Data and Installation

S-Quad

Sensor, Sounder, Speech & Visual Alarm

Honeywell GENT

These instructions are for the S-Quad product range in white and black moulding. An S-Quad product integrates dual angle smoke, heat and carbon monoxide gas detection for fire detection with electronic sounder, speech and LED flasher (Visual Alarm Device - VAD) in one assembly.



LOSS PREVENTION CERTIFICATION BOARD LPCB

042xx/xx (LPCB numbers)

042bw/01 042bu/05
042bv/01 042ca/01
042bu/06 042ca/03
042bu/04 042ca/02
042bw/02 042ak/04
042bw/03 042bz/01
042bu/07 042bf/03
042bu/09 042ca/04
042bv/02 042bu/10
042an/04 042bd/01
042bu/08 042bf/01
042bf/02
042be/01
042ak/01

All LPCB approved Sensor STATES are listed in the S-Quad Description and commissioning information.

Information on minimum sound output levels to include polar dispersion is covered in a technical note TECH7018.033, available on request from manufacturer.

See section headed 'S-Quad (S4) Coverage' in part 2 of this document for data on Visual Alarm Devices coverage.

Technical Data

Operating voltage		35V - 48V
Weight		Sensor head only 110g (with Standard base - 170g) (Standard Base with IP21 plate 230g)
Dimensions		Sensor head: 117mm diameter by 49.6mm height (With Base the height increases to 63.8mm) (With base and IP 21 Plate - 140mm diameter by 52mm height)
IP rating		IP21C when Base is mounted on an IP21 plate
Enclosure		ABS
Colour	White Black	RAL 9010 Black (as material colour ABS HF380 Black)
Approval		LPCB approved
Storage Temperature		-20°C to +70°C (for S-Quad with CO it is -20°C to +50°C)
Ambient operating temperature		-10°C to +50°C
Relative Humidity		95% non condensing (+5°C to +45°C)
Heat (H)		EN54-5:2017+A1:2018 A2
Optical (O)		EN54-7:2018 ~
Dual Optical (O²)		EN54-7:2018 ~
Sounder (S)		EN54-3 : 2001, A1:2002, A2:2006 ~ ~ A2-2006 is not applicable for S4-770, S4-720, S4-715, S4-710 and S4-711
Visual Alarm Device (VAD)		EN54-23 : 2010
EN54-18 : 2005 - Input/Output devices		
EN54-17 : 2005 - Short circuit isolator (section 4.8) data	Vmax 48 V Vnom 40 V Vmin 35 V Vso max 16 V Vso min 8 V	IC max 0.8 A IS max 1.25 A IL max 50 uA Zc max 0.13 Ω

Symbols on product

⏚	Protective Earth connection terminal.
	The WEEE symbol. It indicates the product is to be recycled and not thrown away.
CE	The CE compliance logo. This product is in conformity with the relevant European Union harmonisation legislation.
RoHS	The RoHS compliance logo. The RoHS directive restricts the use of certain hazardous substances commonly used in electronic and electronic equipment.

Product range

Part number	Description	Markings
S4-720	S4 Heat Sensor	H
S4-715 #	S4 Optical Sensor#	O #
S4-710	S4 Optical Heat Sensor	OH
S4-770	S4 Optical Heat Sensor & Sounder	OH/S
S4-711	S4 Dual Optical Heat Sensor	O^2H
S4BK-711	Black S4 Dual Optical Heat Sensor	O^2H
S4BK-711-V	Black S4 Dual Optical Heat & Voice Sounder	O^2H/V
S4-711-VAD-HPR	S4 Dual Optical Heat Sesnor & Red VAD (HP)	$O^2H/RVAD/HP$
S4-720-V-VAD-HPR	S4 Heat Sensor, Voice Sounder and Red VAD (HP)	H/V/RVAD/HP
S4-711-V-VAD-HPR	S4 Dual Optical Heat Sensor, Voice Sounder & Red VAD (HP)	$O^2H/V/RVAD/HP$
S4-911-V-VAD-HPR	S4 Dual Optical Heat CO Sensor, Voice Sounder & Red VAD (HP)	$O^2HCO/V/RVAD/HP$
S4-711-VAD-HPW	S4 Dual Optical & Heat Sensor & White VAD (HP)	$O^2H/WVAD/HP$
S4-711-VAD-LPW	S4 Dual Optical Heat Sensor & White VAD (LP)	$O^2H/WVAD/LP$
S4-711-V-VAD-LPW	S4 Dual Optical Heat Sensor, Voice Sounder & White VAD (LP)	$O^2H/V/WVAD/LP$
S4-711-V-VAD-LPR	S4 Dual Optical Heat Sensor, Voice Sounder & Red VAD (LP)	$O^2H/V/WVAD/LP$
S4BK-711-V-VAD-HPR	Black S4 Dual Optical Heat Sesnor, Voice Sounder & Red VAD (HP)	O2H/V/WVAD/HP
S4-711-V-VAD-HPW	S4 Dual Optical & Heat Sensor, Voice Sounder & White VAD (HP)	O2H/V/WVAD/HP
S4-720-V-VAD-HPW	S4 Heat Sensor, Voice Sounder & White VAD (HP)	H/V/WVAD/HP
S4-911-V-VAD-HPW	S4 Dual Optical Heat CO Sensor, Voice Sounder & White VAD (HP)	$O^2HCO/WVAD/HP$
S4-711-V	S4 Dual Optical Heat Sensor & Voice Sounder	O^2H/V
S4-770-S	S4 Optical Heat Sensor & Sounder	OH/S
S4-771-S	S4 Dual Optical Heat Sensor & Sounder	O^2H/S
S4-780-S	S4 Heat Sensor & Sounder	H/S
S4-901	S4 Dual Optical Heat CO Sensor	O^2HCO

This Optical Sensor is used in the Duct sensor.

Associated products

S4-700	Base (for all S4 Sensors)
S4-705	IP21 Plate (5 pack)
S4-701	IP21 Base (includes IP21 Plate)
S4BK-700	Black Base for Black S-Quad
S4BK-705	Black IP21 plate (5 per pack)
805589	Sensor dust cover (50 pack)
805580	Removal tool kit (supplied with Dust Cover Remover part)
805576	Label plate (10 pack)

Siting

A S-Quad device plugs into a dedicated Base that is installed in the protected premises. The Bases should be sited in locations as defined by the project plans and by BS5839 : Part 1 : 2017 and VAD coverage defined in EN54 Part 23 .

Do's and Don't

Follow recommendations detailed in section 22 relate to automatic fire detectors and section 16 relate to alarm sounders in BS5839 : Part 1 : 2017.

DO locate Visual Alarm Devices in accordance with Loss Prevention Council Code of Practice CoP 0001. http://www.redbooklive.com/lps.jsp

DO NOT locate smoke detectors where products of combustion may be present such as in kitchens, garages, furnace rooms, welding shops etc.

DO NOT locate heat detectors above boilers or heaters or where the temperature is normally very high or liable to sudden fluctuations.

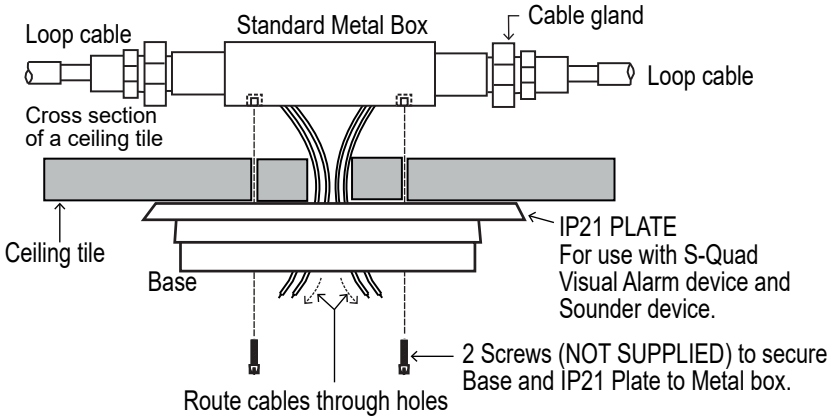
DO NOT locate smoke or heat detectors: -
- **In dusty or dirty environment**
- **Near heating or air-conditioning grilles**
- **Outdoors in stables, sheds etc**
- **In excessively damp areas**
- **In dead air spaces at the junctions of ceilings and walls**
- **At ceiling locations where a 'thermal barrier' may exist.**

DO NOT locate a CO detector: -
- **In buildings where farm animals are kept**
- **In excessive damp areas**
- **In battery room where non sealed batteries are kept**
- **In a Car park where exhaust fumes will be present.**

Mounting

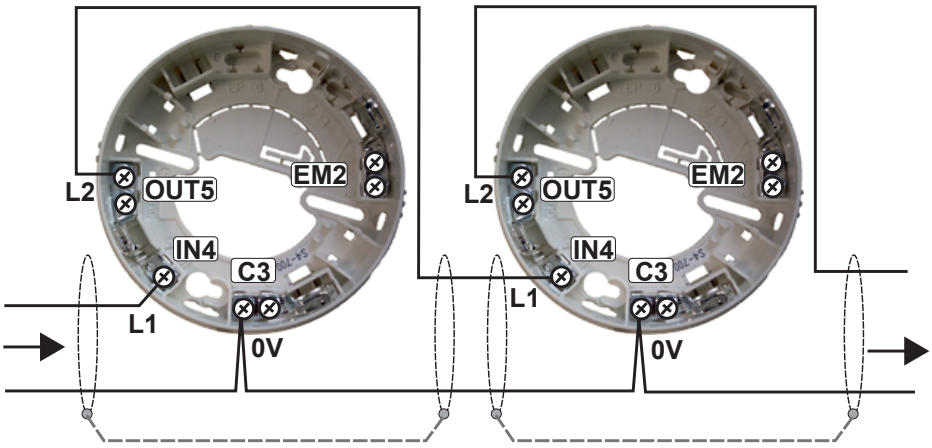
Metal back box

A metal back box must be used for base mounting. The earth continuity must be maintained throughout the whole loop circuit. The earth must be securely connected to the back box.



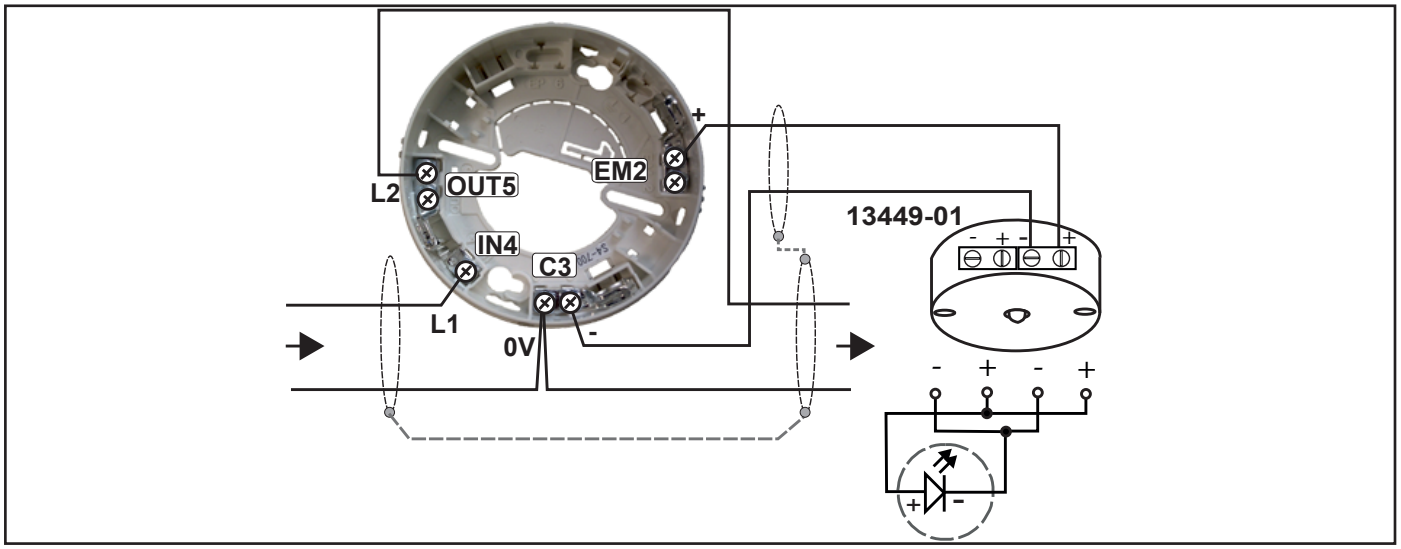
Wiring

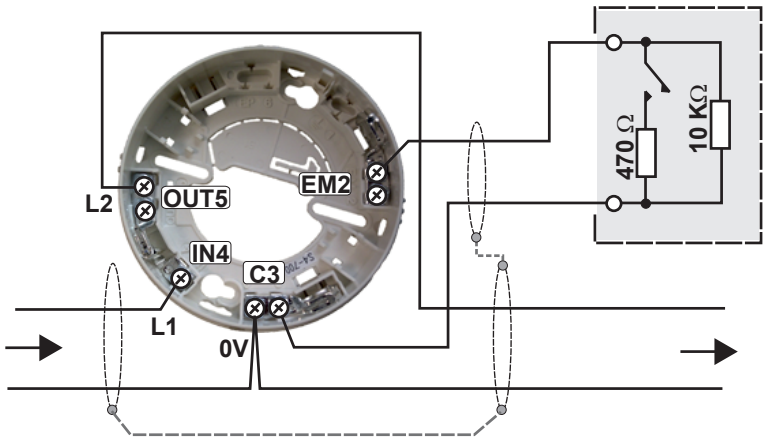
In - Out wiring to bases



Programmable input/output

All S-Quad devices can be configured as either monitored input or unmonitored output. The factory setting of the programmable input / output is unmonitored output, to drive an external repeat LED without a series resistor. There is a maximum cable length limit of 15 metres from the base to the external I/O Unit.





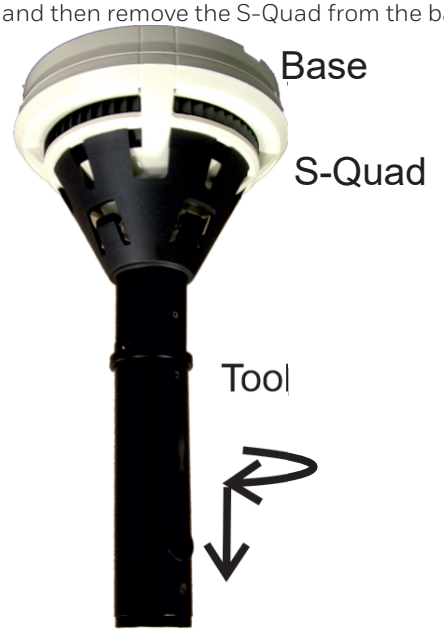
The input can accept signals such as fire, non fire or fault, these are configured during commissioning. As a fire input it is possible to connect a conventional Manual Call Point (non UK application only) with a series resistor of value 470 Ohms coupled with an end-of-line 10Kohms resistor. In this case the fire input is fully monitored for open or short circuit faults. The input can be setup as a non-fire or fault input using a similar arrangement with series and parallel resistors as shown. It is possible for such an input to trigger a command that is configured to action an output elsewhere in the system to control plant equipment such as the ventilation system.

Tools

An extractor tool allows removal and fitting of the S-Quad device head into the base. By fitting a screw-on adaptor, the tool can be used to remove the sensor dust cover.

To remove the S-Quad

Fit the tool onto the S-Quad. Turn S-Quad anticlockwise until it stops and then remove the S-Quad from the base.



To fit an S-Quad

Fit the S-Quad on to the tool. Offer S-Quad to base and rotate clockwise until it moves upwards on to the base and rotate it again until it clicks and goes no further, the lines on the base and S-Quad will align.



To fit the dust cover using tool

Place the dust cover onto the tool inside the cradle. Offer the cover to the S-Quad, locate and push to fit it onto the assembly. Withdraw the tool when the dust cover is in place.



To remove the dust cover using tool

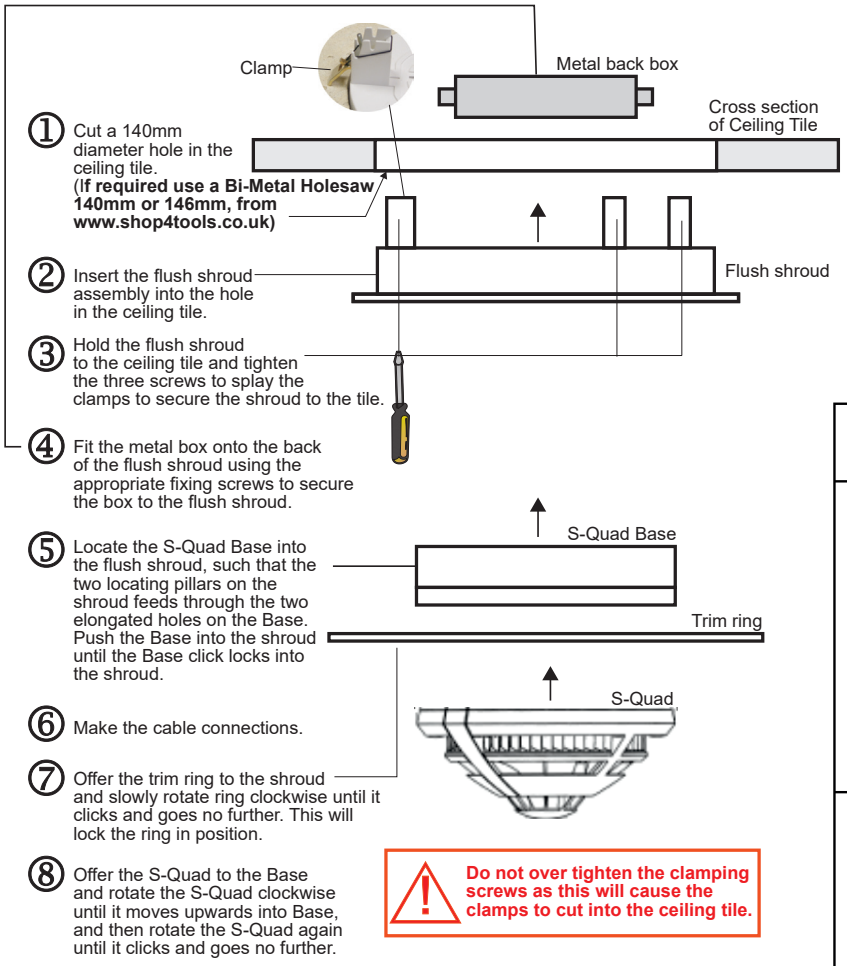
A dust cover remover tool must be fitted to the main tool to extract the dust cover. Press the pad of the dust cover remover tool onto the dust cover, this creates an air tight grip, to allow the cover to be pulled off from the S-Quad.



Semi-flush fixing kit (S-Quad)

Semi Flush fixing is only applicable for White body S-Quad range.
An S-Quad device in white device can be semi-flush mounted to a ceiling tile to an approximate depth of 20mm, which is slightly deeper than the base assembly. To semi-flush mount a special housing must be used, which consists of a main assembly and a trim ring.





1. Cut a 140mm diameter hole in the ceiling tile. (**If required use a Bi-Metal Holesaw 140mm or 146mm, from www.shop4tools.co.uk)**
2. Insert the flush shroud assembly into the hole in the ceiling tile.
3. Hold the flush shroud to the ceiling tile and tighten the three screws to splay the clamps to secure the shroud to the tile.
4. Fit the metal box onto the back of the flush shroud using the appropriate fixing screws to secure the box to the flush shroud.
5. Locate the S-Quad Base into the flush shroud, such that the two locating pillars on the shroud feeds through the two elongated holes on the Base. Push the Base into the shroud until the Base click locks into the shroud.
6. Make the cable connections.
7. Offer the trim ring to the shroud and slowly rotate ring clockwise until it clicks and goes no further. This will lock the ring in position.
8. Offer the S-Quad to the Base and rotate the S-Quad clockwise until it moves upwards into Base, and then rotate the S-Quad again until it clicks and goes no further.

Do not over tighten the clamping screws as this will cause the clamps to cut into the ceiling tile.

Technical data

Weight	164g with trim ring
Dimensions	174mm diameter by 50mm depth
Enclosure	ABS
Colour	RAL 9010
Storage Temperature	-20°C to +70°C
Ambient temperature	-10°C to +50°C
Relative Humidity	95% non condensing (+5°C to +45°C)

CE
2831

Gent by Honeywell
Manufactured by: Honeywell Life Safety Systems-Romania
Street: Str. Salcamilor 2 bis- Lugoj
13

DoP	Product No.	DoP	Product No.
001-CPR-2013	S4-715	071-CPR-2013	S4-711-V-VAD-HPR
001-CPR-2013	S4-710	125-CPR-2015	S4BK-711-V-VAD-HPR
001-CPR-2013	S4-720	071-CPR-2013	S4-711-V-VAD-LPW
001-CPR-2013	S4-711	107 -CPR-2014	S4-711-V-VAD-LPR
001-CPR-2013	S4-770	071-CPR-2013	S4-711-V-VAD-HPW
123-CPR-2015	S4BK-711	071-CPR-2013	S4-711-V
070-CPR-2013	S4-711-VAD-HPR	124-CPR-2015	S4BK-711-V
071-CPR-2013	S4-711-VAD-LPW	073-CPR-2013	S4-911-V-VAD-HPR
070-CPR-2013	S4-711-VAD-HPW	073-CPR-2013	S4-911-V-VAD-HPW
072-CPR-2013	S4-720-V-VAD-HPR	075-CPR-2013	S4-771-S
072-CPR-2013	S4-720-V-VAD-HPW	077-CPR-2013	S4-901
074-CPR-2013	S4-770-S		
076-CPR-2013	S4-780-S		

EN54-3:2001, A1:2002, A2:2006, EN54-5:2017+A1:2018 A2
EN54-7:2018, EN54-17:2005, EN54-18:2005 EN54-23: 2012

S4-715 (EN54-7, 17 & 18)
S4-710 (EN54-5, 7, 17 & 18)
S4-720 (EN54-5, 17 & 18)
S4-711 (EN54-5, 7, 17 & 18)
S4-770 (EN54-5, 7, 17 & 18)
S4BK-711 (EN54-5, 7, 17 & 18)
S4BK-711-V (EN54-3, 5, 7, 17 & 18)
S4-711-VAD-HPR (EN54-5,7,17,18 & 23)
S4-711-VAD-HPW (E54-5, 7, 17, 18 & 23)
S4-711-VAD-LPW (E54-5, 7,17,18 & 23)
S4-711-V-VAD-HPR (EN54-3, 5, 7, 17, 18 & 23)
S4BK-711-V-VAD-HPR (EN54-3, 5, 7, 17, 18 & 23)
S4-711-V-VAD-LPW (EN54-3, 5, 7, 17, 18 & 23)
S4-711-V-VAD-LPR (EN54-3, 5, 7, 17, 18 & 23)
S4-711-V-VAD-HPW (EN54-3, 5, 7, 17, 18 & 23)
S4-711-V (EN54,5,7,17 & 18)
S4-720-V-VAD-HPR (EN54-3, 5, 17, 18 & 23)
S4-720-V-VAD-HPW (EN54-3, 5, 17, 18 & 23)
S4-911-V-VAD-HPR (EN54-3, 5, 7, 17, 18 & 23)
S4-911-V-VAD-HPW (EN54-3, 5, 7, 17, 18 & 23)
S4-770-S (EN-54-3, 5, 7, 17 & 18)
S4-771-S (EN54-3, 5, 7, 17 & 18)
S4-780-S (EN54-3, 5, 17 & 18)
S4-901 (EN54-5, 7, 17 & 18)

Intended for use in fire detection and fire alarm systems in and around buildings
Refer to DoP 070-CPR-2013 to 077-CPR-2013, and DoP 107 -CPR-2014 and DoP 001-CPR-2013 and 017-CPR-2013, and DoP 123-CPR-2015, 124-CPR-2015 and 125-CPR-2015 for level or class of performance declared, for details see website www.gent.co.uk

At the end of their useful life, the packaging, product and batteries should be disposed of via a suitable recycling centre and in accordance with national or local legislation.

WEEE Directive:
At the end of their useful life, the packaging, product and batteries should be disposed of via a suitable recycling centre.
Do not dispose of with your normal household waste.
Do not burn.

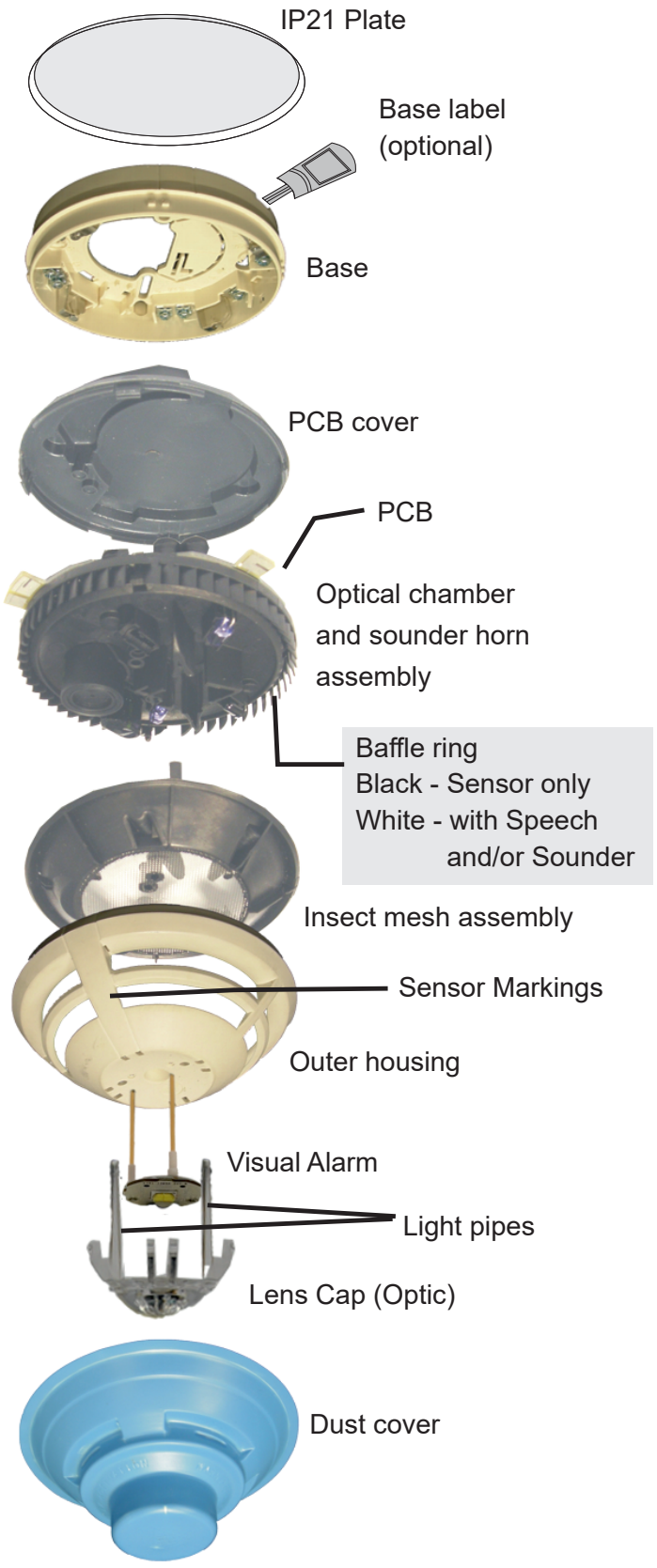
Honeywell Gent reserves the right to revise this publication from time to time and make changes to the content hereof without obligation to notify any person of such revisions of changes.

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Tech. Support: www.gentexpert.co.uk

S-Quad

Sensor, Sounder, Speech & Visual Alarm

Description



Base

The base has terminals for external cables to allow it to be electrically connected to the panel loop circuit and to the monitored input or output circuit. Any S-Quad device can be plugged into a S-Quad base.

Base with IP21 Plate

The 'Base' requires a 'IP21 plate' to prevent water damage from dripping water from the ceiling.

The 'Base' with 'IP21 Plate' must be used with Visual Alarm and Sounder Alarm S-Quad devices to meet Standards.
Failure to use 'Base' with 'IP21 Plate' will contravene the requirements of the Standards.

Base labels

An optional label (Part No: 805576) can be fitted to the base. The label can be marked up with device location information.

Lock

Refer to the instructions supplied with the Base for instructions on how to lock the Sensor to Base.

Indicators

The S-Quad has a red LED that gives an indication in the event of a fire. The LED can be configured to flash periodically, as an 'in operation' confirmation, this indication is given system-wide at all S-Quads. The S-Quad with a CO sensor also has a blue LED to indicate when a fire signal senses the presence of CO.

Dust Cover

A dust cover is supplied with the S-Quad, to prevent dust from building work contaminating the sensor. The cover is removed prior to the commissioning of the fire alarm system.

Monitoring

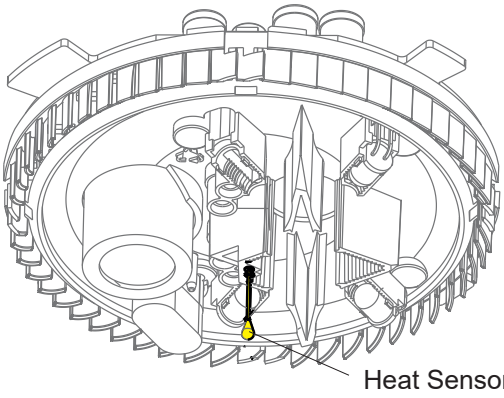
Under normal conditions the S-Quad devices are monitored regularly and the data is used to create a background performance record. When there is a potential event, the S-Quad device will flag the control panel for attention. The control panel will take further readings from the device and compare all the measurements with patterns and rules to determine if it is a fire event.

Device functionality

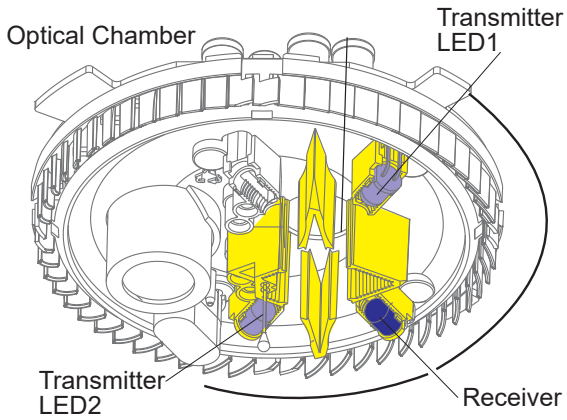
All S-Quad devices are monitored periodically to check if they are working correctly, an indication of a fault is given if there is a failure. For example the infrared signals through the optical chamber are regularly checked, the thermistor is checked and the CO cell circuit is monitored for failure. The speech, VAD and sounder circuits are monitored for failure.

Heat sensor (H)

The heat sensing is provided by a thermistor. The temperature at which the device goes into fire is defined by the configuration settings in the control panel. The control panel also calculates any rate of rise elements required in the fire decision.



Optical sensors



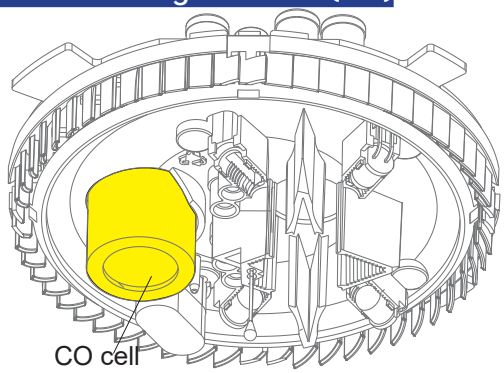
Dual Optical Sensor

The optical sensing is performed by the dual angle optical chamber, which has two transmitting LED1 and LED2, plus an infrared receiver. Normally measurements are taken at regular intervals at both angles of the chamber. The panel uses both readings to form a ratio. The ratio is used to compensate the optical sensor, producing a very flat response to different fire types. There are distinct bands of ratios that define the presence of types of smoke, dust or steam. The dual optical sensor is therefore able to discriminate between certain aerosol in the environment. Additionally to stop the sensor saturating with large false alarm signals the sensor incorporates an extended dynamic range. The sensor is therefore suitable for use in wider applications where steam and dust particles may occasionally be present.

Single Optical Sensor

The optical sensing is performed in the optical chamber using transmitting LED 1 and an infrared receiver. Measurements are taken at regular intervals. The control panel use these readings to detect the presence of smoke.

Carbon Monoxide gas sensor (CO)



The Carbon Monoxide (CO) sensing is provided by a CO cell. The CO cell will sense carbon monoxide gas that is generated from carbon based smouldering fires. The CO sensor is resilient to particles of dust, steam and insects. The CO gas sensing element is used with the heat and smoke sensors to give a capability of detecting a very wide range of fire types. The CO is always used with the heat and optical sensor to give a capability of detecting all EN54 : Part 7 fire tests.

The CO cell has a life expectancy of 5 to 7 years, after this period the sensor should be replaced.

Sounder (S)

The sounder function in a is designed to meet the requirement of EN54 : Part 3. The EN54 : Part 3 average output from the sounder is 85dBA at 1m or 75dBA at 3m at a bedhead, making it suitable for installation in hotel bedrooms. The sounder can operate a turbo mode if configured during commissioning to provide further 3dB output. The sound outputs are based on the settings of the FABs and SABs at the panel that gives changing levels over 2 seconds duration in 8 time slots. The standard outputs are synchronised with the 34000 sounders and S3 devices installed in the same system.
A piezo disk within the S-Quad assembly outputs the sound via a horn, which is constructed in the chamber moulding. The volume of the sound output can be individually set at the device, note that the sound level should not be set lower than 65dBA at 1m for standards compliance. The system prevents adjustment of volume down to zero. Another feature that can be configured is the soft start that ramps the sound volume gradually to the maximum level set at the device. The Sounder function is silently monitored for failure. An S-Quad device with a white baffle identifies it as having Sound functionality.

The Sound Pressure Level on axis at 90° will typically be 92dB(A).

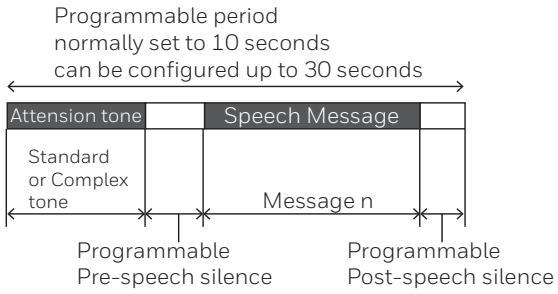
Tones

Signal 1* Intermittent tone 970Hz ±10% @ 1Hz
Signal 2* Alternating tone 730Hz ±10% / 970Hz ±10% @ 2Hz
Signal 3* High Tone (Continuous 970Hz ±10%)

The Signals marked with an * are LPCB approved.

Speech (Sp)

The S-Quad device Speech function is provided by stored messages on a flash memory chip within the assembly. The standard flash memory can hold up to 20 seconds of audio and additionally it holds local complex attention tones, such as the bell and DIN signals. Each signal output from an S-Quad Speech device consists of an attention tone followed by a message. The attention tone can be a local complex tone or a panel tone, such as the standard 'nee naw' sound. The Speech function is silently monitored for failure.



It is possible to reprogram factory set speech messages

There are four default messages in English plus a bell tone. However your system may carry special messages.

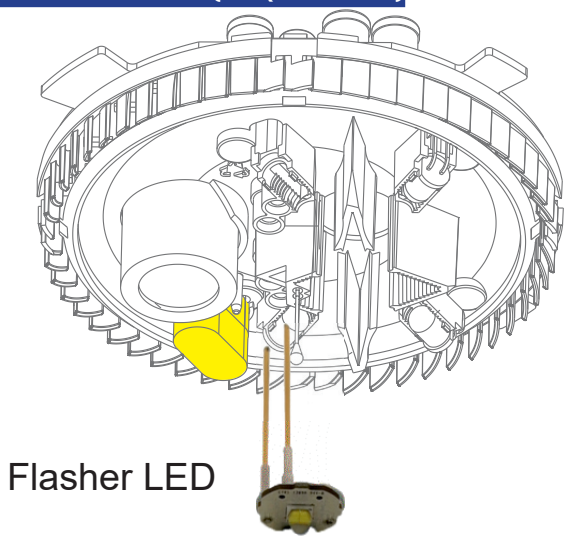
Messages

Default messages

Message 1	Bell tone	
Message 2	*Attention please this is an emergency please leave the building by the nearest available exit.* (female voice)	Signal 3
Message 3	***An incident has been reported in this building please await further instructions.*** (female voice)	Signal 1
Message 4	***This is a test message no action is required.*** (female voice)	Signal 0
Message 5 #	***This is a fire alarm please leave the building immediately by the nearest available exit.*** (male voice)	Signal 2

Approved to EN54-3 Annex C.

Visual Alarm Device (S-Quad VAD)

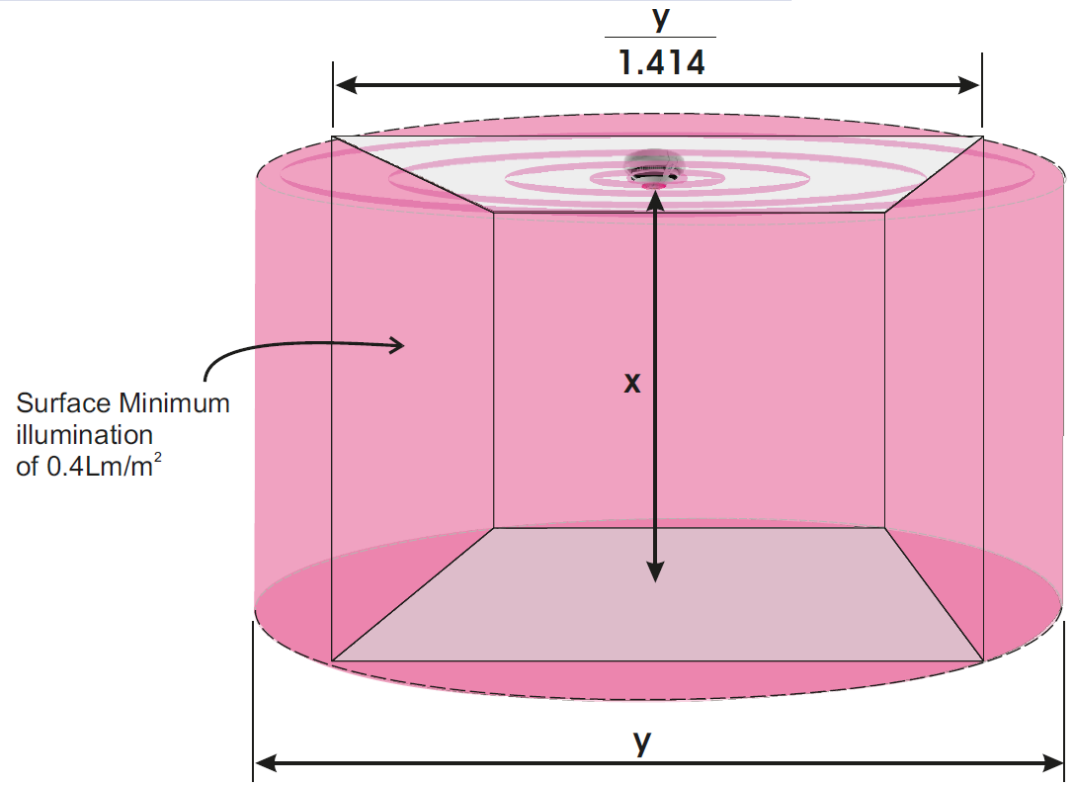


The Visual Alarm Device (VAD) utilises a high-power red / white LED that receives its power from a super capacitor in the S-Quad assembly. The high light output from the LED is made possible by the low impedance of the capacitor. The Visual Alarm is designed to meet requirements of EN54 Part 23 for installation on a ceiling. As factory set the Visual Alarm provides a pulsed output every 2s. The Visual Alarm is synchronised all S-Cubed VAD installed in the same system. The Equality Act 2010 recommends visual alarms S-Quad, are installed in protected premises to warn occupants who are hard of hearing.

It is possible to set the flash rate with commissioning tools to 1s,2s,or 4s but only the 2s rate is compliant with EN54-23.

‘C’ and ‘O’ Category Visual Alarm Coverage

What is ‘C’ Category (Ceiling-mounted) coverage volume



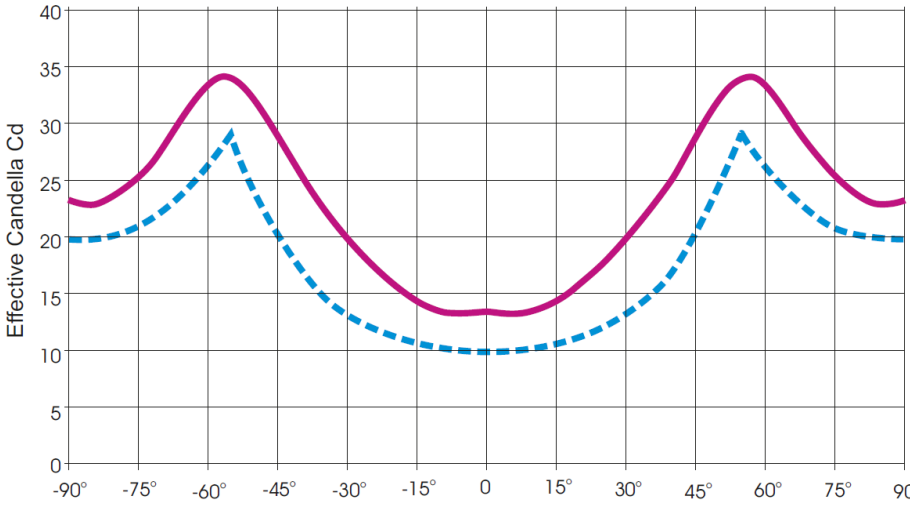
A ceiling-mounted Visual Alarm Device (VAD) covers a cylindrical volume with a minimum effective illuminance of 0.4 Lux.
The coverage volume is stated as:

C-x-y

- where C is the ceiling mounted category
- ‘x’ is the maximum mounting height in metres and
- ‘y’ is the maximum diameter in metres.

The ‘C’ category is currently restrictive and only allows mounting heights to be specified as 3, 6 or 9 metres.
This diagram shows how to relate the cylindrical volume to a square spacing volume.
Note the diameter ‘y’ is divided by 1.414.

Example
A C-3-14 could be mounted at 3m and have a square spacing of 9.9m; however the recommendations of CoP 0001 must be applied.



Typical plot that shows the performance of the White VAD on medium power setting

What is ‘O’ Category (Open category) coverage volume

The open ‘O’ category allows coverage volume to be specified, to remove the limitations on the mounting height of a ‘C’ category Visual Alarm Device (VAD). Gent by Honeywell ‘O’ category specification has exactly the same cylindrical shape, however the mounting height ‘x’ allows more flexibility, being specified between 3m and 6m.

All S-Quad VADs have a defined ‘C’ Category for each power setting and an ‘O’ category to allow it to meet the needs of building applications.

Example
An O-5-14 could be mounted at 5m and have a square spacing of 10m. It should become apparent why the enhanced mounting height may become critical when the recommendation of CoP 0001 are applied.

S-Quad (S4) Visual Alarm Coverage

High performance data of S-Quad White VAD (HPW)

Power setting	Maximum loop current and power for the VAD only	Maximum loop current and power for the sounder (minimum voltage)	Maximum total loop current and power for the VAD and sounder	EN54-23 coverage and volume in cubic metres		Additional EN54-23 Category 'O' coverage and volume in cubic metres	
High	16mA (560mW)	Turbo = 4.5mA (158mW)	20.5mA (718mW)	C-6-16	1206.3 m^3	None	
		Non-Turbo = 2mA (70mW)	18mA (630mW)				
Medium	11.5mA (403mW)	Turbo = 4.5mA (158mW)	16mA (560mW)	C-3-14	461.8 m^3	O-5-14	769.6 m^3
		Non-Turbo = 2mA (70mW)	13.5mA (473mW)				
Low	6mA (210mW)	Turbo = 4.5mA (158mW)	10.5mA (368mW)	C-3-10.8	274.8 m^3	O-4-10.8	366.4 m^3
		Non-Turbo = 2mA (70mW)	8mA (280mW)				

Note the above table show worst case performance data for S4 White VAD (high performance-HPW)

It is essential that the 'Battery Standby and Loop Load calculator' is used for system design.

Standard performance S-Quad White VAD (LPW and LPR)

Power setting	Maximum loop current and power for the VAD only	Maximum loop current and power for the sounder	Maximum total loop current and power for the VAD and sounder	EN54-23 coverage and volume in cubic metres		Additional EN54-23 Category 'O' coverage and volume in cubic metres
Low	6mA (210mW)	Turbo = 4.5mA (158mW)	10.5mA (368mW)	C-3-10	235.6 m^3	None
		Non-Turbo = 2mA (70mW)	8mA (280mW)			

Note the above table show worst case performance of the S4 White VAD (standard performance-LPW)

High performance of S-Quad Red VAD (HPR)

Power setting	Maximum loop current and power for the VAD only	Maximum loop current and power for the sounder (minimum voltage)	Maximum total loop current and power for the VAD and sounder	EN54-23 coverage and column in cubic metres		Additional EN54-23 Category 'O' coverage and volume in cubic metres	
High	16mA (560mW)	Turbo = 4.5mA (158mW)	20.5mA (718mW)	C-3-14	461.8 m3	O-4.5-14	692.7 m^3
		Non-Turbo = 2mA (70mW)	18mA (630mW)				
Medium	11.5mA (403mW)	Turbo = 4.5mA (158mW)	16mA (560mW)	C-3-13	398.1 m3	O-4-13	530.9 m^3
		Non-Turbo = 2mA (70mW)	13.5mA (473mW)				
Low	6mA (210mW)	Turbo = 4.5mA (158mW)	10.5mA (368mW)	C-3-10	235.6 m3	None	
		Non-Turbo = 2mA (70mW)	8mA (280mW)				

Note the above table show worst case performance of the S4 Red VAD (high performance-HPR).

CoP 0001 Coverage distance multiplication factors

The table below shows how the EN54-23 coverage specification will vary with the ambient light level and if the VAD can be viewed directly or indirectly i.e. if it relies on reflections to be viewed.

As S-Quad is a sensor and a VAD, then its placement must always be suitable for both fire detection and warning occupants of an emergency. The coverage of the VAD has been designed so that in most cases it can match the coverage of a particular sensor. It is however advisable to site the VAD so that direct viewing is possible to maximize the VAD coverage.

Ambient light level (Lux)	Ceiling mount direct viewing	Ceiling mount indirect viewing
<100	2.8	1.3
100-200	2.4	1.2
200-300	1.9	1
300-400	1.4	0.8
400-500	1.1	0.6
500-600	0.9	0.5
600-700	0.7	0.4
700-800	0.5	0.3

Example 1:
A S-Quad VAD is used in an open area with a rating of O-5-14. The location has an ambient light level of up to 480 Lux and it can be viewed directly. The sensor is a Optical-CO-Heat. The maximum mounting height is:
5 x 1.1 = 5.5m
It will have a maximum coverage diameter of:
14 x 1.1 = 15.4m (15m)
However as the Optical and CO sensor has a coverage diameter of 15m then this will limit the maximum VAD diameter to 15m.
The maximum square spacing will then be the same as a smoke or CO sensor:
15 x 1/1.414 = 10.6m

Example 2:
A S-Quad VAD is used in an open area with a maximum rating of C-6-16. The location has an ambient light level of up to 490 Lux and it can only be viewed indirectly. The sensor is a Heat-only. The maximum mounting height is:
6 x 0.6 = 3.6m
It will have a maximum coverage diameter of:
16 x 0.6 = 9.6m
In this case because the viewing is indirect and the ambient light level is quite high, then the VAD will limit the coverage diameter of the heat sensor from 10.6m to 9.6m.
The maximum square spacing will then also be limited by the VAD:
9.6 x 1/1.414 = 6.8m

Example 3:
A S-Quad VAD is used in a corridor that is 2m wide with a rating of C-3-10.8. The location has an ambient light level of up to 350 Lux and it can be viewed directly. The sensor is an optical-heat. The maximum mounting height is:
3 x 1.4 = 4.2m
It will have a maximum coverage diameter of:
10.8 x 1.4 = 15.1m (15m)
However the optical-heat sensor has a coverage diameter of 15m and this will limit the maximum VAD diameter to 15m.
The maximum spacing along the 2m corridor will then be the same as the optical-heat sensor:
15m

Compatibility

At the time of releasing this issue of data sheet the S-Quad devices were compatible for installation on the loop circuits of fire alarm system based on panels having the following Main Controller Card/Board (MCC / MCB) and Loop Processor Card (LPC) software.

VIGILON

≥ means greater than or equal to.	Vigilon 4 Loop	Vigilon Compact	Vigilon 1-6 Loop		BS panel Vigilon 4 Loop		
Card ->	MCC	MCB	MCC	LPC	MCC	LPC	**<- Card**
All **S-Quad** devices with VADs operate in 'Compliant mode', **meets EN54 Part 23**	≥ 4.52	≥ 4.52	≥ 4.52	≥ 4.48	≥ 3.90	≥ 3.90	
All **S-Quad** devices with VADs operate in 'Non Compliant mode', that is as Visual Indicator Devices (VIDs) meaning they DO NOT meet EN54 Part 23.	≥ 4.37	≥ 4.37	≥ 4.37	≥ 4.30	All S-Quad devices with VADs operate in 'Non Compliant mode', that is as Visual Indicator Devices (VIDs) meaning they DO NOT meet EN54 Part 23.		

A Vigilon System is configured using the Vigilon Commissioning Tool ≥ V1.30

NANO

All S-Cubed with VAD can be installed in a GENT Nano fire alarm system with panel card software stated below. The VADs will only operate at a Low Power setting to meet EN54 Part 23.

≥ means greater than or equal to.	Nano panel	
Card ->	MCB (Main Control Board)	LP (Loop Processor)
All S-Cubed Mark 3 with VAD devices	≥ 3.12	≥ 1.08

A Nano System is configured using the Nano Commissioning Tool ≥ V3.0

How to check card software version

The Master Control Board MCB and Master Control Card MCC are always Card 0. There can be up to 2 loop cards installed in a Vigilon Compact Panel in slots labelled Card 1 and Card 2 on the MCB.

There can be up to 4/6 loop cards installed in a EN54 Vigilon 4/6-loop panel. The loop cards are installed in slots labelled **Card 1 to Card 4/6** on the backplane.

a. Press the **MENU ON/OFF** button.

b. Press the F3 button to select **[Info]**.

c. To display a Device label: Press the F1 button to select **[Display].**

d. Press the F4 button to select **<etc>** until **[Status]** appears on the display.

e. Press the F2 button to select **[Status]**.

f. Press the F3 button to select **[Card].**

g. Enter the Card number: For MCC/MCB this is card 0 and for the Loop processor card LPC this can be card 1,2,3, 4, 5 or 6 dependent on panel type.

h. Press the F2 button to select **[Enter].** Notice the selected card status is displayed to include the software version number.

Support data for legacy sensor devices S4-720, S4-715, S4-710 and S4-711

≥ means greater than or equal to	BS panel Vigilon		EN panels Vigilon 4 Loop	Vigilon Compact	Vigilon Compact VA	Vigilon 4-6 Loop	
Card ->	MCC	LPC	MCC	MCB	MCB	MCC	LPC
S-Quad (introduction)	≥ 3.90	≥ 3.90	≥ 4.21	≥ 4.21			≥ 4.19
S-Quad	≥ 3.90	≥ 3.90	≥ 4.30	≥ 4.30	≥ 4.30	≥ 4.37	≥ 4.30
S-Quad supports S4-710	≥ 3.90	≥ 3.90	≥ 4.30	≥ 4.30	≥ 4.30	≥ 4.37	≥ 4.30
S-Quad supports STATE 2 & STATE 4 Optical	≥ 3.94	≥ 3.93	≥ 4.37	≥ 4.37	≥ 4.37	≥ 4.37	≥ 4.35
S-Quad supports STATE 7 heat	≥ 3.98	≥ 3.98	≥ 4.47	≥ 4.37	≥ 4.37	≥ 4.47	≥ 4.35

Approved S-Quad STATES

The STATE in which an S-Quad sensor operate can be changed from the default factory set STATE to another STATE configured during commissioning using the Vigilon Commissioning tool. The environment in which an S-Quad device is installed will determine what STATE is used.

Device	LPCB approved STATES	Meets ~ EN54-7 : 2018 * EN54-5:2017+A1:2018 A2
Dual Optical & Heat sensor variant - S4-711 and S4BK-711 (With VAD) S4-711-VAD-HPR, S4-711-VAD-HPW, S4-711-VAD-LPW, S4-711-V-VAD-LPW & S4-711-V-VAD-LPR (With Speech) S4-711-V and S4BK-711-V (With VAD & Speech) S4-711-V-VAD-HPR, S4BK-711-V-VAD-HPR S4-711-V-VAD-HPW (With Sounder) S4-771-S	STATE 0 #	Normal sensitivity optical smoke ~ / Class A1 heat *
	STATE 2	*Low sensitivity optical smoke* ◈ Class A1 heat *
	STATE 3	High sensitivity optical smoke ~ / Class A1 heat *
	STATE 4	Normal sensitivity (no spike) optical smoke ~ / Class A1 heat *
	STATE 5	Normal sensitivity optical smoke ~ / Class B heat *
	STATE 6	*Low sensitivity optical smoke* ◈ / Class BS heat *
	STATE 7	Normal sensitivity optical smoke ~ / Class A2S heat *
	STATE 8	Delayed normal sensitivity optical smoke ~ / Class A1 heat*
	STATE 11	*Low sensitivity optical smoke* ◈ Class B heat *
	STATE 12	Class A1 heat *
Dual Optical, Heat & CO sensor variant- S4-901 (With Speech & VAD) S4-911-V-VAD-HPR S4-911-V-VAD-HPW	STATE 0 #	Normal sensitivity optical smoke ~ / Class A1 heat * Normal sensitivity gas (CO)
	STATE 1	High sensitivity optical smoke ~ / Class A1 heat * High sensitivity gas (CO)
	STATE 2	Medium sensitivity optical smoke ~ / Class A1 heat * Low sensitivity gas (CO)
	STATE 4	Normal sensitivity (no spike) optical smoke ~ / Class A1 heat * Normal sensitivity gas (CO)
	STATE 6	Low sensitivity optical smoke ³ Class A1 heat * Normal sensitivity gas (CO)
	STATE 7	Normal sensitivity (no spike) optical smoke ~ / Class A2S heat * Normal sensitivity gas (CO)
	STATE 9	Class A1 heat * Normal sensitivity gas (CO)
	STATE 11	Normal sensitivity (no spike) optical smoke ~ / Class B heat *
	STATE 12	Class A1 heat *
Optical & Heat sensor variant - (With Sounder) S4-710 S4-770-S S4-770	STATE 0 #	Normal sensitivity optical smoke ~ / Class A1 heat*
	STATE 2	*Low sensitivity optical smoke* ◈ Class A1 heat*
	STATE 3	High sensitivity optical smoke ~ / Class A1 heat*
	STATE 4	Normal sensitivity (no spike) optical smoke ~ / Class A1 heat*
	STATE 5	Normal sensitivity optical smoke ~ / Class B heat*
	STATE 6	*Low sensitivity optical smoke* ◈ Class BS heat*
	STATE 7	Normal sensitivity optical smoke ~ / Class A2S heat*
	STATE 8	Normal sensitivity (delayed) optical smoke ~ / Class A1 heat*
	STATE 11	*Low sensitivity optical smoke* ◈ Class B heat*
	STATE 12	Class A1 heat*
Heat sensor variant - S4-720 (With Speech & VAD) S4-720-V-VAD-HPR S4-720-V-VAD-HPW (With Sounder) S4-780-S	STATE 0 #	Class A1 heat *
	STATE 5	Class B heat *
	STATE 6	Class BS heat *
	STATE 7	Class A2S heat *
	STATE 13	Class A2 heat *
Optical sensor - S4-715	STATE 0 #	Normal sensitivity optical smoke
	STATE 2	*Low sensitivity optical smoke* ◈
	STATE 3	High sensitivity optical smoke
	STATE 4	Normal sensitivity (no spike) optical smoke
	STATE 8	Medium sensitivity delayed optical smoke

- factory default settings. ◈ Low sensitivity optical smoke sensing is not approved but may still be useful in certain applications.

S-Quad Dual Optical Heat & Optical Heat sensor STATES

STATE	Definition / Class	Application in / Suitable for:	Sensitivity a-high- to-k-none
STATE 3	High sensitivity optical, Class A1 heat	Area where smoke, dust or steam occurs at times.	a
STATE 4	Normal sensitivity with no optical spike protection, Class A1 heat	General area as STATE 0 with less immunity to steam and dust for ease of testing using artificial smoke in normal operating mode, when test / commissioning mode is not active.	b
STATE 0#	Normal sensitivity optical, Class A1 heat	General area.	c
STATE 8	Delayed normal sensitivity optical, Class A1 heat	General application in area with transient steam, dust or smoke present.	d
STATE 7	Normal sensitivity optical, Class A2S heat	General application in area with low dust, smoke or steam present, for fixed temperature operation that is totally unaffected by transient temperature variation.	e
STATE 5	Normal sensitivity optical, Class B heat	Area having high ambient temperature with low dust, smoke or steam present.	f
STATE 2	*Low sensitivity optical smoke* ◈, Class A1 heat	Areas with moderate dust, smoke or heat during working hours when used with timing function.	g
STATE 11	*Low sensitivity optical smoke* ◈, Class B heat	Area having high ambient temperature, plus where moderate dust, smoke or steam present.	h
STATE 6	*Low sensitivity optical smoke* ◈, Class BS heat	Area having high ambient temperature that changes, plus moderate dust, smoke or steam present.	i
STATE 12	Class A1 heat only	Area where smoke, dust or steam occurs at times.	j
STATE 15	No detection		k

- factory default STATE. NOTE: All the Sensor STATES in the above table are LPCB approved to EN54-5 & EN54-7 with the exception of STATES 2, 6 and 11 which are only approved to EN54-5. ◈Low sensitivity optical smoke sensing is not approved but may still be useful in certain applications. The STATE 15 is no detection and is not part of LPCB approval.

S-Quad Dual Optical, Heat & CO sensor STATES

STATE	Definition / Class	Application in / Suitable for:	Sensitivity a-high- to-k-none
STATE 1	High sensitivity optical, Class A1 heat, high sensitivity gas	Clean area or environment where early detection is required with false alarm reduction.	a
STATE 4	Normal sensitivity optical, Class A1 heat, Normal sensitivity gas (CO)	General area as STATE 0 with less immunity to steam and dust for ease of testing using artificial smoke in normal operating mode, when test / commissioning mode is not active.	b
STATE 0#	Normal sensitivity optical, Class A1 heat, Normal sensitivity gas (CO)	General area where false alarm reduction is required for comprehensive fire detection.	c
STATE 7	Normal sensitivity optical, Class A2S heat, normal sensitivity gas (CO)	General area with moderate dust, smoke (tobacco) or steam, operates at a fixed temperature and is totally unaffected by transient temperature variation.	d
STATE 2	Normal sensitivity optical, Class A1 heat, low sensitivity gas (CO)	Applications with moderate dust, smoke (tobacco) or steam.	e
STATE 9	Normal sensitivity gas (CO), Class A1 heat	Area where high levels of smoke, dust or steam is often present.	f
STATE 11	Normal sensitivity optical, Class B heat	Area with high ambient temperature, plus moderate levels of dust, smoke or steam present.	g
STATE 6	Low sensitivity optical smoke ◈, Class B heat, normal sensitivity gas (CO)	Area with high ambient temperature, plus normal levels of dust, smoke or steam present.	h
STATE 12	Class A1 heat only	Area where smoke, dust, steam or gas occurs at times.	i
STATE 15	No detection		j

- factory default STATE. NOTE: All the Sensor STATES in the above table are LPCB approved to EN54-5 & EN54-7 with the exception of STATE 6 which is only approved to EN54-5. ◈ Low sensitivity optical smoke sensing is not approved but may still be useful in certain applications. The STATE 15 is no detection and is not part of LPCB approval.

S-Quad Heat sensor STATES

STATE	Definition / Class	Application in / Suitable for:	Sensitivity a-high- to-k-none
STATE 0#	Class A1 heat	Area having high levels of smoke, dust or steam.	a
STATE 13	Class A2 heat	Area where there is moderate temperature changes plus dust, smoke or steam present.	b
STATE 7	Class A2S heat	Area where fixed temperature operation is required, but is totally unaffected by transient temperature variations.	c
STATE 5	High temperature Class B heat	Area having high ambient temperature plus dust, smoke or steam present.	d
STATE 6	High temperature Class BS heat - with no rate of rise component	Area where there is rapid temperature changes plus dust, smoke or steam present.	e
STATE 15	No detection		f

- factory default STATE. NOTE: All the Sensor STATES in the above table are LPCB approved to EN54-5 & EN54-7. The STATE 15 is no detection and is not part of LPCB approval.

S-Quad Optical sensor STATES

STATE	Definition / Class	Application in / Suitable for:	Sensitivity a-high- to-k-none
STATE 3	High sensitivity optical	Clean area or environment where early detection is required.	a
STATE 4	Normal sensitivity with no spike protection	General area as STATE 0 with less immunity to steam and dust to facilitate witness test.	b
STATE 0#	Normal sensitivity optical	General area.	c
STATE 8	Delayed normal sensitivity optical	General area with transient steam, dust or smoke present.	d
STATE 2	Low sensitivity optical smoke ◈	Area with moderate dust, smoke or steam present.	e
STATE 15	No detection		f

- factory default STATE. NOTE: All the sensor STATES in the above table are LPCB approved to EN54-7 with the exception of STATE 2. ◈ Low sensitivity optical smoke sensing is not approved but may still be useful in certain applications. The STATE 15 is no detection and is not part of LPCB approval.

S-Quad Status

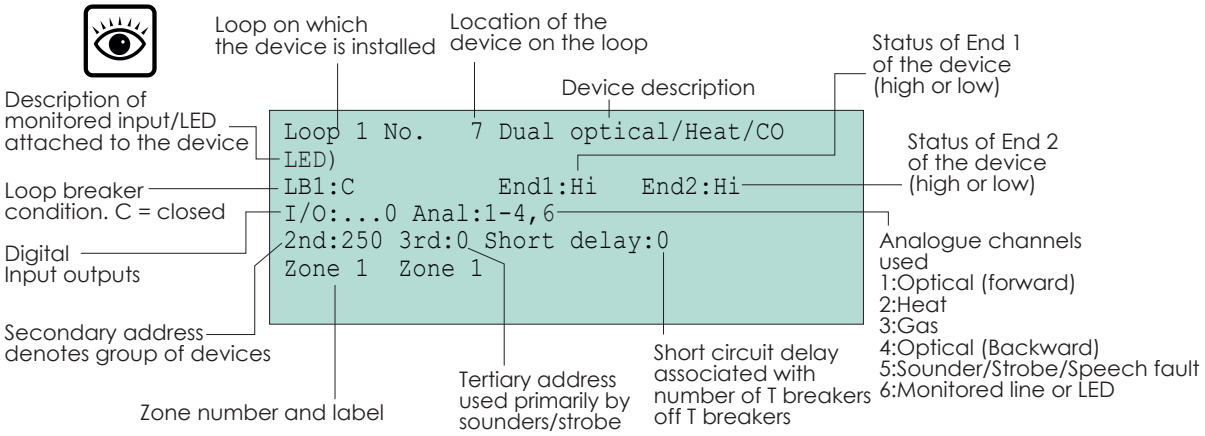
To view the status of an S-Quad device following the allocation of the loop circuit on which it is installed

a. Press Menu On/Off button.

b. Select [Info], momentarily press <etc> to select [Status]

c. Select [Device] and enter a device number

d. Select [Loop] and enter the loop number and then [Enter] to view device status information.



Part No	Product	Digital I/O				Analogue Channels
S4-720	Heat Sensor	.	.	.	O	2
S4-715	Optical Sensor	.	.	.	O	1
S4-710	Optical & Heat Sensor	.	.	.	O	1, 2
S4-770	S4 OH / Sounder	.	O	O	O	1, 2, 5
S4-711 & S4BK-711	Dual Optical & Heat Sensor Black Dual Optical & Heat Sensor	.	.	.	O	1, 2, 4
S4-711-VAD-HR	S4 Dual OH / Red VAD (HP)	O	.	.	O	1, 2, 4, 5
S4-720-V-VAD-HPR	S4 Heat / Voice Sndr. / Red VAD (HP)	O	O	O	O	2, 5
S4-711-V-VAD-HPR & S4BK-711-V-VAD-HPR	S4 Dual OH / Voice Sndr. / Red VAD (HP) Black S4 Dual OH / Voice Sndr. / Red VAD (HP)	O	O	O	O	1, 2, 4, 5
S4-911-V-VAD-HPR	S4 Dual OHCO / Voice Sndr. / Red VAD (HP)	O	O	O	O	1, 2, 3, 4, 5
S4-711-VAD-LPW	S4 Dual OH / White VAD (LP)	O	.	.	O	1, 2, 4, 5
S4-711-VAD-HPW	S4 Dual OH / White VAD (HP)	O	.	.	O	1, 2, 4, 5
S4-711-V-VAD-LPW	S4 Dual OH / Voice Sndr. / White VAD (LP)	O	O	O	O	1, 2, 4, 5
S4-711-V-VAD-LPR	S4 Dual OH / Voice Sndr. / Red VAD (LP)	O	O	O	O	1, 2, 4, 5
S4-711-V-VAD-HPW	S4 Dual OH / Voice Sndr. / White VAD (HP)	O	O	O	O	1, 2, 4, 5
S4-720-V-VAD-HPW	S4 Heat / Voice Sndr. / White VAD (HP)	O	O	O	O	2, 5
S4-911-V-VAD-HPW	S4 Dual OHCO / Voice Sndr. / White VAD (HP)	O	O	O	O	1, 2, 3, 4, 5
S4-711-V & S4BK-711-V	S4 Dual OH / Voice Sounder Black S4 Dual OH / Voice Sounder	.	O	O	O	1, 2, 4, 5
S4-770-S	S4 OH / Sounder	.	O	O	O	1, 2, 5
S4-771-S	S4 Dual OH / Sounder	.	O	O	O	1, 2, 4, 5
S4-780-S	S4 Heat / Sounder	.	O	O	O	2, 5
S4-901	S4 Dual OH CO	.	.	.	O	1, 2, 3, 4, 5
	+ Monitored input / + Monitored output					6
		- = Unconnected O = Output				

Analogue Channel 1 is forward scatter optical smoke sensor
Analogue Channel 2 is heat sensor
Analogue Channel 3 is for CO gas sensor
Analogue Channel 4 is for backward scatter optical smoke sensor
Analogue Channel 5 reports sounder / VAD / speech faults to the control panel
Analogue Channel 6 reports monitored input/monitored output faults/operation to the control panel.
The correct device type may not be displayed if the loop circuit has allocation faults.

S-Quad Exceptions or Condition codes

The Exception codes are also sometimes called condition codes and these codes provide information about a sensor device. A code indicates small changes in the:

- environmental condition
- sensor mechanism and
- how the sensor performs in the system.

To ensure that the sensor exception codes are meaningful, after power up the system should be left undisturbed for at least 24 hours.

Definition

There are ten different conditions possible for each sensor type, although not all of them are defined. Each condition code has a range of 0-3,

Exception/ Condition Code	Meaning
0	This condition is OK. This code is not displayed unless another non zero code exists.
1 or 2	Suggest preventive maintenance is required, where necessary, to avoid possible false alarms.
3	The sensor is faulty. A fault condition indication is given at the control panel. A message reading 'Sensor Out of Specification' is displayed.

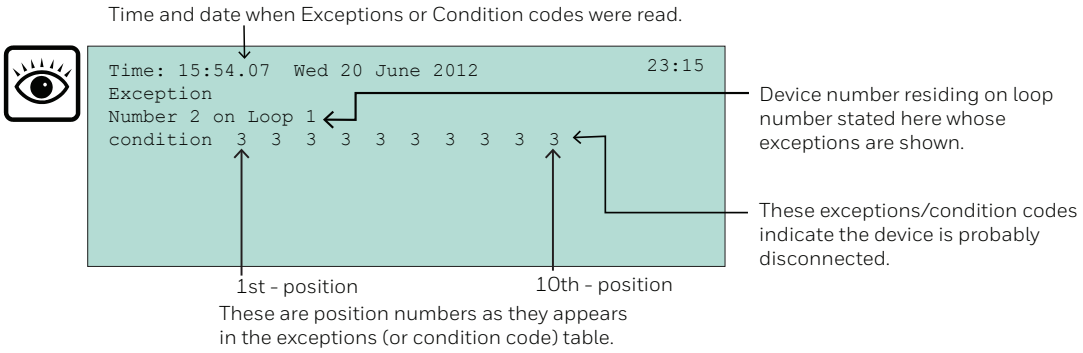
A sensor having code 3 is automatically disabled by the system to prevent false alarms.

To view the exceptions/condition codes of a device/outstation:

a. Press Menu On/Off button

b. Select [Info] and press <etc> to select [Event]

c. Press <etc> and select [Exception] and then select [Enter].



How to interpret Exception Codes

Exceptions /Condition codes	Meaning	Action
1 0 0 0 0 0 0 0 0 0 or 0 1 0 0 0 0 0 0 0 0 or 1 1 0 0 0 0 0 0 0 0	This is the sub-fire band and if set should be taken as showing that the sensor is at its optimum sensitivity for its location.	No action need be taken.
2 0 0 0 0 0 0 0 0 0 or 0 2 0 0 0 0 0 0 0 0 or 2 2 0 0 0 0 0 0 0 0	A sub-fire has been generated which would suggest that the sensor was either too sensitive for its environment or that the sensor type may be incorrect for the location.	Action should be to check location and alter sensor state or type as required. The customer should be made fully aware of this change. Remember to backup all changes of states onto the NVM.
0 0 1 0 0 0 0 0 0 0 or 0 0 2 0 0 0 0 0 0 0	These codes indicate that the sensor is in a windy location. This will cause the chamber voltage to drop. Code Level 1 shows one drop only, Level 2 shows greater than one drop.	The location should be checked and a change in siting made, if required. Note: Wind will not cause the sensor to false alarm.
0 0 0 0 1 0 0 0 0 0 or 0 0 0 0 2 0 0 0 0 0 or 0 0 0 0 0 1 0 0 0 0 or 0 0 0 0 0 2 0 0 0 0	This shows that the sensor time averages are close to acceptable limits.	On commissioning the sensor should be replaced. A sensor with code 2 is worse than code 1. On maintenance sensors with code 2 should be replaced.
0 0 0 0 0 0 1 0 0 0 or 0 0 0 0 0 0 2 0 0 0 or 0 0 0 0 0 0 0 1 0 0 or 0 0 0 0 0 0 0 2 0 0	This shows sensor hardware faults. 1 for code 1 and more than one for a code 2.	The sensor should be replaced.
0 0 0 0 0 0 0 0 1 0 or 0 0 0 0 0 0 0 0 2 0	This shows sensor hardware faults. 1 for code 1 and more than one for a code 2.	The sensor should be replaced.
0 0 0 0 0 0 0 0 0 1 or 0 0 0 0 0 0 0 0 0 2	This shows that transmission faults are being noted. Code 2 is worse than code 1.	The sensor should be replaced. If it reoccurs then check the environment.

How to clear Exception codes

This can be done by removal and replacement of the sensor chamber, by re-allocation of the loop having the sensor or by using the menu controls.

a. Press Menu On/Off button.

b. Select [Test/Eng] and then [Usercode].

c. Select <etc> to display and select [Config].

d. Select [Clear] and then select [Exception] and [Enter].

All cleared codes will return if the conditions are still true.

Exception (or Condition) Codes for S-Quad devices

Gen type	Pos. No.	Description	Exception codes			
			Normal band 0	Sub fault band 1	2	Fault band 3
ENVIRONMENT	1	Optical subfire	None	Small signal sensed [Check location, STATE & type]	Subfire [Check location, STATE & type]	
	2	Heat subfire	None	Small signal sensed [Check location, STATE & type]	Subfire [Check location, STATE & type]	
	3	Gas subfire		Small signal sensed [Check location, STATE & type]	Subfire [Check location, STATE & type]	
	4					
SENSOR	5	Optical/Gas channel drift or out of range	OK		Close to acceptable limit	Out of limits [Clean/replace]
	6	Heat channel drift or out of range	OK			Out of limits [Clean/replace]
	7	Optical/Gas channel noisy (High freq)	OK	Single HF noise event detected	Multiple HF noise seen (Check location and report)	
	8	Heat channel noisy (High frequency)	OK	Single HF noise event detected	Multiple HF noise seen (check location and report)	
DEVICE	9	device firmware	OK	Isolated fault [Note/report]	Repetitive fault [Note / report / replace]	Total failure [Replace]
	10	device transmission	OK	Low error rate	Medium error rate [Report]	High error rate [Replace]

S-Quad Time average readings

The typical time average values for sensors under normal operating condition are shown in the table below.

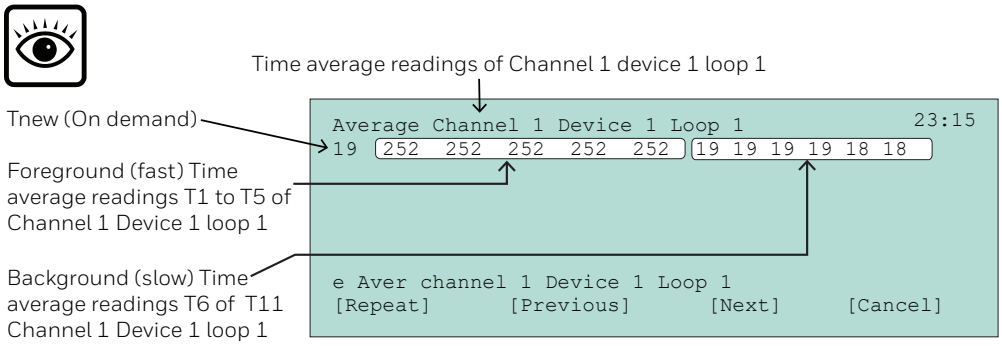
Part No.	Product	Analogue Channels	Time average at manufacture Tnew
S4-720	S4 Heat Sensor	2 - heat	66
S4-715	S4 Optical Sensor	1 - Optical (forward)	25
S4-710	S4 Optical Heat Sensor	1 - Optical (forward) 2 - heat	25 66
S4-770	S4 Optical Heat Sounder	1 - Optical (forward) 2 - heat	25 66
S4-711 & S4BK-711	S4 Dual Optical & Heat Sensor Black S4 Dual Optical & Heat Sensor	1 - Optical (forward) 2 - Heat 4 - Optical (backward)	25 66 40
S4-711-V-VAD-HPR & S4BK-711-V-VAD-HPR	S4 Dual OH/Voice Sen Sndr/Red VAD (HP) Black S4 Dual OH / Voice Sndr. / Red VAD (HP)	1 - Optical (forward) 2 - Heat 4 - Optical (backward)	25 66 40
S4-711-VAD-HPW S4-711-VAD-HPR S4-711-VAD-LPW	S4 Dual OH/White VAD (HP) S4 Dual OH/Red VAD (HP) S4 Dual OH/White VAD (LP)	1 - Optical (forward) 2 - Heat 4 - Optical (backward)	25 66 40
S4-711-V-VAD-LPW S4-711-V-VAD-HPW S4-711-V-VAD-LPR S4-711-V-VAD-HPR	S4 Dual OH/Voice Sndr/White VAD S4 Dual OH / Voice Sndr. / White VAD (HP) S4 Dual OH / Voice Sndr. / Red VAD S4 Dual OH / Voice Sndr. / Red VAD (HP)	1 - Optical (forward) 2 - Heat 4 - Optical (backward)	25 66 40
S4-720-V-VAD-HPW S4-720-V-VAD-HPR	S4 Heat/Voice Sndr/White VAD (HP) S4 Heat / Voice Sndr. / Red VAD (HP)	2 - Heat	66
S4-911-V-VAD-HPW S4-911-V-VAD-HPR	S4 Dual OH/CO/Voice Sen Sndr/White VAD HP S4 Dual OHCO / Voice Sen Sndr/Red VAD (HP)	1 - Optical (forward) 2 - Heat 3 - CO 4 - Optical (backward)	25 66 25 40
S4-711-V S4BK-711-V	S4 Dual OH/Voice Sounder Black S4 Dual OH / Voice Sounder	1 - Optical (forward) 2 - Heat 4 - Optical (backward)	25 66 40
S4-770-S	S4 OH Sensor Sounder	1 - Optical (forward) 2 - Heat	25 66
S4-771-S	S4 Dual OH Sensor Sounder	1 - Optical (forward) 2 - Heat 4 - Optical (backward)	25 66 40
S4-780-S	S4 Heat Sensor Sounder	2 - Heat	66
S4-901	S4 Dual OH CO Sensor	1 - Optical (forward) 2 - Heat 3 - CO 4 - Optical (backward)	25 66 25 40
	Beam Transmit		0
	Beam Receive	2	150 - 170

Typical new Time average values for legacy 34K sensors

Device type 34K	Analogue Channel number	Time average Tnew
Optical	1	200 - 235
Heat	2	180 - 210

Checking the time averages

Press the Menu On/Off button and then [Info], momentarily press <etc> to select [Time Avg] and type in the required channel number from the range 1-6 whose time average is required, select [Device] and type in the device number, select [Loop] and type in the loop number of the device ->[Enter]. The display shows time averages for the device. If necessary select [Repeat] to refresh the readings.



	Foreground (fast) time average readings					Background (slow) time average readings					
Tnew	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11
On demand	80mS	320mS	1.28S	5.12S	20.48S	1.36min	5.46min	21.84min	1.45hr	5.82hr	23.3hr
	Normally reads 252, unless there is a threshold.										

S-Quad - Message Action List

This list shows the messages that are likely to be displayed at the control panel or at a loop repeat panel in the fire system.

Message Action list

The messages displayed at the control panel or loop repeat panels are given for guidance only:

- fault message
- likely meaning of the message
- along with suggestions on what initial actions may be taken to rectify the problem.
- the term Outstation and Device are used interchangeably

Only the messages that are applicable will appear on the display of the control panel or loop repeat panels.

Message	associated with..	meaning..	..possible action
CO sensor faulty	Device	There is a fault with the CO sensor.	Replace the device
CO sensor near end of life	Device	The CO cell is nearing the end of manufacturer recommended life expectancy.	Replace the device
CO sensor restored	Device	The CO sensor fault has been restored.	-
Flash memory checksum error	Device	Speech Memory Checksum Error	Replace the device
Invalid Configuration	Device	EEPROM incorrectly programmed	Replace the device
Invalid configuration	Loop	Loop recovered with freeblocks ON	This is not allowed. Switch OFF the freeblocks and reallocate.
Memory corrupt	Device	EEPROM checksum failure	Replace the device
Program memory corrupted	Device	Checksum failure on EPROM at midnight	Clear and ignore single occurrence. Record in log book.
Sounder circuit has failed	Device	There is a fault with the sounder hardware on the S-Quad or S-Cubed.	Replace the device
Sounder circuit Restored	Device	The fault on the sounder S-Quad or S-Cubed has been restored.	-
Speech circuit has failed	Device	There is a hardware fault possibly associated with the voice chip on the speech S-Quad or S-Cubed.	Replace the device
Speech circuit Restored	Device	The fault on the speech S-Quad and S-Cubed has been restored.	-
Strobe (VAD) circuit has failed	Device	The strobe (VAD) circuit on the S-Quad or S-Cubed device has failed	Replace the device
Strobe (VAD) circuit Restored	Device	The hardware fault associated with the strobe (VAD) has been restored.	-

Finding an S-Quad device

The 'find device' is a function that gives a visual or audible indication at the respective S-Quad device on a loop circuit.

a. Press the **Menu On/Off** button and then **[Test/Eng]** .

b. Select **[Loop]** and then **[Find Dev]**.

c. Now enter a Loop card number to select the loop circuit.

d. Select **[Start]** and type in a device number (usually device 1 is entered).

e. Select **[Enter].** The display shows the device and loop number.

Number 1 on Loop 1

f. Press **[Next]** to find the next device on the loop and at any stage if the previous device needs to be found then select **[Previous]**.

A found device will provide visual or audible indication:

- On any S-Quad device there will be a flashing indication given by the local LED.
- An S-Quad with Sounder, but without speech, will cause the Sounder to output pulsed tone
- An S-Quad with Visual Alarm will cause the light to operate.
- An S-Quad with Speech will cause a tone followed by announcement of a test message: "This is a test message no action is required".

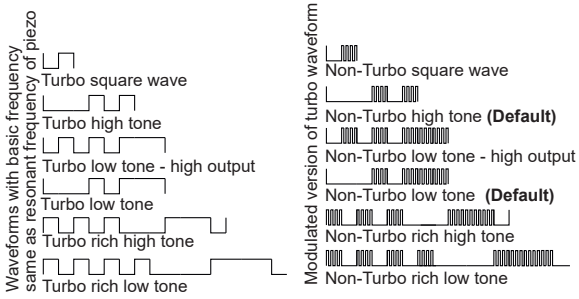
Loop loading

The 'Battery Standby and Loop Load calculator' tool is available via Gentexpert website. The tool must be used to accurately determine the loop loading, cable length for lumped loads and to ensure the devices installed on each loop are within the maximum allowed and will meet the control panel's standby requirement.

Turbo and Non Turbo Modes

The S-Quad devices can output in turbo and/or in non turbo modes. When the panel commands a low or high tone output at S-Quad, if configured during commissioning, the S-Quad will output turbo and/or non turbo tones. The **high and low FAB mappings** are used to change the tone output of the S-Quad sounder. The turbo mode outputs a waveform with a basic frequency that is the same frequency as the resonant frequency of the S-Quad piezo. The non turbo mode outputs modulated turbo waveform.

No.	Description
0	Turbo square wave
1	Turbo high tone
2	Turbo low tone - high output
3	Turbo low tone
4	Turbo rich high tone
5	Turbo rich low tone
8	Non-Turbo square wave
9	Non-Turbo high tone
10	Non-Turbo low tone - high output
11	Non-Turbo low tone
12	Non-Turbo rich high tone
13	Non-Turbo rich low tone



The volume levels and power requirements of the S-Quad operating in turbo mode are significantly higher than in non-turbo mode.

System test

Preparation

- Check to ensure access will be provided to areas where installed equipment is to be tested, such as in locked or secure areas.
- Ensure all sensor dust covers are removed.
- Tests may be made easier by having: sensor extractor tool, smoke pole and canister, heat gun.



Health and safety must be observed when using these test tools.

Communication to site occupants

- Before undertaking any of these tests and to prevent unnecessary building evacuation, ensure:
  - all affected personal on site are informed via a responsible person that the fire alarm system is being commissioned.
  - where there is a link to an alarm receiving centre, the appropriate action should be taken to ensure they are informed that tests are being carried out on the system.

Commissioning tool

It is much easier for the panel and system to be configured from a Commissioning tool

Test mode



The [Reset / No Reset] is a toggle option and is under the Test mode function, it allows the test on sensor devices with or without a panel reset.

EN Control panel having version 4 or higher software

The zone test mode function must be used to test sensor devices in the system.

- A zone may be put in to the test mode when testing devices in a zone. It allows the engineer to test zones without having to return to the panel to silence alarms and reset the system.

  While the panel is in the Zone test mode, following a fire event the alarm sounds for 5 seconds and the panel automatically performs a Silence Alarms sequence and thereafter a panel Reset, see note. The panel inhibits the operation of delay block functions, network functions, auxiliary and clean contact relays operation in this mode.
- All zones of the system that are not in test mode will operate normally.
- To put the panel in or out of zone test mode: Press Menu On/Off button and select [Test/Eng]. Select [UserCode] and enter the Engineering password (PIN), this need only be done if an Engineering password is set up. Press <etc> and select [Test] and select [Zone] and toggle select [Reset / No Reset], whatever it reads that is what is selected. Now select [On] and type in the zone number and select [Enter].
  Test LED will be lit
- On completion of tests ensure the Zone mode is switched OFF and notice the Test indicator will also switch Off.

Testing Fire Sensors

It is important to ensure that the panel is in Test mode before testing sensors in the system. This is particularly important when testing S-Quad sensors having dual optical sensing, as they are designed to minimise false alarms caused by dust and steam. The 'artificial smoke' particles from smoke canister look more like steam. When the panel is in Test mode all the dual optical S-Quad sensors in the system are treated as single channel optical sensors. A single channel optical sensor overrides the false alarm immunity of dual optical sensor and permit the testing of the S-Quad sensors by using canned smoke

1. **When testing heat sensors DO NOT use a heat gun to test heat sensors in a hazardous environment.**
2. **Recommended test equipment and methods must be used to fire test flame detectors off interface units.**
4. **When smoke testing fire sensors using artificial smoke, avoid excessive spray to prevent accumulation of sticky residue on sensor, see instructions on the smoke canister.**
5. **The beam sensors should be tested using obscuration filters to simulate smoke at default sensitivity.**

The BS5839:Part 1 recommends that all sensors are tested for correct operation.

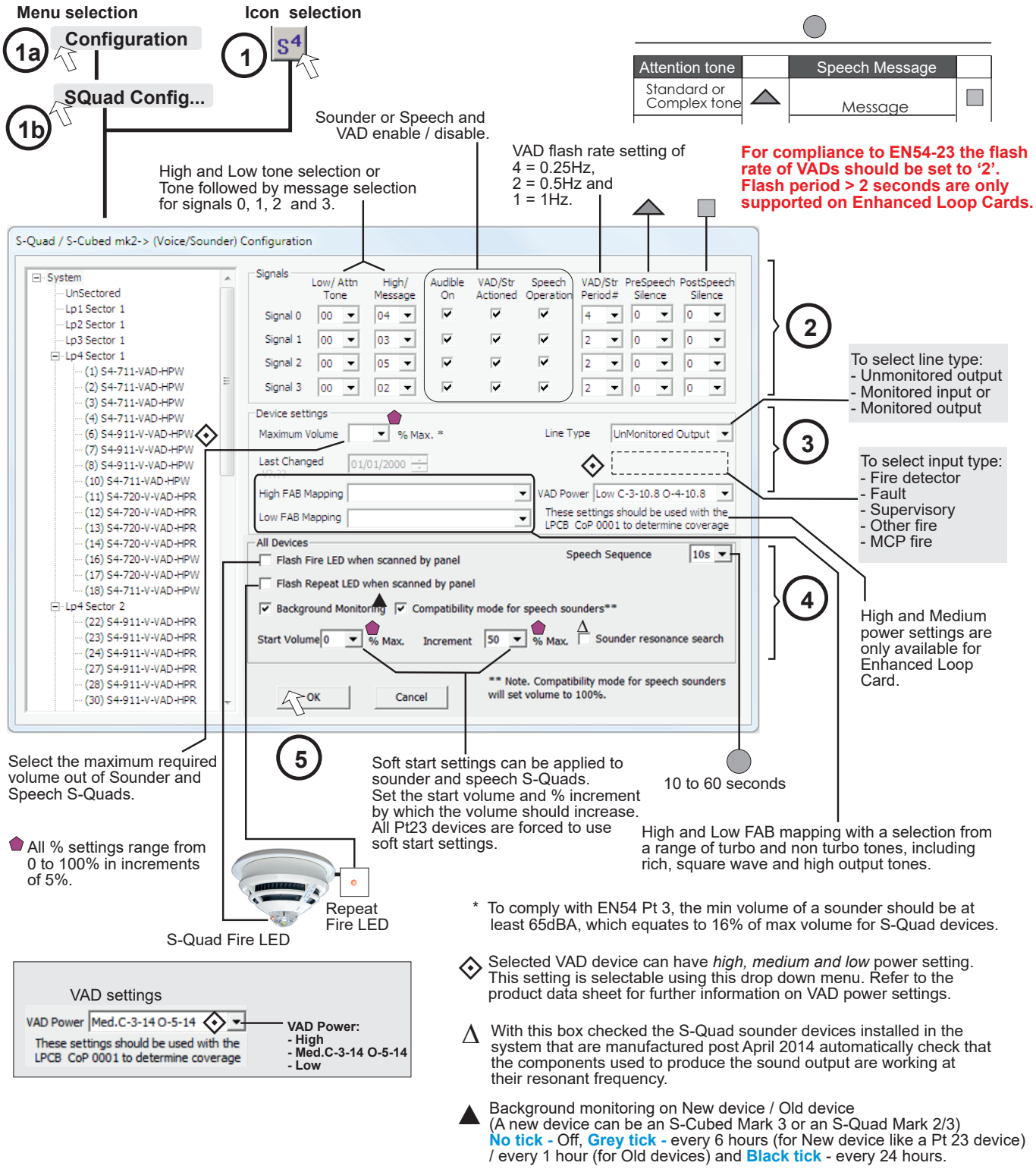
- Unless otherwise instructed all sensors should be tested.
- Each sensor should also be checked for any physical obstacles that would inhibit the operation of the sensor in the event of a fire.
- Where practical, each conventional flame detector operating via an interface unit should be functionally tested.

Other tests on S-Quad devices

- The sensor(s) part of the S-Quad must be system tested as per previous section.
- For the Sound and Speech part of the S-Quad ensure each device outputs the correct signal at the appropriate volume level and ensure the VAD operate at the required flash rate. All S-Quad devices in the system should have been setup using the commissioning tool.
- Each S-Quad should be tested for correct operation in the event of fire.
- The sound levels in the areas should be tested in accordance with the British Standard requirements and to meet the site specific needs as agreed with the customer.

Vigilon Commissioning tool settings for S-Quad

See Vigilon Commissioning tool user guide for full information.



* To comply with EN54 Pt 3, the min volume of a sounder should be at least 65dBA, which equates to 16% of max volume for S-Quad devices.

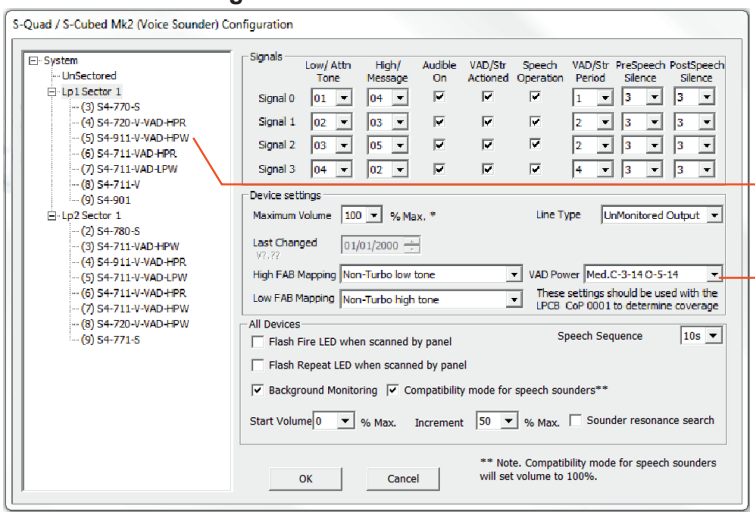
◇ Selected VAD device can have *high, medium and low* power setting. This setting is selectable using this drop down menu. Refer to the product data sheet for further information on VAD power settings.

Δ With this box checked the S-Quad sounder devices installed in the system that are manufactured post April 2014 automatically check that the components used to produce the sound output are working at their resonant frequency.

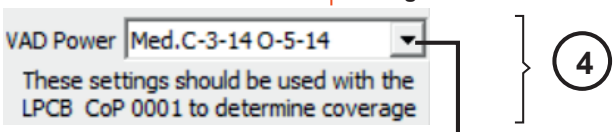
▲ Background monitoring on New device / Old device
(A new device can be an S-Cubed Mark 3 or an S-Quad Mark 2/3)
No tick - Off, **Grey tick -** every 6 hours (for New device like a Pt 23 device) / every 1 hour (for Old devices) and **Black tick** - every 24 hours.

Note the Commissioning tool will not distinguish between part number prefix S4BK and S4 of equivalent devices.

Visual Alarm Settings



VAD Device settings



VAD Power:
- High
- Med.C-3-14 O-5-14
- Low
See Visual Alarm Coverage section.

Nano Commissioning tool S-Quad settings

See the Nano Commissioning tool - User guide for full information.

All the S-Quad VAD devices installed on a Nano system loop are fixed at Low Power setting for light coverage to comply with EN54 Part 23.

Notes

Notes

Notes

At the end of their useful life, the packaging, product and batteries should be disposed of via a suitable recycling centre and in accordance with national or local legislation.

WEEE Directive:
At the end of their useful life, the packaging, product and batteries should be disposed of via a suitable recycling centre.
Do not dispose of with your normal household waste.
Do not burn.

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