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Report

on the

Certificate

M6A 020196 0274 Rev. 00

of the

Safety components
Series R35, inductive

Applicant

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Testing Laboratory for Safety Components

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Modification History

Rev.	Status	Date	Author	Modification / Description
1.0	Replaced	2020-06-04	M. Braun	Initial
1.1	Replaced	2022-01-26	M. Braun	Update Certificate
1.2	Replaced	2024-11-26	M. Braun	ECI 1122, EQI 1134 added, update to EN ISO 13849-1:2023
1.3	Active	2025-09-23	M. Braun	ExI 11xx Gen5.0 Mid-Range added

Table 1: Modification history

1 Target of Evaluation (ToE)

In May 2019, Dr. JOHANNES HEIDENHAIN GmbH requested TÜV SÜD Rail GmbH to test and certify the Series R35, inductive according to the standard listed in clause 4 of this report. The project number related to this Technical Report is 717519484.

In November 2021, Dr. JOHANNES HEIDENHAIN GmbH requested TÜV SÜD Rail GmbH to test and certify the ExI 11xx FS kompakt according to the standard listed in clause 4 of this report and to issue a new certificate. The project number related to Rev. 1.1 of this Technical Report is 717523290.

In September 2024, Dr. JOHANNES HEIDENHAIN GmbH requested TÜV SÜD Rail GmbH to test and certify the ExI 11xx Gen.5 E30-R2 Performance (incl. Gen4Replace) according to the standard listed in clause 4 of this report. The project number related to Rev. 1.2 of this Technical Report is 717530956.

In July 2025, Dr. JOHANNES HEIDENHAIN GmbH requested TÜV SÜD Rail GmbH to test and certify the ExI 11xx Gen5.0 Mid-Range according to the standard listed in clause 4 of this report. The project number related to Rev. 1.3 of this Technical Report is 717532712.

The ToE is a product used in safety related applications. The Series R35, inductive is a Safety Encoder approved for SIL 2, 3 according to IEC 61508 and Category 3 / PL d, e according to ISO 13849-1.

2 Scope of Testing

2.1 Test Specimen

The safety functions of the Series R35, inductive covered by this certificate are listed in the Annex A to this report.

2.2 Nomenclature and Identification of Series R35, inductive

The certified variants of the Series R35, inductive covered by this certificate are listed in the Annex A to this report.

3 Certification Requirements

The certification of the Series R35, inductive will be according to the regulations and standards listed in clause 4 of this document. This certifies the successful completion of the following test segments.

I. Functional Safety including

- Functional safety management (FSM) and safety lifecycle
- Applied safety development process
- Analysis of the product structure / architecture (Block-Diagram-FMEA)
- Analysis of the hardware (FMEDA on component or block level, quantitative analysis)
- Verification and validation procedures/activities
- Fault simulations and tests
- Approval of fault avoidance measures
- Functional tests

II. Electrical Safety

III. Susceptibility to environmental errors including

- Climate and temperature
- IP degree of protection
- Mechanical effects

IV. Electromagnetic compatibility (EMC)

- Immunity

V. Safety information in the product documentation (safety manual, user manual, installation and operating instructions).

VI. Product-Related Quality Assurance in Manufacture and Product Development

Certification is dependent on successful completion of all above listed test segments. The testing follows the basic certification scheme for Safety Components of TÜV SÜD Rail GmbH.

3.1 Certification Documentation

The detailed technical evaluation is documented in the most recent version of the Technical Report:

Document No.	Description	Project No.
HT85524T, Rev. 1.3	Technical Report	717519484
HT84061T, Rev. 1.2	Technical Report - Concept of SIL 3 safety functions with Heidenhain measurement instruments	717518371
HT95190C-A	Annex in the current valid revision.	717532712

Table 2: Technical Report

Modifications have been evaluated and tested and are documented in the most recent version of the Technical Report of Modifications (TRM):

Document No.	Modification Description	Project No.
HT97828T	ExI 11xx FS kompakt Electronics	717523290
HT85545T, Rev. 1.3	ExI 11xx FS kompakt Mechanics	717523290
HT104008T	ExI 11xx Gen.5 E30-R2 Performance (incl. Gen4Replace)	717530956
HT105538T	ExI 11xx Gen5.0 Mid-Range	717532712
Safety related requirements, conditions and restrictions can be found in the following user documentation		
1384898	Operating Instructions ECI 1119, EQI 1131 EnDat22 70C 82A 1KA FS	
1417616	Operating Instructions ECI 1119, EQI 1131 EnDat22 70C 82A FS	
1388510	Operating Instructions ECI 1119, EQI 1131 EnDat22 70D 82A FS	
1363898	Operating Instructions ECI 1119, EQI 1131 EnDat22 70G 82A FS	
1384973	Operating Instructions ECI 1119, EQI 1131 E30-R2 70C 82A 1KA FS	
1419551	Operating Instructions ECI 1119, EQI 1131 E30-R2 70D 82A FS	
1388665	Operating Instructions ECI 1119, EQI 1131 E30-R2 70H 82D FS	
1409623	Operating Instructions ECI 1119, ECI 1122, EQI 1131, EQI 1134 E30-R2 70C 82A FS	
1421762	Operating Instructions ECI 1119, ECI 1122, EQI 1131, EQI 1134 E30-R2 70D 82A FS	
1416681	Operating Instructions ECI 1122, EQI 1134 E30-R2 70G 82A FS	
1419040	Operating Instructions ECI 1119, EQI 1131 E30-R2 70H 82D FS	
1471184	Operating Instructions ECI 1119, EQI 1131 E30-R2 70C 82A FS	
1454464	Operating Instructions ECI 1119, EQI 1131 E30-R2 70I 82A, 82E FS	

Table 3: Report on Modifications

Based on the specified purpose of use of the Series R35, inductive in safety critical process applications, the certification is based on the set of standards listed in clause 4 of this document. The issuance of the certificate states compliance with these references unless specifically noted otherwise.

4 Standards and Guidelines

The regulations and guidelines which form the basis of the type testing are listed below.

4.1 Guidelines and Directives

No.	Reference	Description
/N1/	2006/42/EC	Directive 2006/42/EC of the European Parliament and of the Council of 2006-05-17 on machinery

Table 4: Guidelines and directives

4.2 Functional Safety Standards

No.	Reference	Description
/N2/	EN 61508-1:2010 (SIL 2, 3)	Functional safety of electrical/electronic/programmable electronic safety-related systems – Part 1: General requirements
/N3/	EN 61508-2:2010 (SIL 2, 3)	Functional safety of electrical/electronic/programmable electronic safety-related systems – Part 2: Requirements for electrical/electronic/ programmable electronic safety-related systems
/N4/	EN ISO 13849-1:2015 EN ISO 13849-1:2023 (Cat. 3, PL d, e)	Safety of machinery - Safety-related parts of control systems Part 1: General principles for design

Table 5: Basic safety standards

No.	Reference	Description
/N5/	EN 61800-5-2:2017	Adjustable speed electrical power drive systems – Part 5.2: Safety requirements -Functional
/N6/	IEC 61800-5-3:2021	Adjustable speed electrical power drive systems - Part 5-3: Safety requirements - Functional, electrical and environmental requirements for encoders

Table 6: Associated safety standards

4.3 Mechanical Compatibility and IP Code testing

Remark: The following standards were approved by other testing services.

No.	Reference	Description
/N7/	Functional Safety_Mechanical components_2.0_2020-12	Grundsätzliche Vorgehensweise für die Bewertung mechanischer und mechatronischer Systeme im Umfeld der „Funktionalen Sicherheit“
/N8/	FKM Richtlinie: 2020	Rechnerischer Festigkeitsnachweis für Maschinenbauteile
/N9/	VDI 2230 / Blatt 1: 2015	Systematische Berechnung hochbeanspruchter Schraubenverbindungen
/N10/	EN 60529:1989/A2:2013/ AC:2019	Degrees of protection provided by enclosures (IP Code)

Table 7: Mechanical Compatibility and IP Code testing standards

4.4 Basic Safety, Environmental testing

Remark: The following standards were approved by other testing services.

No.	Reference	Description
/N11/	EN 61800-5-1:2007/ A1:2017	Adjustable speed electrical power drive systems – Part 5-1: Safety requirements – Electrical, thermal and energy

Table 8: Basic Safety, Environmental testing standards

4.5 Electromagnetic Compatibility

Remark: The following standards were approved by other testing services.

No.	Reference	Description
/N12/	EN 61800-3:2004/ A1:2012	Adjustable speed electrical power drive systems – Part 3: EMC requirements and specific test methods
/N13/	EN 61800-5-2:2017	Adjustable speed electrical power drive systems – Part 5.2: Safety requirements -Functional

Table 9: Electromagnetic compatibility standards

4.6 Safety Information in the Product Documentation (safety manual, operating instructions, labelling)

No.	Reference	Description
/N14/	EN ISO 13849-1:2015 EN ISO 13849-1:2023	Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design

Table 10: Safety information standards

4.7 Quality Management System

No.	Reference	Description
[M1]	QMS	Quality Management System TÜV SÜD Rail GmbH
	TR_RA_P_04.50	Test Program Functional Safety & Cybersecurity TR_RA_P_04.51 Definition Scope of testing TR_RA_P_04.52 Concept Phase & Safety Lifecycle TR_RA_P_04.53 Detail Phase Hardware TR_RA_P_04.54 Detail Phase Software TR_RA_P_04.55 Safety Manual TR_RA_P_04.56 Result of Testing
[M2]	D-PL-11190-08-00	DAkkS accreditation according to DIN EN ISO 17025:2018 / EN ISO/IEC 17025:2017

Table 11: Quality Management System

5 Results

5.1 Functional Safety

The tests performed and quality assurance measures implemented by the Dr. JOHANNES HEIDENHAIN GmbH have shown that the Series R35, inductive complies with the testing criteria specified in clause 4 subject to the conditions defined in clause 6 and is suitable for safety-related use in applications up to

- SIL 2, 3 in accordance with IEC 61508[1] and
- category 3, PL d, e according to ISO 13849-1[1].
- For details see related annex.

[1] With additional measures suitable for safety-related applications up to SIL 3, category 4 PL e, see HT84061T

6 Implementation Conditions and Restrictions

The use of the Series R35, inductive shall comply with the current version of the safety parts of the user manual, and the following implementation and installation requirements have to be followed, if the Series R35, inductive is used in safety-related installations.

- The guidelines and requirements specified in the user documentation shall be followed. Only modules certified for safety-related operation shall be used for safety-critical functions.
- Timing aspects like reaction times, test intervals or test execution times have to be considered by the implementation of the final Safety function.
- The operating conditions like operating temperature as specified in the user documentation shall be met.

7 Certificate Number

This report specifies technical details and implementation conditions required for the application of Series R35, inductive to the certificate:

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Gert Effenberger
2025.09.23 17:04:24
+02'00'

Technical Certifier