EMERSON
Process Management

ROC nr 1100
Rev. A

EL-O-MATIC

Manufacturers Declaration

Manufacturer : Emerson Process Management
Valve Automation
Asveldweg 11
7556 BR, HENGELO
The Netherlands

Product : Pneumatic Rack & Pinion actuator

Brand : El-O-matic

Type : E and P serie

Utilisation : Actuators for control of valves in Safety Instrumented Systems.

Application : El-O-matic E and P serie pneumatic Rack and Pinion Actuators are suitable for Safety Instrumented Systems up to and including SIL 3 according IEC 61508.

Detailed results are available in Exida report:
E-serie : VAD 03/08-24 R003
P-Serie : VAD 03/08-24 R004

See next pages for a summary of the results of the Failure Modes, Effects, and Diagnostic Analysis (FMEDA) of the EI-O-Matic E and P Series pneumatic rack & pinion actuators.

The suitability for of the application can only be determined in conjunction with the assessment of the other components of the Safety Instrumented System.

Signed : _____
Name : D.L.Farr
Function : Vice President Operations - Emerson Valve Automation
Date : December 2, 2007

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Hersteller Erklärung

Hersteller : Emerson Process Management
Valve Automation
Asveldweg 11
7556 BR, HENGELO
The Netherlands

Produkt : Pneumatische Antriebe

Marke : El-O-Matic

Typ : E und P Serie

Verwendungzweck : Sicherheitsgerichtete Antrieb zur steuerung von geeignete Armaturen

Application : Die Geräte der oben genannten Typenreiche sind geeignet zur Verwendung in sicherheitsgerichteten Systemen bis einschließlich SIL 3 nach IEC 61508.

Detaillierte Ergebnisse sind folgende Exida Bericht zu entnehmen:
E-Serie : VAD 03/08-24 R003
P-Serie : VAD 03/08-24 R004

Eine Zusammenfassung der Prüfwerte steht auf der nächsten Seiten.

Die Eignung für bestimmte Einsatzfälle kan nur in Verbindung mit der Beurteilung weiterer Komponenten des Subsystems bestimmt werden.

Unterzeichnet : _____
Name : D.L.Farr
Funktion : Vice President Operations - Emerson Valve Automation
Datum : December 2, 2007

Management summary

This report summarizes the results of the Failure Modes, Effects, and Diagnostic Analysis (FMEDA) of the El-O-Matic E-Series pneumatic rack & pinion quarter turn actuators. A Failure Modes, Effects, and Diagnostic Analysis is one of the steps to be taken to achieve functional safety assessment per IEC 61508 of a device. From the FMEDA, a full set of failure rates is determined. For full functional safety assessment purposes all requirements of IEC 61508 must be considered.

The El-O-Matic E-Series pneumatic actuators are classified as a Type A[1] devices, with a hardware fault tolerance of 0. The failure rates for the device are listed in Table 1.

Table 1 Failure rates El-O-Matic E-Series pneumatic actuator

Failure category	Failure rate (in FIT)	
	Spring-Return	Double Acting
Fail Safe	76	0
Fail Dangerous Undetected	342	362
No Effect	1550	1285

The failure rates for the El-O-Matic E-Series pneumatic actuator when performing partial valve stroke testing are listed in Table 2.

Table 2 Failure rates El-O-Matic E-Series pneumatic actuator with partial valve stroke testing

Failure category	Failure rate (in FIT)	
	Spring-Return	Double Acting
Fail Safe	76	0
Fail Dangerous Detected	225	201
Fail Dangerous Undetected	117	161
No Effect	1550	1285

Note that the "No Effect" failures on its own will not affect system reliability or safety, and should not be included in spurious trip calculations.

The failure rates are valid for the useful lifetime of the product. A user of the El-O-Matic E-Series pneumatic actuator can utilize these failure rates in a probabilistic model of a safety instrumented function (SIF) to determine suitability in part for safety instrumented system (SIS) usage in a particular safety integrity level (SIL).

[1] Type A component: "Non-Complex" component with well-defined failure modes, for details see 7.4.3.1.2 of IEC 61508-2.

Management summary

This report summarizes the results of the Failure Modes, Effects, and Diagnostic Analysis (FMEDA) of the El-O-Matic P-Series pneumatic rack & pinion, quarter turn, actuators. A Failure Modes, Effects, and Diagnostic Analysis is one of the steps to be taken to achieve functional safety assessment per IEC 61508 of a device. From the FMEDA, a full set of failure rates is determined. For full functional safety assessment purposes all requirements of IEC 61508 must be considered.

The El-O-Matic P-Series pneumatic actuators are classified as Type A[1] devices, with a hardware fault tolerance of 0. The failure rates for the device are listed in Table 1.

Table 1 Failure rates El-O-Matic P-Series actuator

Failure category	Failure rate (in FIT)	
	Spring-Return	Double Acting
Fail Safe	80	0
Fail Dangerous Undetected	559	465
No Effect	1993	1265

The failure rates for the El-O-Matic P-Series pneumatic actuator when performing partial valve stroke testing are listed in Table 2.

Table 2 Failure rates El-O-Matic P-Series actuator with partial valve stroke testing

Failure category	Failure rate (in FIT)	
	Spring-Return	Double Acting
Fail Safe	80	0
Fail Dangerous Detected	370	256
Fail Dangerous Undetected	189	209
No Effect	1993	1265

Note that the "No Effect" failures on its own will not affect system reliability or safety, and should not be included in spurious trip calculations.

The failure rates are valid for the useful lifetime of the product. A user of the El-O-Matic P-Series pneumatic actuators can utilize these failure rates in a probabilistic model of a safety instrumented function (SIF) to determine suitability in part for safety instrumented system (SIS) usage in a particular safety integrity level (SIL).

[1] Type A component: "Non-Complex" component with well-defined failure modes, for details see 7.4.3.1.2 of IEC 61508-2.