Automation - Functional Safety

Evaluation report

Report about the evaluation of the modification of
KFD2-RSH-1.2D.FL2-Y1
KFD2-RSH-1.2D.FL3-Y1
KFD2-RSH-1.2E.L2-Y1
KFD2-RSH-1.2E.L3-Y1

Report-No.: 968/FSP 1538.01/20
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Report about the evaluation of the modification of KFD2-RSH-1.2*-Y1

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Evaluated product:	KFD2-RSH-1.2D.FL2-Y1 KFD2-RSH-1.2D.FL3-Y1 KFD2-RSH-1.2E.L2-Y1 KFD2-RSH-1.2E.L3-Y1
Customer / Manufacturer:	Pepperl+Fuchs GmbH Lilienthalstraße 200 68307 Mannheim Germany
Customer-Order-No. / Date:	8001016212 / 2019-07-11
Certification Body:	TÜV Rheinland Industrie Service GmbH Safety & Security for Automation & Grid (D-ZE-11052-02-01) Am Grauen Stein 51105 Köln Germany
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Duration:	March 2020 - April 2020

The results are exclusively related to the product/project.

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1. Scope

With this report the results of the examination of changes performed at the KFD2-RSH * relay signal conditioner family are summarized concerning their impact on the validity of the existing type approval.

The KFD2-RSH* relay modules series consists of two basic variants DTS and ETS. The DTS (de-energized to safe) module turns the output off, when the safety function needs to be executed. The ETS (energized to safe) module turns the output on, when the safety function needs to be executed.

The DTS relay modules are to be assessed for the fulfilment of the requirements of IEC 61508 (low and high demand mode of operation), IEC 62061 and ISO 13849, the ETS relay modules for IEC 61508 (low and high demand mode of operation) only.

The changes performed to the product result in a new type designation of the products by adding "-Y1". This evaluation report serves as the basis for the issuance of a certificate for the product described in chapter 3.1.

2. Applied standards and guidelines

[N1] IEC 61508 Part 1 - 7:2010
Functional safety of electrical/electronic/programmable electronic safety-related systems

[N2] IEC 62061:2015
Safety of machinery-Functional safety of safety-related electrical, electronic and programmable electronic control systems

[N3] ISO 13849-1:2015 (in extracts)
Safety of machinery-Safety-related parts of control systems
Part 1: General principles for design

[N4] EN 61010-1:2010 / A1:2019
Safety requirements for electrical equipment for measurement, control and laboratory use
Part1: General requirements

3. Identification of the evaluated product

3.1. Description of the product

The DTS Variants provide a galvanic isolation between field circuits and control circuits. The safe state is the de-energized state corresponding to open relay outputs.

The ETS Variants provide also a galvanic isolation between field circuits and control circuits, but the safe state is the energized state corresponding to closed relay outputs.

The following modifications have been applied to the KFD2-RSH System:

Changing the input impedance which is needed for the dynamic tests.

3.2. Documents for the evaluation

Document			
No. Document	**Document-No./ File Name**	**Rev.**	**Date**
[D1]	**Impact Analysis:** fs0101tv-25a.pdf	V1.0	2019-05-22
[D2]	**V&V Test Results:** 136016.pdf	V1.0	2019-07-15

Document			
No. Document	**Document-No./ File Name**	**Rev.**	**Date**
[D3]	**Safety Manuals:** tdoct5815c_eng.pdf tdoct5816c_eng.pdf	 - -	 2019-11 2019-11
[D4]	**Datasheets:** fs0101tv-33a5.pdf fs0101tv-33a6.pdf fs0101tv-33a7.pdf fs0101tv-33a8.pdf	 - - - -	 2019-07-15 2019-07-15 2019-07-15 2019-07-15
[D5]	**EMC tests:** prdebu59b.pdf	 -	 2019-07-25
[D6]	**Test report – Examination of Emerson DO-cards:** 135668.pdf	 -	 2018-06-21

3.3. Previous reports and certificates

	Report-No.	Date	Certificate	Date
[R1]	968/FSP 1538.00/17	2017-12-12	968/FSP 1538.00/17	2017-12-12

3.4. Documents compiled by TÜV Rheinland

No.	Document Title / File Name	Rev.	Date
[T1]	List of Open Items LOP_P&F_KFD2-RSH_V2.xlsx	V2	2020-04-21

4. Evaluation and Review

4.1. Evaluation Process

The evaluation of the results of the previously listed inspection reports carried out by the inspection body, the client, accredited testing laboratories and external service providers was mainly done by means of a review.

The results of the individual evaluations of the product according to the evaluation plan are recorded in the following chapters.

4.1.1. EN 61010-1:2010 / A1:2019

A comparison of the requirements in the actual revision of EN 61010-1:2010 / A1:2019 with the requirements in the EN 61010-1:2010 edition concluded that the certified product meets the requirements of the new edition EN 61010-1:2010 / A1:2019 as well. The modifications in EN 61010-1:2010 / A1:2019 do not have any impact on the existing design of the devices and the requested tests for the assessment of conformity.

4.1.2. Review of change description including impact analysis

The changes and their impact to the functional safety of the product are described in the impact analysis [D1]. In order to implement an impedance change at the inputs of the devices a reference diode was changed. This diode changed from a 1.24V to a 2.5V type.

Based on this modification it is described, which verification and validation activities are planned and which documents need to be updated/created. The PCB layout was not modified. The validation of the modification was done by hardware and timing tests, to verify the correct functionality. As a further result of the analysis, no environmental tests were defined to be necessary. Due to the small impact of the modification on the circuit design no additional EMC test was required.

Result:

The impact analysis was reviewed with a positive result. The certification body agrees on the definition of safety related and non-safety related modification. The planned verification and validation is accepted and considered as effective.

4.1.3. Review of verification and validation

As a result of the impact analysis verification and validation activities have been performed by the manufacturer as documented in the V&V Test results [D2]. Furthermore an EMC test was performed with a positive result [D5].

The documentation of the planned and performed verification and validation activities were reviewed by the certification body.

Result:

The review of the verification and validation documentation was concluded with a positive result. The rest results are considered as a valid prove for correct implementation of the modifications.

The changes have no negative impact to the functional safety of the product.

5. Summary

The assessment of the modifications of the new KFD2-RSH-1.2*-Y1 types of customer Pepperl+Fuchs GmbH came to the result, that the requirements of the applicable standards as listed in chapter 2 are still met.

Variant DTS:

SIL 3 according to IEC 61508 for low and high demand mode of operation, SIL CL 3 according to IEC 62061, PL e according to ISO 13849-1.

Variant ETS:

SIL 3 according to IEC 61508 for low demand mode of operation

SIL 3 according to IEC 61508 for high demand mode of operation, if the measures described in chapter 4.3.2 and 4.4.3 are implemented by the user. The required measures are described in the associated safety manual for the variant ETS, see [D3].

Cologne, 2020-07-01
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Report released after review:
Date: 2020-07-02

The assessors

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