



Certificate / Certificat Zertifikat / 合格証

WES 1902128 C001

exida hereby confirms that the:

**Quantum Control Monitor Series
3600, 3700, 3800, 8600, 8700 and 8800**

**Westlock Controls.
Saddle Brook, NJ - USA**

Have been assessed per the relevant requirements of:

IEC 61508 : 2010 Parts 1-7

and meets requirements providing a level of integrity to:

Systematic Capability: SC 3 (SIL 3 Capable)

Random Capability: Type A, Route 2_H Device

**PFH/PFD_{avg} and Architecture Constraints
must be verified for each application**

Safety Function 1:

The Solenoid Valve will move to the designed safe position when de-energized / energized within the specified safety time.

Safety Function 2:

The Control Monitor switch(es) will change it's output when the attached Valve moves to the configured position.

Application Restrictions:

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



Evaluating Assessor

Certifying Assessor

The manufacturer may use the mark:



Revision 3.0 June 28, 2022
Surveillance Audit Due
August 1, 2025



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Systematic Capability: SC 3 (SIL 3 Capable)

Random Capability: Type A, Route 2_H Device

**PFH/PFD_{avg} and Architecture Constraints
must be verified for each application**

Systematic Capability :

The product has met manufacturer design process requirements of Safety Integrity Level (SIL) 3. These are intended to achieve sufficient integrity against systematic errors of design by the manufacturer.

A Safety Instrumented Function (SIF) designed with this product must not be used at a SIL level higher than stated.

Random Capability:

The SIL limit imposed by the Architectural Constraints must be met for each element. This device meets *exida* criteria for Route 2_H.

Version Overviews

| Device | Solenoid Configuration |
|----------------------------|---|
| 3/2-Way Valve | Single Coil, .Spring Return, DTT or ETT, with or w/o Manual Override |
| 5/2-Way Valve | Single Coil, .Spring Return, DTT or ETT, with or w/o Manual Override |
| Dual Coil Solenoid 5/2-Way | 5/2-Way, 2 Position, Dual Coil, fail in place, with or w/o Manual Overrides |

| Series | Switch Quantity and Type (Option Code) |
|--------------|---|
| Quantum 3600 | 1 to 4 SPDT Microswitches (5) 1 to 4 DPDT Microswitches (6) 1 to 4 P&F Inductive Sensor (7) 1 to 4 Magnum Switches (9) |
| Quantum 3700 | |
| Quantum 3800 | |
| Quantum 8600 | |
| Quantum 8700 | |
| Quantum 8800 | |

IEC 61508 Failure Rates in FIT¹

Quantum Series attached Falcon Solenoid Valve Failure Rates:

| Device | λ_{SD} | λ_{SU} | λ_{DD} | λ_{DU} |
|---------------------------|----------------|----------------|----------------|----------------|
| 3/2-Way Single Coil - DTT | 0 | 304 | 0 | 283 |
| 3/2-Way Single Coil - ETT | 0 | 77 | 0 | 431 |
| 5/2-Way Single Coil - DTT | 0 | 275 | 0 | 343 |
| 5/2-Way Single Coil - ETT | 0 | 74 | 0 | 451 |
| Dual Coil 5/2-Way | 0 | 66 | 0 | 559 |

Quantum Series Switch Output Failure Rates:

| Quantum Series Switch Circuit Qty (Option Code) | λ_{SD} | λ_{SU} | λ_{DD} | λ_{DU} |
|--|----------------|----------------|----------------|----------------|
| 1 Switch Circuit (5, 6, 7 or 9) | 0 | 11 | 0 | 94 |
| 2 Switch Circuits (5, 6, 7 or 9) | 0 | 22 | 0 | 119 |
| 3 Switch Circuits (5, 6, 7 or 9) | 0 | 34 | 0 | 149 |
| 4 Switch Circuits (5, 6, 7 or 9) | 0 | 45 | 0 | 174 |
| 6 Switch Circuits (5, 6, 7 or 9) | 0 | 68 | 0 | 229 |
| 8 Switch Circuits (6) | 0 | 80 | 0 | 239 |

¹ FIT = 1 failure / 10⁹ hours

SIL Verification:

The Safety Integrity Level (SIL) of an entire Safety Instrumented Function (SIF) must be verified via a calculation of PFH/PFD_{avg} considering redundant architectures, proof test interval, proof test effectiveness, any automatic diagnostics, average repair time and the specific failure rates of all products included in the SIF. Each element must be checked to assure compliance with minimum hardware fault tolerance (HFT) requirements.

The following documents are a mandatory part of certification:

Assessment Reports: WES 15/05-053 R002 V4R1 (or later) & WES 18/01-124 R002 V1R1 (or later)

Safety Manuals: TECHUK-78 Rev 5 & TECHUK-101 Rev 1 (or later)

Quantum Control
Monitor Series 3600,
3700, 3800, 8600, 8700
and 8800



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T-061, V5R1

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