CERTIFICATE

E+H 1009074 P0012 C01

exida Certification S.A. hereby confirms that the

Liquicap M FMI 51/52 FEI50H Level Transmitter

Endress+Hauser GmbH + Co KG

Maulburg, Germany

Has been assessed according to the relevant requirements of

IEC 61508:2000

Parts 1 - 3, and meets requirements providing a level of integrity to

Systematic Integrity :   SIL 2 Capable
Random Integrity :   SIL 2 @ HFT=0

Safety Function

The Liquicap M will measure level within the stated safety accuracy and indicate an output.

Application Restrictions

The unit must be properly designed into a Safety Instrumented Function per the requirements in the Safety Manual.

Assessor   Certifying Assessor

Date: 12 November 2010

exida Certification SA, Nyon, Switzerland

Systematic Integrity: SIL 2 Capable

SIL 2 Capability

The product has met manufacturer design process requirements of Safety Integrity Level (SIL) 3. These are intended to achieve sufficient integrity against systematic errors of design by the manufacturer. A Safety Instrumented Function (SIF) designed with this product must not be used at a SIL level higher than the statement without "prior use" justification by end user or diverse technology redundancy in the design.

For a Liquicap M used in final element assembly, SIL must also be verified for the specific application using the following failure data:

Random Integrity: SIL 2 @ HFT=0

Summary for the Liquicap M
Type B device
IEC61508 failure rates

Failure category	Failure rates in FIT=10^{-9}/h
Fail Dangerous Detected	695
Fail detected (internal diagnostic)	628
Fail low (deteced by the logic solver)	39
Fail High (deteced by the logic solver)	28
Fail Dangerous Undeteced	75
No Effect	116
Announciation Undetected	2
Not Part	111

DD – Output does not indicate level within safety accuracy but failure detected by automatic diagnostics.
Det. – Internal fault detected by automatic diagnostics, output goes to state defined by jumper setting
H – Output goes to high saturation current level
L – Output goes to low saturation current level
DU – Output does not indicate level within safety accuracy and undetected by internal automatic diagnostics
AU – Internal failure of diagnostics
NE – No effect of safety function or automatic diagnostics

SIL Verification:

The Safety Integrity Level (SIL) of an entire Safety Instrumented Function (SIF) must be verified via a calculation of PFD_{AVG} considering redundant architectures, proof test interval, proof test effectiveness, any automatic diagnostics, average repair time and the specific failure rates of all products included in the SIF. Each subsystem must be checked to assure compliance with minimum hardware fault tolerance (HFT) requirements.

The following documents are mandatory parts this certificate:
E+H 03-03-22 R045 V1R4 Assessment report.
Safety manual SD198FEN_1007

The holder of this certificate
may use this mark.

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