



## ENGINEERING SAFETY CONSULTANTS

*The Global Provider of Functional Safety Expertise and Technical Consultancy*

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# Random Hardware Reliability and Systematic Assessment Certificate

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### ***Functional Safety of Safety-Related Programmable Electronic Systems***

The **Delta Mobrey, Hydrastep 2468 Electronic Gauging System (Model 2468CA/CC\*\* – Single Input (I/P) Board and Model 2468CB/CD/CE\*\* – Dual I/P Board) using a 4-20mA or relay output** have been assessed and are considered capable for use in a low demand Safety Function up to (and including) SIL 1 or SIL 2, with respect to random hardware failures, architectural constraints and systematic capability.

The assessment was based on the assumptions, data provided, and recommendations given in:

- **Engineering Safety Consultants Ltd Report: K066\_FM001 rev. 2;**
- **Single I/P FMEDA: Hydrastep Single Input Board FMEDA (With 4-20mA Output), Revision: 3, Date: 15/03/2022;**
- **Dual I/P Board FMEDA: Hydrastep Dual Input Board FMEDA (With 4-20mA Output), Revision: 4, Date: 15/03/2022;**
- **Single I/P FMEDA: Hydrastep Single Input Board FMEDA (With Relay Card), Revision: 1, Date: 20/09/2022;**
- **Dual I/P FMEDA: Hydrastep Dual Input Board FMEDA (With Relay Card), Revision: 1, Date: 06/09/2022.**

The products were assessed against the following failure modes:

- **Failure to provide a 4-20mA output to enable shutdown of the system;**
- **Failure of provide a relay output to enable shutdown of the system.**

The assessment was carried out to determine compliance with IEC 61508 (2010 Edition) with regards to:

- SIL 1 with a HFT = 0 (No Proof Test) via Route 1H;
- SIL 2 with a HFT = 0 (With Proof Test) via Route 1H;
- Architectural Constraint (Type B, SFF 90%, ≤99%);
- Systematic Capability of SIL 2 against IEC 61511 (2016 Edition) Prior Use.

Note: The entire SIL of an entire SIF (sensor, logic solver and final element subsystems) must be verified to calculate the required PFD / PFH, considering any redundancy, Proof Test Interval (PTI), Proof Test Coverage (PTC), Mission Time and Mean Time To Restoration (MTTR) for all elements included in the SIF. Each subsystem should be verified to ensure compliance with the minimum HFT requirements.

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The assessment results are as follows:

Model	$\lambda$ SD (/hr)	$\lambda$ SU (/hr)	$\lambda$ DU (/hr)	$\lambda$ DD (/hr)	DC	SFF	Type	Estimated SIL Capability
2468CA/CC** – Single I/P (No Proof Test) with 4-20mA output	2.2E-07	7.5E-08	2.2E-07	2.0E-06	89.9%	91.1%	B	SIL 1
2468CA/CC** – Single I/P (Partial Proof Test) with 4-20mA output	2.8E-07	2.9E-09	4.4E-08	2.1E-06	98.0%	98.2%	B	SIL 2
2468CA/CC** – Single I/P (Complete Proof Test) with 4-20mA output	2.4E-07	0.0E+00	4.1E-08	2.2E-06	98.2%	98.4%	B	SIL 2
2468CB/CD/CE** – Dual I/P (No Proof Test) with 4-20mA output	7.6E-07	6.1E-08	1.4E-07	3.3E-06	95.9%	96.7%	B	SIL 1
2468CB/CD/CE** – Dual I/P (Partial Proof Test) with 4-20mA output	4.7E-07	2.3E-08	1.1E-07	3.6E-06	97.1%	97.5%	B	SIL 2
2468CB/CD/CE** – Dual I/P (Complete Proof Test) with 4-20mA output	5.0E-07	0.0E+00	7.8E-08	3.7E-06	98.0%	98.2%	B	SIL 2
2468CA/CC** – Single I/P (No Proof Test) with Relay output	2.2E-07	7.6E-08	2.2E-07	2.6E-06	92.2%	92.9%	B	SIL 1
2468CA/CC** – Single I/P (Partial Proof Test) with 4Relay output	2.8E-07	3.7E-09	4.4E-08	2.8E-06	98.4%	98.6%	B	SIL 2
2468CA/CC** – Single I/P (Complete Proof Test) with Relay output	2.4E-07	8.4E-10	4.2E-08	2.8E-06	98.6%	98.7%	B	SIL 2
2468CB/CD/CE** – Dual I/P (No Proof Test) with Relay output	4.5E-07	6.0E-08	1.4E-07	4.9E-06	97.1%	97.4%	B	SIL 1
2468CB/CD/CE** – Dual I/P (Partial Proof Test) with Relay output	4.8E-07	2.5E-08	1.1E-07	4.9E-06	97.8%	98.0%	B	SIL 2
2468CB/CD/CE** – Dual I/P (Complete Proof Test) with Relay output	5.1E-07	1.7E-09	8.6E-08	4.9E-06	98.3%	98.4%	B	SIL 2

**IMPORTANT:** It should be noted that this assessment does not include confirmation of the response time of the device. For response times (along with any relevant assumptions) reference should be made to the Safety Manual of each device and the total SIF response time **MUST** be compared against the process safety time for the specific application.

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Managing Director: Simon Burwood  
Assessment Date: March 2022  
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