/Red/Purple) status bar	
Alarm strobe	Yes	
Alarm flashing mode	Slow, Fast, Burst	
Environment smoke learning	24 hours, 365 days non-stop environmental background level learning	
Flow detection principle	Heat mass detection	
Flow monitoring	• Pipe flow normalised to 100% • Flow high and flow low faults • Adjustable flow detection sensitivity • Adjustable flow fault threshold	
Aspirator	Yes	
Aspirator speed adjustment	10	
CO sensor	No	Yes
CO detection range	Not applicable	0-500 ppm
Relay output	2 relays (configurable) rating: 2 A @ 30 Vdc	
General purpose inputs NOTE: UDI = user defined input	1 x GPI (configurable), functions: RESET/ISOLATE/MUTE/TEST/MAINS FAULT/BATT. FAULT/POWER FAULT/SENSITIVITY MODE 1/SENSITIVITY MODE 2/SCAN/UDI-1/UDI-2/UDI-4/UDI-5	
Communication	• RS485 network • Max. number of devices on network: 250 • Max. total cable length for all Indigo CSD: 1.2 km • Supports Modbus RTU open protocol	
Event logs	• Number of Events: 180,000 • Event type: Alarm/Fault/Operation/Smoke/Flow/Auxiliary Sensors	
Voltage	19.6-28.8 Vdc	
Current @24V	71 mA	
Dimension	100(h) x 227.3(w) x 47.8(d) mm (4"(h) x 9"(w) x 2"(d))	
Weight	0.725 kg (1½ lb)	
Operating conditions	• Ambient temperature: 0 to ~40°C (32 to ~104°F) • Sampling air temperature: -30 to ~60°C (-22 to ~140°F) • Humidity: 10 to ~95% RH non-condensing	

3. Specification



IMPORTANT NOTES:

Per EN54-20, the sampling pipes and fittings shall have adequate mechanical strength and temperature resistance in accordance with EN61386-1 to at least Class 1131. The requirements of EN54-20 sub-clause 5.7 should be met.

Per EN54-20, the power for the aspirating smoke detector shall be supplied by a power supply complying with EN54-4. This power supply may be common to the control and indicating equipment

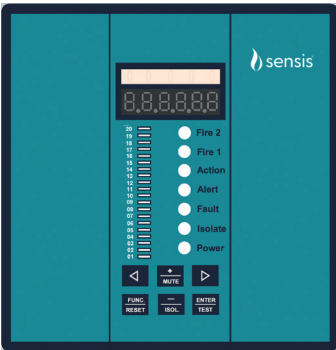
Voltage range under approval test condition is 19.6-28.8 Vdc.



4. Remote Display Unit (optional)



Indigo CSD-H can be connected to a Remote Display Unit (RDU) for the control, display and configuration of the detection system. When the Indigo CSD-H is installed inside a cabinet or at a remote location, the RDU can be installed at a convenient location for easy operation.



Panel mounted
Remote Display Unit

RDU function

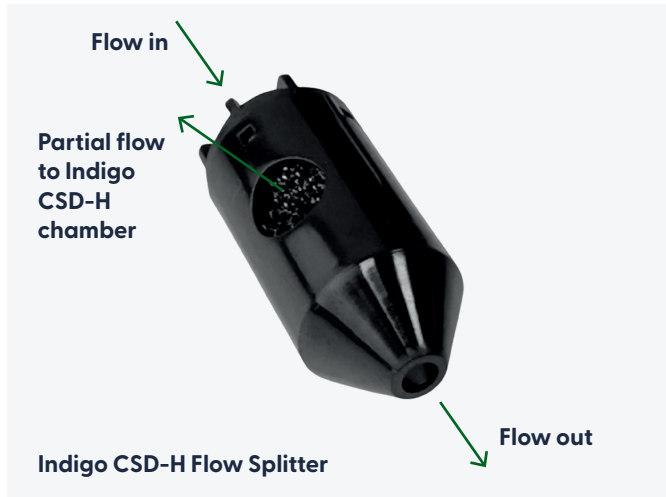
CONTROL	<RESET> <ISOLATE> <MUTE> & <TEST> BUTTONS
Display	• Alarm strobe • 20 segment smoke level bar graph • 6-digit numerical display – Real-time smoke level – Real-time air flow level: raw and normalised flows – Device address – Active event & codes • LED indicators – Alarm indicator: Alert, Action, Fire 1, Fire 2 – Fault indicator – Isolated indicator • Buzzer
Programmer	• Access controlled by password • Bar graph and 6-digit numerical LED display • <Func.> <i><d> <+> <-> <Enter> buttons to change settings
Expansion IO (optional)	3 relays (configurable) 1 configurable general purpose input (GPI)

5. Indigo CSD-H accessories

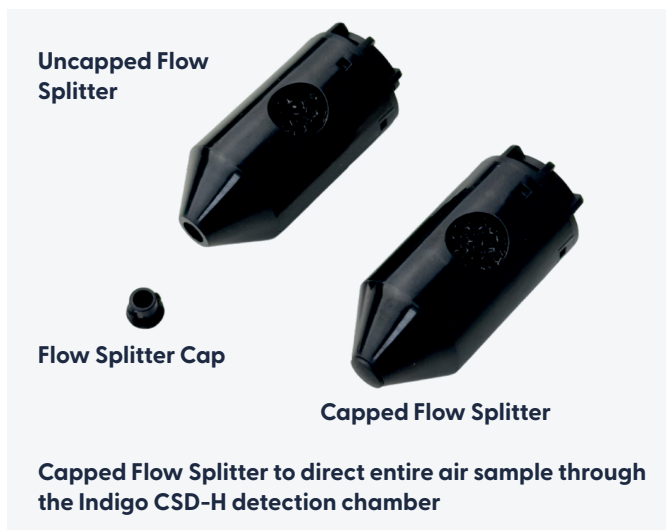


Flow Splitter

The Flow Splitter is mounted inside the Indigo CSD-H inlet port to provide a filtered branch flow (a small percentage of the total air sample which is directed through the detection chamber).



The Flow Splitter will work in most installations, unless the air flow rate is extremely small, for example when the air sample comes from the capillary sampling tube of a separate ASD system. In such cases, a cap can be mounted to the Flow Splitter outlet so that the entire air sample passes through the detection chamber.



The Flow Splitter (uncapped) is mounted already in the Indigo CSD-H inlet port. When it needs to be capped, use needle-nose pliers to remove the Flow Splitter. Fit the cap which you can find in the accessory kit.

NOTE: When the Flow Splitter is taken out, care must be taken to keep the same position when it is refitted. The opening of the Splitter must face upwards so that the flow passes into the detection chamber. Failure to check this will compromise the system's detection capability.

Capillary Tube Adaptor

The Indigo CSD-H uses removable Capillary Tube Adaptors that can be installed or removed from the air inlet or outlet port depending on the application. When the adaptor is not mounted, it can be connected to a 25 mm air-sampling pipe. This design makes the Indigo CSD-H compatible with flexible capillary tubing (ideal for equipment protection) and also provides the option to use the 25 mm pipe typically found in ASD systems.



Two Capillary Tube Adaptors come with the package. One is mounted to the inlet port, the other is in the accessory kit. These adaptors connect to capillary tubing with an OD of 8 mm. Adaptors for other capillary tube diameters are available upon request from your supplier.

In-Line Filter

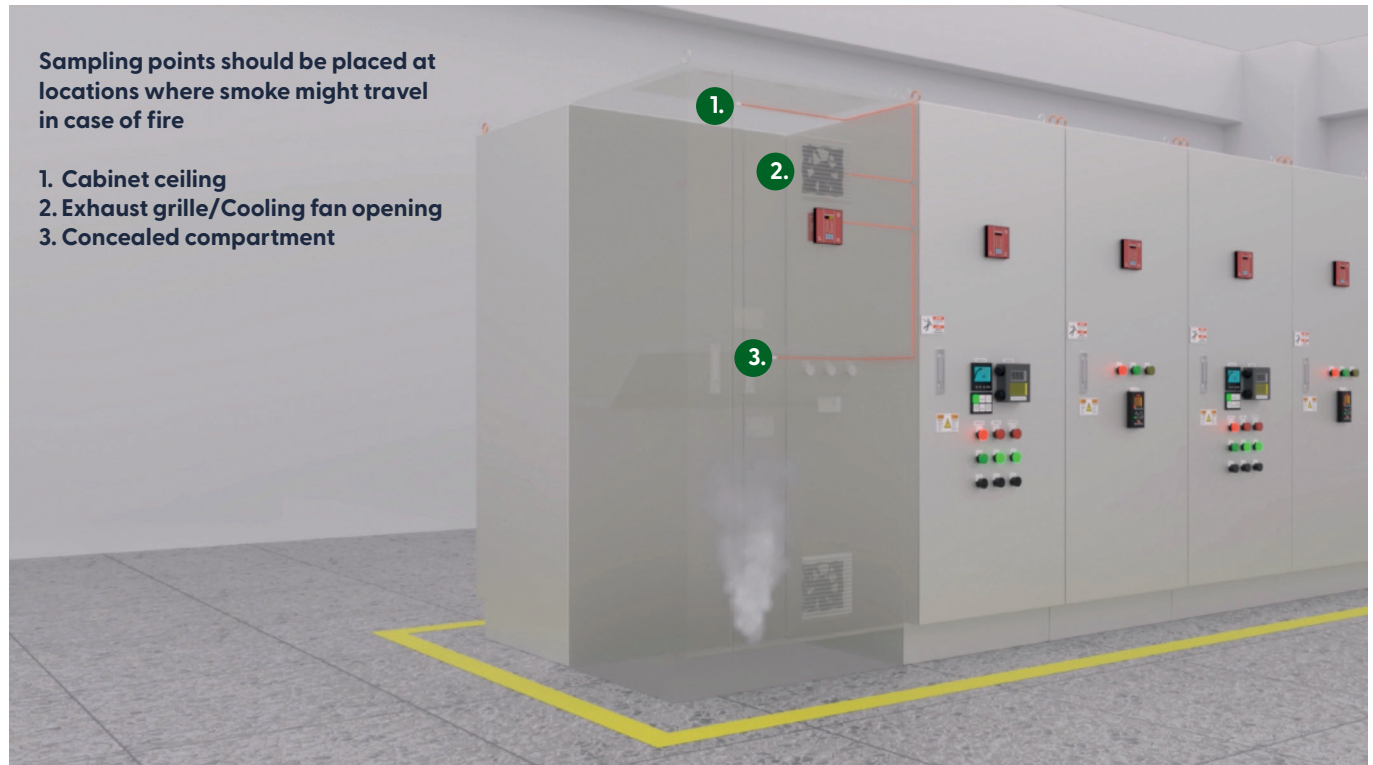
It is highly recommended to install an additional In-Line Filter. In harsh environments, it is essential to have an additional In-Line Filter working with the Indigo CSD-H to enhance the detector's longevity. Different inlet and outlet port options on the In-Line Filter are available for specific pipe or capillary tube installation.



6. In-cabinet sampling design



The Indigo CSD-H is designed for cabinet/equipment fire detection. There are several possible locations for sampling the air inside the cabinet/equipment where the fire originates.



Sampling points should be placed at locations where smoke might travel in case of fire

1. Cabinet ceiling
2. Exhaust grille/Cooling fan opening
3. Concealed compartment

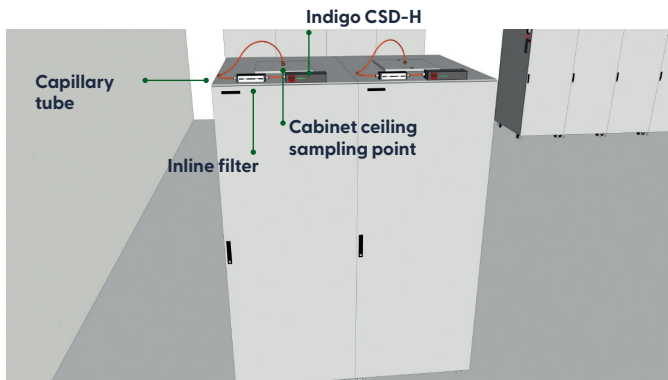
Design considerations

- **Sampling points should be located where smoke might travel to:** Suitable locations are the cabinet ceiling, exhaust grilles and cooling fan vents. If there is a concealed compartment where smoke could be contained, there should be an additional sampling point installed.
- **Pinpoint addressability:** A typical ASD system detects smoke from multiple equipment cabinets, making it difficult to identify the fire origin. As the Indigo CSD-H is designed for individual cabinet/equipment fire detection, it is recommended to install a detector in every cabinet to pinpoint the location of a fire.

7. Typical Indigo CSD-H installations

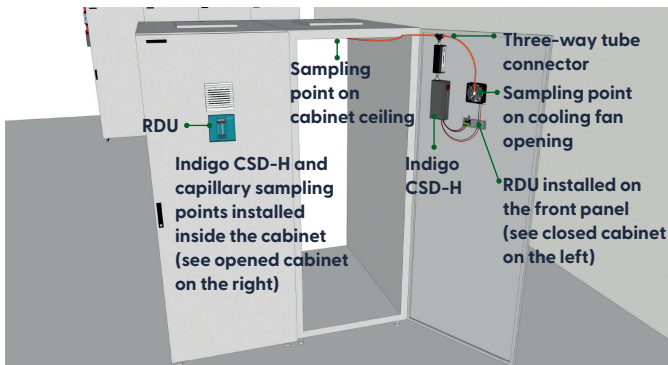


1. In-cabinet sampling with Indigo CSD-H installed on the top of cabinet.



The sampling point is mounted on top of the cabinet/equipment. The Indigo CSD-H is mounted on top to display the real time detection value and alarm/fault conditions.

2. In-cabinet sampling with Indigo CSD-H installed inside the cabinet.



The Indigo CSD-H can be mounted at any convenient location with the capillary tube connected to the sampling point on the cabinet ceiling. When the cabinet/equipment is equipped with an exhaust fan for cooling, there should be an additional sampling point at the fan opening. A 3-way tube connector can be used to provide the branch tube to the cabinet ceiling and exhaust fan opening.

When the Indigo CSD-H is installed inside the cabinet, you are not able to see the display value and alarm conditions as you would if the Indigo CSD-H is installed on top of the cabinet. It is therefore recommended to have a panel-mounted RDU connected to display, control and program the Indigo CSD-H inside.

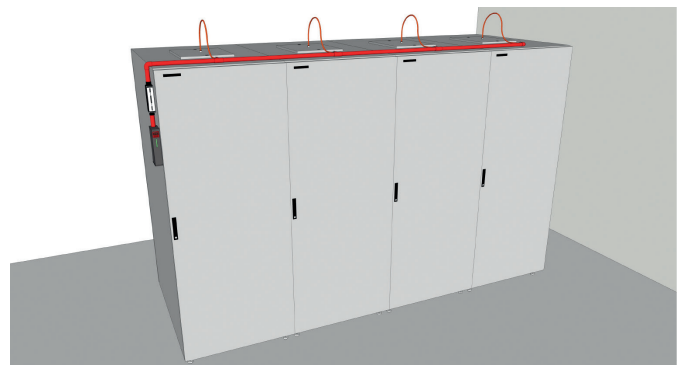
3. Multiple cabinets in-cabinet sampling using capillary tube.



When pinpoint addressability is not crucial, the Indigo CSD-H can be designed to protect multiple cabinets. In this case the Indigo CSD-H can be mounted on the top of the cabinet with capillary tubes connected and branched to the sampling point located at the top of each protected cabinet.

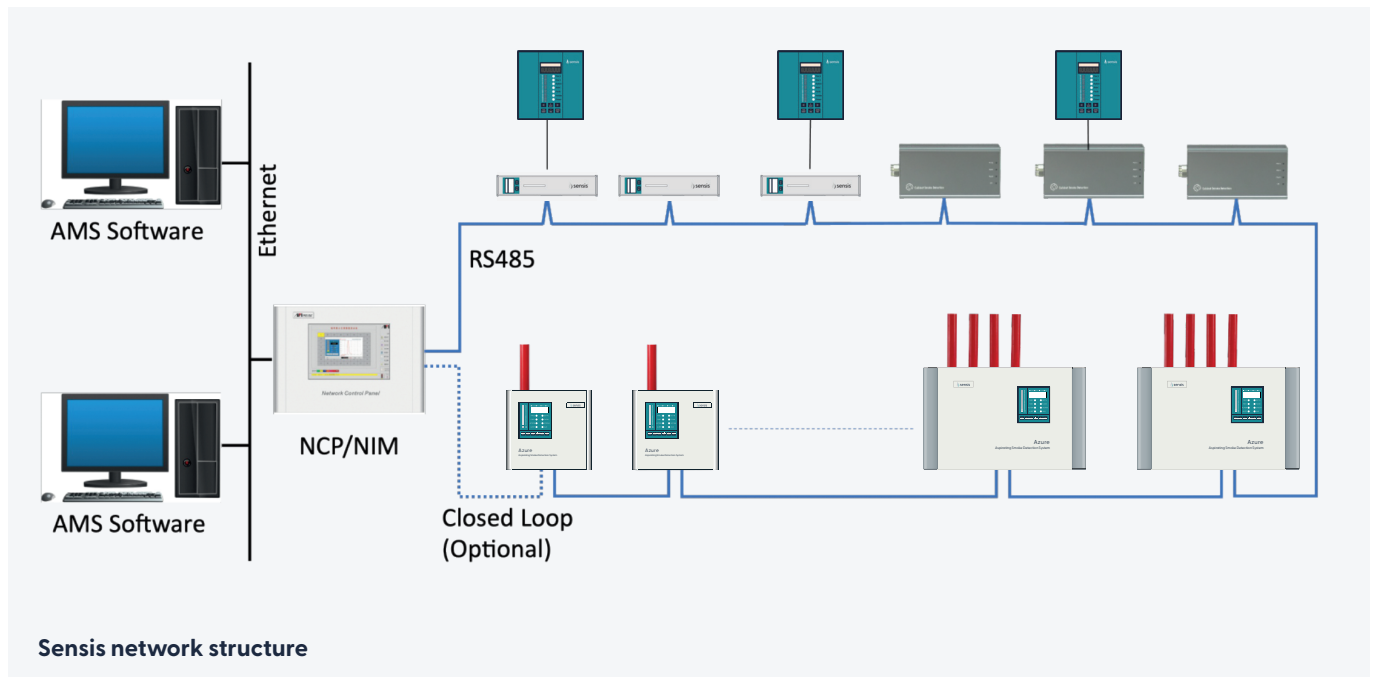
NOTE: Use a maximum of four sampling points for one Indigo CSD-H. Take care not to exceed the maximum number of sampling points if detection is needed at the exhaust fan opening or in an independent compartment.

4. Multiple cabinets in-cabinet sampling using 25 mm pipe.



It's also possible to use a 25 mm pipe to connect the capillary sampling points like a typical Aspirating Smoke Detection System. When this is desired, the Indigo CSD-H can be installed on the side of cabinet or on the wall nearby. A maximum of 4 samplings points can be connected to one Indigo CSD-H.

8. Networking



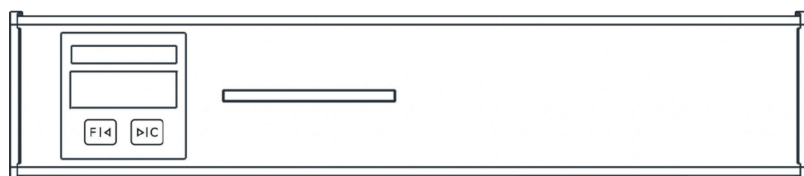
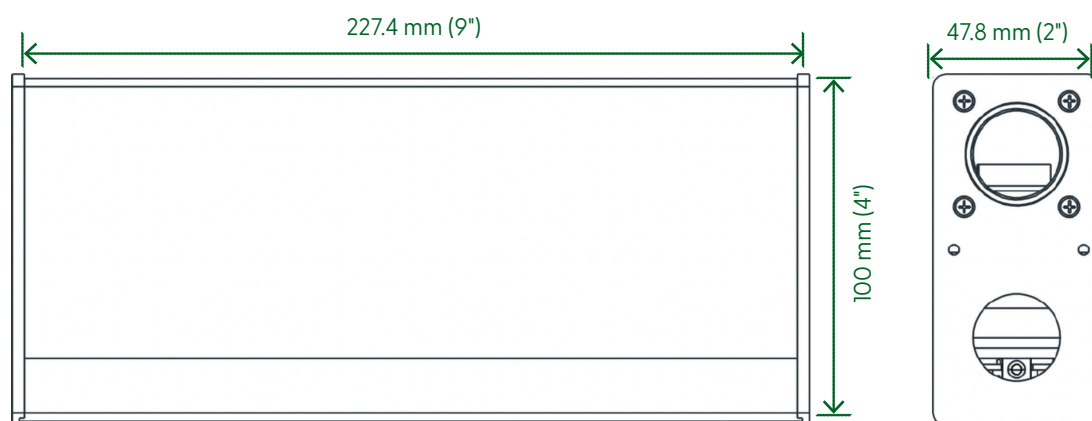
The Indigo CSD-H features an RS485 network option for connecting to the SensisNet Control Panel (NCP), SensisNet Interface Module (NIM) or SensisNet Management Software (AMS) running on PCs for centralised monitoring of the Sensis devices on the network.

The maximum RS485 cable length for Indigo CSD-H detectors on the network is 1.2 km in total. However, the cable length can be extended by an additional 1.2 km if connected with an RS485 repeater or a Sensis Azure ASD unit, which has a built-in repeater in its circuit.

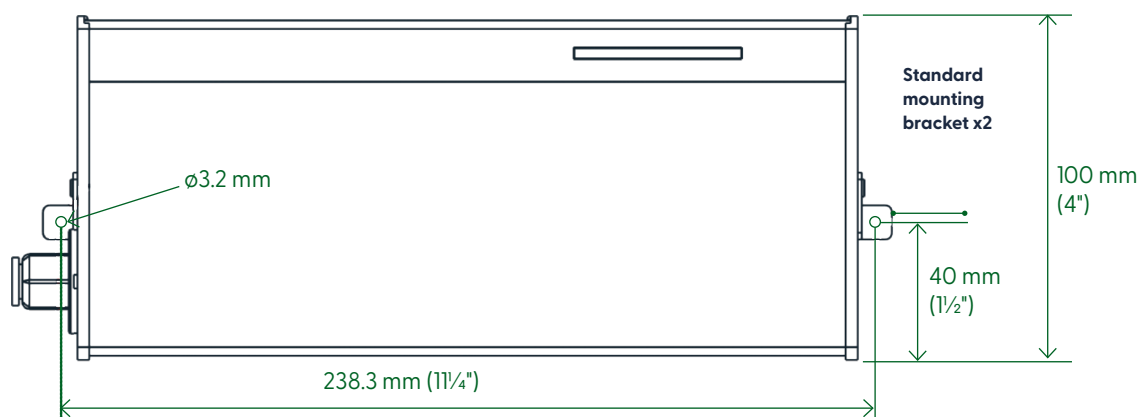
The Indigo CSD-H RS485 network can also be connected to the SensisTool configuration and diagnostic software running on a PC for commissioning.

The Indigo CSD-H RS485 network supports the Modbus RTU open protocol, for which a register definition table is available on request. This makes Indigo CSD-H very easy and economical to integrate with SCADA, PLC or HMI.

9. Mechanical installation



Indigo CSD-H dimensions



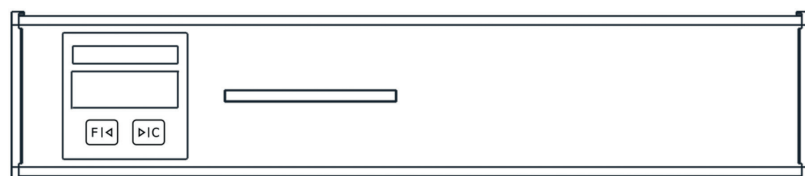
Indigo CSD-H mounting position

NOTE: It is recommended that the installation is carried out by suitably experienced and trained personnel.

10. Indigo CSD-H display orientation

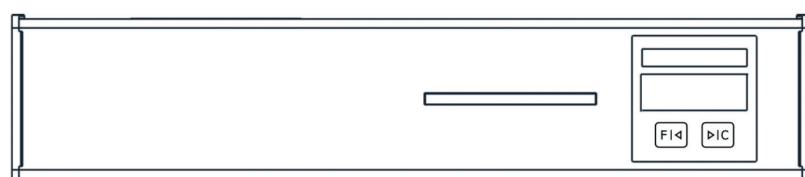


The Indigo CSD-H mini-display is designed to be rotatable. It can rotate by 90°, 180° or 270° depending on the installation. To change the orientation, open the front cover, loosen the two screws on the top and bottom side of the mini-display, remove and rotate the display to the desired angle, refit the display and replace the screws.



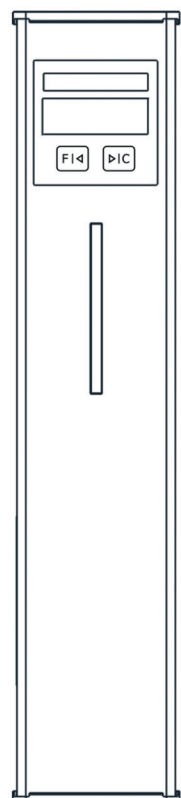
Mini-display orientation: 0°

Air sample inlet on the left side.
Wiring entrance on the right side.



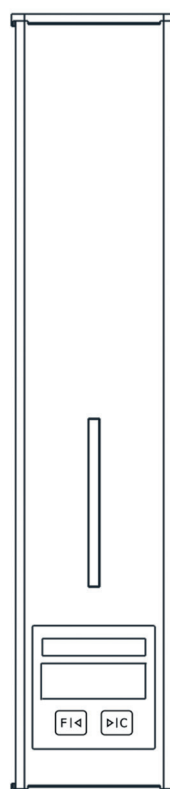
Mini-display orientation: 180°

Air sample inlet on the right side.
Wiring entrance on the left side.



Mini-display orientation: 90°

Air sample inlet on the top side.
Wiring entrance on the down side.



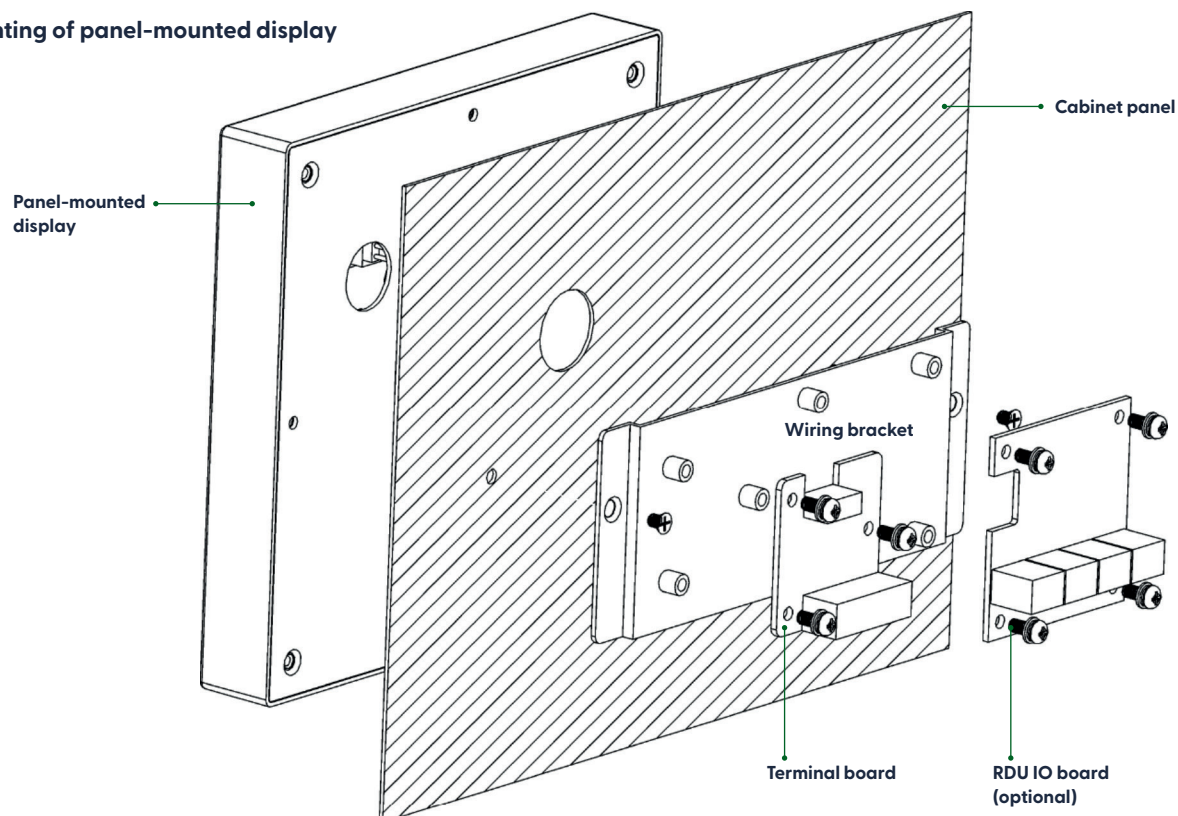
Mini-display orientation: 270°

Air sample inlet on the down side.
Wiring entrance on the up side.

11. Panel-mounted RDU installation

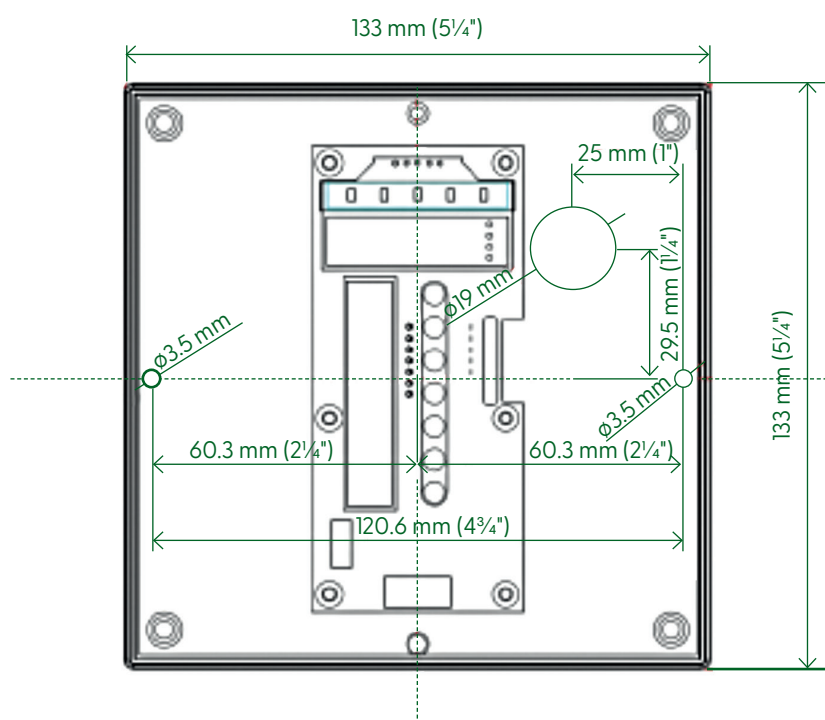


Mounting of panel-mounted display



Installation of panel-mounted display

The two small holes ($\varnothing 3.5$ mm) are for the screws to mount the RDU. The larger hole ($\varnothing 19$ mm) is for the cables. The three holes must be drilled on the cabinet panel.

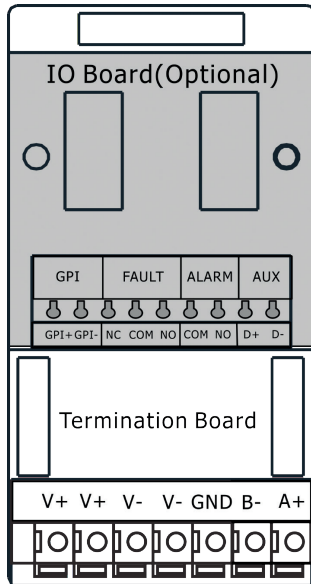


12. Electrical installation



NOTE: All the electrical connections should be made to the wiring terminals.

Wiring terminals



Indigo CSD-H wiring terminals definition

TERMINAL ASSIGNMENT	DESCRIPTION
Vdc	Power input: 19.6-28.8 Vdc
RS485	RS485 communication port
GPI	Monitor input, short the GPI input to activate the set function
RELAY	2 relay outputs, default setting is Fault and Fire-1 signal
AUX	Connect to auxiliary module such as RDU and auxiliary gas sensor communication port

NOTE: GPI, Relays and AUX are located on the optional I/O Board

Cables

- Power and Control cable should be 0.5 mm² strands cable.
- RS485 network should be 22 AWG twisted pair shielded cable.

Terminal connections

Power supply connections

The Vdc power terminals on the termination board must be connected to a 12/24 (19.6-28.8) Vdc power supply. The device may be powered by any EN54-4 or NFPA 72 compliant monitored 24 Vdc power supply of sufficient capacity.

RS485

- One set of RS485 terminals (GND, B-, A+)
- The maximum total cable length for all Indigo CSD-H detectors on one network is 1.2 km.
- RS485 network can be configured in closed loop for better communication reliability. The communication can switch direction to communicate with devices behind the failure point when there is a device failure, line break or line short circuit.
- SensisNet Management System computer software can monitor all devices on the network.
- SCADA/HMI/PLC systems capable of Modbus RTU open protocol can communicate with Sensis devices.

Relay connections

There are 2 configurable relays on the termination board. The relay default outputs are as follows:

- Fault (NO/NC)
- Fire-1 (NO)

NOTE:

NO=Normally open
NC=Normally closed
Com=Common

The relay rating is 2A @ 30 Vdc. If the load connected is more than the relay rating, a transfer relay suitable for the rating should be used.

All relays are configurable to one of the following functions: **Alert, Action, Fire 1, Fire 2, Fault, Isolate, and Auxiliary**. The relay output function printed on the termination board is the factory default setting. Users can change the relay function setting using the display on the front panel or the SensisNet Management computer software. However, the fault relay circuit needs a normally closed setting to give a fail-safe output when the device is powered off. Therefore, check the relay's NO or NC is correct when changing relay functions.



Terminal connections

GPI, General Purpose Input

There is one General Purpose Input terminal on the Indigo CSD-H termination board. This input is designed to monitor the status of the connected devices. The connected devices monitored by the GPI can be just a button, a fault relay from the power supply, or even an alarm relay from another detector. Short-circuiting the input pins activates the function defined in the GPI settings. There are 14 possible functions in the following categories:

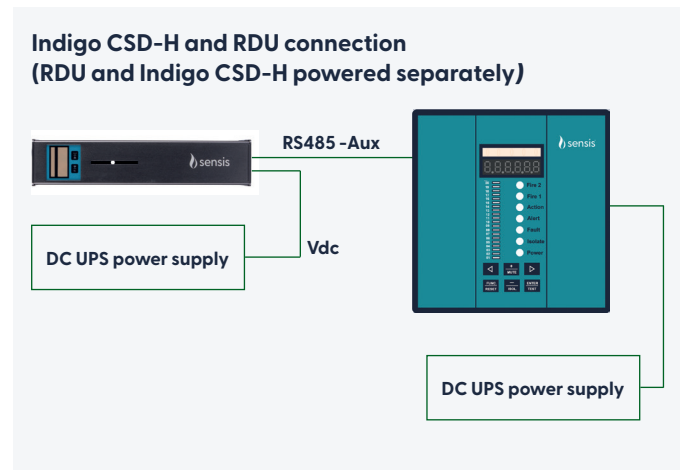
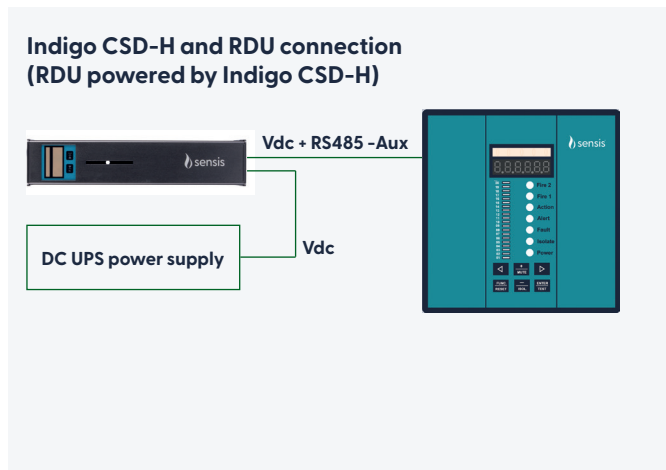
CATEGORIES	FUNCTIONS	DESCRIPTION
Device control	Reset Isolate Mute Test	The GPI terminal can be connected to a remote button, a control/output module of the fire alarm system, or a PLC so those control functions can be performed remotely or by other systems.
Power monitoring	Mains fault Battery fault Power fault	It is sometimes required by local code that the fault status of the mains and/or battery condition of the detector's power supply should be monitored. In this case, the Sensis detection device will signal a fault when the connected power supply relay is activated. The Sensis fault condition can then be monitored by a fire alarm system when its fault relay is connected to the fire alarm system input module.
Sensitivity change	Sensitivity mode 1 Sensitivity mode 2	In some applications, the detection area environment background smoke level is different from day to night. For example, during work hours the background smoke level is usually higher than during non-working hours. Sometimes, outside pollutants entering the detection area can generate a nuisance alarm. In this case, the GPI can be connected to a button, a timer, a PLC or even a relay output of another Sensis detector sensing the pollutant level from outside, so that sensitivity adjustment can be made manually or locally.
User defined device monitoring	UDI-1-5	The User-Defined Input (UDI) is usually used to monitor the status (relay) of other detection devices, like gas sensors, temperature sensors, or other aspirating smoke detectors.

12. Electrical installation

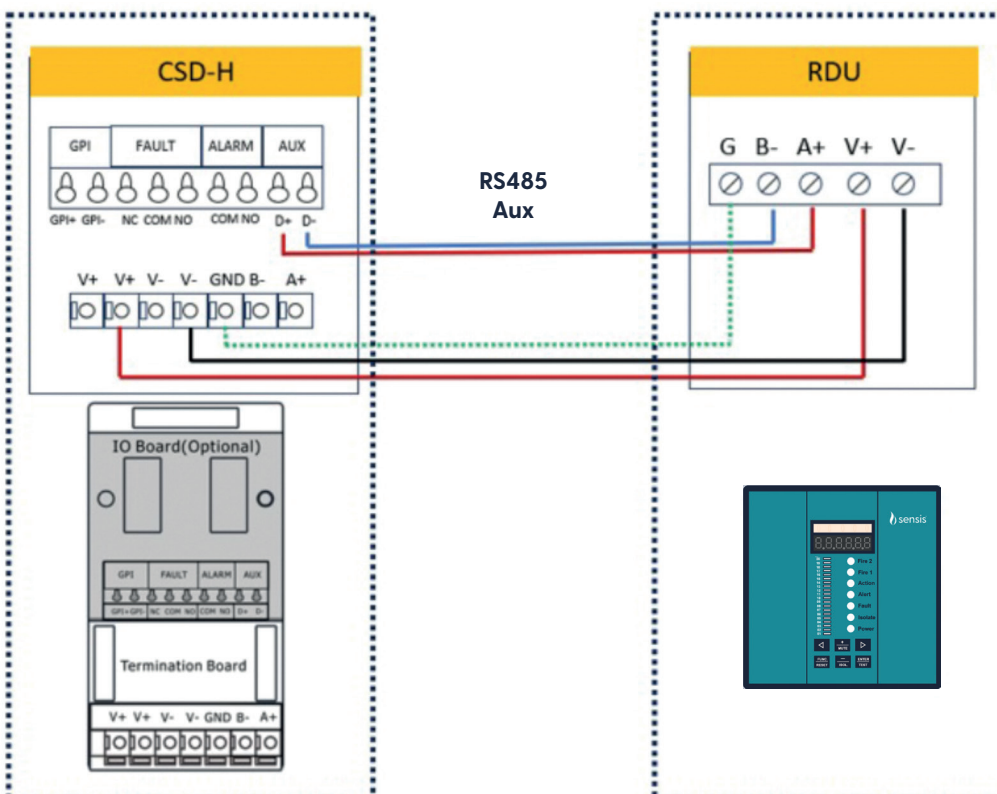
Terminal connections

Auxilliary connections

The Power and RS485-AUX terminals on the Indigo CSD-H are the connection to auxiliary units. Auxiliary units currently available are the Remote Display Unit (RDU), auxiliary sensors, and the external fan/flow unit. The Auxiliary Units can be powered from the Indigo CSD-H or separately by another power supply.



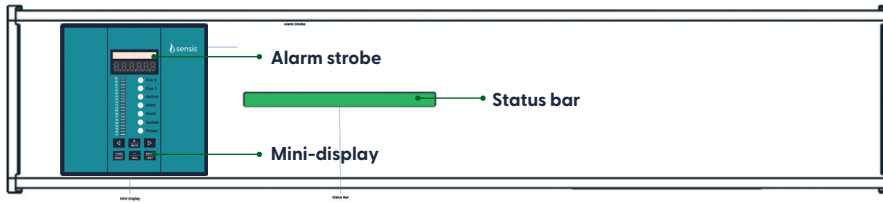
Wiring connections between Indigo CSD-H and RDU



13. Operation



Indigo CSD-H mini-display and status bar



The Indigo CSD-H mini-display and status bar allow the user to access the device's operating conditions, control and basic function settings. The operation of the mini-display is given in the following table. In the table, "Press" means "Press and release the button", and "Long press" means "Press and hold the button for 2 seconds".

MODE	DISPLAY	DESCRIPTION
Display mode	Press ▷ C F ◁ to switch between the following values	
	Smoke	Default display. On initial power up the display shows a countdown timer (in seconds) for the fast smoke learning to be completed.
	Flow Normalised (F)	Current normalised flow value in %. With the power on, it shows the countdown timer (in seconds) for the flow normalisation process to be completed (if the Auto Normalisation is set to ON).
	Flow Raw	Current flow raw value
	Address (A)	Device RS485 Address
	Event (E)	When switched to Event, E__N indicates the number of active events. N=0 indicates no event. When N is other than 0, long press ▷ C to show the event code of the latest event. Press ▷ C or F ◁ to show the next or last event if multiple events have occurred. Long press ▷ C or F ◁ to return.
	Temperature (T)	Current temperature in CSD-H
	Humidity (H)	Current humidity
	CO (g)	Current CO value, if equipped.
Prog. mode	Long press F ◁ when in display mode to enter the programmer mode to perform the following basic function settings. NOTE: A PIN code needs to be entered to access the programming functions. ---- indicates the software is waiting for the PIN to be entered. Please ask your supplier for the PIN. Press ▷ C or F ◁ to switch between functions. Long Press ▷ C to enter the function. The numerical display will be flashing to indicate the parameter that can now be changed. Press ▷ C or F ◁ to switch between parameters. Long press ▷ C to save the parameter. Long press F ◁ when in programmer mode to return to display mode. No operation for more than 1 minute will automatically close the programmer mode. NOTE: Only Fire 1 Level, Fan Speed, RS485 Address and CO Calibration can be set using the mini-display. Full function settings should be conducted using RDU or SensisTool running on a PC. AMS or NCP also provide full function settings if the CSD-H detector is networked.	
	Sensitivity (S)	S. 0.1-12.5
	Fan (F)	F. 0-10
	Address (N)	N.001-250
	CO (if equipped)	Zero point calibration
Control mode	Long press ▷ C when in display mode to enter control mode. Press ▷ C or F ◁ to switch between Reset/Isolate (De-Isolate)/Silence/Test operations. Long Press ▷ C to perform the selected operation and return to display mode.	
	rEst	Reset
	ISOL/DeIS	Isolate/De-Isolate
	SILE	Silence
	tEst	Display test

13. Operation



The status bar

The status bar on the Indigo CSD-H front panel indicates the following conditions.

STATUS BAR		INDICATION	DESCRIPTION
Colour	Condition		
Green	On	Normal operation	The device is powered.
	Fast blinking	Smoke learn	The quick smoke learning process is in progress.
	Slow blinking	Flow normalisation	The flow normalisation process is in progress.
Yellow	On	Fault	
Blue	On	Isolate	
Red	On	Alert	The device is in Alarm condition. Red bar flashing indicates Alert/Action condition. NOTE: The Alarm Levels can be identified from the flashing frequency of the alarm strobe (see table below).
		Action	
		Fire 1	
		Fire 2	
Purple	On	Aux sensor alarm	The device auxiliary sensor (CO, temperature, etc.) is in Alarm condition.

NOTE: The status bar shows only the highest-level condition when multiple conditions have occurred. The priority of the condition is Isolate > Alarm > Fault > OK. If smoke alarm and auxiliary alarm are both active, the status bar will show Red and Purple in rotation.

Alarm strobe

The flashing frequency options are listed below and can be changed in function settings. The alarm strobe works with the status bar to identify the alarm levels.

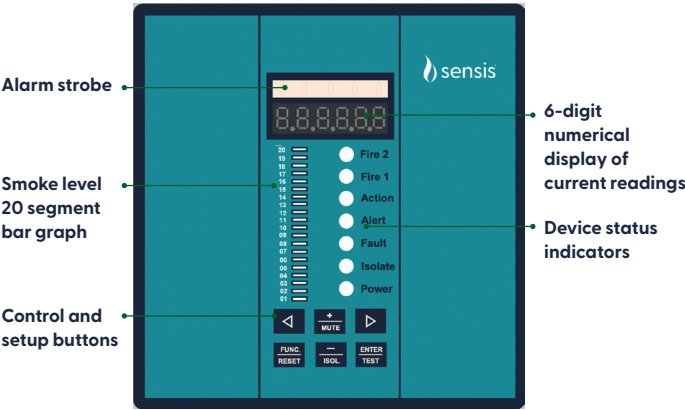
MODE	FLASH FREQUENCY	DEFAULT SETTING
0	Not used	
1	Slow flashing	Alert
2	Fast flashing	Action
3	Burst flashing	Fire 1 and Fire 2

NOTE: Alarm strobe will be stopped when the Mute button is pressed. The flash will start again when a new event occurs. Alarm strobe flashing frequency can be changed. Refer to function settings for details.



Remote Display Unit

The following instructions apply to panel-mounted, rack-mounted and wall-mounted Remote Display Units.



Control



KEY	ACTION	DESCRIPTION
RESET	Press	Reset, press this key to clear alarms or faults.
ISOLATE/DE-ISOLATE	Long press	The device will be isolated when it was not isolated. It will be de-isolated if it was isolated.
MUTE	Long press	The buzzer will be silenced and flashing will be stopped.
TEST	Long press	All LED indicators on the display will go on for 3 seconds and go off for 2 seconds. The cycle repeats twice for the user to check if there is any malfunctioning LEDs.

The difference between MUTE and ISOLATE is that MUTE is for the buzzer/strobe in confirming the alarm or fault status. When a new alarm or fault occurs, the buzzer/strobe will activate again. ISOLATE removes the system alarm from the corresponding output completely, so that there is no alarm output when the device is isolated.

Press and hold the <RESET> key for 2 seconds to enter program mode. For the key functions in program mode please see the parameter settings section.

14. Display



Indicators

INDICATOR (COLOUR)		DESCRIPTION
GREEN	PWR	The device is powered. Fast flash indicates the device is in Quick Smoke Learn Process. Slow flash indicates the device is in Flow Normalisation Process.
BLUE	ISOL	The device is isolated.
YELLOW	FAULT	Smoke detection fault Air flow Hi/Lo fault, air flow sensor failed, aspirator failed, system fault
RED	ALERT	The Alert threshold has been reached and the appropriate time delays have expired. The detector will generate an Alert Alarm.
RED	ACTION	The Action threshold has been reached and the appropriate time delays have expired. The detector will generate an Action Alarm.
RED	FIRE 1	The Fire 1 threshold has been reached and the appropriate time delays have expired. The detector will generate a Fire 1 Alarm.
RED	FIRE 2	The Fire 2 threshold has been reached and the appropriate time delays have expired. The detector will generate a Fire 2 Alarm.
YELLOW	Bar graph	Displays the real-time smoke level, with full scale of Fire 1 Level In program mode, individual bar graph LED flashing indicates selected parameter number.

NOTE: The status of the Alarm and Fault LEDs might not represent the current device status. This is because the Alarm/Fault output will be maintained even when the Alarm/Fault condition no longer exists if the Alarm Latch or Fault Latch function is enabled. A manual reset will be needed to clear the Alarm or Fault.

6-digit numerical display

In normal operation, the 6-digit numerical display shows the real-time smoke level, air flow level, device address and active events. Press <D> buttons on the panel to switch the display item in sequence as follows:

Smoke (S) ↔ Flow Normalised (Fn) ↔ Flow Raw (Fr) ↔ Address (Ad) ↔ Event (E) ↔ Temperature (T) ↔ Humidity (H) ↔ CO (g)

When switching to Event, the total number of active events will be displayed first. Press <+> <-> keys to show the detailed event message, including date, time and event code. For example, if two events have occurred (code E11 followed by code A0), the display shows 2 when the Event option is selected. Press <+> repeatedly to display the A0 event message, the E11 event message and the number of events again. Press <-> to show the events in reverse order. If there are no active events, the display shows NONE.

The default numerical value shown is smoke level. If it is switched from the default to another item, it will return to the default item if no buttons are pressed for 10 minutes.

The default display item can be changed by pressing and holding the <D> key for 2 seconds.

DISPLAY ITEM	NUMERICAL LED	UNIT	REMARKS
SMOKE (S)	0.000-25.00	%/m	
AIR FLOW (FN)	0-200	%	
FLOW RAW (FR)	0-4095		
ADDRESS (ADDR)	0-250		
EVENT (E)	NONE A1-A14 E0-E35		In setting other parameters, all indicators will go off except indicators for smoke learning and air flow normalising.
TEMPERATURE (T)	-40-125	°C	If enabled*
HUMIDITY (H)	0-100	%RH	If enabled*
CO (G)	0-1000	ppm	If equipped

NOTE: The temperature and humidity display can be disabled – refer to function settings for detail. The flashing indicators of Smoke Learning and/or Air Flow Normalising will continue to flash when switching the numerical display.



Buzzer

The following buzzer modes indicate when the device is in Alarm or Fault status. Users can change the buzzer modes according to their application.

MODE	BUZZER ACTION
0	Disables the buzzer.
1	In Alarm, beeps 1 second in every 10 seconds. In Fault, no beep.
2	In Alarm or Fault, beeps 1 second in every 10 seconds.
3	In Alarm, beeps continuously. In Fault, beeps 1 second in every 10 seconds.
4	In Alarm or Fault, beeps continuously.

Alarm flash

The flashing frequency options are listed below and can be changed in function settings.

MODE	FLASH FREQUENCY	DEFAULT SETTING
0	Not used	
1	Slow flashing	Alert
2	Fast flashing	Action
3	Burst flashing	Fire 1 and Fire 2

NOTE: Alarm flash will stop when the Mute button is pressed. The flash will start again when a new event occurs. The alarm flashing frequency can be changed – refer to function settings for detail.



14. Display



TYPES	CODE	DESCRIPTION
SMOKE ALARM	A1	Alert
	A2	Action
	A3	Fire 1
	A4	Fire 2
AUXILIARY SENSOR ALARM	A5	Sensor 1(Temperature) High Alarm
	A6	Sensor 1(Temperature) Rate of Rise Alarm
	A7	Sensor 2 (Humidity) High Alarm
	A8	Sensor 2 (Humidity) Rate of Rise Alarm
	A9	Sensor 3 High Alarm
	A10	Sensor 3 Rate of Rise Alarm
	A11	Sensor 4 (CO) High Alarm
	A12	Sensor 4 (CO) Rate of Rise Alarm
SMOKE DETECTION FAULT	A13	Sensor 5 High Alarm
	A14	Sensor 5 Rate of Rise Alarm
	E1	Smoke Detector Failed
	E2	Smoke Detector Service Required
FLOW FAULT	E3	Smoke Level High
	E4	Smoke Level Low
	E5	Aspirator Failed
	E6	Flow Sensor Failed
	E7	Pipe Flow High Fault
	E8	Pipe Flow Low Fault
	E9	Normalisation Failed
	E17	Filter Blockage
	E18	Filter Removed
	E19	Filter Change Due

The display panel has integrated control/programming that, when in operating mode, can execute the REST/ISOLATE/ MUTE/TEST functions as well as display the Smoke/Flow/ Addr/Evt. While in setting mode, the setting of related operating parameters of detecting devices can be done via keypad/bar graph/ numerical display.

Table: Summary of key functions under operating mode

TYPES	CODE	DESCRIPTION
COMMS. FAULT	E10	Programmer Not Found
	E11	Fan Board Not Found
	E12	Zone Relay Board Not Found
	E13	HSSD Not Found
	E14	Auxiliary Sensor Board Not Found
SYSTEM FAULT	E20	Power Fault
	E21	Battery Fault
	E22	Mains Fault
	E23	RTC Fault
	E24	Sensitivity Mode Conflicition
AUXILIARY SENSOR FAULT	E25	Sensor 1 Failed
	E26	Sensor 2 Failed
	E27	Sensor 3 Failed
	E28	Sensor 4 Failed
	E29	Sensor 5 Failed
LEARNING	E31	Flow Normalisation
	E32	Smoke Background Learning
ISOLATION	E30	Device Isolated
	E33	Zone Isolated
GPI	E34	GPI (Termination Board) Activated
	E35	GPI (RDU) Activated
	E40	GPI-UDI1 Active
	E41	GPI-UDI2 Active
	E42	GPI-UDI3 Active
	E43	GPI-UDI4 Active

KEY PAD	KEY ACTION	DESCRIPTION
FUNC.	Long press	In operating mode, enter into program mode
RESET	Press	Reset
◀	Press	Numerical display item switched leftward
	Long press	Numerical display default item. The default item will be switched rightward to the next item.
▶	Press once	Numerical display item switched rightward.
+		
ISOL	Long press	Isolated
-		
MUTE	Long press	Mute
↩		
TEST	Long press	Display LED test

15. Programmer



- Press and hold the **FUNC.** key for 2 seconds when in operating mode to enter into program mode, the Bar graph 01 indicator flashes and shows in setting 01 parameter with its numerical value displayed. If parameter password function is set at 1 (ON), a PIN code would be required before editing parameters, otherwise the values can only be read. If password was set to 0 (OFF), direct editing of parameters is possible.
- Editing parameters: press **+/-key** to alter parameter value; adjust it to the proper figure and press and hold return key for 2 seconds to store; the numerical display will flash 3 times if successfully stored.
NOTE: If the password function is set to 1 (ON), but a PIN code has not been entered correctly, pressing +/- has no effect.
- The flashing segments in the bar graph represents the selected parameter number. For parameter numbers above 20, two segments will flash; for example, 21 is shown by segments 20 and 01 flashing.
- If a setting value exceeds the range permitted, the detector will automatically jump to the other end of the range.
- Press and hold **F** key for 2 seconds to exit the setting mode.
- If no action is taken for 1 minute in program mode, a 10-second countdown will be displayed before returning to operating mode.

KEY PAD	PRESSING KEY	EXECUTION
FUNC.	Long press	Enter or exit program mode.
RESET		
◀	Press	Return to the previous parameter.
▶	Press	Move to next parameter.
-	Press	Reduce displayed value. When the value reaches the minimum, press <-> key will jump to the maximum value.
	Long press	Rapidly reduce displayed value.
ISOL		
+	Press	Increase the displayed value. When the value reaches the maximum, press <+> key will jump to the minimum value.
	Long press	Rapidly increase displayed value.
MUTE		
ENTER	Long press	Save setting, the numerical display will flash 3 times if successfully saved.
TEST		

Table: Functions of keys in program mode

16. Parameter Functions



ITEM	MENU	PARAMETER	LEAD NO.	MIN	MAX	DFT	DESCRIPTION	ACCESS LEVEL
1	Alarm Level	Full Scale Sensitivity	AF.	0.1	12.5	0.80	The detector smoke level in %/m for the bar graph reaching its full scale (20 bars). The smaller the value, the higher the sensitivity and/or vice versa.	ADM
		Alert Bar Graph Level	A1.	4	4	4	When this bar graph setting is reached and the appropriate time delays have occurred, the detector will trigger an Alert Alarm. Alert Smoke Level (%/m) = Full Scale Level/20 x Alert Bar Graph Level. Using the default settings, the alert level is 0.2/20x10=0.1%/m.	
		Action Bar Graph Level	A2.	12	12	12	When this bar graph setting is reached and the appropriate time delays have occurred, the detector will trigger an Alert Alarm. Action Smoke Level (%/m) = Full Scale Level/20 x Action Bar Graph Level. Using the default settings, the action level is 0.2/20x15=0.15%/m.	
		Fire 1 Bar Graph Level	A3.	20	20	20	When this bar graph setting is reached and the appropriate time delays have occurred, the detector will trigger a Fire 1 Alarm. This setting is fixed to 20 and cannot be modified.	
		Fire 2 Level	A4.	0.1	20.0	3.2	When this smoke level setting (in %/m) has been reached and the appropriate time delays have occurred, the detector will generate a Fire 2 Alarm.	
2	Time Delay	Alert Delay	t1.	0	60	30	Each delay is the number of seconds that an alarm level must be continuously measured before the alarm is initiated. Each alarm level has a programmable delay of between 0 and 60 seconds.	ADM
		Action Delay	t2.	0	60	20		
		Fire 1 Delay	t3.	0	60	10		
		Fire 2 Delay	t4.	0	60	10		
3	Pipe Flow	Pipe Used	U.	N	Y	Y	Enables or disables flow sensing on the specified pipe inlet of the detector. If any pipe inlets are unused, set the relevant flow sensor function for the pipe inlet to No to avoid unwanted flow faults.	ADM
		Pipe Flow High	H.	101	200	120	Flow high is the level above which air flow needs to increase to trigger a fault indication (which may indicate a loose or damaged inlet pipe).	
		Pipe Flow Low	L.	0	99	80	Flow low is the level below which air flow needs to be reduced to trigger a fault reading (which may indicate a blocked pipe).	
		Pipe Fan Speed	F.	0	10	5	The value entered sets the aspirator in the detector to one of a range of predetermined speeds. The lower the number entered the lower the air flow rate and the lower the power consumption.	
		Flow Sensitivity	S.	0	5	3	Increase this value to increase the flow detection sensitivity.	DST

16. Parameter functions



ITEM	MENU	PARAMETER	LEAD NO.	MIN	MAX	DFT	DESCRIPTION	ACCESS LEVEL
4	Normalise Flow	Normalise	NF.	N	Y	N	Setting this function to Y puts the detector into automatic flow normalisation process. This takes a few minutes to normalise the flow to 100% based on the current flow rates. During normalisation, the Power indicator (LED) on the Indigo CSD-H and RDU (if fitted) will flash to indicate the normalisation status. After normalisation, a flow reading of greater than 100 means the current flow is higher than normal, a sign of pipe breakage. A flow reading of less than 100 means the current flow is smaller than normal, a sign of pipe or sampling port blockage. NOTE: It is crucial to check that there is no breakage or blockage on the pipe before setting the device into normalisation process. Otherwise the system will see the abnormal condition as a normal condition.	DST
		AutoNorm.	NA.	N	Y	N	Setting this function to Y will automatically start the normalisation process when the device is powered on.	
5	Alarm Action	Cascade Alarm	AC.	N	Y	Y	Setting this function to Y means that only when the detector's controller has gone into Alert does the controller start counting down the Action delay i.e. the time delays on Alert and Action are cumulative. So are the following Fire 1 and Fire 2 delays. It is possible for the high-level alarm to occur before the low-level alarm if the time delays are not consistent and the smoke level rises quickly. Enabling the cascade alarm will guarantee the alarms go off step by step.	ADM
		Alarm Latch	AL.	N	Y	Y	When this function is set to Y it requires a reset on the front panel or a remote reset to clear an alarm condition. This means the alarms must be confirmed and reset manually even if the smoke level has reduced below the alarm level. This is the factory default setting. When this function is set to N, the alarm will be reset automatically when the smoke level has reduced below the alarm threshold.	
		Fault Latch	FL.	N	Y	N	When this function is set to Y it requires a reset from the front panel or a remote reset to clear fault indications. If this function is set to N, the fault will be reset automatically when the fault condition is cleared.	
		Fault Delay	Ft.	0	60	60	The fault delay is the number of seconds that a fault condition must be continuously measured before the fault is initiated.	
6	Filter	Filter Status	Fs.	0	100		Read only.	
		Filter Due	Fd.	0	730		Read only.	
		New Filter	FN.	N	Y	N	Set this function to Y to when a new filter is installed (on detectors equipped with an internal filter).	DST

16. Parameter functions



ITEM	MENU	PARAMETER	LEAD NO.	MIN	MAX	DFT	DESCRIPTION	ACCESS LEVEL
7	Front Panel	Reset Button	dr.	N	Y	Y	The front panel buttons may be enabled or disabled individually by setting these functions to Y or N.	ADM
		Isolate Button	dl.	N	Y	Y		
		Mute Button	dS.	N	Y	Y		
		Test Button	dt.	N	Y	Y		
		Buzzer	db.	0	4	3	The front panel buzzer has different modes when it is set to the following numbers: 0: Disable the buzzer, no sound in case of alarm or fault. 1: In alarm, the buzzer sounds one second in every 10 seconds. In fault, the buzzer will not sound. 2: In alarm and fault, the buzzer sounds one second in every 10 seconds. 3: In alarm, the buzzer sounds consistently. In fault, the buzzer sounds one second in every 10 seconds. 4: In alarm and fault, the buzzer sounds consistently.	
		Alert Flash	A1	0	3	1		
		Action Flash	A2	0	3	2		
		Fire 1 Flash	A3	0	3	3		
		Fire 2 Flash	A4	0	3	3		
		GPI-1	l1.	0	115	0	Remote Display Unit (RDU, if fitted) Optional Input/Output Board Settings. Please refer to Item 9 (GPI) and 10 (Device Relay Configuration) for the Settings Value Definition.	DST
		Relay 1	r1.	1	109	2		
		Relay 2	r2.	1	109	3		
		Relay 3	r3.	1	109	5		
8	Control	RESET	Cr.	N	Y	N	This has the same effect as pressing the <RESET/ISOLATE/SILENCE/TEST> buttons on the front panel.	ADM
		ISOLATE	Cl.	N	Y	N		
		MUTE	CS.	N	Y	N		
		TEST	CT.	N	Y	N		
		Relay 1	r1.	OFF	ON	OFF	Relay test of the Display Expansion Input/Output.	DST
		Relay 2	r2.	OFF	ON	OFF		
		Relay 3	r3.	OFF	ON	OFF		
9	GPI	GPI-1	l1.	0	115	1	This sets the GPI terminal to the functions below (inputs are NO): 0: NOT USED 8: SENSITIVITY MODE 1 1: RESET 9: SENSITIVITY MODE 2 2: ISOLATE 10: SCAN (QUARTAS-2000 Only) 3: MUTE 11: UDI-1 4: TEST 12: UDI-2 5: MAINS FAULT 13: UDI-3 6: BATT. FAULT 14: UDI-4 7: POWER FAULT 15: UDI-5 Use values of 101-115 to set the functions above to use NC inputs. When the GPI is set to UDI, the UDI Relay ID 201-215 can be configured to provide the Relay output in case of UDI activation.	DST

16. Parameter functions



ITEM	MENU	PARAMETER	LEAD NO.	MIN	MAX	DFT	DESCRIPTION	ACCESS LEVEL
10	Device Relay Configuration	Relay 1	r1.	NA	NA	NA	This sets the termination board relays to the outputs below. 1: ISOLATE 5: FIRE 1 2: FAULT 6: FIRE 2 3: ALERT 7: AUXILIARY 4: ACTION 7-9: Aux. Sensor Output ID NOTE: Relay 2 is Normally Closed the others are Normally Open. Use values of 101-109 to reverse the relay's operation from the default status (NO becomes NC and vice versa). NOTE: Special ID 201-215 (and 211-215 for reversed relay activation) are used for GPI connection to monitor User Defined Input (UDI-1-UDI-5).	DST
		Relay 2	r2.	1	109	2		
		Relay 3	r3.	NA	NA	NA		
		Relay 4	r4.	NA	NA	NA		
		Relay 5	r5.	1	109	5		
		Relay 6	r6.	NA	NA	NA		
		Relay 7	r7.	NA	NA	NA		
11	Expansion IO (when fitted & enabled)	GPI 1-1	l1	0	115	0	Refer to Item 9 and 10 for GPI & Relay Configuration.	DST
		Relay1-1	01.	01	47	02		
		Relay1-2	02.	01	47	03		
		Relay1-3	03.	01	47	04		
		Relay1-4	04.	01	47	05		
12	Device Relay Test	Relay 1	r1.	N	Y	N	When the selected relay is set to Y or N, the relay will be activated or de-activated to check if the relay connected device action is correct. For example, If relay 5 is Fire 1 and connected to the fire alarm system, setting relay 5 to Y should cause a Fire condition on the panel. Setting All (All Relays) will activate all relays.	ADM
		Relay 2	r2.	NA	NA	NA		
		Relay 3	r3.	NA	NA	NA		
		Relay 4	r4.	NA	NA	NA		
		Relay 5	r5.	N	Y	N		
		Relay 6	r6.	NA	NA	NA		
		Relay 7	r7.	NA	NA	NA		
13	Expansion IO Relay Test	All	AL.	N	Y	N	Refer to Item 12.	ADM
		Relay 1	01.	OFF	ON	ON		
		Relay 2	02.	OFF	ON	ON		
		Relay 3	03.	OFF	ON	ON		
14	Date & Time	Relay 4	04.	OFF	ON	ON	It is important that the time and date be set up correctly on the controller's internal calendar/clock because it uses this information to store events in the event log. NOTE: While flow is normalising, if using SensisTool the clock will not sync to PC time. wait until Normailse has completed.	ADM
		YYYY/Year	yy.	2000	2099	2010		
		MM/Month	NN.	01	12	05		
		DD/Day	dd.	01	31	18		
		HH/Hour	HH.	01	23	19		
		MM/Minute	nn.	00	59	36		
		SS/Second	SS.	00	59	0		

16. Parameter functions



ITEM	MENU	PARAMETER	LEAD NO.	MIN	MAX	DFT	DESCRIPTION	ACCESS LEVEL
15	System	Address	Ad.	1	250	250	Sets the device RS485 address. A device must have a unique address on the network.	ADM
		Baud Rate	Br.	2.4	115.2	19.2	RS485 Baud Rate (options are 2.4/4.8/9.6/19.2/38.4/115.2K).	DST
		Factory Default	dF.	N	Y	N	Setting this function to Y will restore the device to the factory default settings. However, the device address will not be affected to avoid an unwanted network error.	
		Password	PS.	N	Y	Y	When this function is set to Y, a password is required to enter the program mode, and a user can then change settings. Setting this function to N makes the program mode accessible without a password, but all the settings are read-only.	
16	Log	Log Enable	SN.	N	Y	Y	Setting this function to Y enables the smoke/flow log. There are two selectable log modes, CHANGE and RATE. On Sensis, 0 is CHANGE and 1 is RATE. When the log mode CHANGE is selected, events are recorded if the % obscuration changes by the selected level (regardless of duration), where the options are: 0.01%, 0.05%, 0.1%, 0.2%, 0.5%, 1%, 2%, 5%.	ADM
		Log Mode	SL.	0	1	0		
		Change/Rate	SC./St.	0.01/1	5/3600	5/3600	When the log mode RATE is selected, events are recorded if they occur for longer than the selected time in seconds, where the options are: 1, 10, 60, 300, 600, 1200, 1800, 3600. NOTE: For the smoke change, the detection full scale is the bar graph full scale, which is the same as Fire 1 Level. For the flow change it's 200%, i.e., twice the maximum flow rate measured.	

16. Parameter functions



ITEM	MENU	PARAMETER	LEAD NO.	MIN	MAX	DFT	DESCRIPTION	ACCESS LEVEL
17	Scale	Mean Period	rt.	15	480	60	This value is the period used to calculate the mean smoke background level. The mean period is selectable between the following values in minutes: 15, 60, 120, 240, 480.	DST
		Sensitivity Mode 1	S1.	0.1	10.0	1.0	Use this function as a multiplier of the original alarm thresholds, to increase or decrease the sensitivity of the smoke detection when the relevant GPI is activated. This setting must work with the GPI which is set to Sensitivity Mode 1 or 2. If this function value is set to be greater than 1.0, the smoke detection becomes less sensitive. It becomes more sensitive if this function value is set to less than 1.0. This function is usually used when different smoke detection sensitivity is required in certain situations. For example, in work hours the smoke background level increases due to all kinds of production activities. It may be desirable to have lower sensitivity in work hours and have higher sensitivity in non-working hours. Or when there are pollutants outside the detection zone causing false alarms, it can be solved by decreasing the sensitivity by using another Sensis device to detect the pollutant level and connect its relay to the GPI of the Sensis device in the detection zone.	
		Sensitivity Mode 2	S2.	0.1	10.0	1.0		
		Reference Detector Address	rA.	0	250	0	Set the reference detector address number between 1 and 250 to enable referencing. When this function is set to 0 the referencing is disabled.	
		Reference Zone	rP.	1	8	1	The zone (detector) number of the reference detector address set above.	
		Reference Dilution	rd.	1	100	100	This value is the percentage reference signal subtracted from the detector's signal, if a reference device has been allocated.	
		Reference Delay	rt.	0	100	0	This value is the delay time (in seconds) between a build-up of pollution being seen by the reference (if used) and the pollution being seen by the detector.	
18	SW Version.	Model					Read only.	USR
		Controller	SC.				Read only.	
		Display	Sd.				Read only.	
		Serial No.	SN.				Read only.	
19	Reserved						NA	
20	Optional Module	Zone Used	OP.	0	1	1		DST
		Display Used	Od.	0	1	0		
		Filter Used	OF.	0	1	0		
		Sensor Used	OS.	0	1	0		

16. Parameter functions



ITEM	MENU	PARAMETER	LEAD NO.	MIN	MAX	DFT	DESCRIPTION	ACCESS LEVEL
21	Temperature	Enable	EN.	0	2	2	0: Disable (No Display and alarm). 1: Enable (Display value and able to trigger alarm). 2: Read Only (Display value but no able to trigger).	
		Calibration	CA.	NA	NA	NA		
		High	H.	-40	125	58	A fixed temperature heat detector generates an alarm condition if the temperature within the protected area reaches the temperature alarm threshold (°C). Typical Fixed Temperature: Class A1: 58°C Class A2: 62°C Class B: 77°C. 0: Disable Fixed Temperature Alarm.	
		Rate of Rise	rr.	0	15	10	Rate-of-Rise (ROR) heat detectors operate on a rapid rise in temperature of 6.7° to 8.3°C (12° to 15°F) increase per minute, irrespective of the starting temperature. 0: Disable Rate of Rise Temperature Alarm.	
		Time Delay	td.	0	60	10	Sets the time for which a temperature rise must be measured before before an alarm is raised.	
		Fire 2 Logic	OL.	0	3	0	Select how smoke and heat signals are used to generate Fire 2 alarm (0 = smoke only; 1 = smoke AND heat needed; 2 = smoke OR heat needed; 3 = heat only).	
		Output ID	OI	7	9	7	The Sensor Output ID is used to assign the relay output when the sensor goes into alarm. It must work with Relay Configuration to set the designated relay to the Output ID so the relay will activate when the sensor is in alarm condition.	
22	Humidity	Enable	EN.	0	2	2	0: Disable (No Display and alarm). 1: Enable (Display value and able to trigger alarm). 2: Read Only (Display value but no able to trigger).	
		Calibration	CA.	NA	NA	NA	Not used; humidity detector does not require calibration.	
		High	H.	0	100	80		
		Rate of Rise	rr.	0	100	20	Sets the humidity alarm threshold in percentage. The set value Rate increase per minute will trigger an alarm.	
		Time Delay	td.	0	60	10		
		Fire 2 Logic	OL.	0	3	0	Select how smoke and humidity signals are used to generate Fire 2 alarm (0 = smoke only; 1 = smoke AND humidity needed; 2 = smoke OR humidity needed; 3 = humidity only).	
		Output ID	OI	7	9	7	The Sensor Output ID is used to assign the relay output when the sensor goes into alarm. It must work with Relay Configuration to set the designated relay to the Output ID so the relay will activate when the sensor is in alarm condition.	
23	Reserved							

16. Parameter functions



ITEM	MENU	PARAMETER	LEAD NO.	MIN	MAX	DFT	DESCRIPTION	ACCESS LEVEL
24	CO	Enable	EN.	0	2	1	0: Disable (No Display and alarm). 1: Enable (Display value and able to trigger alarm). 2: Read Only (Display value but no able to trigger.)	
		Calibration	CA.	OFF	ON	OFF	When set to ON, the CO sensor is calibrated.	
		High	H.	0	500	30		
		Rate of Rise	rr.	0	500	10	Sets the CO alarm threshold in parts per million (ppm). The set value Rate increase per minute will trigger an alarm.	
		Time Delay	td.	0	60	10		
		Fire 2 Logic	OL.	0	3	0	Select how smoke and CO signals are used to generate Fire 2 alarm (0 = smoke only; 1 = smoke AND CO needed; 2 = smoke OR CO needed; 3 = CO only).	
		Output ID	OI	7	9	7	The Sensor Output ID is used to assign the relay output when the sensor goes into alarm. It must work with Relay Configuration to set the designated relay to the Output ID so the relay will activate when the sensor is in alarm condition.	
25	Reserved							

S

Access level

- DST: Distributor access level, full access authorisation for commissioning purpose.
- ADM: Management access level, limited access authorization for user's management purposes.
- USR: User access level, settings are read-only and cannot be changed.

17. Commissioning



Before commissioning the detector, the local standards for aspirating detection systems must be consulted. These standards differ widely throughout the world and specific advice for the market in one country may not be applicable to another.

Commissioning strategy will initially depend upon the environment in which the detector is installed. For instance, the test for a computer room (which should be a relatively clean environment) would be very different from, say, a tobacco factory, which would probably have a high level of airborne particulate content.

Widely accepted standards for computer rooms/IDC areas are British Standard BS6266 and NFPA 76, which involve early detection at the incipient or pre-flame stage of a fire. To perform the test, electrically overload a 1-meter length of PVC insulated wire of 10/0.1mm gauge for one minute using an appropriate power supply. The detector has two minutes from the end of the wire burn to give a response.

For areas with higher levels of background particulate matter, the testing methodology would be similar to that of standard point detectors.

Please note:

On initial power up and subsequent power cycling (eg during maintenance when batteries may be disconnected and mains interrupted), the Detector will initiate a "Normalise Airflow" cycle.

This Normalise process will be displayed by the Main Indicator LED flashing Green. During this phase the Detector is learning how much air flow is entering and takes this reading as "Normal".

Before initial power up, it is important that all pipes are connected, sampling holes are in place and any additional in-line filtration is fitted. Post Normalise, the Green LED stops flashing, stays Green and the Detector is able to detect flow blockages or breakages. Default settings are 80% of original flow = low flow fault. 120% of original flow = High flow fault.

This feature enables the commissioning engineer to carry out initial set up without the need for a laptop or SensisTool SW.

During any maintenance visit, please check pipe integrity and check filters prior to any power cycling of the Detector.

Commissioning check list

The following brief checklist allows quick setup of the Detector. This procedure will be adequate for most standard installations.

COMMISSIONING CHECK LIST

- ✓ Before powering up the detector, visually check all cabling to ensure correct connection. If wire identification is not immediately clear (e.g. by use of different coloured wires or wire identification sleeves) an electrical check should be made. Any damage caused by misconnection of the detector is not covered by warranty.
- ✓ Power up the unit and enter the engineering access code.
- ✓ Enter the Setup menu and verify that the time and date are correct.
- ✓ Set the appropriate alarm levels and time delays for the protected environment.
- ✓ Modify necessary settings in your application and exit program mode.
- ✓ Introduce smoke to every pipe end to make sure the maximum transport time is within specification. Typical maximum transport time per NFPA 72 is 120 seconds. Other transport time requirements should be considered and specified during the design stage.
- ✓ Perform any necessary smoke tests, like Hot Wire performance test or Potassium Chlorate / Lactose performance test, ensuring that the detector reacts appropriately, and let the smoke fully dissipate.

NOTE:

1. If the device is connected to SensisNet Management System (SMS), the date and time can be synchronized to the computer date and time. All the devices on the network can be synchronized by AMS at the same time.
2. Set the time delays temporarily to 0 second when testing the transport time is appropriate to eliminate the alarm delay time in counting the response time. However, the time delays should be set to their appropriate values after the tests.
3. The maximum transport time may be specified to 90 or 60 seconds when early warning or very early warning fire detection is required.



Filter maintenance and replacement

The Sensis Indigo CSD is a very low maintenance detection system. If required, external cleaning of the unit should be performed using a damp (not wet) cloth. Do not use solvents as these may mar the display bezel. The only part that may require field replacement during servicing is the inline dust filter (when this is installed and enabled in the menu). The inline filter condition can be checked from the Status Screen of the mini-display, which gives a percentage reading of filter efficiency and the filter expired due date. When the level drops to 70% or the date is due the detector will signal a Filter renew fault and the filter will need replacing.

When the replacement filter is fitted, enter the setup menu to set a new filter. When new filter is set, a filter flow calibration process will be initiated to learn the flow rate passing through the new filter. The filter due date will also be set to two years from the date of changing the filter.



Preventive maintenance

To guarantee the best performance of the Sensis aspirating detection system, a periodic preventive maintenance is required. The PM schedule is as follows:

CONTENT	MONTHLY	QUARTERLY	EVERY 6 MONTHS	EVERY YEAR	EVERY 2 YEARS
Power supply check	V	V	V	V	V
Display check	V	V	V	V	V
Air flow check	V	V	V	V	V
End cap test		V	V	V	V
Sampling pipes inspection			V	V	V
Signaling inspection				V	V
Clean sampling pipework					V

There are monthly, quarterly, half-yearly, annual, and biannual inspection schedules for the Sensis aspirating smoke detection systems. It is recommended that monthly inspection is done by the user and all the others are performed by competent, qualified engineers.

During inspections, check that there have been no unauthorised changes to the system configuration (e.g. Sensitivity). If changes are required or have taken place, then these must be documented.



Check the power supply (UPS)

- a. Check the DC input voltage using a meter to make sure the power is within normal range.

Check the device display

- a. Press the **Test** button (if enabled) to check if all the LEDs and the numerical display illuminate normally.

Check the air flow

- a. Use Sensis front panel display or SensisTool computer software to check and record the air flow readings.
- b. Compare the current reading to the previously recorded values to check for any significant change. Air flow reading during maintenance should be confirmed as $\pm 20\%$ of the values measured at commissioning.
- c. If there is a significant change in the air flow, inspect the sampling pipes for breakages or blockages.

End cap smoke test

- a. Introduce smoke to the pipe end.
- b. Check the response time is within specification (typically 120 seconds) and compare this to the values previously measured. Measurements of transport time from the furthest hole during maintenance should be confirmed to be within $\pm 15\%$ or ± 3 seconds, whichever is the greater, of the same measurement taken at commissioning.
- c. Inspect the pipework if there is significant change in the response time.

Sampling pipes inspection

- a. Check there are no obstructions affecting sampling pipework, sampling points or remote capillaries.
- b. Visually check that there is no pipe breakage or sampling point blockage.
- c. Check remote sampling points to make sure that capillary tubes are securely connected.

Signaling inspection

To verify the connections between the Aspirating Smoke Detection system and other connected systems (e.g. CIE, BMS);

- a. Activate the fire relays in the relay test menu or introduce smoke to put the detector into alarm to check if an alarm is generated on the fire alarm panel (if the detector is connected to the fire alarm system).
- b. Activate the fault relay in the relay test menu or put the detector into fault (e.g. pull out the sampling pipe to generate flow fault) to check if a fault is generated on the fire alarm panel, if it is connected to the fire alarm system.
- c. Shut down the main power supply. Check if the power supply backup output and its display function correctly. Check if there is a fault generated on the Sensis device if the mains or power fault monitoring GPI is connected. Check if there is a fault generated on the fire alarm panel and if the fault relay is connected to the fire alarm system.
- d. Disconnect the negative wire (black) of the power supply batteries. Check if the power supply and its display function correctly. Check if there is a fault indicated on the Sensis device, and if the battery or power fault GPI is connected.

Clean the sampling pipework

- a. The sampling point can be cleaned using a proper tool (e.g. a toothpick or sharp needle) to remove the dust build-up on the sampling hole.
- b. To clean the capillary tube, remove the tube from the pipe and use compressed air to blow the dust away.
- c. To clean the whole sampling pipework system, a pipe must be removed from the pipe inlet and a high air flow introduced by a compressor into the sampling pipe, to remove any dust particles found inside the pipework and/or within the sampling holes. Alternatively, for ease of maintenance, install a three-way valve upstream of the pipe inlet. During normal operation, ensure that the valve connects the detector pipe and the sampling pipe. Connect the compressor to the third inlet of the valve, so that the high air flow can be directed to the sampling pipe during maintenance. (Isolate the detector zone prior to pipe cleaning to prevent any nuisance alarms.)

NOTE: Do not introduce compressed air directly into the Sensis detector.