



Certificate / Certificat Zertifikat / 合格証

WES 1508043 C001

exida hereby confirms that the:

**Quantum Control Monitor Series:
360, 366, 711, 722, 764, 765, 777,
784, 789, 811, 864, 865 and 877**

**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

**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 May 31, 2022
Surveillance Audit Due
May 1, 2025



Systematic Capability: SC 3 (SIL 3 Capable)

Random Capability: Type A, Route 2_H Device

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 ¹
3-Way Valve	Single Coil, Spring Return, DTT or ETT, with or w/o Manual Override
4-Way Valve	Single Coil, Spring Return, DTT or ETT, with or w/o Manual Override
Double Pilot	4-Way, 2 position, Dual Coil (2 Solenoids), ETT, fail in place, with or w/o Manual Overrides

Series	Switch Type (Option Code)	Switch Quan (x)
Quantum 711, 722 & 811	P&F Inductive Sensor NJ2-V3-N (2M08) SPDT Mechanical (M09) SPST Magnum (M10) SPDT Magnum (2M12)	2 (711 & 722) 2 or 4 (811)
Quantum 765, 789 & 865	SPDT Magnum (xM06 or xM12)	2 (765 & 789) 2 or 4 (865)
Quantum 764, 784 & 864	SPDT/DPDT Mechanical (xM02/xM04)	2 (764 & 784) 2 or 4 (864)
Quantum 777, 877, 360 & 366	SPDT/DPDT Mechanical (xM02/2M04) SPDT Magnum (xM06 or xM12)	2 or 4 (All Series)

IEC 61508 Failure Rates in FIT²

Quantum Series attached Falcon V Solenoid Valve Failure Rates:

Device	λ_{SD}	λ_{SU}	λ_{DD}	λ_{DU}
3-Way Single Coil - DTT	0	362	0	299
3-Way Single Coil - ETT	0	96	0	479
4-Way Single Coil - DTT	0	387	0	369
4-Way Single Coil - ETT	0	121	0	549
4-Way Double Pilot - ETT	0	184	0	731

Quantum Series Switch Output Failure Rates³:

Quantum Series Switch Circuit Qty (all Switch Codes)	λ_{SD}	λ_{SU}	λ_{DD}	λ_{DU}
1 Switch Circuit	0	11	0	94
2 Switch Circuits	0	23	0	119
3 Switch Circuits	0	34	0	149
4 Switch Circuits	0	45	0	174

¹ Refer to the Assessment Report for the full list of included Configurations and Coil types

² FIT = 1 failure / 10⁹ hours

³ Failure Rates listed are only applicable if the switch contacts current is limited to 60% of the switches rated capacity and the end user has added external transient protection if being used with non-resistive loads.

SIL Verification:

The Safety Integrity Level (SIL) of an entire Safety Instrumented Function (SIF) must be verified via a calculation of 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 13/07-059 R002 V3R2 (or later) & WES 19/02-096 R001 V3R1 (or later)

Safety Manual: SMAN-005 rev C (or later)

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