

# SIL



## Functional Safety Certificate

No. 3N210315.AMI0N17

**Certificate's Holder:**

Anhui Meikang Instrument Automation Co., Ltd.  
202, Building 19, Between Jingjiu Road and Jingshi Road  
(Weiyi Road), Tiancha Road, Tianchang City

**Product:  
Model(s):**

Zirconia oxygen analyzer  
MK-400-A, MKGW-13H-500-A, MKFB-400-A/H

**Standard:**

Has been assessed per the relevant requirements of:  
IEC 61508:2010 Parts 1-7, IEC 62061:2005+AMD1:2012+AMD2:2015

And meets requirements providing a level of integrity to:

Systematic Capability: SC 3 (SIL 3 Capable)

Random Capability: Type A Element

SIL 3 @ HFT= 0; SIL 3@ HFT=1; Route 2<sub>H</sub>

\* Safety Function:

The on-line gas chromatograph will move to the designed safe position when de-energized / energized within the specified safety time.

\* Application Restrictions:

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

\* Is suitable to be safety function according to the description and the configuration defined in Annex I.

**Verification Mark:**



The Verification Mark can be affixed on the product. It is NOT permitted to alter the Verification Mark in any way

**Remark:** This SIL Verification of Compliance has been issued on a voluntary basis. ECM confirms that a Test Report is existent for the above listed product(s) and found to meet the requirements of above standards for application in safety related system up to Safety Level of **SIL 3**.

The unit must be properly designed into a Safety Instrument Function as per the requirements in the Safety Manual. The Verification Mark shown above can be affixed on the product. It is NOT permitted to alter the Verification Mark in any way. In addition the Verification's Holder is NOT allowed to transfer the Verification to third parties. This certificate can be checked for validity at [www.entecerma.it](http://www.entecerma.it)

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# Annex I

**No. 3N210315.AM10N17**

1. The use of the product [Zirconia oxygen analyzer] must obey the required rules to conservation of SIL 3 properties. These rules are recalled in the §6 of the Assessment Report reference: [SIL Capability assessment report].
2. The product version of hardware components used for validation and type tests are the following:

<b>Product Type:</b>	Zirconia oxygen analyzer
<b>Model(s):</b>	MK-400-A, MKGW-13H-500-A, MKFB-400-A/H

3. Acceptable environmental constraints for the system are stated in the safety manual. These elements must be checked for each integration operation of the product.
4. The SIL3 capable certified Safety Instrumented Function of the product [Zirconia oxygen analyzer] is the following:
  - SF1: To Close on demand.
  - SF2: To Open on demand.
5. Hypothesis used for calculations are presented here under: The mode of operation is Low demand, which means less than 1 trip demand each year;

Component architecture	SIL Capability	Demand frequency	PFD
Loo1 configuration	SIL3	Low	8.32E-03
Loo2 configuration	SIL3	Low	1.96E-04

## IEC61508 Failure Rates

Failure Category	Ad fl/h)	Ad d(1/h)	Adu(1/h)	SFF	1 MHF(h)	Certificate
Average	1.88E-07	1.76E-07	1.24E-08	72%	4.10E+06	SIL3
	2.27E-08	2.02E-08	2.51 E-09	75%	4.16E+06	SIL3

Safety function	Failure rate	Undetected dangerous failure rate	Tests intervals	MTTR
SF1	3.24E-07	4.36E-08	12months	24h
SF2	1.56E-07	1.34E-08	12months	24h

6. The Safety Integrated Level of the safety function using the product [Zirconia oxygen analyzer] shall be calculated taking into account the characteristics of complete system.