



**The IS-D105 sounder is CE marked for compliance with the European Explosive Atmospheres Directive 94/9/EC and the European EMC Directive 89/336/EEC**

## 1) Introduction


The IS-D105 is an ATEX and IECEx certified intrinsically safe sounder which produces a loud warning signal in a hazardous area. Forty-nine first stage alarm sounds can be selected by internal switches and each one can be externally changed to a second or third stage alarm sound. The sounder may be used in all gas groups IIA, IIB and IIC. An IS-DL105 intrinsically safe combined sounder and beacon is also available.

## 2) Ratings and Markings

### 2.1 ATEX/IECEx certification

The IS-D105 sounder complies with the following standards:-

EN60079-0:2012 / IEC60079-0:2011  
 EN60079-11:2012 / IEC60079-11:2011  
 IEC 60079-26:2014

 II 1G Ex ia IIC T4 Ga (-40°C ≤ Ta ≤ +60°C)

The EC-Type Examination Certificate SIRA 04ATEX2301X has been issued by the Notified Body Sira. This confirms compliance with the European ATEX Directive 94/9/EC for Group II, Category 1 G equipment. The sounder carries the Community Mark and subject to local codes of practice, may be installed in any of the EEA member countries. The product has also been approved to the IECEx scheme, Certificate no. IECEx SIR04.0038X. This instruction sheet describes installations which conform to EN60079-14:2008/IEC60079-14:2007 Electrical Installation in Hazardous Areas. When designing systems for installation outside the UK, the local Code of Practice should be consulted.

The certification marking is as follows:

- 1) The certificate number has an 'X' suffix, which indicates that the certificate contains one or more special conditions for safe use. Those installing or inspecting the equipment should refer to this section of the certificate.
- 2) The equipment has not been assessed as a safety-related device (as referred to by Directive 94/9/EC Annex II, clause 1.5).
- 3) Installation of this equipment shall be carried out by suitably-trained personnel in accordance with the applicable code of practice.
- 4) Repair of this equipment shall only be carried out by the manufacturer or in accordance with the applicable code of practice.
- 5) The certification of this equipment relies on the following materials used in its construction:

Enclosure: Aluminium Pressure Die Cast Body LM6  
 Sealing of Enclosure & Mechanism: 'O' Ring

If the equipment is likely to come into contact with aggressive substances, then it is the responsibility of the user to take suitable precautions that prevent it from being adversely affected, thus ensuring that the type of protection is not compromised.

"Aggressive substances" - e.g. acidic liquids or gases that may attack metals, or solvents that may affect polymeric materials.

"Suitable precautions" - e.g. regular checks as part of routine inspections or establishing from the material's data sheet that it is resistant to specific chemicals.

### 2.2 Zones, Gas Groups and Temperature Classification

The IS-D105 sounder has been certified Ex ia IIC T4 Ga. When connected to an approved system it may be installed in:

- |        |   |
|--------|---|
| Zone 0 | explosive gas air mixture continuously present.   |
| Zone 1 | explosive gas air mixture likely to occur in normal operation.                                      |
| Zone 2 | explosive gas air mixture not likely to occur, and if it does, it will only exist for a short time. |

#### Be used with gases in groups:

- |           |          |
|-----------|----------|
| Group IIA | propane  |
| Group IIB | ethylene |
| Group IIC | hydrogen |

#### Having a temperature classification of:

- |    |       |
|----|-------|
| T1 | 450°C |
| T2 | 300°C |
| T3 | 200°C |
| T4 | 135°C |

### 3) Installation requirements

#### SPECIAL CONDITIONS FOR SAFE USE (as stated on the EC Type Examination Certificate SIRA 04ATEX2301X)

The equipment shall only be supplied via Terminals + w.r.t. Terminals – from a barrier having a maximum open circuit voltage  $U_o$  that is  $\leq 28$  V and a maximum short circuit current  $I_o$  that is  $\leq 93$  mA, where  $I_o$  is resistively limited. The barrier shall be ATEX certified by a notified body.

The total capacitance connected to terminals + wrt – (i.e. the capacitance of the cable plus any other capacitance) shall not exceed 83 nF.

The equipment has an ingress protection rating of IP66; however, if it has been supplied without a cable entry device, then the user shall ensure that the device that is fitted will provide an ingress protection that is appropriate to the environment in which it is installed i.e. IP20 or better.

The enclosure may be manufactured from cast aluminium. In rare cases, ignition sources due to impact and friction sparks could occur. This shall be considered during installation, particularly if the equipment is installed in an area requiring Equipment Protection Level Ga.

#### 3.1 Terminals + and –

Power is supplied to the sounder via the + and – terminals which have the following input safety parameters:

<b>U<sub>i</sub></b>	28V
<b>I<sub>i</sub></b>	93mA
<b>P<sub>i</sub></b>	660mW
<b>C<sub>i</sub></b>	0mA
<b>L<sub>i</sub></b>	0mA

The IS-D105 sounder may be powered from an ATEX certified Zener barrier or galvanic isolator which have output parameters equal to or less than 28V, 93mA and 660mW where  $I_o$  is resistively limited. The cable parameters stated on the selected Zener barrier or galvanic isolator certificate must be observed.

Up to three IS-D105 sounders can be connected in parallel and powered from a common barrier or isolator. Connecting two sounders in parallel will reduce the output from each by about 3dB. Three sounders should only be powered from a common supply when the maximum supply voltage is available.

#### 3.2 Terminals S2 and S3

When terminals S2 or S3 are connected to 0V (- terminal) the sounder output tone changes to the second or third stage alarm respectively. The input safety parameters for these terminals are:

U <sub>i</sub>	=	28V
I <sub>i</sub>	=	0mA

Because the permitted input current is zero, these terminals may only be connected to a diode return barrier, an intrinsically safe relay or a galvanic isolator, all of which must have been certified by an EC Notified Body. Only diode return barriers with a voltage drop of less than 0.9V may be used. Alternatively, these terminals may be connected directly to a mechanically activated switch within the hazardous area.

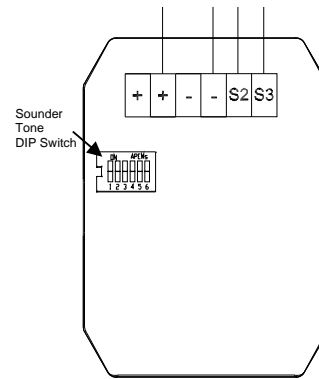


Fig 1 Simplified block diagram

### 3.3 Description

Fig 1 shows a simplified block diagram of an IS-D105 sounder. The device operates immediately when power is applied to the + and – terminals which are duplicated to allow a second sounder to be connected in parallel, or for an end of line monitoring resistor to be installed. The output tone is defined by the positions of the six internal switches and this tone can be changed to a second or third stage alarm tone by connecting terminals S2 or S3 to 0V. The tone generator is crystal controlled to ensure that when two sounders are started at the same time the output tones remain synchronised.

### 3.4 Supply Voltage

The IS-D105 sounder has been designed to operate in a hazardous area from a 24V dc supply via 28V 93mA resistive ATEX and IECEx certified Zener Barriers or Galvanic Isolators. The sounders may be tested or used in safe areas without a Zener barrier or galvanic isolator, but at supply voltages above 16V the internal current limit will function and therefore it is recommended that they are not operated continuously with a direct supply greater than 16V.

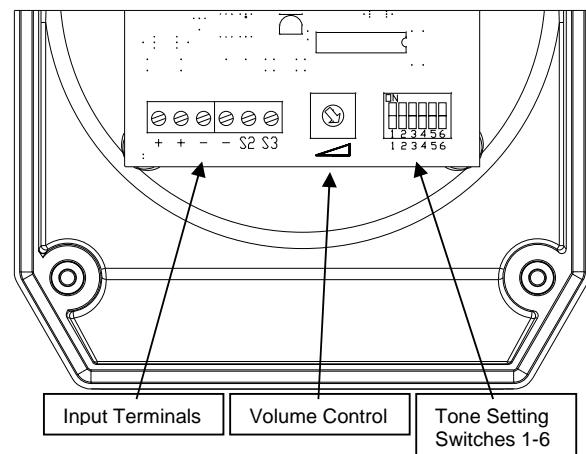


Fig 2 Location of field terminals and controls.

## 4) Installation

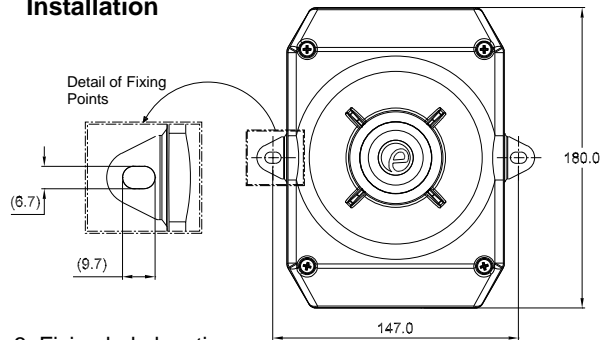


Fig 3 Fixing hole locations

IS-D105 sounders should only be installed by trained competent personnel.

### 4.1 Mounting

The IS-D105 sounder may be secured to any flat surface using the two M6, 147.0mm pitch fixing centres. The enclosure provides IP66 protection and is suitable for installation in exterior locations providing it is positioned so that water cannot collect in the horn, and the cable entry is sealed.

### 4.2 Installation procedure

- Secure the IS-D105 sounder to a flat surface via the two M6, 147.0mm pitch fixing centres in the mounting feet.
- Remove the front of the sounder by unscrewing the four captive screws and pulling the front away from the enclosure.
- Remove the PVC grommet and fit a 20mm cable gland or conduit entry into the hole in the enclosure and connect the field wiring to the appropriate sounder terminals as shown in section 6 and fig 2 of this manual. The power supply terminals + and - are duplicated so that sounders may be connected in parallel, or an end of line monitoring resistor may be fitted.
- Select the required output tone by positioning the 6-way DIP switch as shown in Table 1.0 and Fig 2.
- Apply power to the sounder and adjust the internal volume control to provide the required sound level.
- Replace the front of the sounder and tighten the four captive cover screws.

## 5) Electrical System Design For Installation In Hazardous Areas Using Zener Barriers

### 5.1 Single stage alarm

If the control switch is in the positive supply, or the power supply is being turned on and off, only a single channel Zener barrier is required as shown in Fig 3. This circuit may also be used if the sounder is being controlled by a mechanically activated switch on the hazardous area side of the barrier.

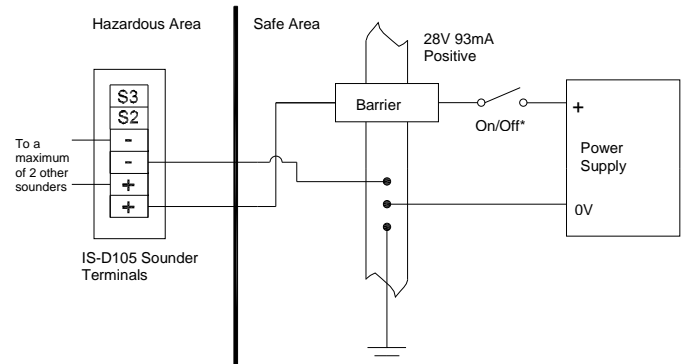


Fig 4 Single stage alarm using single channel barrier.

If the control switch must be in the negative supply, the circuit shown in Fig 4 may be used. Any diode return barrier certified Ex ia by a EC Notified Body may be used, providing its voltage drop is less than 0.9V.

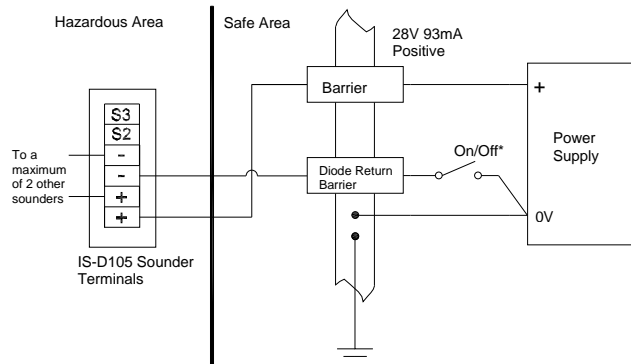


Fig 5 Single stage alarm using two channel barrier.

### 5.2 Multi-stage alarm

Connecting terminal S2 to 0V activates the second stage alarm, and similarly terminal S3 for the third stage alarm. Fig 5 shows how the diode return barriers may be used. If only two stages of alarm are required the third stage barrier should be omitted, the 28V 93mA barrier and the single diode return channel may then be contained in one package.

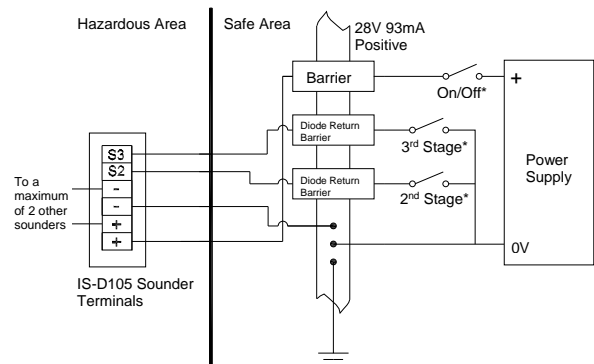


Fig 6 Multi stage alarm using Zener barriers.

## 6) Electrical System Design For Installation In Hazardous Areas Using Galvanic Isolators

Galvanic isolators although more expensive than Zener barriers, do not require a high integrity earth connection. For small systems where a high integrity earth is not already available, the use of galvanic isolators often reduces the overall installation cost and simplifies design.

### 6.1 Single stage alarm

The IS-D105 sounder may be powered by any galvanic isolator having output parameters within the limits specified in section 4.3, which has been certified Ex ia by an EC Notified Body. The sounder may be controlled by turning the galvanic isolator on and off, or by a mechanically activated switch on the hazardous area side of the isolator.

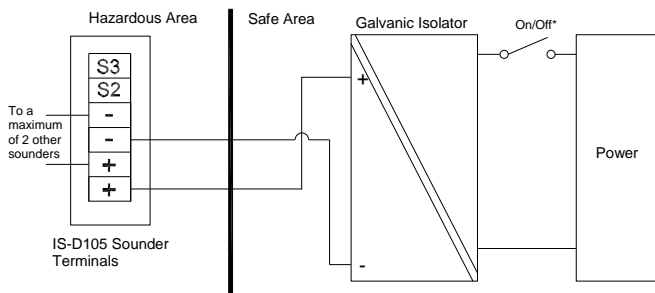


Fig 7 Single stage alarm using galvanic isolator.

### 6.2 Multi stage alarm

The IS-D105 sounder second and third stages may be activated by using Galvanically Isolated Relays that have output parameters within the limits specified in section 4.4, which have been certified Ex ia by an EC Notified Body.

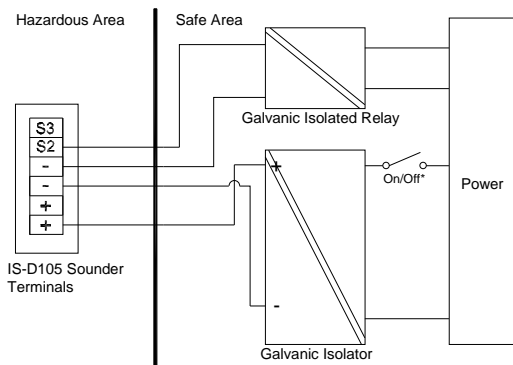


Fig 8 Multi stage alarm using galvanic isolated relays

## 7) Cable Parameters

The maximum permitted cable parameters are as specified on the certificate of the Zener barrier or galvanic isolator that has been selected for the installation. Normally the limits are not restrictive, but care should be taken not to exceed a capacitive limit of 83nF for installations when very long cables are used.

## 8) Volume Control

The output level of the IS-D105 sounder can be set by adjusting the volume control potentiometer (see Fig 2).

**Tone Selection** – To select the required first stage tone set the tone switches 1 to 6 (see Fig 2) to the tone setting shown in the table below. The table also shows which 2<sup>nd</sup> and 3<sup>rd</sup> stage tones are available for use with the selected first stage tone if more than one tone output stage is required.

Tone Number	Tone Description	Switch Settings	Second Stage Alarm	Third Stage alarm
		1 2 3 4 5 6		
Tone 1	Continuous 340Hz	0 0 0 0 0 0	Tone 2	Tone 5
Tone 2	Alternating 800/1000Hz @ 0.25s intervals	1 0 0 0 0 0	Tone 17	Tone 5
Tone 3	Slow whoop 500/1200Hz @ 0.3Hz with 0.5s gap repeated	0 1 0 0 0 0	Tone 2	Tone 5
Tone 4	Sweeping 500/1000Hz @ 1Hz	1 1 0 0 0 0	Tone 6	Tone 5
Tone 5	Continuous 2400Hz	0 0 1 0 0 0	Tone 3	Tone 20
Tone 6	Sweeping 2400/2900Hz @ 7Hz	1 0 1 0 0 0	Tone 7	Tone 5
Tone 7	Sweeping 2400/2900Hz @ 1Hz	0 1 1 0 0 0	Tone 10	Tone 5
Tone 8	Siren 500/1200/500Hz @ 0.3Hz	1 1 1 0 0 0	Tone 2	Tone 5
Tone 9	Sawtooth 1200/500Hz @ 1Hz - <i>D.I.N.</i>	0 0 0 1 0 0	Tone 15	Tone 2
Tone 10	Alternating 2400/2900Hz @ 2Hz	1 0 0 1 0 0	Tone 7	Tone 5
Tone 11	Intermittent 1000Hz @ 1Hz	0 1 0 1 0 0	Tone 2	Tone 5
Tone 12	Alternating 800/1000Hz @ 0.875Hz	1 1 0 1 0 0	Tone 4	Tone 5
Tone 13	Intermittent 2400Hz @ 1Hz	0 0 1 1 0 0	Tone 15	Tone 5
Tone 14	Intermittent 800Hz 0.25s ON, 1s OFF	1 0 1 1 0 0	Tone 4	Tone 5
Tone 15	Continuous 800Hz	0 1 1 1 0 0	Tone 2	Tone 5
Tone 16	Intermittent 660Hz 150Ns ON, 150ms OFF	1 1 1 1 0 0	Tone 18	Tone 5
Tone 17	Alternating 544Hz (100ms) / 440Hz (400ms) – <i>NFS 32-001</i>	0 0 0 0 1 0	Tone 2	Tone 27
Tone 18	Intermittent 660Hz 1.8s ON, 1.8s OFF	1 0 0 0 1 0	Tone 2	Tone 5
Tone 19	Sweep 1400Hz to 1600Hz up 1s 1600Hz to 1400Hz down 0.5s	0 1 0 0 1 0	Tone 2	Tone 5
Tone 20	Continuous 660Hz	1 1 0 0 1 0	Tone 2	Tone 5
Tone 21	Alternating 554/440Hz @ 1Hz	0 0 1 0 1 0	Tone 2	Tone 5
Tone 22	Intermittent 544Hz @ 0.875Hz	1 0 1 0 1 0	Tone 2	Tone 5
Tone 23	Intermittent 800Hz @ 2Hz	0 1 1 0 1 0	Tone 6	Tone 5
Tone 24	Sweeping 800/1000Hz @ 50Hz	1 1 1 0 1 0	Tone 29	Tone 5
Tone 25	Sweeping 2400/2900Hz @ 50Hz	0 0 0 1 1 0	Tone 29	Tone 5
Tone 26	Simulated bell	1 0 0 1 1 0	Tone 2	Tone 15
Tone 27	Continuous 554Hz	0 1 0 1 1 0	Tone 26	Tone 5
Tone 28	Continuous 440Hz	1 1 0 1 1 0	Tone 2	Tone 5
Tone 29	Sweeping 800/1000Hz @ 7Hz	0 0 1 1 1 0	Tone 7	Tone 5
Tone 30	Continuous 300Hz	1 0 1 1 1 0	Tone 2	Tone 5
Tone 31	Sweeping 660/1200 @ 1Hz	0 1 1 1 1 0	Tone 26	Tone 5
Tone 32	Two Tone Chime	1 1 1 1 1 0	Tone 26	Tone 15
Tone 33	Intermittent 745Hz	0 0 0 0 0 1	Tone 2	Tone 5
Tone 34	Alternating 1000/2000Hz @ 0.5s – <i>Singapore</i>	1 0 0 0 0 1	Tone 38	Tone 45
Tone 35	420Hz @ 0.625s - <i>Australian Alert</i>	0 1 0 0 0 1	Tone 36	Tone 5
Tone 36	500-1200Hz 3.75s / 0.25s - <i>Australian Evacuate</i>	1 1 0 0 0 1	Tone 35	Tone 5
Tone 37	Continuous 1000Hz	0 0 1 0 0 1	Tone 9	Tone 45
Tone 38	Continuous 2000Hz	1 0 1 0 0 1	Tone 34	Tone 45
Tone 39	Intermittent 800Hz 0.25s ON 1s OFF	0 1 1 0 0 1	Tone 23	Tone 17
Tone 40	Alternating 544Hz (100ms) / 440Hz (400ms) – <i>NFS 32-001</i>	1 1 1 0 0 1	Tone 31	Tone 27
Tone 41	Motor Siren – Slow rise to 1200Hz	0 0 0 1 0 1	Tone 2	Tone 5
Tone 42	Motor Siren – Slow rise to 800Hz	1 0 0 1 0 1	Tone 2	Tone 5
Tone 43	Continuous 1200Hz	0 1 0 1 0 1	Tone 2	Tone 5
Tone 44	Motor Siren – Slow rise to 2400Hz	1 1 0 1 0 1	Tone 2	Tone 5
Tone 45	Intermittent 1000Hz 1s ON, 1s OFF	0 0 1 1 0 1	Tone 38	Tone 34
Tone 46	Sawtooth 1200/500Hz @ 1Hz - <i>D.I.N. (PFEER P.T.A.P)</i>	1 0 1 1 0 1	Tone 47	Tone 37
Tone 47	Intermittent 1000Hz 1s ON, 1s OFF – <i>PFEER General Alarm</i>	0 1 1 1 0 1	Tone 46	Tone 37
Tone 48	420Hz @ 0.625s - <i>Australian Alert</i>	1 1 1 1 0 1	Tone 49	Tone 5
Tone 49	500-1200Hz 3.75s / 0.25s - <i>Australian Evacuate</i>	0 0 0 0 1 1	Tone 26	Tone 37