Automation, Software and Information Technology

Test report about
the supplementary type approval and certification
of the FLEX-I/O system

Report-No.: 968/EZ 188.03/10
Date: 2010-02-11
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Test object: FLEX-I/O-System
Types: see list of certified components
Customer: Rockwell Automation Asia Pacific Business Center Pte Ltd.
No. 2 Corporation Road
#06-05/10 Corporation Place
618494 Singapore
Manufacturer: see Customer
Order-No./Date: PA14378 dated 2009-12-09
Test Institute: TÜV Rheinland Industrie Service GmbH
Automation, Software and Information Technology (ASI)
Am Grauen Stein
51105 Köln
Germany
Department: Automation, Software and Information Technology (ASI)
TÜV-Offer-No./Date: 968/457/09 dated 2009-11-13
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Inspector: Dipl-Ing. Andreas Hesse
Test location: see Test Institute
Test duration: December 2009 to February 2010

The test results are exclusively related to the test samples.

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1. **Scope**

Scope of this report is the assessment of the changes to different modules of the previously certified FLEX-I/O system.

2. **Standards forming the basis for the requirements**

Functional safety of electrical/electronic/programmable electronic safety-related systems

Programmable controllers - Part 2: Equipment requirements and tests

[S3] EN 50178:1997
Electronic equipment for use in power installations

Fire detection and fire alarm systems Part 2: Control and indicating equipment

[S5] EN 50156-1:2004
Electrical equipment for furnaces and ancillary equipment Part 1: Requirements for application design and installation

3. **Identification of the test object**

The test object are revised modules of the FLEX-I/O-system.

3.1 **Modules covered by this report**


The module is identical with the previously certified 1794 IF4I from a functional point of view. The changes are related to some Hardware components on the board. These components were changed due to the higher temperature range of the module.

3.1.2 Flex EtherNet Adapter 1794-AENT - HW-Rev. B / FW Rev. 4.2

The firmware of the 1794-AENT was revised for correcting some anomalies.

3.2 **Documentation**

[D1] Flex EtherNet Adapter Firmware Revision 4.2 - 1794-AENT

[D2] FLEX I/O System with ControlLogix for SIL 2 Bulletin 1794 Publication 1794-RM001D-EN-P - January 2010

3.3 **Previous test reports**

[T1] Concept review Flex-I/O-System of Rockwell Automation for SIL2 (in combination with ControlLogix-System) Report-No.: 968/EZ 188.00/04, dated 2004-11-30 Test Institute
4. Tests and test results

4.1 General

The measuring and test equipment, which has been used by the TÜV Rheinland Group in the tests described in the following, is subject to regular inspection and calibration. Only devices with valid calibration have been used. The devices used in the various tests are recorded in the inspector’s documentation.

All considerations concerning uncertainty of the measurements, so far applicable, are stated in the inspector’s documentation, too.

In cases where tests have been executed in an external test lab or in the test lab of the manufacturer and where the results of these tests have been used within the here documented approval, this has occurred after a positive assessment of the external test lab and the achieved test results in detail according to the Quality Management procedure QMA 3.310.05.

4.2 Inspection and review of the safety plan and verification and validation plan (V&V plan) for compliance with the requirements of IEC 61508

The handling of the updates followed the Rockwell internal TQCS-procedures, which were assessed by the test institute.

Therefore, the previous FSM and V&V-plan was taken into account.

Result:

The procedures are in line with the requirements of IEC61508 for modification handling.

4.3 Inspection and review of the functional and safety related specification of the product

The changes did not require a change in the specification of the modules.

Result:

The previous results remain valid.

4.4 Test of all safety related functions

The basic safety function did not change.

The modules were tested using the standard quality test plans of Rockwell Automation.

The test reports were reviewed by the test institute.

Result:

The changes did not have an influence on the safety functions of the modules.
4.5 Verification of the measures for the detection and control of faults in HW and SW

The changes did not have an influence on the measures for the detection and control of failures.

**Result:**

The previous results remain valid.

4.6 Inspection of the SW-verification tests (module, integration and system tests) performed by the manufacturer

4.6.1 Isolated Analog Input 4 pt

The firmware remains the same as the previously certified firmware.

**Result:**

The previous results remain valid.

4.6.2 Flex EtherNet Adapter 1794-AENT

All changes inside the firmware as described in [D1] were tracked using a bug tracking system. The changes were identified within the code using the tracking number.

The changes were tested using the standard test procedure for the 1794-AENT module.

**Result:**

The results are accepted by the test institute.

4.7 Assessment of the applied measures for the avoidance of faults

All changes followed the already assessed procedures of the Rockwell internal TQCS.

These procedures include among others:

- ECN-system
- Change and impact analysis
- Restest of changed components

**Result:**

The applied measures for the avoidance of faults are in line with the requirements of IEC 61508 / SIL 2.

4.8 Inspection and review of the reports on the environmental tests

The environmental tests were carried out according to [S2].

For the 1794-IF4ICFXT a tests were carried out to verify the functionality under higher temperature (70°C).

The necessary test reports were reviewed by the Test Institute.
Result:
All test were finished with a positive result.
The results are accepted by the Test Institute based on a positive assessment of the laboratory.

4.9 Test of the electrical safety
The changes did not have an influence on the electrical safety.

Result:
The previous results remain valid.

4.10 Inspection and review of the documentation for the user
The documentation for the user comprises of the installation instructions and user manuals for the modules and the safety reference manual [D2].

Result:
The documentation for the user contains the necessary information for correct installation and safe operation of the devices.
The safety related reliability data are documented in the safety reference manual [D2].

4.11 Additional requirements of application standards

4.11.1 EN 54-2 [S4]
The EN 54-2 lists the application specific requirements to be fulfilled by a complete installation.
The FLEX-I/O as a possible part of the installation can only fulfil parts of these requirements.

Result:
The design of the FLEX-I/O system followed defined quality management procedures as required in chapter 12.1.
The installation and user documentation fulfils the applicable requirements of chapter 12.2.1 (e.g. operating instructions, maintenance information).
The detailed design documentation for all FLEX-I/O-devices were provided to the Test Institute as required in chapter 12.2.2.
The use of FLEX-I/O system inside a specific application must be evaluated separately taken into account all other requirements and boundary conditions of EN 54-2.
The installation instructions, user manuals and the safety reference manual [D2] shall be considered.

4.11.2 EN 50156-1 [S5]
The EN 50156-1 lists application specific requirements to be fulfilled by a complete installation.
The FLEX-I/O as a possible part of the installation can only fulfil parts of these requirements.
Result:

The development of the Flex-I/O-System followed the lifecycle as given in the IEC 61508. This process is considered adequate to the requirements given in EN 50156-1 chapter 10.1.

The technical documentation of the FLEX-I/O system fulfils the applicable requirements of EN 50156-1 chapter 14.

The use of FLEX-I/O system inside a specific application for furnaces must be evaluated separately taken into account all other requirements and boundary conditions of EN 50156-1.

The installation instructions, user manuals and the safety reference manual [D2] shall be considered.

5. **Summary**

The product complies with the requirements of the relevant standards and can be used in applications up to SIL 2 acc. to IEC 61508.

The installation instructions, user manuals and the safety reference manual [D2] shall be considered.

Cologne, 2010-02-11

TIS/ASI/Kst. 968 he-nie

The inspector

Dipl.-Ing. Andreas Hesse

Dipl.-Ing. Heinz Gall

Report released after review:

Date: 2010-02-11