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**REFLEX VF SERIES TDR MTF FIGURES FOR SIL1 STANDARD**

This document summarizes the results of the hardware assessment carried out on the Guided Radar (TDR) Level Meter Reflex VF Series in October 2008.

The hardware assessment consists of a Failure Modes, Effects and Diagnostics Analysis (FMEDA). A FMEDA is one of the steps taken to achieve functional safety assessment of a device per IEC 61508. From the FMEDA, failure rates are determined and consequently the Safe Failure Fraction (SFF) is calculated for the device. For full assessment purposes all requirements of IEC 61508 must be considered. The failure rates used in this analysis are from the EXIDA Electrical & Mechanical Component Reliability Handbook.

The Guided Radar (TDR) Level Meter Reflex VF Series is considered to be a Type B1 subsystem with a hardware fault tolerance of 0. It is assumed that the connected logic solver is configured as per the NAMUR NE43 signal ranges, i.e. the Guided Radar (TDR) Level Meter Reflex VF Series with 4/20 mA current output communicates detected faults by an alarm output current  $\leq 3,6\text{mA}$  or  $\geq 21\text{mA}$ . Assuming that the application program in the safety logic solver does not automatically trip on these failures, these failures have been classified as dangerous detected failures. The following table shows how the result of this calculation.

<b>Fail Safe Detected (<math>\lambda_{SD}</math>)</b>	<b>0 FIT</b>
<b>Fail Safe Undetected (<math>\lambda_{SU}</math>)</b>	<b>626 FIT</b>
<b>Fail Dangerous Detected (<math>\lambda_{DD}</math>)</b>	<b>1203 FIT</b>
<b>Fail Dangerous Undetected (<math>\lambda_{DU}</math>)</b>	<b>240 FIT</b>
<b>Total failure rate (safety function)</b>	<b>2069 FIT</b>
<b>SFF Safe Fraction Failure</b>	<b>88%</b>
<b>DCD Diagnostic Coverage of dangerous failures</b>	<b>83%</b>
<b>MTBF Mean time before Failure</b>	<b>52 years</b>

Profile used for this calculation: Low power electrical (two wire) field products having minimal self heating and subject to daily temperature swings. Unprotected mechanical field products with minimal self heating subject to daily temperature swings and rain or condensation.

The worst-case internal fault detection time is 16 seconds. Depending on the application, this interval needs to be considered directly in the safety verification. Complete report of external body EXIDA available on demand.