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**Subject: Triconex Availability and Probability-To-Fail-On-Demand (PFD)
Calculations for the TRICON and TRIDENT Controllers**

As part of the TÜV Certification Process for the Triconex Tricon and Trident, Triple Modular Redundant (TMR), Fault Tolerant and Critical Control Systems, TÜV has thoroughly reviewed and verified the validity of the Triconex MARKOV modeling methodology.

Triconex utilizes Markov Modeling for the purpose of determining the Mean-Time-To-Fail Spurious (MTTFspurious) and the Probability-To-Fail-On-Demand (PFDavg) in accordance with the following industry standards:

- IEC 61508
Functional Safety of Electric/Electronic/Programmable Electronic Safety-Related Systems
- ISA-TR84.0.02
Safety Instrumented Systems (SIS)-Safety Integrity Level (SIL) Evaluation Techniques
Part 4: Determining the SIL of a SIS via Markov Analysis

The spreadsheet calculation tool developed by Triconex was used by TÜV to calculate MTTFspurious and PFDavg values for the stated Triconex controllers.

The tool is stated to be correct. It can be used to obtain the above mentioned figures.

The Markov modeling is in accordance with IEC 61508-7 and ISA-TR84.0.02 Part 4.

MTTFspurious and PFDavg calculations specific to a Triconex controller configuration can be obtained by contacting Triconex.

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The spreadsheets reviewed by TÜV are listed below:

- Tricon V9.5 and earlier Triconex Part No. 9100050-001
- Tricon V9.6 and later Triconex Part No. 9100051-001
- Trident V1.2 and later Triconex Part No. 9100052-001

Best regards from Cologne

Automation, Software
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