Certificate / Certificat
Zertifikat / 合格証

WES 1508043 C001

exida hereby confirms that the:

Quantum Control Monitor Series: 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 Function1:
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 1.1 July 31, 2019
Surveillance Audit Due
May 1, 2022

ISO/IEC 17065
PRODUCT CERTIFICATION BODY
#1004

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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

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

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-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
Dual Coil Valve, 3 or 4-Way	3 or 4-Way, 2 position, Dual Coil, 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 Magnum (2M12)	2
Quantum 765, 789 & 865	SPDT Magnum (xM06 or xM12)	2 or 4
Quantum 764, 784 & 864	SPDT/DPDT Mechanical (xM02/xM04)	2, 4 or 6
Quantum 777 & 877	SPDT/DPDT Mechanical (xM02/2M04) SPDT Magnum (xM06 or xM12)	2

IEC 61508 Failure Rates in FIT[1]

Quantum Series attached Falcon V Solenoid Valve Failure Rates:

Device	λ_{SD}	λ_{SU}	λ_{DD}	λ_{DU}
3/2-Way Single Coil - DTT	0	353	0	299
3/2-Way Single Coil - ETT	0	96	0	481
5/2-Way Single Coil - DTT	0	379	0	369
5/2-Way Single Coil - ETT	0	121	0	551
Dual Coil 5/2-Way	0	180	0	733

Quantum Series Switch Output Failure Rates[2]:

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] FIT = 1 failure / 10^9 hours

[2] 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 Report: WES Q19-02-096 R001 V1R1

Safety Manual: SMAN-005

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