

# Certificate



**No.: 968/V 1033.01/23**

**Product tested** Sand Probe Relay **Certificate holder** Ruelco, Inc.  
1209 Distributors Row  
New Orleans, LA 70123  
USA

**Type designation** 1S03, 1SE3

**Codes and standards** IEC 61508 Parts 1-2 and 4-7:2010

**Intended application** Safety Function: The Sand Probe Relay changes state either of a 3-way valve or a micro switch, when process pressure is present at the process port connection.

The relays are suitable for use in a safety instrumented system up to SIL 2 (low demand mode) . Under consideration of the minimum required hardware fault tolerance HFT = 1 for the complete final element the relays may be used up to SIL 3.

**Specific requirements** The instructions of the associated Installation, Operating and Safety Manual shall be considered.  
A minimum of 40 psi is required for the relay to function.

For safety applications the idle current principle has to be applied. The redundant contacts of the DPDT micro switch have to be wired in series.

Summary of test results see back side of this certificate.


Valid until 2028-03-14

The issue of this certificate is based upon an evaluation in accordance with the Certification Program CERT FSP1 V1.0:2017 in its actual version, whose results are documented in Report No. 968/V 1033.01/23 dated 2023-02-09. 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

Köln, 2023-03-14

Certification Body Safety & Security for Automation & Grid

  
Dipl.-Ing. (FH) Wolf Rückwart

Holder: Ruelco, Inc.  
 1209 Distributors Row  
 NEW ORLEANS LA 70123  
 USA

Product tested: Sand Probe Relay  
 Type 1S03 and 1SE3

### Results of Assessment for mechanical device 1S03

Route of Assessment		$2_H / 1_S$	
Type of Sub-system		Type A	
Mode of Operation		Low Demand Mode	
Hardware Fault Tolerance	HFT	0	
Systematic Capability		SC 3	
Lambda Dangerous confidence level of calculation $1-\alpha = 95\%$	$\lambda_D$	4.94 E-08 / h	49 FIT
Lambda Dangerous Undetected assumed Diagnostic Coverage DC = 0 %	$\lambda_{DU}$	4.94 E-08 / h	49 FIT
<b>Average Probability of Failure on Demand 1oo1</b> assumed Proof Test Interval $T_1 = 730$ h (once every month)	<b>PFD<sub>avg</sub>(T<sub>1</sub>)</b>	<b>1.80 E-05</b>	
<b>Average Probability of Failure on Demand 1oo2</b> assumed Proof Test Interval $T_1 = 730$ h (once every month) assumed $\beta_{1oo2} = 10\%$	<b>PFD<sub>avg</sub>(T<sub>1</sub>)</b>	<b>1.80 E-06</b>	

### Results of Assessment for device with micro switch 1SE3

		SPDT		DPDT	
Lambda Dangerous - AC confidence level of calculation $1-\alpha = 95\%$	$\lambda_{D\_AC}$	7.22 E-08 /h	72 FIT	5.06 E-08 /h	51 FIT
<b>Average Probability of Failure on Demand 1oo1 - AC</b> assumed Proof Test Interval $T_1 = 730$ h (once every month)	<b>PFD<sub>avg\_AC</sub>(T<sub>1</sub>)</b>	<b>2.64 E-05</b>		<b>1.85 E-05</b>	
Lambda Dangerous - DC confidence level of calculation $1-\alpha = 95\%$	$\lambda_{D\_DC}$	1.68 E-07 /h	168 FIT	6.02 E-08 /h	60 FIT
<b>Average Probability of Failure on Demand 1oo1 - DC</b> assumed Proof Test Interval $T_1 = 730$ h (once every month)	<b>PFD<sub>avg\_DC</sub>(T<sub>1</sub>)</b>	<b>6.14 E-05</b>		<b>2.20 E-05</b>	

### Origin of failure rates

The stated failure rates are the result of the analysis of field feedback data.

Failure rates include failures that occur at a random point in time and are due to degradation mechanisms such as ageing.

The stated failure rates do not release the end-user from collecting and evaluating application-specific reliability data.

### Periodic Tests and Maintenance

The given values require periodic tests and maintenance as described in the Safety Manual.

The operator is responsible for the consideration of specific external conditions (e.g. ensuring of required quality of media, max. temperature, time of impact), and adequate test cycles.