TECHNIS

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CERTIFICATE of RELIABILITY and FUNCTIONAL SAFETY

This is to certify that

The **Horizon DAS – Monitoring System** provided by **Bandweaver Technology Ltd, Clasford Farm Unit 22, Aldershot Road, Guildford GU3 3HQ, UK** has been assessed and is considered suitable for use **in low and high demand** safety functions:

- **As an unvoted item (ie hardware fault tolerance of 0) at SIL 1**
- **As a voted item (ie hardware fault tolerance of 1) at SIL 2**

This claim is based on FMEDA in respect of random hardware failures and architectural constraints (ie safe failure fraction). It is based on the assumptions and recommendations given in Technis Report T993 (Issue 2.0). The product was assessed against the failure modes:

- **Failure to deliver a defined IEC104 signal in response to a valid acoustic condition**
- **A Spurious IEC104 signal despite no acoustic change**

The product includes the following:

- Printed boards & fibre cable as defined in report T993 Issue 2.0

The assessment was carried out having regard to the guidance in IEC 61508 [2010] and the related body of guidance in respect of Random Hardware Failures and Architectural Constraints [route 1_H]

Integrity in respect of fail to detect	**SIL 1**	**SIL 2**
Total Failure Rate	15.2 pmh	
"hazardous" failure rate (revealed)	7.40 pmh	
"hazardous" failure rate (unrevealed)	3.66 pmh	
"hazardous" failure rate (total)	11.06 pmh = **$9.7\ 10^{-2}$ pa**	0.125 pmh =**$1.1\ 10^{-3}$ pa**
"safe" failure rate (revealed)	1.62 pmh	
"safe" failure rate (unrevealed)	0	
Diagnostic Coverage	>66%	>66%
System Type	B	B
Hardware Fault Tolerance	**0**	**1**
Safe Failure Fraction	>71%	>71%
PFD (hazardous failure)	**1.6×10^{-2}**	**2.6×10^{-4}**
Proof Test Interval	Up to 1 year	Up to 1 year

The validity of this certificate requires that: The product is used in accordance with any assumptions, limitations or intervals stipulated in the underpinning reliability/integrity report. The product build state continues to conform to the drawings and issues quoted in the underpinning reliability/integrity report. The product is used having regard to the instructions, limitations of use, intervals etc as outlined in the manufacturer's Safety Manual. The manufacturer maintains a credible level of Functional Safety Management in respect of (for example) design configuration control, procurement, manufacturing and defect analysis. The certificate will not apply to any product variation/modification or to the use of functions not addressed in the original study. It is recommended that the design, defect records and the company FSM procedure are reviewed, at least every 2 years, and should any changes have occurred since the original certification then the manufacture should contact Technis to request re-certification.

Signed:.....(Certificate No T993-183.1) – 6 Sept 2022)

Dr David J. Smith BSc,PhD,CEng,FIEE,FIQA,HonFSaRS,MIGasE

This certificate does not warrant fitness for any specific applications related purpose and is based on probabilistic and statistical assessment