

FUNCTIONAL SAFETY CERTIFICATE

CERTIFICATO – ZERTIFIKAT – CERTIFICADO – CERTIFICAT

The product:

ICOL
Train Control and Management System

Manufactured by:

Softronic SRL
*Calea Severinului no. 40,
Craiova, Romania, 200609*

suitable for the following safety function(s):

Refer to next page.

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
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
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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:
SOFT-ICOLX-SSE-E02

Revision: B

Issued:
17/02/2022

Valid until:
21/09/2024

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° 158721SS01B



#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.

Safety Functions failure rates

SIF	λ_s	λ_{DU}	λ_{DD}
OUTPUTS DEACTIVATION AT POWER SUPPLY CONNECTION OR ICOL-UC RESETTING	2560	93	8
ACTIVATION DEACTIVATION CABIN	291	25	60
PANTOGRAPH LIFTING – LOWERING	833	108	2000
DIRECTION SELECTION	647	38	208
TRACTION	2930	46	0
AUTOMATIC SPEED CONTROL	2460	40	284
DOUBLE TRACTION DEACTIVATION AT INTERRUPTED COMMUNICATION	823	19	65
SIMULTANEOUS COMMAND MANAGEMENT	833	20	0
NON-PROPERLY EXECUTED COMMAND	1370	25	0
ATP TCO	514	52	2
ISOLATION ATP	237	43	459
ISOLATION ATC-2	237	41	461
ATP SLEEP MODE	331	27	360
MCB CONNECTION DISCONNECTION	2230	118	1790

Note:

- All failure rates are in FIT (Failure In Time 1 FIT = 1 failure / 10⁹ hours).
- For more details about safety functions, refer to the safety manual DT-0547

The prescriptions contained in the safety manual DT-0547 shall be followed.

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The Functional Safety
Assessment report no.

21-SOF-ICOLX-FSA-02

dated:
16/02/2022

is an integral part of this
certificate



Mod_12_CB Rev03

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