Data and Installation

S-Quad

Sensor, Sounder, Speech & Strobe

GENT by Honeywell



These instructions are for the S-Quad product range. An S-Quad product integrates dual angle smoke, heat and carbon monoxide gas detection with electronic sounder, speech and LED flasher (Strobe) in one assembly.

Product range

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

These products are not visual alarm devices and do not meet EN 54-23.

Part number	Description	Symbol
S4-720	Heat Sensor	H
S4-780	Heat Sensor & Sounder	HS
S4-720-ST-VO	Heat Sensor, Speech & Strobe	HStSp
S4-715 #	Optical Sensor #	O #
S4-710	Optical & Heat Sensor	OH
S4-770	Optical & Heat Sensor plus Sounder	OHS
S4-711	Dual Optical & Heat Sensor	O^2H
S4-771	Dual Optical & Heat Sensor plus Sounder	O^2HS
S4-711-ST	Dual Optical & Heat Sensor plus Strobe	O^2HSt
S4-711-VO	Dual Optical & Heat Sensor plus Speech	O^2HSp
S4-711-ST-VO	Dual Optical & Heat Sensor plus Speech & Strobe	O^2HSpSt
S4-911	Dual Optical, Heat & CO Sensor	O^2HCO
S4-911-ST-VO	Dual Optical, Heat & CO Sensor plus Speech & Strobe	$O^2HCOSpSt$

This 'Optical' Sensor is used in the Duct sensor.

Associated products

S4-700	S-Quad Base
S4-FLUSH	Semi-Flush fixing kit
805589	Sensor dust cover (50 pack)
805580	Removal tool kit
S4-COVER-REMOVER	Dust cover remover tool (spare adaptor)
805576	Label plate (10 pack)
805573	Base IP43 Gasket (5 pack)

General specification

Operating voltage	35V - 41V
Weight	110g (with base - 170g) S4-720 only:88g (with base - 148g)
Dimensions	117mm diameter by 49.6mm height (With base the height increases to 63.8mm)
IP rating	IP30 IP20 when mounted on a metal back box
Enclosure	ABS
Colour	RAL 9010
Approval	LPCB approved
Storage Temperature	-20°C to +70°C (for S-Quad with CO -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) Standard	EN54 : Part 5 : 2002
Optical (O) Standard	EN54 : Part 7 : 2002
Dual Optical (O^2) Standard	EN54 : Part 7 : 2002
Sounder (S) Standard	EN54 : Part 3 : 2002
Gas (CO) Standard *	LPS 1274
Multi sensor standard	CEA 4021: 2003-07

EN54-18 : 2005 - Input/Output devices

EN54-17 : 2005 - Short-circuit isolator (section 4.8) data:	V_{max}	42V	$I_{C\ max}$	0.4A
	V_{nom}	40V	$I_{S\ max}$	1A
	V_{min}	24V	$I_{L\ max}$	20µA
	$V_{SO\ max}$	16V	$Z_{C\ max}$	0.16Ω
	$V_{SO\ min}$	8V		

* The 'Gas' sensing is designed to meet the requirements of LPS 1274 : issue 1.0

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

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 : 2002.

Do's and Don't

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.**

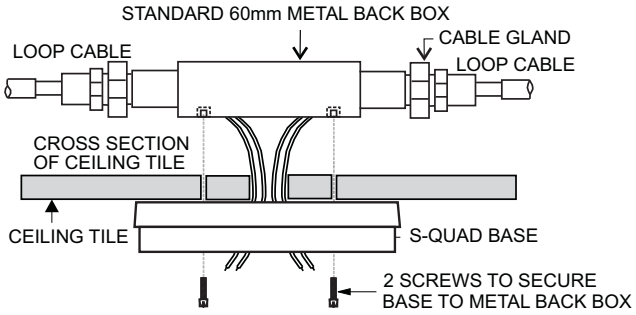
DO NOT locate a CO detector: -

- **In buildings where farm animals are kept**
- **In excessive damp areas**
- **In battery room where non sealed battery are kept**
- **In a Car park where exhaust fumes will be present.**

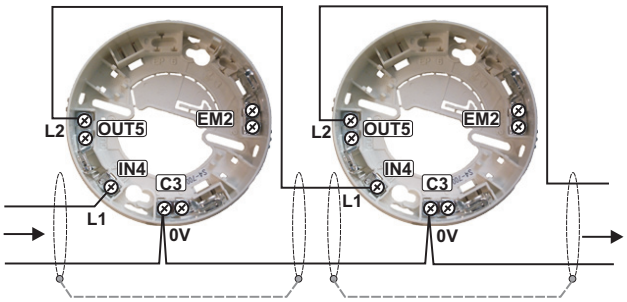
Follow recommendations detailed in section 22 of BS5839 : Part 1 : 2002

Metal back box

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



In - Out wiring to S-Quad bases

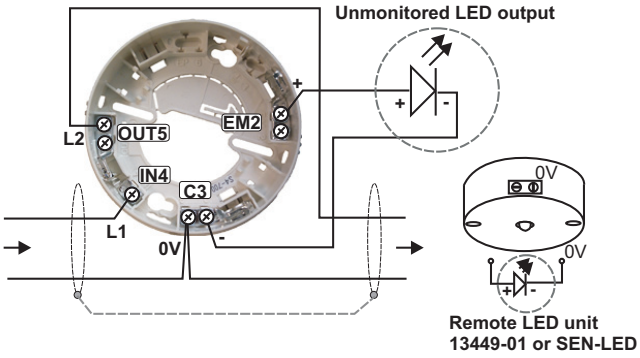


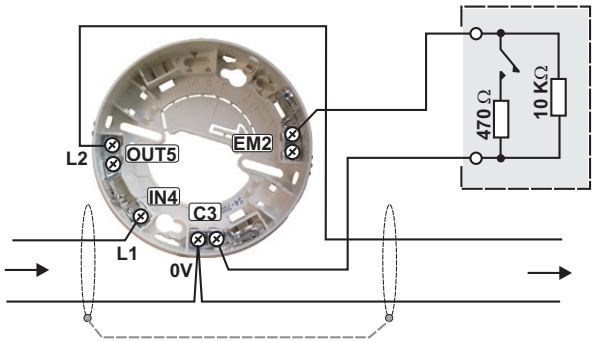
Programmable input/output

The 34703 Slave Relay unit and 34703 Slave LED indicator unit are NOT supported for use with S-Quad fire sensors. The Slave units are only compatible with 34xxx range of fire sensors.

All S-Quad devices can be configured as either monitored input or unmonitored output. The factory setting of the programmable 'input / output' is for an unmonitored output to drive an external repeat LED without a series resistor.

There is a maximum cable length limit of 15 metres from the S-Quad 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.



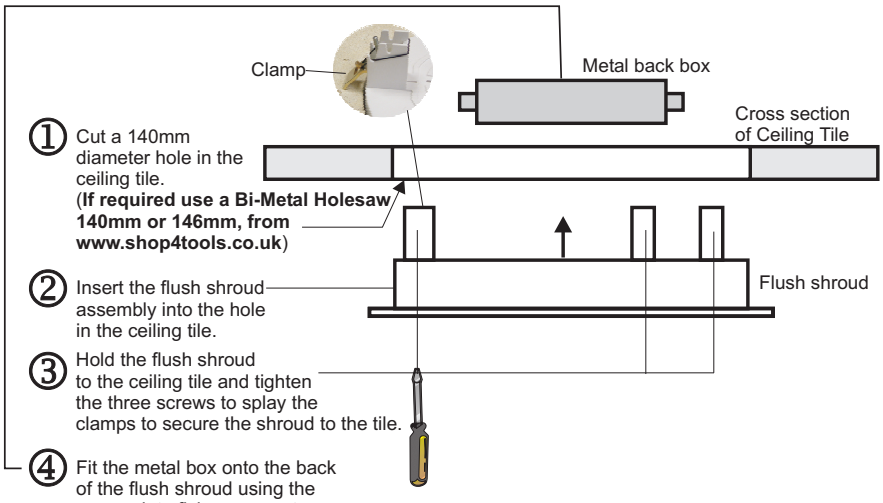
S-Quad Semi-flush fixing kit (S4-FLUSH)

An S-Quad 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.

There is an enhanced volume output of sound and speech from a flush mounted S-Quad.

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 to +45°C)





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.

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.

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.

Further information about these products can be found in Part 2 of this document available on Gent Expert website.

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Gent by Honeywell (Novar Systems Limited)
Manufactured by: Honeywell Life Safety Systems,
140 Waterside Road, Hamilton Industrial Park,
Leicester, LE5 1TN, United Kingdom
13

DoP	Product No.	DoP	Product No.
001-CPR-2013	S4-715	017-CPR-2013	S4-911-ST-VO
001-CPR-2013	S4-710	017-CPR-2013	S4-911
001-CPR-2013	S4-720	017-CPR-2013	S4-711-ST
001-CPR-2013	S4-770	017-CPR-2013	S4-711-ST-VO
001-CPR-2013	S4-711	017-CPR-2013	S4-711-VO
		017-CPR-2013	S4-771
		017-CPR-2013	S4-720-ST-VO
		017-CPR-2013	S4-780

EN54-3:2001, A1: 2002, A2:2006, EN54-5:2002, A1:2002, EN54-7:2000, A1:2002, A2:2006, EN54-17:2005, EN54-18:2005

S4-715	(EN54-7, 17 & 18)	S4-911-ST-VO	(EN54-3, 5, 7,17 & 18)
S4-710	(EN54-5, 7, 17 & 18)	S4-911	(EN54-5, 7, 17 & 18)
S4-720	(EN54-5, 17 & 18)	S4-711-ST	(EN54-5, 7, 17 & 18)
S4-770	(EN54-3, 5, 7,17 & 18)	S4-711-ST-VO	(EN54-3, 5, 7, 17 & 18)
S4-711	(EN54-5, 7, 17 & 18)	S4-711-VO	(EN54-3, 5, 7, 17 & 18)
		S4-720-ST-VO	(EN54-3, 5, 17 & 18)
		S4-771	(EN54-3, 5, 7,17 & 18)
		S4-780	(EN54-3, 5,17 & 18)

Intended for use in fire detection and fire alarm systems in and around buildings

Refer to DOP 001-CPR-2013 and 017-CPR-2013 for level or class of performance declared, for details see website ww.gent.co.uk

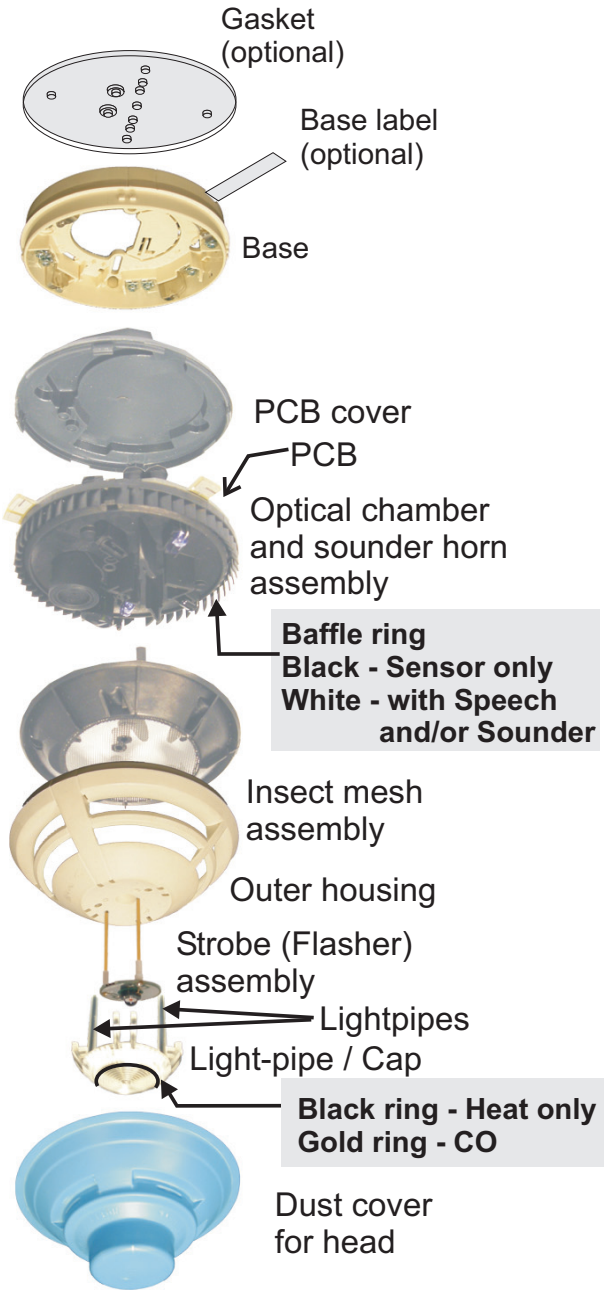
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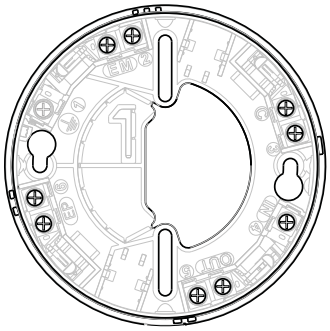
S-Quad

Sensor, Sounder, Speech & Strobe

S-Quad



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 Gasket

The optional foam rubber base gasket (Part No: 805573) can be fitted to the base to prevent water damage from dripping water from the ceiling.

Base labels

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

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.

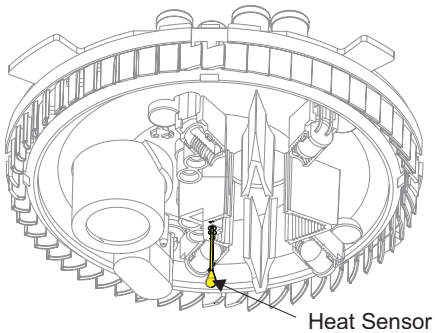
Monitoring

Under normal conditions the S-Quads 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

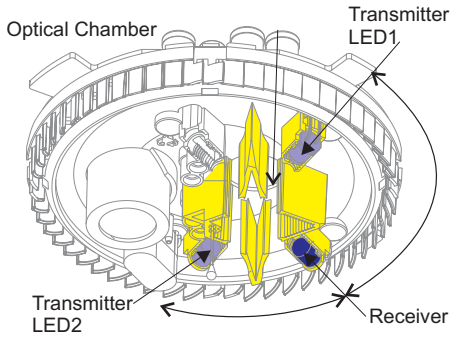
All S-Quads are monitored periodically to check if they are working correctly, an indication of a fault is given if there is a failure. For example the infrared signals through the optical chamber are regularly checked, the thermistor is checked and the CO cell circuit is monitored for failure. The speech,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



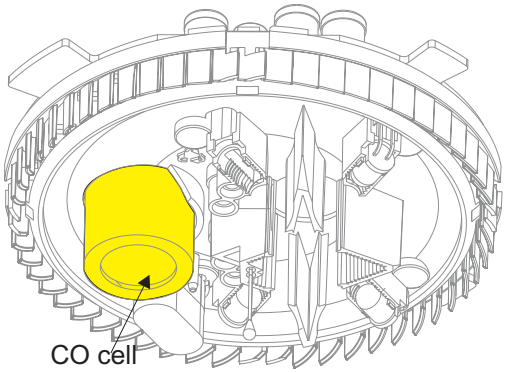
Dual Optical Sensor

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 years, after this period the sensor should be replaced.

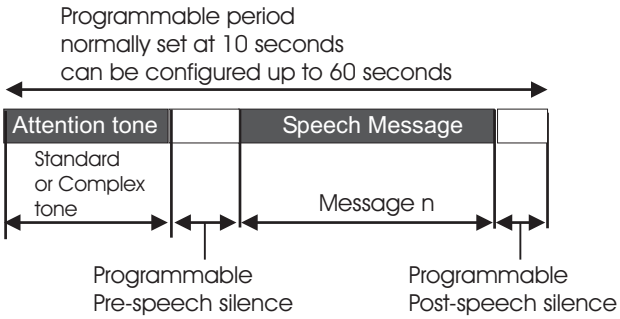
Sounder (S)

The sounder function in a S-Quad 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 S^3 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 S-Quad will have a white baffle to identify it as having Sound functionality.

The Sound Pressure Level at 90° will far exceed the more useful average Sound Pressure Level quoted.

Speech (Sp)

The S-Quad Speech function is provided by stored messages on a flash memory chip within the assembly. The standard flash memory can hold up to 60 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.



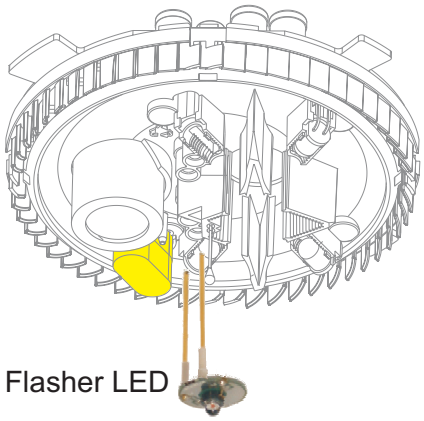
It is possible to reprogram factory set speech messages

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

System default:

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

Strobe (St)



The Strobe utilises a high-power red 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. When compared with the conventional Xenon flasher the S-Quad strobe outputs a lower level of light over longer duration to achieve the same intensity. The strobe is designed for installation on a ceiling and provides a wide viewing angle to allow the light to be seen all around. As factory set the strobe provides a pulsed output every 2s with signal 1, 1 second with signal 2 and 1 second with signal 3, however the operation of the strobe with the signals 1, 2 and 3 can be changed at the commissioning stage. The strobe is synchronised with S-Cube strobe installed in the same system.

The Disability Act 1995 recommends visual alarms, like S-Cube and S-Quad, are installed in protected premises to warn occupants who are hard of hearing.

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

Compatibility

At the time of releasing this 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:

≥ mean - Greater than or equal to.	BS panel		EN panels				
	Vigilon		Vigilon 4 Loop	Vigilon Compact	Vigilon Compact VA	Vigilon 4-6 Loop	
Card ->	MCC	LPC	MCC	MCB	MCB	MCC	LPC
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 STATES 2 & 4 Optical	≥3.94	≥3.93	≥4.37	≥4.37	≥4.37	≥4.37	≥4.35
S-Quad supports STATE 6 CO	≥3.97	3.97	≥4.43	≥4.43	≥4.43	≥4.43	≥4.41
S-Quad supports STATE 7 heat	≥3.98	≥3.98	≥4.47	≥4.47	≥4.47	≥4.47	≥4.45

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 BS and EN54 Vigilon 4/6-loop panel . The loop cards are installed in slots labelled **Card 1 to Card 4/6** on the backplane. The 6-loops are applicable to EN panel only.

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.

S-Quad STATES

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

# - factory default settings **Device**		**LPCB approved STATE**	**Meets ~ EN54 : Part 7 :2000 * EN54 : Part 5 :2002**
Dual Optical & Heat sensor variant-			
	S4-711	STATE 0 #	Medium optical smoke ~ / Class A1 heat *
(With Strobe)	S4-711-ST	STATE 5	Medium optical smoke ~ / Class B heat *
(With Speech)	S4-711-VO	STATE 8	Delayed medium optical smoke ~ / Class A1 heat*
(With Strobe & Speech)	S4-711-ST-VO		
(With Sounder)	S4-771		
Dual Optical, Heat & CO sensor variant-			
	S4-911	STATE 0 #	Medium optical smoke ~ / Class A1 heat *
(With Speech & Strobe)	S4-911-ST-VO	STATE 9	Class A1 heat *
Optical & Heat sensor variant -	S4-710		
(With Sounder)	S4-770	STATE 0 #	Medium optical smoke / Class A1 heat*
Heat sensor variant -	S4-720		
(With Speech & Strobe)	S4-720-ST-VO	STATE 0 #	Class A1 heat *
(With Sounder)	S4-780	STATE 5	Class B heat *
(With Strobe)	S4-780-ST		
Optical senor -	S4-715	STATE 0 #	Medium optical smoke

All S-Quad range of sensor sounder devices meet CEA 4021 where applicable. All S-Quad range of sensor sounder devices meet EN54-17:2005, Short-circuit Isolators and EN54-18:2005, Input/Output devices for use on the transmission path of fire detection and alarm systems.

S-Quad Heat sensor STATES

STATE	**Definition / Class**	**Application in / Suitable for:**	**Sensitivity** **a-high- to-e-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

S-Quad Optical sensor STATES

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

S-Quad Dual Optical Heat & Optical Heat sensor STATES

STATE	Definition / Class	Application in / Suitable for:	Sensitivity a-high- to-j-none
STATE 3	High sensitivity optical, Class A1 heat	Clean area or environment, where early detection is required	a
STATE 4	Medium 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#	Medium sensitivity optical, Class A1 heat	General area	c
STATE 8	Delayed medium sensitivity optical, Class A1 heat	General application in area with transient steam, dust or smoke present	d
STATE 7	Medium 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	Medium sensitivity optical, Class B heat	Area having high ambient temperature with low dust, smoke or steam present	f
STATE 2	Low sensitivity optical, Class A1 heat	Areas with moderate dust, smoke or heat during working hours when used with timing function	g
STATE 11	Low sensitivity optical, Class B heat	Area having high ambient temperature, plus where moderate dust, smoke or steam present	h
STATE 6	Low sensitivity optical, 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 settings

S-Quad Dual Optical, Heat & CO sensor STATES

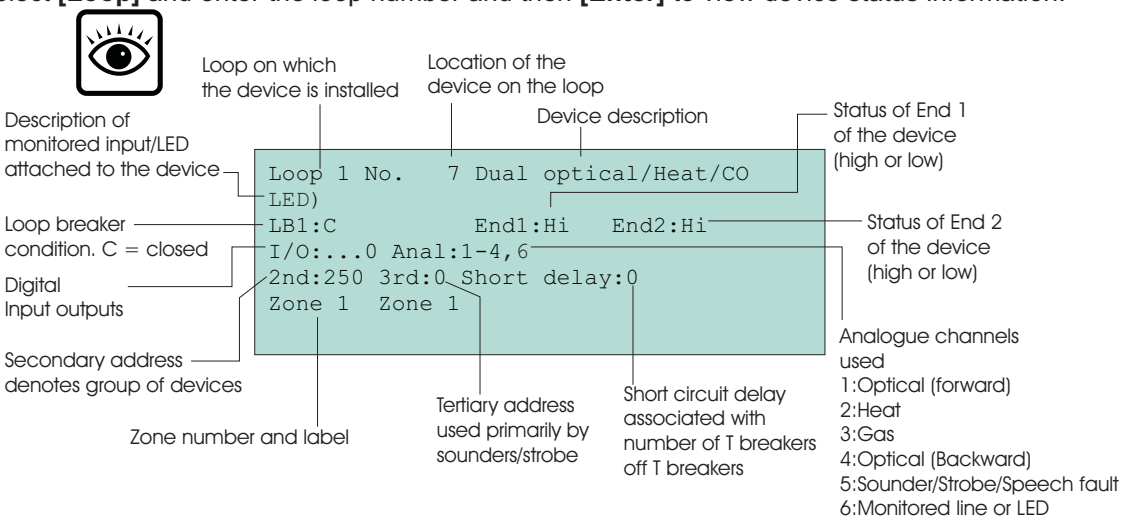
STATE	Definition / Class	Application in / Suitable for:	Sensitivity a-high- to-h-none
STATE 1	High sensitivity optical, Class A1 heat, high sensitivity gas	Clean area or environment where early detection is required with false alarm reduction	a
STATE 4	Medium sensitivity optical with no spike protection, Class A1 heat, medium sensitivity gas	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#	Medium sensitivity optical, Class A1 heat, medium sensitivity gas	General area where false alarm reduction is required for comprehensive fire detection	c
STATE 7	Medium sensitivity optical, Class A2S heat, medium sensitivity gas	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	Medium sensitivity optical, Class A1 heat, low sensitivity gas	Applications with moderate dust, smoke (tobacco) or steam	e
STATE 9	Medium sensitivity gas, Class A1 heat	Area where high levels of smoke, dust or steam is often present	f
STATE 11	Medium sensitivity optical, Class B heat	Area with high ambient temperature, plus low levels of dust, smoke or steam present	g
STATE 12	Class A1 heat only	Area where smoke, dust, steam or gas occurs at times	h
STATE 15	No detection		i

S-Quad Status

How to view 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
S4-720-ST-VO	Heat Sensor plus Speech & Strobe	O	O	O	O	2,5
S4-780	Heat Sensor Sounder	.	O	O	O	2, 5
S4-715	Optical Sensor	.	.	.	O	1
S4-710	Optical & Heat Sensor	.	.	.	O	1,2
S4-770	Optical & Heat Sensor plus Sounder	.	O	O	O	1,2,5
S4-711-VO	Dual Optical & Heat Sensor plus Speech	.	O	O	O	1,2,4,5
S4-711	Dual Optical & Heat Sensor	.	.	.	O	1, 2,4
S4-711-ST	Dual Optical & Heat Sensor plus Strobe	O	.	.	O	1, 2, 4, 5
S4-771	Dual Optical & Heat Sensor plus Sounder	.	O	O	O	1, 2, 4, 5
S4-711-ST-VO	Dual Optical & Heat Sensor + Speech & Strobe	O	O	O	O	1, 2, 4, 5
S4-911	Dual Optical, Heat & CO Sensor	.	.	.	O	1, 2, 3, 4, 5
S4-911-ST-VO	Dual Optical, Heat & CO Sensor + Speech & Strobe	O	O	O	O	1, 2, 3, 4, 5
	+ Monitored input					6
	+ Monitored output					6
		. - Unconnected				
		O - Output				
		- Don't Care				

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/flasher/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.

How to check S-Quad Exception 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

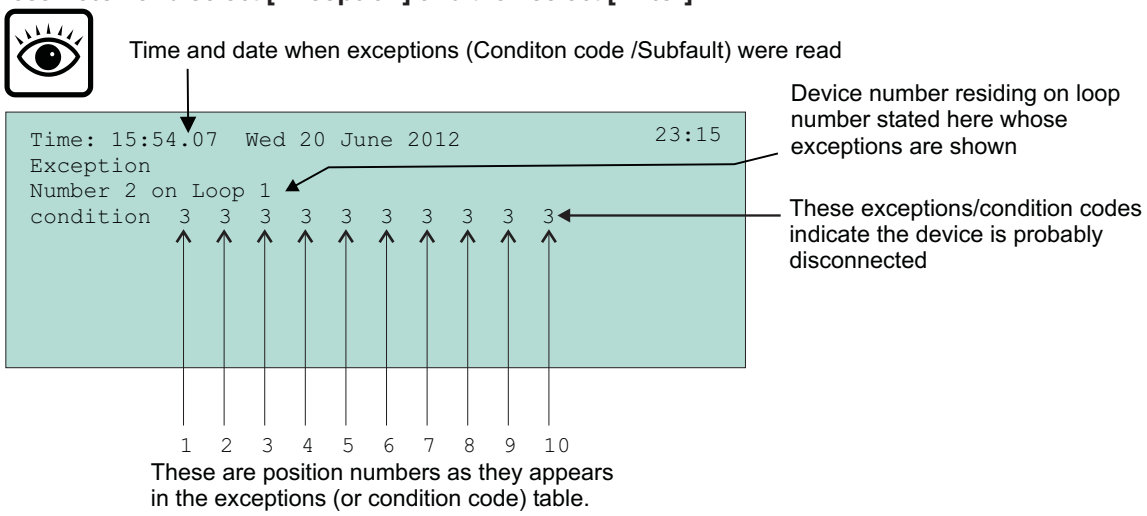
There are ten different conditions possible for each sensor type, although not all of them are defined. Each condition code has a range of **0-3**,

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 that high frequency noise events have been detected by the system. A code 1 shows one event and a code 2 shows more than one event.	The sensor should be replaced. On maintenance, sensor with code 2 should be replaced. If it reoccurs then check the environment.
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-Quads

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

S-Quad Time average reading

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

Part No	Product	Analogue Channels	Time average Tnew
S4-720	Heat Sensor	2 - heat	66
S4-720-ST-VO	Heat Sensor Speech Strobe	2 - heat	66
S4-780	Heat Sensor Sounder	2 - heat	66
S4-715	Optical Sensor	1 - optical (forward)	25
S4-710	Optical & Heat Sensor	1 - optical (forward) 2 - heat	25 66
S4-770	Optical & Heat Sensor plus Sounder	1 - optical (forward) 2 - heat	25 66
S4-711-VO	Dual Optical & Heat Sensor plus Speech	1 - optical (forward) 2 - heat 4 - optical (backward)	25 66 40
S4-711	Dual Optical & Heat Sensor	1 - optical (forward) 2 - heat 4 - optical (backward)	25 66 40
S4-711-ST	Dual Optical & Heat Sensor plus Strobe	1 - optical (forward) 2 - heat 4 - optical (backward)	25 66 40
S4-771	Dual Optical & Heat Sensor plus Sounder	1 - optical (forward) 2 - heat 4 - optical (backward)	25 66 40
S4-711-ST-VO	Dual Optical & Heat Sensor plus Speech & Strobe	1 - optical (forward) 2 - heat 4 - optical (backward)	25 66 40
S4-711	Dual Optical, Heat & CO Sensor	1 - optical (forward) 2 - heat 3 - CO 4 - optical (backward)	25 66 25 40
S4-911-ST-VO	Dual Optical, Heat & CO Sensors plus Speech & Strobe	1 - optical (forward) 2 - heat 3 - CO 4 - optical (backward)	25 66 25 40

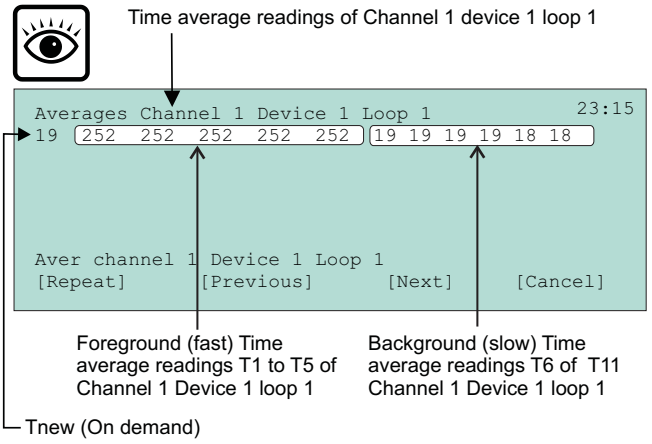
	Foreground (fast) time average readings					Background (slow) time average readings					
Tnew	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11
On demand	80mS	320mS	1.28S	5.12S	20.48S	1.36min	5.46min	21.84min	1.45hr	5.82hr	23.3hr
	Normally reads 252, unless there is a threshold.										

Checking the time averages

The following procedure assumes there is no password access required.

a. Press the **Menu On/Off** button.
b. Select **[Info]** and momentarily press **<etc>** to select **[Time Avg].**
c. Type in the channel number from the range 1-6
d. Select **[Device]** and type in the device number for which the time average is required.
e. Select **[Loop]** and enter the loop number of the device and **[Enter].**
f. If necessary select **[Repeat]** to refresh the readings.

The display shows time averages for the device.



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.



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

- ☐ The term **Outstation** and **device** are used interchangeably.

Message	associated with..	meaning..	..possible action
CO sensor faulty	Device	There is a fault with the CO sensor.	Replace 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 Processor Card	Loop recovered with freeblocks ON	This is not allowed. Switch OFF the freeblocks and reallocate
Memory corrupt	Device	EEPROM checksum failure	Replace device
Program memory corrupted	Card	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-Cube.	Replace the device
Sounder circuit Restored	Device	The fault on the sounder S-Quad or S-Cube 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-Cube.	Replace the device
Speech circuit Restored	Device	The fault on the speech S-Quad and S-Cube has been restored.	-
Strobe circuit has failed	Device	The strobe circuit on the S-Quad or S-Cube device has failed	Replace the device
Strobe circuit Restored	Device	The hardware fault associated with the strobe 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:

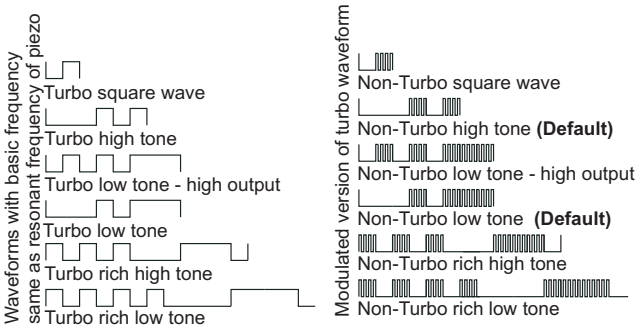
- ☐ On any S-Quad device there will be a flashing indication given by the local LED.
- ☐ An S-Quad with Sounder, but without speech, will cause the Sounder to output pulsed tone
- ☐ An S-Quad with Strobe will cause the strobe to operate.
- ☐ An S-Quad with Speech will cause a tone followed by announcement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

Loop loading

The 'Battery Standby Calculator' tool is avilable via Gentexpert website. The tool must be used to accurately determine the loop loading 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-Quads can output in **turbo** and/or in **non turbo** modes. When the panel commands a low or high tone output at S-Quads, 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-Quads 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 computer

It is much easier for the panel and system to be configured from a Commissioning computer, see Programming tool manual.

Test / Commissioning mode

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

Control panel having version 4 software (for EN Panels)

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

☐ On completion of tests ensure the Zone mode is switched OFF and notice the Test indicator will also switch Off.

Control panel having version 3+ software (for BS panels)

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

☐ The system may be put in the commissioning mode when testing fire sensors. It allows the engineer to test sensors without having to return to the panel to Silence Alarms and Reset the system.

While the panel is in the Commissioning mode, following a fire event the alarm sounds for 5 seconds and then automatically performs a Silence Alarm sequence and thereafter a panel reset, see note.

☐ **To put the control panel in or out of the Commissioning mode:** Press **Menu On/Off** button and select **[Test/Eng]**. Select **[UserCode]** and enter the Engineering password, this need only be done if an Engineering password is set up. Press **<etc> <etc> <etc>** and then select **[Commissn]** and toggle select **[Reset / No Reset]** whatever it reads that is what is selected. Now toggle select On using the **[On / Off]** selection and then **[Enter]**.

☐ On completion of tests ensure the Commissioning mode is switched 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 / Commissioning 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.

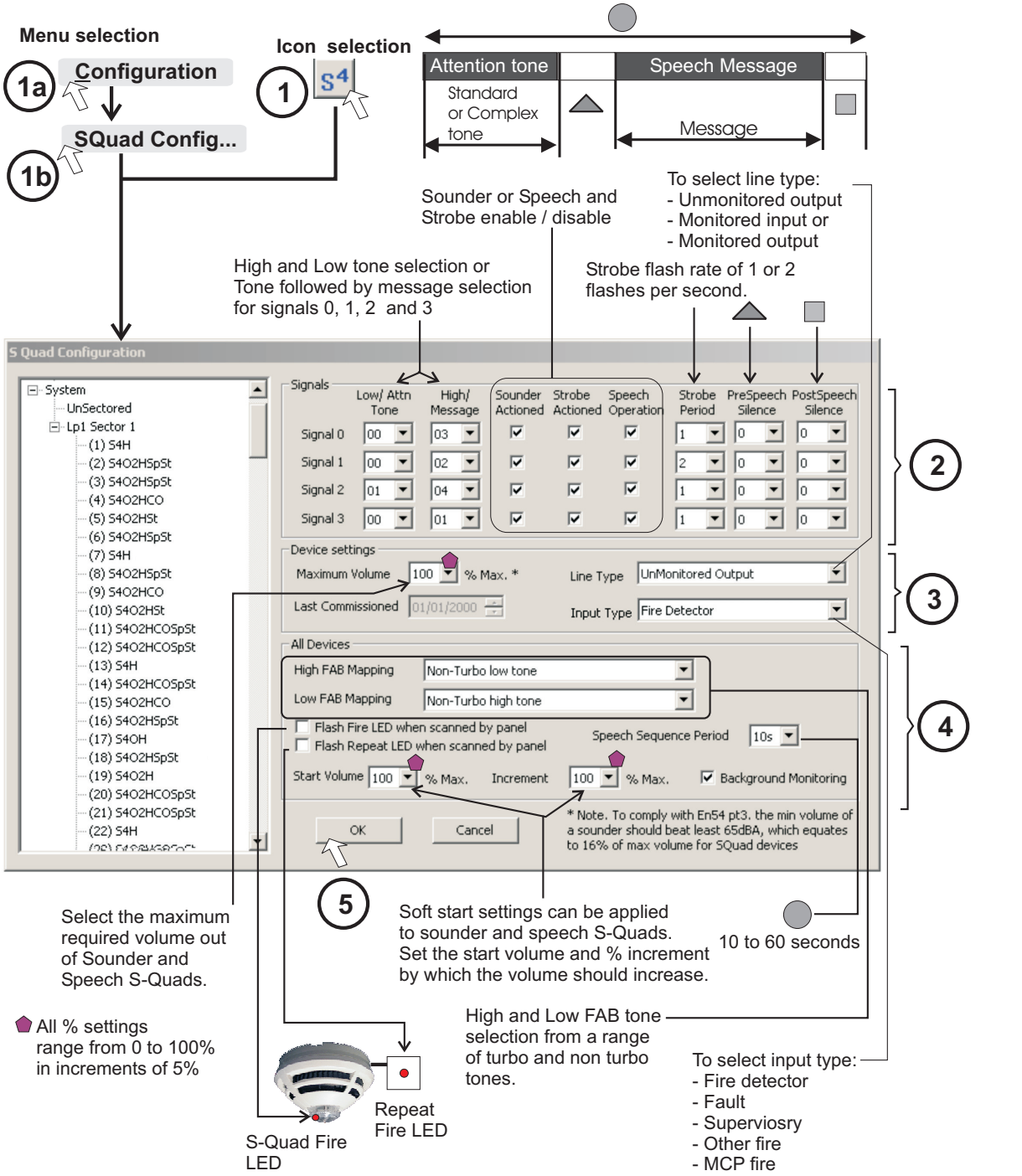
The BS5839:Part 1 recommends that all sensors are tested for correct operation.

- ☐ 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.

Testing the 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 strobe 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.

Commissioning tool settings



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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