FUNCTIONAL SAFETY

CERTIFICATE

CERTIFICATO – ZERTIFIKAT – CERTIFICADO – CERTIFICAT

The product:

Rotary Encoder
RTS100
CANopen Safety Version

Manufactured by:

Legal Location	Operative Location
TSM SENSORS S.r.l. *Via Roma, 110* *24021 Albino, Bergamo* *Italy*	*TSM SENSORS S.r.l.* *Via De Gasperi, 6/5* *25030 Zocco d'Erbusco, Brescia* *Italy*

suitable for the following safety function(s):

Provide a device output signal consistent with specifications with respect to angular and/or inclination measurement.

has been assessed per the relevant requirements of

IEC 61508:2010 Parts 1 to 3

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 B

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:
TSMS-RTS10-ESE-E01
Revision: A

Issued:
July 02nd, 2024

Valid until:
July 01st, 2027

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° 161624ES01A

ANAB
ANSI National Accreditation Board
ACCREDITED
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 Inclinometer

Configuration	λ_S	λ_{DU}	λ_{DD}
WITHOUT INTEGRATED INCLINATION SENSOR	51	121	1906
WITH INTEGRATED INCLINATION SENSOR	51	121	2328

Notes:

- All failure rates are in FIT (Failure In Time 1 FIT = 1 failure / 10^9 hours).
- The device can be used in stand-alone configuration, up to PLd acc. to ISO 13849-1:2023, as pre-validated subsystem.
- The firmware release considered to be covered by the certificate is FW2302R1XX.
- The device can be used in stand-alone configuration, up to SIL 2 acc.to IEC 61508:2010.

The prescriptions contained in the safety manual MNL0013 shall be followed.

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The Functional Safety Assessment report no.

24-TSM-RTS10-FSA-01

dated:
July 01st, 2024

is an integral part of this certificate

Mod_12_CB Rev07

BYHON
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