



Certificate / Certificat Zertifikat / 合格証

SIE 16031107 P002 C001

exida hereby confirms that the:

TF/TR/TH320 TF/TR/TH420 TS500 Temperature Transmitters

Product Version V01.xx.xx

Siemens AG

76181 Karlsruhe, Germany

Have been assessed per the relevant requirements of:

IEC 61508 : 2010 Parts 1-7

and meets requirements providing a level of integrity to:

Systematic Capability: SC 3 (SIL 3 Capable)

Random Capability: Type B Element

SIL 2 @ HFT=0; SIL 3 @ HFT = 1; Route 1_H

**PFH/PFD_{avg} and Architecture Constraints
must be verified for each application**


Safety Function:

The TF/TR/TH320, TF/TR/TH420 and TS500 Temperature Transmitters convert sensor input signals from hazardous areas to a 4..20 mA current output signal with a safety accuracy of $\pm 2\%$.

Application Restrictions:

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




Evaluating Assessor


Certifying Assessor

The manufacturer
may use the mark:



Revision 2.0 Aug 3, 2021
Surveillance Audit Due
Sep 1, 2024



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must be verified for each application**

Systematic 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 stated.

Random Capability:

The SIL limit imposed by the Architectural Constraints must be met for each element.

IEC 61508 Failure Rates in FIT*

	λ_{safe}	λ_{DD}	λ_{DU}
TR/TH320/420			
Single sensor configuration	0	443	27
Dual sensor configuration	0	472	34
Redundant sensor configuration	0	486	22
TF320/420			
Single Chamber	0	567	35
Dual Chamber	0	599	37
TS500 (with redundant configuration for High Stress)			
RTD Configuration Low Stress	0	630	52
RTD Configuration High Stress	0	2405	176
TC Configuration Low Stress	0	732	51
TC Configuration High Stress	0	4406	177

* FIT = 1 failure / 10⁹ hours

SIL Verification:

The Safety Integrity Level (SIL) of an entire Safety Instrumented Function (SIF) must be verified via a calculation of PFH/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 element must be checked to assure compliance with minimum hardware fault tolerance (HFT) requirements.

The following documents are a mandatory part of certification:

Assessment Report: SIE 16-09-078-C R004 V2R1

Safety Manual: SITRANS TH320/TH420/TR320/TR420/TF320/TF420/TS500 with HART Functional Safety Manual, 06/2021, A5E41864869-AD

TF/TR/TH320
TF/TR/TH420
TS500

Temperature
Transmitters



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