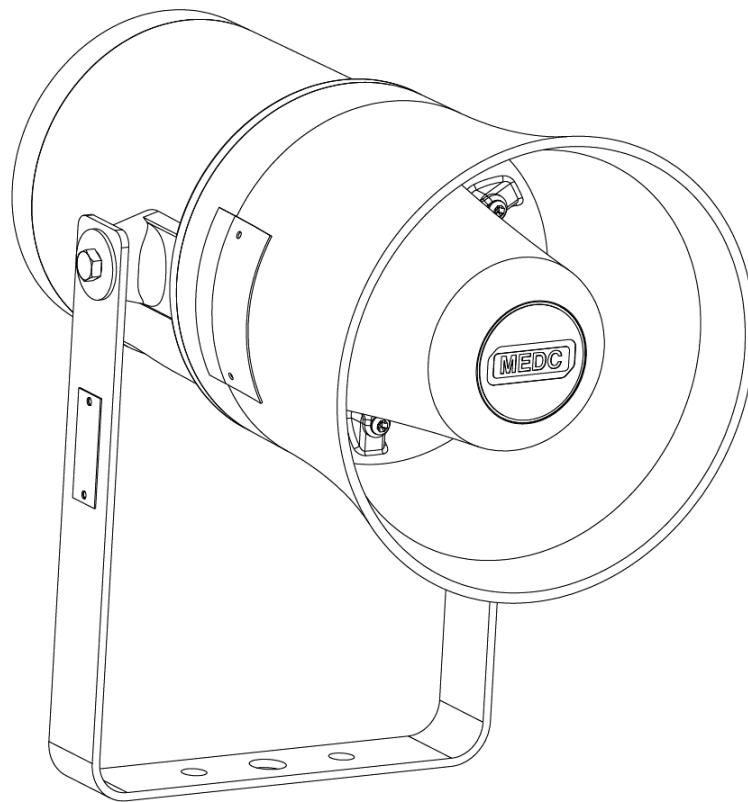




Technical Manual for the Speaker DB4



Please note that every care has been taken to ensure the accuracy of our technical manual. We do not, however, accept responsibility for damage, loss or expense resulting from any error or omission. We reserve the right to make alterations in line with technical advances and industry standards.

1.0 INTRODUCTION

This range of loudspeakers, intended for use in potentially explosive gas and dust atmospheres, has a power rating of up to 25 watts and is suitable for use in all gas groups including hydrogen.

The flamepaths, flare and the body are manufactured completely from a UV stable glass reinforced polyester. Stainless steel screws and sinter are incorporated thus ensuring a corrosion free product. A tapered Flamepath is used to overcome the problems of assembly of parallel spigot flamepaths.

2.0 INSTALLATION

General

When installing and operating explosion-protected equipment, requirements for selection, installation and operation should be referred to eg. IEC60079-14 worldwide and the 'National Electrical Code' in North America. Additional national and/or local requirements may apply.

Ensure that all nuts, bolts and fixings are secure.

Ensure that only the correct listed or certified stopping plugs are used to blank off unused gland entry points and that the NEMA/IP rating of the unit is maintained. MEDC recommend the use of a sealing compound such as HYLOMAR PL32 on the threads of glands and stopping plugs in order to maintain the IP rating of the unit.

The unit mounts via 2 off $\text{Ø}23/64''$ ($\text{Ø}9\text{mm}$) mounting holes in the 'U' shaped stirrup / mounting bracket. The holes have been designed to accept an M8 screw or bolt. If required the unit can be initially placed using the $\text{Ø}1/2''$ ($\text{Ø}13\text{mm}$) central hole in the mounting bracket. The unit can then be rotated into the correct orientation and fixed via the other two holes.

When the unit is fixed in the required position, it's alignment can be adjusted by loosening the two M6 screws which fasten the mounting bracket to the speaker. The speaker can then be adjusted to the required position and the screws tightened. The unit should be positioned such that dust/debris or water cannot settle in the re-entrant horn.

MEDC recommend the use of stainless steel screws.

Cable Termination

CAUTION: Before removing the cover assembly, ensure that the power to the unit is isolated.

General

The cover is secured with 6 off M5 cover screws (4.0mm A/F hexagon key). Once the cover fixings are unscrewed, twist the cover assembly gently clockwise and anti-clockwise, whilst pulling it away from the base. Remove to gain access to the interior.

Ensure all non-captive fixings are kept in a safe accessible location during cable termination.

Cable termination should be in accordance with specifications applying to the required application. MEDC recommends that all cables and cores should be correctly identified. Please refer to the wiring diagram provided with the product.

Ensure that only the correct listed or certified cable glands are used and that the assembly is shrouded and correctly earthed.

All cable glands should be of an equivalent NEMA/IP rating to that of the speaker and integrated with the unit such that this rating is maintained.

The internal earth terminal, where fitted, must be used for the equipment grounding connection and the external terminal is for a supplementary bonding connection where local codes or authorities permit or require such a connection.

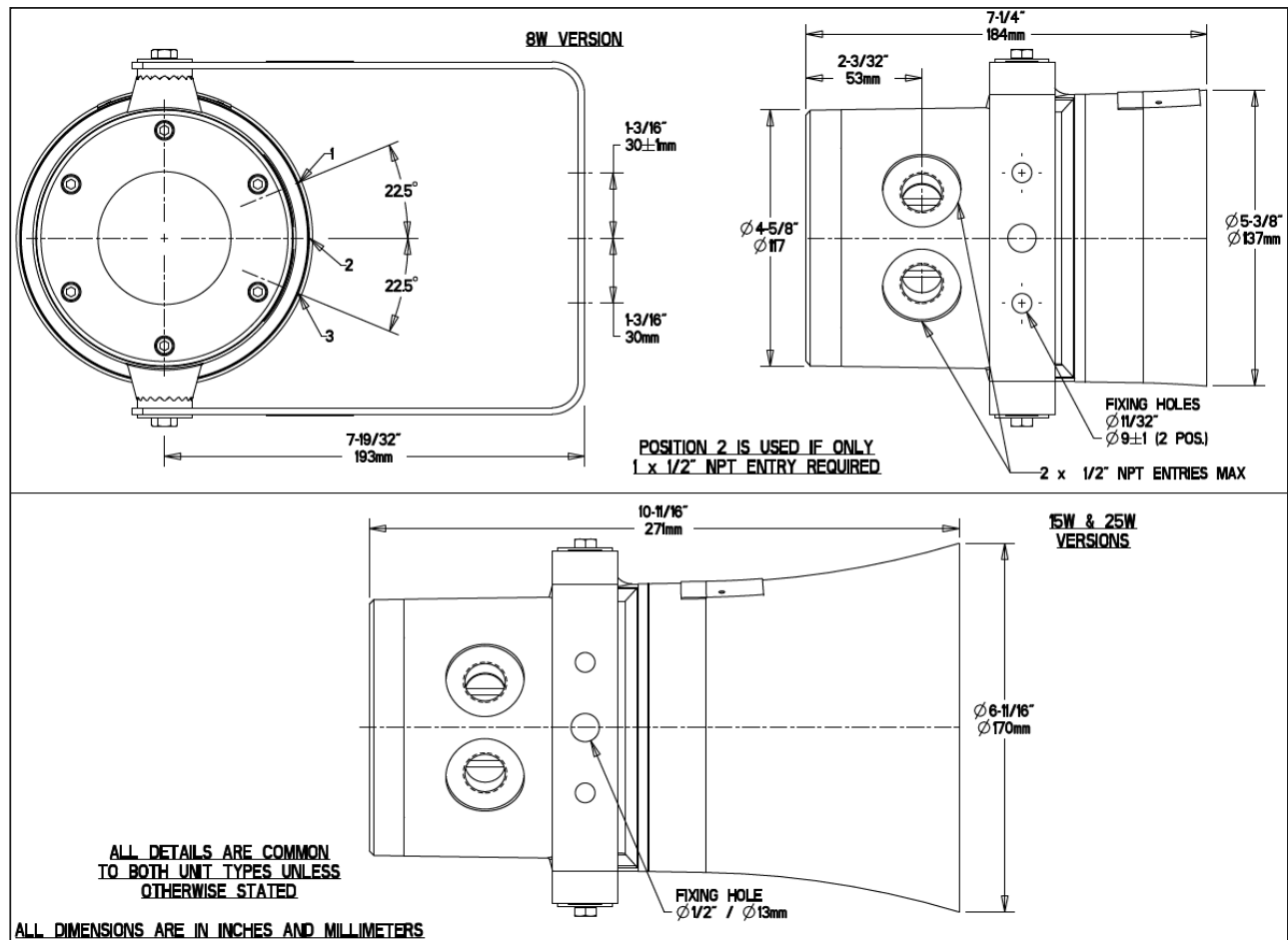
Once termination is complete, carefully replace the cover assembly back onto the body, avoiding damage to the mating surfaces. Replace the cover screws into the holes in the cover assembly and tighten evenly. Ensure the O-ring is seated correctly on the cover during re-assembly. Ensure the required maximum gap of 0.15mm is maintained between the cover and the base once assembled.

3.0 OPERATION

The operating voltage of the unit is stated on the unit label. The speaker is available in 3 standard wattage ratings from 8 watts to 25 watts. Different sound levels can be obtained by selecting the transformer tapings in the unit. See table below for details.

Transformer Tappings	Power (W)		
	25W	15W	8W
1:2	25.0	15.0	8.0
2:3	12.5	7.5	4.0
3:4	6.0 </td <td>5.0</td> <td>2.0</td>	5.0	2.0
1:3	4.0	4.0	1.5
2:4	2.0	2.0	0.7
1:4	1.0	0.8	0.4

GENERAL ARRANGEMENT



4.0 MAINTENANCE

During the working life of the unit, it should require little or no maintenance. GRP will resist attack by most acids, alkalis and chemicals and is as resistant to concentrated acids and alkalis as most metal products. However, if abnormal or unusual environmental conditions occur due to plant damage or accident etc., then visual inspection is recommended.

If the unit requires cleaning, then only clean exterior with a damp cloth to avoid electro-static charge build up. Repairs should be undertaken by returning the unit to MEDC or by an authorised repairer of Ex equipment. If a unit fault should occur, then the unit can be repaired by MEDC. All parts of the unit are replaceable. If you acquired a significant quantity of units, then it is recommended that spares are also made available. Please discuss your requirements with the Technical Sales Engineers at MEDC.

5.0 CERTIFICATION/APPROVALS

Please refer to the marking on the unit for specific approval details

UL listed for use in USA (USL) and Canada (CNL) Class I, Zone 1, AExd IIC T4
Class 1, Div. 2, Groups A, B, C & D
Class II, Div. 2, Groups F & G

UL Standards UL 1480, UL60079-0, UL60079-1, CSA E60079-0, CSA E60079-1

6.0 FUNCTIONAL SAFETY

Introduction

The DB4 Speaker has been designed for use in potentially explosive atmospheres and harsh environmental conditions. The glass reinforced polyester enclosures are suitable for use offshore or onshore, where light weight combined with corrosion resistance is required.

The FMEDA has considered the worst case scenario which includes the Exe Chamber on the rear.

The safety function of the Speaker is to provide an audible warning when required.

Under No fault (Normal) Operating conditions the DB4 Speaker will provide an audible warning when required.

Under fault conditions the failure mode of the Speaker is a failure to provide an audible warning sound. For the failure rate associated with this failure mode please refer to the table below.

Assessment of Functional Safety

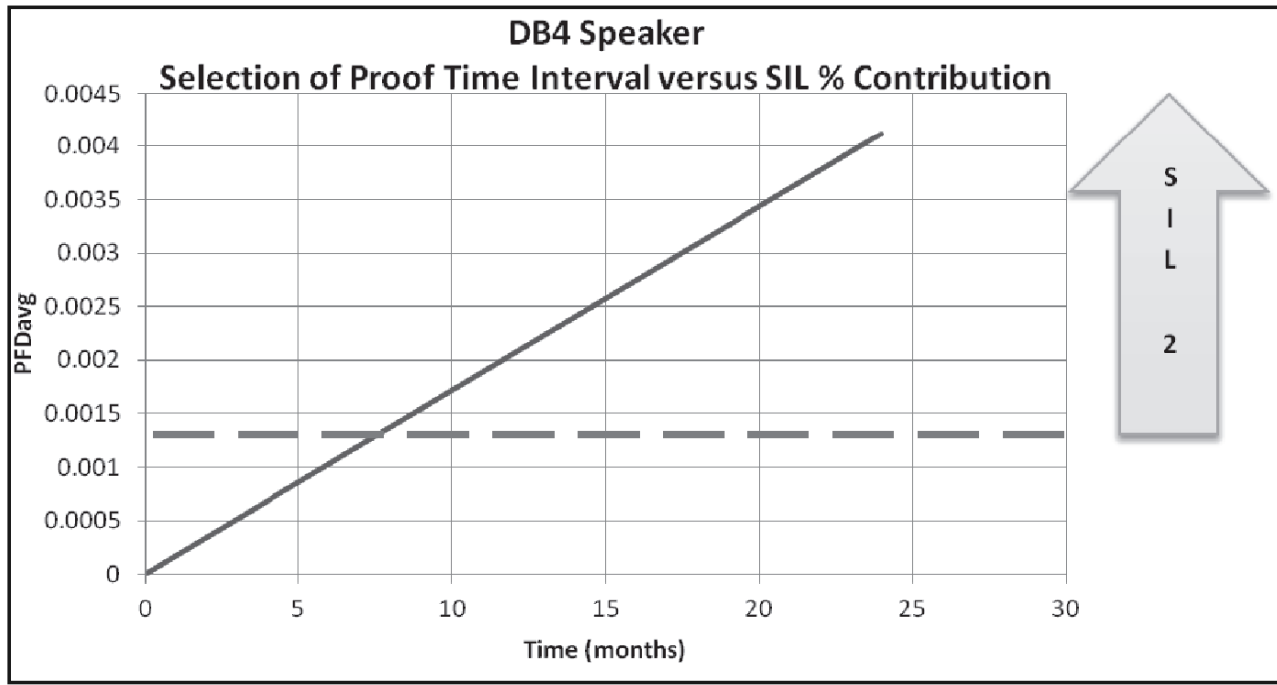
The DB4 Speaker is intended for use in a safety system conforming to the requirements of IEC61508.

Sira Test & certification Ltd has conducted a Failure Modes Effect and Diagnostic Analysis (FMEDA) of the DB4 Speaker unit against the requirements of IEC61508-2 using a proof test interval of 8760hrs.

The DB4 Speaker is classed as a Type A device.

PROVEN IN USE SUMMARY TABLE

DB4 SPEAKER			
Safety Function of the DB4 Speaker: <i>To provide an audible warning sound when required</i>			
Architectural constraints:	Type A HFT=0 SFF = 85.00%	Proof Test Interval =8760Hrs MTTR = 8 Hrs	SIL2
Random hardware failures:	$\lambda_{DD} = 0$ $\lambda_{DU} = 4.70E-07$	$\lambda_{SD} = 0$ $\lambda_{SU} = 2.86E-06$	
Probability of failure on demand:	PFD _{AVG} = 2.06E-03 (Low Demand Mode)		SIL2
Probability of Dangerous failure on safety function:	PFH = 4.70E-07 (High Demand Mode)		SIL2
Hardware safety integrity compliance	Route 1 _H		
Systematic safety integrity compliance	Route 1 _S		
Systematic Capability	SC2		
Overall SIL-capability achieved	SIL 2 (Low Demand) SIL 2 (High Demand)		



Conditions of Safe Use

The following conditions apply to the installation, operation and maintenance of the assessed equipment. Failure to observe these may compromise the safety integrity of the assessed equipment:

1. The user shall comply with the requirements given in the manufacturer's user documentation (This Safety Manual and Technical manual) in regard to all relevant functional safety aspects such as application of use, installation, operation, maintenance, proof tests, maximum ratings, environmental conditions, repair, etc;
2. Selection of this equipment for use in safety functions and the installation, configuration, overall validation, maintenance and repair shall only be carried out by competent personnel, observing all the manufacturer's conditions and recommendations in the user documentation.
3. **All information associated with any field failures of this product should be collected under a dependability management process (e.g., IEC 60300-3-2) and reported to the manufacturer.**
4. The unit should be tested at regular intervals to identify any malfunctions; in accordance with this safety manual.

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