

FUNCTIONAL SAFETY CERTIFICATE

CERTIFICATO – ZERTIFIKAT – CERTIFICADO – CERTIFICAT

The product:

*Mechanical Vibration Switch 5550 and 5550G
(All configurations)*

Manufactured by:

*Metrix Instruments Co.
18824 Fallbrook Dr. Houston, TX 77064
United States of America*

suitable for the following safety function(s):

Overall vibration protection input device for low to medium speed machinery.

has been assessed per the relevant requirements of

IEC 61508:2010 Parts 1 to 2

and meets the requirements providing the following:

Systematic Capability:

The compliance with the requirements for the avoidance of systematic faults and the requirements for the control of systematic faults have been achieved following the compliance Route 1_S.

SC 3

Hardware Safety Integrity:

The constraints on hardware safety integrity have been verified in order to achieve a sufficiently robust architecture taking into account the level of element and subsystem complexity following the compliance Routes 1_H and 2_H.

Type
A

Random Safety Integrity:

The estimated safety integrity, for each safety function, due to random hardware safe and dangerous failures rates (excluding "no part" and "no effect" contribution).

See
page
2

The architectural constraints and the effects of random failures (PFH/PFD_{AVG}) must be verified for each specific application and safety function implemented by the E/E/PE safety-related system.

Certified by:

BYHON

BYHON Certification Director:

Francesco Rosati
Rosati Francesco

CERTIFICATE No:
MTXI-5550G-ENS-B01

Issued:
February 20th, 2025

Valid until:
February 19th, 2028

The owner of a valid certificate for an assessed product is authorized to affix the following mark to all recognized devices which are identical to the product assessed.

BYHON
SIL ✓



ANSI National Accreditation Board

ACCREDITED

ISO/IEC 17065

PRODUCT CERTIFICATION
BODY

#8914

*The Certificate shall be reproduced only in its original entirety

The design of each Safety Instrumented Function (SIF) shall meet the requirements listed in the reference standards that shall be selected by taking into account the specific application. Specific activities necessary to investigate and reach a judgment on the adequacy of the functional safety achieved by the E/E/PE safety-related system or compliant items (elements/subsystems) has been conducted by an independent assessor.

The following failure rates data shall be used to the PFH/PFD_{AVG} estimation, taking into consideration all parameters such as redundancy, architectural constraints, diagnostic capability, also introduced by the whole system, including the considerations about the proof test and its effectiveness, mean time of restoration, up to the maintenance capability and its minimum characteristics.

Failure rate for Mechanical Vibration Switch 5550

Configuration	λ_S	λ_{DU}	λ_{DD}
SPDT – Manual reset only	388	219	-
SPDT – Reset coil option	504	375	-
DPDT – Manual reset only (COMMON)	321	185	-
DPDT – Manual reset only (REDUNDANT SWITCH)	67	34	-
DPDT – Reset coil option (COMMON)	437	341	-
DPDT – Reset coil option (REDUNDANT SWITCH)	67	34	-

Failure rate for Mechanical Vibration Switch 5550G

Configuration	λ_S	λ_{DU}	λ_{DD}
SPDT with Reset coil	473	290	-
DPDT with Reset coil (COMMON)	406	256	-
DPDT with Reset coil (REDUNDANT SWITCH)	67	34	-

Note:

- All failure rates are in FIT (Failure In Time 1 FIT = 1 failure / 10⁹ hours).
- The prescriptions contained in the safety manual QP064-43 shall be followed.
- SPDT contacts are standard; DPDT contacts are optional. Reset coil is standard on 5550G, optional on 5550.
- The device can be used in SIL 2 application with HFT=0, and up to SIL 3 application with HFT=1.

CERTIFICATE NO:
MTXI-5550G-ENS-B01

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February 20th, 2025

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The Functional Safety
Assessment report no.

25-MTX-5550G-FSA-01

dated:
February 20th, 2025

is an integral part of this
certificate



Mod_12_CB Rev09

BYHON
Via Lepanto 23, 59100
Prato (PO)
ITALY

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original entirety.



The following pages are the prior revisions of this certificate.

FUNCTIONAL SAFETY CERTIFICATE

CERTIFICATO – ZERTIFIKAT – CERTIFICADO – CERTIFICAT

The product:

Mechanical Vibration Switch 5550 and 5550G
(all configurations)

Manufactured by:

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8824 Fallbrook Dr. Houston, TX 77064
United States of America

suitable for the following safety function(s):

Overall vibration protection input device for low to medium speed machinery.

has been assessed per the relevant requirements of

IEC 61508:2010 Parts 1 to 7

and meets the requirements providing the following:

Systematic Capability:

The compliance with the requirements for the avoidance of systematic faults and the requirements for the control of systematic faults have been achieved following the compliance route 1_S.

SC 2

Hardware Safety Integrity:

The constraints on hardware safety integrity have been verified in order to achieve a sufficiently robust architecture taking into account the level of element and subsystem complexity following the compliance route 1_H.

Type
A

Random Safety Integrity:

The estimated safety integrity, for each safety function, due to random hardware safe and dangerous failures rates (excluding "no part" and "no effect" contribution).

See
page
2

The architectural constraints and the effects of random failures (PFH/PFD_{AVG}) must be verified for each specific application and safety function implemented by the E/E/PE safety-related system.

Certified by:

BYHON

BYHON Certification Director:


Rosati Francesco

CERTIFICATE No:
MTXI-5550G-ENS-E01

Revision: A

Issued:
February 16th, 2022

Valid until:
February 15th, 2025

The owner of a valid certificate for an assessed product is authorized to affix the following mark and relative ID number, to all recognized devices which are identical to the product assessed.

BYHON
SIL ✓

ID.N° 010522E01N



#8914
ISO/IEC 17065
Product Certification Body

The design of each Safety Instrumented Function (SIF) shall meet the requirements listed in the reference standards that shall be selected by taking into account the specific application. Specific activities necessary to investigate and reach a judgment on the adequacy of the functional safety achieved by the E/E/PE safety-related system or compliant items (elements/subsystems) has been conducted by an independent assessor.

The following failure rates data shall be used to the PFH/PFD_{AVG} estimation, taking into consideration all parameters such as redundancy, architectural constraints, diagnostic capability, also introduced by the whole system, including the considerations about the proof test and its effectiveness, mean time of restoration, up to the maintenance capability and its minimum characteristics.

Failure rate for Mechanical Vibration Switch 5550

Configuration	λ_{SU}	λ_{SD}	λ_{DU}	λ_{DD}	λ_{RES}
SPDT – Manual reset only	388	0	219	0	234
SPDT – Reset coil option	504	0	375	0	393
DPDT – Manual reset only (COMMON)	321	0	185	0	234
DPDT – Manual reset only (REDUNDANT SWITCH)	67	0	34	0	0
DPDT – Reset coil option (COMMON)	437	0	341	0	393
DPDT – Reset coil option (REDUNDANT SWITCH)	67	0	34	0	0

Failure rate for Mechanical Vibration Switch 5550G

Configuration	λ_{SU}	λ_{SD}	λ_{DU}	λ_{DD}	λ_{RES}
SPDT with Reset coil	473	0	290	0	309
DPDT with Reset coil (COMMON)	406	0	256	0	309
DPDT with Reset coil (REDUNDANT SWITCH)	67	0	34	0	0

Note:

- SPDT contacts are standard; DPDT contacts are optional. Reset coil is standard on 5550G, optional on 5550.
- The λ_{RES} (RESIDUAL) failure rates includes the NO PART and NO EFFECT failure rates.
- All failure rates are in FIT (Failure In Time 1 FIT = 1 failure / 10⁹ hours).

The prescriptions contained in the safety manual QP064-43 shall be followed.

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22-MTX-5550G-FSA-01

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Mod_12_CB Rev03

BYHON
Via Lepanto 23, 59100
Prato (PO)
ITALY



The following pages are the prior revisions of this certificate.

CERTIFICATE

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Hardware Safety Integrity:

The constraints on hardware safety integrity have been verified in order to achieve a sufficiently robust architecture taking into account the level of element and subsystem complexity following the compliance route 1s.

Type
A

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The estimated safety integrity, for each safety function, due to random hardware safe and dangerous failures rates (excluding "no part" and "no effect" contribution).

See
page
2

The architectural constraints and the effects of random failures (PPH/PFD_{avg}) must be verified for each specific application and safety function implemented by the E/E/PE safety-related system.

Certified by:

BYHON

BYHON Certification Director:



Rosati Francesco

CERTIFICATE No:
MTXI-5550G-ENS-E01
Revision: A

Issued:
July 31st, 2019

Valid until:
July 30th, 2022

The owner of a valid certificate for an assessed product is authorized to affix the following mark and relative ID number, to all recognized devices which are identical to the product assessed.

BYHON

SIL ✓

ID.N° 500719E02N

The design of each Safety Instrumented Function (SIF) shall meet the requirements listed in the reference standards that shall be selected by taking into account the specific application. Specific activities necessary to investigate and reach a judgment on the adequacy of the functional safety achieved by the E/E/PE safety-related system or compliant items (elements/subsystems) has been conducted by an independent assessor.

The following failure rates data shall be used to the PFI/PFD_{avg} estimation, taking into consideration all parameters such as redundancy, architectural constraints, diagnostic capability, also introduced by the whole system, including the considerations about the proof test and its effectiveness, mean time of restoration, up to the maintenance capability and its minimum characteristics.

Failure rate for Mechanical Vibration Switch 5550

Configuration	λ_{SU}	λ_{SD}	λ_{DU}	λ_{DD}	λ_{RES}
SPDT – Manual reset only	388	0	219	0	234
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Failure rate for Mechanical Vibration Switch 5550G

Configuration	λ_{SU}	λ_{SD}	λ_{DU}	λ_{DD}	λ_{RES}
SPDT with Reset coil	473	0	290	0	309
DPDT with Reset coil (COMMON)	406	0	256	0	309
DPDT with Reset coil (REDUNDANT SWITCH)	67	0	34	0	0

Note:

- SPDT contacts are standard; DPDT contacts are optional. Reset coil is standard on 5550G, optional on 5550.
- All failure rates are in FIT (Failure In Time 1 FIT = 1 failure / 10⁹ hours).
- The λ_{RES} (RESIDUAL) failure rates includes the NO PART and NO EFFECT failure rates.

The prescriptions contained in the safety manual QP064-43 shall be followed.

CERTIFICATE NO:
MTXI-5550G-ENS-E01

Revision: A

Issued:
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July 30th, 2022

The Functional Safety
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is an integral part of this
certificate

