ROC nr 9120
Rev. A

EMERSON
Process Management

HYTORK

Manufacturers Declaration

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

Product : Pneumatic Rack & Pinion actuator

Brand : Hytork

Type : XL Serie

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

Application : Hytork XL 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:
VAD 03/08-24 R001

See next pages for a summary of the results of the Failure Modes, Effects, and Diagnostic Analysis (FMEDA) of the Hytork XL Serie 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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Herstellererklärung

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

Produkt : pneumatische Antriebe

Marke : Hytork

Typ : XL Serie

Verwendungzweck : Antrieb für Armaturen in sicherheitsgerichteten Systemen (SIS)

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

Detaillierte Ergebnisse sind folgendem Exida Bericht zu entnehmen:
VAD 03/08-24 R001

Eine Zusammenfassung der Prüfwerte ist auf den folgenden Seiten enthalten.

Die Eignung für bestimmte Einsatzfälle kann 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 : Dezember 2, 2007

Management summary

This report summarizes the results of the Failure Modes, Effects, and Diagnostic Analysis (FMEDA) of the HyTork XL pneumatic rack & pinion quarter turn actuator. 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 HyTork XL pneumatic actuator is classified as a Type A[1] device, with a hardware fault tolerance of 0. The failure rates for the device are listed in Table 1.

Table 1 Failure rates HyTork XL pneumatic actuator

Failure category	Failure rate (in FIT)	
	Spring-Return	Double Acting
Fail Safe	96	0
Fail Dangerous Undetected	302	397
No Effect	1662	1762

The failure rates for the HyTork XL pneumatic actuator when performing partial valve stroke testing are listed in Table 2.

Table 2 Failure rates HyTork XL pneumatic actuator with partial valve stroke testing

Failure category	Failure rate (in FIT)	
	Spring-Return	Double Acting
Fail Safe	96	0
Fail Dangerous Detected	178	207
Fail Dangerous Undetected	124	190
No Effect	1662	1762

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 HyTork XL 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.