



**Functional Safety
for Final Elements**



WE MAKE ACTUATORS SINCE 1992

ACTREG, established in 1992, is a multinational company specialized in the manufacture and sales of high quality actuators for valves requiring a rotary quarter turn movement for either On/Off or modulating duty.

The expertise and know how has made ACTREG leader in actuation technology.

ACTREG WORLDWIDE

ACTREG provides world coverage thanks to the strategic locations of its factories and offices. The international distribution ensures quick availability and more important, personalized service for valve manufacturers, valve stocking distributors and contractors.

QUALITY ASSURANCE

Actreg actuators are designed and produced to meet the major international standards and we take great care and put a lot of emphasis on QUALITY. The precision in design and quality provides a long and safe operational performance in valve automation.

And in addition, we take great care to make our facilities and our products Environment friendly.

GLOBAL SERVICES

Actreg offers its customers a worldwide service, from technical advice to choose the right actuator up to the design and manufacture of custom built actuators to meet special service requirements.

The continuous R+D+I programme provides engineering and design excellence and our global distribution network offers quick availability of Actreg Actuators and an efficient after sales service.

MARKET SECTORS

Actreg develops and designs actuators for all applications, but the main focus is in Chemical, Petrochemical, Oil & Gas, Water Industry, Pulp & Paper and Energy sectors.



Safety is the most important issue, whether it is related to our daily lives or industrial sector. Risk cannot be reduced to zero, so absolute safety cannot be achieved, however can be reduced to a tolerable level. The release of the new international standard to functional safety IEC 61508, helps to reduce these risks to an acceptable level.

BUT WHAT IS THE DEFINITION OF RISK IN THE MODERN ENGINEERING SYSTEMS?

RISK

=

PROBABILITY
of hazardous event will occur

×

CONSEQUENCES
of hazardous event

SIL FIGURES

The measures required to reduce a risk can sometimes be very simple, but also extremely complex. Based on a hazard and risk analysis, the hazards can be determined from a plant and its control systems.

IEC 61508 defines appropriated methods for achieving functional safety for associates' plants systems.

The probability of dangerous failure on demand (PFDavg) is used for system in low demand mode. As well, when we calculate the PFDavg, we consider the proof interval, repair time and the architecture of the components and many others factors according to IEC61508.

LOW DEMAND MODE: TARGET FAILURE MEASURES

SIL	PFD	Max. accepted failure of the SIS
SIL 1	$> 10^{-2}$ to $< 10^{-1}$	Max. 1 dangerous failure per 10 demands
SIL 2	$> 10^{-3}$ to $< 10^{-2}$	Max. 1 dangerous failure per 100 demands
SIL 3	$> 10^{-4}$ to $< 10^{-3}$	Max. 1 dangerous failure per 1000 demands
SIL 4	$> 10^{-5}$ to $< 10^{-4}$	Max. 1 dangerous failure per 10000 demands

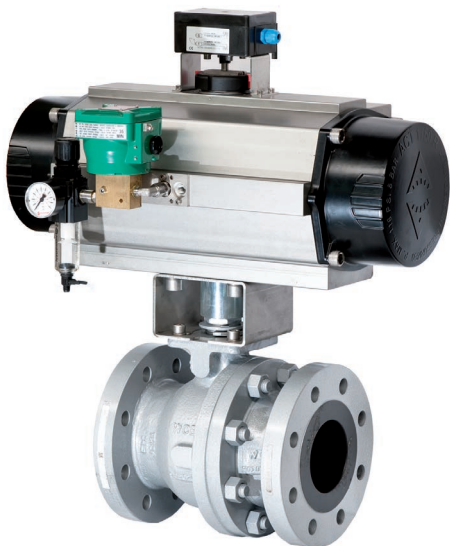
Failure measures for a safety function operated in low demand mode.

WHAT IS A SAFETY INSTRUMENTED SYSTEM?

The growing complexity in automation, demands more capability and advanced methodology. Safety Instrumented System (SIS) provides a protective layer around the process systems by implementing one or more Safety Instrumented Functions (SIF).

A SIS is composed with one or more sensors, logic solvers and final elements. Once SIF is designed, SIL verifications calculations determine and will provide the desired risk reduction.





ACTREG is able to supply actuators with a complete SIL loop calculation for the final elements.

The achieved Safety Integrity Level (SIL) of an entire Safety Instrumented Function (SIF) design must be verified by the designer via calculation of Probability of Failure on Demand Average (PFDavg), considering the architecture, proof test interval, proof test effectiveness, any automatic diagnostics, average repair time and the specific failures rates of all equipment included in the SIF.

Each subsystem must be checked to assure compliance with minimum Hardware Fault Tolerance (HFT) requirements.

WHAT WE OFFER?

ACTREG manufactures actuators for a quarter turn valves. We can supply the final elements loops for SIF, with a full SIL calculations including valves, actuators, solenoid valve, pneumatic ancillaries, brackets and couplings, limit switch boxes, etc.

These SIL calculations are based and can be inspected and verified by a third inspection company TÜV.



EXAMPLE OF SIL ASSEMBLY CERTIFICATE

SIL Assembly Certificate

No.: 73447.1/18

Product: Valve / Actuator / Solenoid

Type designation: Type: Floating Fig. 3530 Series: JC Valves SAU Brand: ACTREG SAU
 Actuator: AGR500-110 Solenoid: IC04 Thompson Ltd
 Codes and standards: IEC 61508 Parts 1-2 and 4-7:2010
 Intended application: Safety Function: Close on demand
 Specific requirements: The assembly Valve/Actuator/Solenoid is suitable for use in a safety instrumented system e.g. acc. To IEC 61511-1 up to SIL 2 (low demand mode). Under consideration of the minimum required hardware fault tolerance HFT=0 the assembly may be used in a redundant architecture up to SIL 3.
 Results of Assessment: Route of Assessment: λ_D / λ_U Mode of Operation: Low Demand Mode
 Type of Sub-system: Type A Hardware Fault Tolerance: HFT 0

Design	Valve	Actuator	Solenoid	Assembly	
Lambda Dangerous confidence level of calculation 1-corr95%	λ_{DU}	100	223	5	337 FIT
Lambda Dangerous Undetected assumed Diagnostic Coverage DC=95%	λ_{DU}	100	223	5	337 FIT
Mean Time To Dangerous Failure	MTTF _D	9,15E+06	4,48E+06	1,88E+08	2,96E+08 h
Average Probability of Failure on Demand 100% assumed Proof Test Interval 1 _{year}	PFD _{avg} (T1)	4,79E-04	9,76E-04	2,21E-05	1,48E-03
Average Probability of Failure on Demand 100% assumed Proof Test Interval 1 _{year} assumed $\beta_{avg}=10\%$	PFD _{avg} (T1)	4,82E-05	9,87E-05	2,21E-06	1,48E-04

Origin of Values
 The calculations of the assembly are based on the data provided by the manufacturers of each component and that appear in the corresponding SIL certificate.
 Systematic Capability
 The development and manufacturing process and the functional safety management applied by the manufacturer in the relevant (hazard) phases of the product have been audited and assessed as suitable for the manufacturing of products for use in applications with maximum Safety Integrity Level of 3 (SC 3).
 Periodic Test and Maintenance
 The given valves require periodic tests and maintenance as described in the different Safety Manuals.
 The operator is responsible for the consideration of specific external conditions (e.g. ensuring of required quality media, max. temperature, time of impact), and adequate test cycles.
 Other considerations
 The connection between Valve and Actuator does not intervene in the safety function because its design is governed by specific regulations: EN 15081 for couplings, brackets.

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