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IEC 61508 Functional Safety Capability Statement

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

Manufacturer:	Delta Mobrey Hudson House, Albany Park, Camberley GU16 7PL, UK
Product:	Hydrastep 2468 Electronic Gauging System
Model:	2468CA/CC** – Single I/P Board (using a 4-20mA or relay output) 2468CB/CD/CE** – Dual I/P Board (using a 4-20mA or relay output)

Application:	Low Demand Mode Safety Instrumented Function
Safety Function:	Upon detection of inability to provide a 4-20mA or relay output, shutdown of system is initiated (Logic solver and final element subsystems not part of this analysis)
Applied standard:	IEC 61508 Ed2 2010 Parts 1-3 & IEC 61511 Ed1
Systematic Capability:	Suitable up to SIL 2
Applicable report:	Environmental Resources Management Ltd Report: K066_FM001 rev. 4 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

Assessment Route:	1_H
Hardware Fault Tolerance:	0
Type:	B
Application restrictions:	Applicable to the following operating conditions: top electrodes in steam, bottom electrodes in water

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Model No.	λDU (/hr)	λDD (/hr)	λSD (/hr)	λSU (/hr)	DC	SFF	SIL AC (HFT = 0)	SIL SC
2468CA/CC** – Single I/P (No Proof Test) with 4-20mA output	2.2E-07	2.0E-06	2.2E-07	7.5E-08	89.9%	91.1%	SIL 1	SC 1
2468CA/CC** – Single I/P (Partial Proof Test) with 4-20mA output	4.4E-08	2.1E-06	2.8E-07	2.9E-09	98.0%	98.2%	SIL 2	SC 2
2468CA/CC** – Single I/P (Complete Proof Test) with 4-20mA output	4.1E-08	2.2E-06	2.4E-07	0.0E+00	98.2%	98.4%	SIL 2	SC 2
2468CB/CD/CE** – Dual I/P (No Proof Test) with 4-20mA output	1.4E-07	3.3E-06	7.6E-07	6.1E-08	95.9%	96.7%	SIL 1	SC 1
2468CB/CD/CE** – Dual I/P (Partial Proof Test) with 4-20mA output	1.1E-07	3.6E-06	4.7E-07	2.3E-08	97.1%	97.5%	SIL 2	SC 2
2468CB/CD/CE** – Dual I/P (Complete Proof Test) with 4-20mA output	7.8E-08	3.7E-06	5.0E-07	0.0E+00	98.0%	98.2%	SIL 2	SC 2
2468CA/CC** – Single I/P (No Proof Test) with Relay output	2.2E-07	2.6E-06	2.2E-07	7.6E-08	92.2%	92.9%	SIL 1	SC 1
2468CA/CC** – Single I/P (Partial Proof Test) with 4Relay output	4.4E-08	2.8E-06	2.8E-07	3.7E-09	98.4%	98.6%	SIL 2	SC 2
2468CA/CC** – Single I/P (Complete Proof Test) with Relay output	4.2E-08	2.8E-06	2.4E-07	8.4E-10	98.6%	98.7%	SIL 2	SC 2
2468CB/CD/CE** – Dual I/P (No Proof Test) with Relay output	1.4E-07	4.9E-06	4.5E-07	6.0E-08	97.1%	97.4%	SIL 1	SC 1

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Model No.	λDU (/hr)	λDD (/hr)	λSD (/hr)	λSU (/hr)	DC	SFF	SIL AC (HFT = 0)	SIL SC
2468CB/CD/CE** – Dual I/P (Partial Proof Test) with Relay output	1.1E-07	4.9E-06	4.8E-07	2.5E-08	97.8%	98.0%	SIL 2	SC 2
2468CB/CD/CE** – Dual I/P (Complete Proof Test) with Relay output	8.6E-08	4.9E-06	5.1E-07	1.7E-09	98.3%	98.4%	SIL 2	SC 2

SIL AC (Architectural Constraints): Represents the maximum allowable SIL of each hardware element, assuming Hardware Fault Tolerance (HFT) = 0.

SIL SC (Systematic Capability): A measure of confidence (expressed on a scale of SC 1 to SC 4) of the confidence that the systematic safety integrity of a device meets the requirements of the specified SIL.

It should be noted that for a device to claim compliance with a specified SIL, the SIL AC and SC of the device needs to both be met. In addition to this, the required Average Probability of Failure on Demand (PFDavg) value for the complete Safety Instrumented Function (SIF) needs to adhere to the SIL PFDavg ranges.

IMPORTANT: It should be noted that this assessment considers only 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 and does not include confirmation of the response time of the device(s).

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 mode safety function up to (and including) SIL 2 with regards to random hardware failures, architectural constraints and systematic capability.

Note 1: The SIL of a complete SIF (sensor, logic solver and final element subsystems) must be verified to calculate the required Probability of Failure on Demand (PFD) / Probability of Failure per Hour (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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