DECLARATION OF CONFORMITY

REV1
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The LOREME society declare under our sole responsibility, that the following product :

Designation: **Analog threshold relay**

Type: **DSL1-35mA-NUC**

N° de revision : 0 date : 18/01/2016

Can be used for functional safety application up to SIL3 according to standard IEC61508-2 : 2000 respecting the safety instructions specified in the safety manual.

The assessment of the safety critical and dangerous random errors lead to the following parameters :

Device with type A components, hardware fault tolerance HFT = 0

λ safe	λ dangerous detected	λ dangerous undetected = PFH	**SFF (1)**	**DC**	**PFDavg T[Proof] = 1 an**	**PFH**
61 $FIT_{(2)}$	213 $FIT_{(2)}$	17 $FIT_{(2)}$	94.0 %	92.4%	$7.44E^{-05}$	$1.7E^{-08}$ 1/h

(1) ***according to FMEA DSL1-35mA-nuc rev0*** *established with "ALD MTBF calculator" : http://www.aldservice.com/ standard : CEI 62380 2004-08*

(2) ***FIT = Failure rate (1/h)***

Metz, le : 18/01/2016

Signed on behalf of LOREME ; M. Dominique Curulla

Annexe : Terms and definitions

The International Electrotechnical Commission's (IEC) standard IEC 61508 defines SIL. The SIL notions are repeated in standard derivative of IEC61508 like IEC61511 related to instrumented system (SIS) for process and the IEC 62061 related to the system with programmable electronic for machines. To achieve a safety application, first evaluate the risk (dangerousness, frequency of occurrence), to define the level of safety: the SIL level. SIL defines the reliability level of SIS. There are two methods to calculated SIL, depending on whether the security system is operating in low demand or whether it operates continuously or at high load. There are 4 level of SIL (SIL1 to SIL4). More than SIL level is high, more the availability of safety system is high.

For the **safety system operating in low demand**, we talk about probability of failure on demand PFD_{avg} in a 10 years period. Following the relationship between the SIL and the PFD_{avg}
SIL 4 : PFDavg between 10^{-5} and 10^{-4}
SIL 3 : PFDavg between 10^{-4} and 10^{-3}
SIL 2 : PFDavg between 10^{-3} and 10^{-2}
SIL 1 : PFDavg between 10^{-2} and 10^{-1}

For the **safety system operating in high load demand** or in continuous operation, we talk about probability of dangerous failure per hour PFF. Following the relationship between the SIL and the PFF
SIL 4 : PFF between 10^{-9} and 10^{-8}
SIL 3 : PFF between 10^{-8} and 10^{-7}
SIL 2 : PFF between 10^{-7} and 10^{-6}
SIL 1 : PFF between 10^{-6} and 10^{-5}

SIL	PFD Low demand mode	PFH High demand or continuous mode	Risk reduction
4	≥ 10^{-5} to < 10^{-4}	≥ 10^{-9} to < 10^{-8}	10 000 - 100 000
3	≥ 10^{-4} to < 10^{-3}	≥ 10^{-8} to < 10^{-7}	1 000 - 10 000
2	≥ 10^{-3} to < 10^{-2}	≥ 10^{-7} to < 10^{-6}	100 - 1 000
1	≥ 10^{-2} to < 10^{-1}	≥ 10^{-6} to < 10^{-5}	10 - 100

Abbreviation	Description
HFT	Hardware Fault Tolerance, capability of a functional unit to continue the execution of the demanded function when faults or anomalies exist.
MTBF	Mean interval between two failures
MTTR	Mean interval between the occurrence of the failure in a device or system and its repair
PFD	Probability of dangerous safety function failures occurring on demand
PFDavg	Average probability of dangerous safety function failures occurring on demand
SIL	Safety Integrity Level, the international standard IEC 61508 defines four discrete safety integrity levels (SIL1 to SIL4). Each level corresponds to a specific probability range with respect to the failure of a safety function. The higher the integrity level of the safety-related system, the lower the probability that the requested functions will not perform.
SFF	Safe Failure Fraction, the proportion of failures without the potential to put the safety-related system into a dangerous or impermissible functional state.
TProof	In accordance with IEC 61508-4, chapter 3.5.8, TProof is defined as the periodic testing to detect failures in a safety-related system.
XooY	Classification and description of the safety-related system with respect to redundancy and the selection procedure used. "Y" indicates how often the safety function is carried out (redundancy). "X" determines how many channels must work properly.
λsd and λsu	λsd Safe detected + λsu Safe undetected failure (IEC 61508-4, chapter 3.6.8): A safe failure occurs when the measuring system switches to the defined safe state or error reporting mode without process input.
λdd and λdu	λdd Dangerous detected + λdu Dangerous undetected failure (IEC 61508-4, chapter 3.6.7): Generally a dangerous failure occurs when the measuring system switches into a dangerous state or into a functionally inoperable condition.
λdu	λdu Dangerous undetected. A dangerous undetected failure occurs if the measuring system neither switches to defined safe state nor to error signalling mode in the event of a request from the process.