# FUNCTIONAL SAFETY

# CERTIFICATE

## CERTIFICATO – ZERTIFIKAT – CERTIFICADO – CERTIFICAT

The product:

*Seismic Velocity Transmitter ST5484E*
*Vibration Transmitter ST5491E (All configurations)*

Manufactured by:

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

suitable for the following safety function(s):

To provide a 4-20mA DC signal output proportional to the vibration amplitude of rotating equipment portion where installed

has been assessed per the relevant requirements of

**IEC 61508:2010 Parts 1 to 2**

and meets the requirements providing the following:

| | |
|---|---|
| **Systematic Capability:**<br>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:**<br>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:**<br>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-5484E-ENS-B01

Issued:
May 23rd, 2025

Valid until:
May 22nd, 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

ANAB
ANSI National Accreditation Board
ACCREDITED
ISO/IEC 17065
PRODUCT CERTIFICATION BODY
#8914





DOCUMENT NO: 1882142
REV: C

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 ST5484E and ST5491E - All configurations**

| Product | Series | $\lambda_S$ | $\lambda_{DU}$ | $\lambda_{DD}$ |
|---|---|---|---|---|
| Seismic Velocity Transmitter | ST5484E | 94 | 117 | 114 |
| Vibration Transmitter | ST5491E | | | |

Note:

- All failure fates are in FIT (Failure In Time 1 FIT = 1 failure / $10^9$ hours).
- The prescriptions contained in the safety manual QP064-42 shall be followed.
- The device can be used in SIL 2 application with HFT=0. In any case, the SIL reached by the entire Safety Instrumented Function (SIF) must be verified by the System Integrator / Final User considering demand mode, architectures, proof test interval and effectiveness, availability of diagnostics.

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Mod_12_CB Rev09

BYHON
Via Lepanto 23, 59100
Prato (PO)
ITALY





DOCUMENT NO: 1882142
REV: C

**The following pages are the prior revisions of this certificate.**

# FUNCTIONAL SAFETY

# CERTIFICATE

CERTIFICATO – ZERTIFIKAT – CERTIFICADO – CERTIFICAT

The product:

***Seismic Transmitters ST5484E and ST5491E***
***(all configurations)***

Manufactured by:

***Metrix Instruments Co.***
***8824 Fallbrook Dr. Houston, TX 77064***
***United States of America***

suitable for the following safety function(s):

. Provides a 4-20mA DC signal output proportional to the vibration amplitude of rotating equipment portion where installed.

has been assessed per the relevant requirements of

**IEC 61508:2010 Parts 1 to 7**

and meets the requirements providing the following:

| | |
|---|---|
| **Systematic Capability:**<br>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:**<br>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:**<br>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-5484E-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° 010522E03N

ANSI ACCREDITED
#8914
ISO/IEC 17065
Product Certification Body



DOCUMENT NO: 1882142
REV: B

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 Seismic Transmitters ST5484E and ST5491E– All configurations

| $\lambda_{SU}$ | $\lambda_{SD}$ | $\lambda_{DU}$ | $\lambda_{DD}$ | $\lambda_{RES}$ |
|---|---|---|---|---|
| 94 | 0 | 117 | 114 | 640 |

Note:

- The $\lambda_{RES}$ (RESIDUAL) failure rates includes the NO PART and NO EFFECT failure rates.
- All failure fates are in FIT (Failure In Time 1 FIT = 1 failure / $10^9$ hours).

The prescriptions contained in the safety manual QP064-42 shall be followed.

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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

CERTIFICATO – ZERTIFIKAT – CERTIFICADO – CERTIFICAT

The product:

***Seismic Transmitters STS484E and STS491E***
***(all configurations)***

Manufactured by:

***Metrix Instruments Co.***
*8824 Fallbrook Dr. Houston, TX 77054*
*United States of America*

suitable for the following safety function(s):

Provides a 4-20mA DC signal output proportional to the vibration amplitude of rotating equipment portion where installed.

has been assessed per the relevant requirements of

IEC 61508:2010 Parts 1 to 7

and meets the requirements providing the following:

| | |
|---|---|
| **Systematic Capability:**<br>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 1s. | SC 2 |
| **Hardware Safety Integrity:**<br>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 1H. | Type A |
| **Random Safety Integrity:**<br>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:
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Issued:
July 31st, 2019

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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° 500719E01N

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REV: A

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 Seismic Transmitters STS484E and STS491E– All configurations**

| $\lambda_{SU}$ | $\lambda_{SD}$ | $\lambda_{DU}$ | $\lambda_{DD}$ | $\lambda_{RES}$ |
|---|---|---|---|---|
| 94 | 0 | 117 | 114 | 640 |

Note:

- All failure fates are in FIT (Failure In Time 1 FIT = 1 failure / $10^9$ hours).
- The $\lambda_{RES}$ (RESIDUAL) failure rates includes the NO PART and NO EFFECT failure rates.

The prescriptions contained in the safety manual QP054-42 shall be followed.

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Issued:
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Valid until:
July 30th, 2022

The Functional Safety Assessment report no.

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