

Certificate



Product Safety
Functional
Safety

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No.: 968/FSP 1550.02/23

Product tested	Isolated Barrier	Certificate holder	Hangzhou HollySys Automation Co., Ltd. Block M10-15-7, No. 12 Street, Economic-Technological Development Zone, Hangzhou, Zhejiang 310018 P.R. China
Type designation	AM1011EX.SIL, AM1012EX.SIL, AM1013EX.SIL, AM1021EX.SIL, AM1031EX.SIL, AM1032EX.SIL, AM1041EX.SIL, AM1051EX.SIL, AM1061EX.SIL		
Codes and standards	IEC 61508 Parts 1-7:2010	IEC 61326-3-1:2017 (non accred.)	
Intended application	The isolated barriers AM1011EX.SIL, AM1012EX.SIL, AM1013EX.SIL, AM1021EX.SIL and AM1031EX.SIL meet SIL 3 and SC 3 of IEC 61508. The isolated barriers AM1032EX.SIL, AM1041EX.SIL, AM1051EX.SIL and AM1061EX.SIL meet SIL 2 and SC 3 of IEC 61508. It can be used in HFT=0 in applications up to SIL 2 and in HFT=1 configuration in applications up to SIL 3. The requirements of IEC 61298-3:2008 were reviewed in terms of the applicable requirements for testing.		
Specific requirements	The instructions of the associated Safety Manual shall be considered.		

The issue of this certificate is based upon an evaluation in accordance with the Certification Program CERT FSP1 V3.0:2020 in its actual version, whose results are documented in Report No. 968/FSP 1550.02/23 dated 2023-07-05. This certificate is valid only for products, which are identical with the product tested. Issued by the certification body accredited by DAkkS according to DIN EN ISO/IEC 17065. The accreditation is only valid for the scope listed in the annex to the accreditation certificate D-ZE-11052-02-01.

TÜV Rheinland Industrie Service GmbH
Bereich Automation
Funktionale Sicherheit
Am Grauen Stein, 51105 Köln

Köln, 2023-07-10

Certification Body Safety & Security for Automation & Grid

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Safety functions:

AM1011EX.SIL, AM1012EX.SIL and AM1013EX.SIL:

The safety function of the device is defined as the output is de-energized (safe state) if the input is in low condition (input current is less than 1.2mA) for normal operation (K1, K3=OFF) or if the input is in high condition (input current is more than 2.1mA) for inverse operation (K1, K3=ON).

AM1021EX.SIL:

The safety function of the device is to de-energize output on demand.

AM1031EX.SIL:

The safety function of the device is to transfer analog 4 ~ 20mA current within the accuracy of $\pm 2\%$ F.S. The logic solver shall diagnose currents above 21.5mA (fail high, over-range, high alarm output current) and below 3.6mA (fail low, under-range, low alarm output current) as faults and take an appropriate action.

AM1032EX.SIL:

The safety function of the device is to repeat analog 4~20mA current or converting the 4~20mA into 1~5V output voltage within the accuracy of $\pm 2\%$ F.S.

AM1041EX.SIL:

The safety function of the device is to transfer analog 4 ~20mA current within the accuracy of $\pm 2\%$ F.S.

AM1051EX.SIL and AM1061EX.SIL:

The safety function is to convert the measured value from thermal couple, resistance thermometers and resistance-type sensors into analog 4 ~20mA current or 1~5V within the accuracy of $\pm 5\%$ F.S. If an output signal deviates more than $\pm 5\%$ from the input signal and in case of internal failures, the output of the IS barrier will supply a current below 3.6mA or above 21.5mA. This state is also defined as the failsafe state, and the failsafe state is reported to the downstream safety device.

Characteristics as per IEC 61508	Value	
Safety Integrity Level(SIL)	AM1011EX.SIL AM1012EX.SIL AM1013EX.SIL AM1021EX.SIL AM1031EX.SIL	SIL 3 (single-channel architecture 1oo1, HFT = 0)
	AM1032EX.SIL AM1041EX.SIL AM1051EX.SIL AM1061EX.SIL	SIL 2 (single-channel architecture 1oo1, HFT =0) SIL 3 (1oo2, HFT =1)
Systematic Capability (SC)	SC3	
Device Type	AM1011EX.SIL AM1012EX.SIL AM1013EX.SIL AM1021EX.SIL AM1031EX.SIL AM1032EX.SIL AM1041EX.SIL	A
	AM1051EX.SIL AM1061EX.SIL	B
Operation Mode	Low and High Demand Mode of Operation	
Recommended time interval for proof-testing T1	4 years	
PFD _{avg} for T1 = 4 year.	AM1011EX.SIL AM1013EX.SIL AM1012EX.SIL AM1021EX.SIL AM1032EX.SIL AM1031EX.SIL AM1041EX.SIL AM1051EX.SIL AM1061EX.SIL	9.38E-05 (1 digital signal input, 1 output); 9.38E-05 (1 digital signal input, 2 outputs); 9.38E-05 (2 digital signal inputs, 2 outputs); 0.0 (de-energize output on demand); 8.06E-04 (4-20mA input and 4-20mA output); 8.06E-04 (4-20mA input and 1-5V output); 7.63E-05 (4-20mA input,4-20mA output); 4.00E-04 (4-20mA input,4-20mA output); 8.50E-04 (TC input and 4-20mA output); 8.53E-04 (TC input and 1-5V output); 6.95E-04 (RTD input and 4-20mA output); 6.98E-04 (RTD input and 1-5V output);

PFH	AM1011EX.SIL AM1013EX.SIL AM1012EX.SIL AM1021EX.SIL AM1032EX.SIL AM1031EX.SIL AM1041EX.SIL AM1051EX.SIL AM1061EX.SIL	5.36E-09 (1 digital signal input, 1 output); 5.36E-09 (1 digital signal input, 2 outputs); 5.36E-09 (2 digital signal inputs, 2 outputs); 0.0 (de-energize output on demand); 4.60E-08 (4-20mA input and 4-20mA output); 4.60E-08 (4-20mA input and 1-5V output); 4.36E-09 (4-20mA input, 4-20mA output); 2.28E-08 (4-20mA input, 4-20mA output); 4.84E-08 1/h (TC input and 4-20mA output); 4.85E-08 1/h (TC input and 1-5mA output); 3.95E-08 1/h (RTD input and 4-20mA output); 3.97E-08 1/h (RTD input and 1-5mA output);
MRT	8h	
MTTR	8h	

Model	λ_s	λ_D	λ_{DD}	λ_{DU}
AM1011EX.SIL	165 FIT	5.36 FIT	0 FIT	5.36 FIT
AM1012EX.SIL	165 FIT	5.36 FIT	0 FIT	5.36 FIT
AM1013EX.SIL	165 FIT	5.36 FIT	0 FIT	5.36 FIT
AM1021EX.SIL	167 FIT	0 FIT	0 FIT	0 FIT
AM1032EX.SIL	372 FIT	46 FIT	0 FIT	46 FIT
AM1031EX.SIL	139 FIT	245 FIT	241 FIT	4.36 FIT
AM1041EX.SIL	426 FIT	22.8 FIT	0 FIT	22.8 FIT
AM1061EX.SIL (RTD input, 4-20mA output)	837 FIT	303 FIT	264 FIT	39.5 FIT
AM1061EX.SIL (RTD input, 1-5V output)	805 FIT	303 FIT	264 FIT	39.7 FIT
AM1051EX.SIL (TC input, 4-20mA output)	845 FIT	312 FIT	264 FIT	48.4 FIT
AM1051EX.SIL (TC input, 1-5V output)	813 FIT	312 FIT	264 FIT	48.5 FIT

1 FIT = 1 E-09 1/h

Remark: Failure rates of the electronic components as per Siemens SN 29500, calculated based upon an ambient temperature of 60 °C.

Safety related modules / components

No.	Type Designation ^[1]	Description	HW Revision	SW Revision	Report-No.:	Certification Status
1	AM1011EX.SIL	Isolated Barrier	4.6	-/-	968/FSP 1550.02/23	Valid
2	AM1012EX.SIL	Isolated Barrier	4.3	-/-	968/FSP 1550.02/23	Valid
3	AM1013EX.SIL	Isolated Barrier	4.3	-/-	968/FSP 1550.02/23	Valid
4	AM1021EX.SIL	Isolated Barrier	4.5	-/-	968/FSP 1550.02/23	Valid
5	AM1031EX.SIL	Isolated Barrier	4.7 (a)	-/-	968/FSP 1550.02/23	Valid
6	AM1032EX.SIL	Isolated Barrier	3.5 (a)	-/-	968/FSP 1550.02/23	Valid
7	AM1041EX.SIL	Isolated Barrier	4.8	-/-	968/FSP 1550.02/23	Valid
8	AM1051EX.SIL	Isolated Barrier	4.3	3.0	968/FSP 1550.02/23	Valid
9	AM1061EX.SIL	Isolated Barrier	4.3	3.0	968/FSP 1550.02/23	Valid

Safety Manual / User documentation

Document No.	Description	Report-No.:	Certification Status
[U1]	04_1_AM1011EX.SIL, AM1012EX.SIL, AM1013EX.SIL Safety manual_V1_2_20230213.doc 04_2_AM1021EX.SIL Safety manual_V1_2_20230213.doc 04_3_AM1031EX.SIL Safety manual_V1_2_20230213.doc 04_4_AM1032EX.SIL Safety manual_V1_1_20230213.doc 04_5_AM1041EX.SIL Safety manual_V1_2_20230213.doc 04_6_AM1051EX.SIL &AM1061EX.SIL Safety manual_V1_2_20230213.doc	968/FSP 1550.02/23	Valid



Revision List
referred to on Certificate No.: 968/FSP 1550.02/23
Certified Product: AM1000EX.SIL series



The content of this Revision List has been agreed between Manufacturer and Certification Body.

Revision:

Date	Rev.	Description / Changes	Author
2023-07-05	1.0	Initial creation, based on Report-No.: 968/FSP 1550.02/23	pl/TRC hd/TRC