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CERTIFICATE of RELIABILITY and FUNCTIONAL SAFETY

This is to certify that

The **BExS110D, BExS110E, BExS120D, BExS120E**, range (including DS range) of dc Sounders provided by **European Safety Systems, Impress House, Mansell Road, London W3 7QH UK**. has been assessed and is considered suitable for use in a low demand safety function:

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

This claim is in respect of random hardware failures and architectural constraints (ie safe failure fraction). The assessment was based on the assumptions, proven-in-use data provided, and recommendations given in Technis Report T746 (Issue 1.1). The product was assessed against the failure modes:

- **Failure respond to an input with a correct tone**
- **Failure respond to an input even with a an alternative tone**
 - **Spurious sound output despite no input**

The products include the following:

- **BExS110D, BExS110E, BExS120D, BExS120E**
- **BExDS110D, BExDS110E, BExDS120D, BExDS120E**

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]**

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 T746[1.1]-040) – 22 October 2014)

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

BEx 110D&E (Correct tone needed)

Integrity in respect of failure to release	SIL 2
Total Failure Rate	0.304 pmh
“hazardous” failure rate (revealed)	0.233 pmh
“hazardous” failure rate (unrevealed)	0.017 pmh
“safe” failure rate (revealed)	0
“safe” failure rate (unrevealed)	0
Diagnostic Coverage	93%
System Type	B
Hardware Fault Tolerance	0
Safe Failure Fraction	>93%
PFD (hazardous failure)	9.4 x10 ⁻⁵ —
Proof Test Interval	Up to 1 week

BEx 110D&E (Total failure)

Integrity in respect of failure to release	SIL 2
Total Failure Rate	0.304 pmh
“hazardous” failure rate (revealed)	0.235 pmh
“hazardous” failure rate (unrevealed)	0.005 pmh
“safe” failure rate (revealed)	0.01
“safe” failure rate (unrevealed)	0
Diagnostic Coverage	98%
System Type	B
Hardware Fault Tolerance	0
Safe Failure Fraction	>98%
PFD (hazardous failure)	2.0 x10 ⁻⁵
Proof Test Interval	Up to 1 week

BEx 120D&E (Correct tone needed)

Integrity in respect of failure to release	SIL 2
Total Failure Rate	0.304 pmh
“hazardous” failure rate (revealed)	0.242 pmh
“hazardous” failure rate (unrevealed)	0.018 pmh
“safe” failure rate (revealed)	0
“safe” failure rate (unrevealed)	0
Diagnostic Coverage	93%
System Type	B
Hardware Fault Tolerance	0
Safe Failure Fraction	>93%
PFD (hazardous failure)	9.1 x10 ⁻⁵
Proof Test Interval	Up to 1 week

BEx 120D&E (Total failure)

Integrity in respect of failure to release	SIL 2
Total Failure Rate	0.304 pmh
“hazardous” failure rate (revealed)	0.245 pmh
“hazardous” failure rate (unrevealed)	0.005 pmh
“safe” failure rate (revealed)	0
“safe” failure rate (unrevealed)	0
Diagnostic Coverage	98%
System Type	B
Hardware Fault Tolerance	0
Safe Failure Fraction	>98%
PFD (hazardous failure)	3.8 x10 ⁻⁵
Proof Test Interval	Up to 1 week