

Automation, Software and Information Technology

**Test report of the software approval
AM2000/MAXI/RIO/RIO-NC - CPU v6.28
for the safety-related automation devices
GuardPLC 1200
GuardPLC 1600
GuardPLC 1800
GuardPLC 2000
GuardPLC Distributed I/O
of Rockwell Automation**

**Report-No.: 968/EZ 164.04/05
Date: 2005-09-15**

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Report-No.:	968/EZ 164.04/05
Date:	2005-09-15
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Object(s) subject to testing:	Software package AM2000/MAXI/RIO/RIO-NC - CPU v6.28
Client/Manufacturer:	HIMA Paul Hildebrandt GmbH + Co. KG Industrie Automatisierung Albert-Bassermann-Straße 28 D-68782 Brühl
Order-No./Date:	Contract HIMA/TÜV dated 2002-11-08
Test Institute:	TÜV Industrie Service GmbH Automation, Software, Information Technology (ASI) Am Grauen Stein D-51105 Köln
TUV-Offer-No./Date:	Proposal for contract HIMA/TÜV dated 2002-10
TÜV-Order-No./Date:	9071450 dated 2004-07-06
Inspector:	Dipl.-Ing. (FH) Oliver Busa
Test location:	see Test Institute
Test duration:	June 2005 - September 2005

The test results exclusively related to the test objects.

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1 Scope

Scope of the approval is the software package AM2000/MAXI/RIO/RIO-NC - CPU v6.28, dated 2005-09-01.

The executed software approval shall show, that the software still meets the requirements up to SIL 3 according to IEC 61508, part 1 - 7.

2 Standards

Functional safety

- [1] IEC 61508:2000, parts 1 - 7
Functional safety of electrical/electronic/programmable electronic safety related systems

3 Object of inspection

The software package AM2000/MAXI/RIO/RIO-NC - CPU v6.28 forms the basis for the different firmware of the safety-related automation devices GuardPLC 1200, 1600, 1800, 2000 and Distributed I/O. The different products and the according firmware implementations are listed in Table 3.

The reason for the software modification is the introduction of new GuardPLC Distributed I/O modules.

As a reason of the above described modification other changes and accommodations were done to relieve future software modifications.

3.1 Documentation of the manufacturer

The needed documentation and software source was handed over by the manufacturer on a CD-ROM (HiMatrix v6.28, dated 2005-09-01). The CD-ROM is archived by the Test Institute.

The following table includes only the primary documents. Software design and test specification and further product and system specific documents are listed in [H1]. The test protocols of the software development tests are listed in [H2].

No.	Description	Revision	Date	Filename
H1	Dokumentationsplan für AM2000-/MAXI-/RIO-/RIONC-/RIOMONO-CPU	v6.6	2005-08-18	cpu_PL_DocPlan.doc
H2	Dokumentationsplan HiMatrix Scanner Protokoll Projekt	v1.4	2005-09-01	p0310pl01_Dokumentationsplan.doc
H3	Auswirkungsanalyse HiMatrix RIONC_HA_08, 09	v1.4	2005-08-18	p0310c01.doc
H4	Technische Anforderungsspezifikation AM2000-/MAXI-/RIO-/RIONC-/RIOMONO-CPU	v6.7	2005-08-04	cpu_rs01.doc

Table 1: Primary documents

3.2 Documentation of the Test Institute

No.	Description
P1	Test report of the type approval Report No. 968/EZ 164.00/04 dated 2004-01-30, TÜV Rheinland
P2	Test report of the type approval Report No. 968/EZ 164.03/05 dated 2005-09-15, TÜV Rheinland
P3	Test report of the software approval Report No. 968/EZ 164.02/05 dated 2005-05-03, TÜV Rheinland
P4	Report of the Audit of the Functional Safety Management Report Nr. 968/FSM 100.00/02 dated 2004-11-15, TÜV Rheinland
P5	Report of the Audit of the Functional Safety Management based on IEC 61508 Report-No.: 968/FSM 101.02/04 Audit Scope: E/E/PE-System Integration dated 2004-12-21, TÜV Rheinland

Table 2: Previous approvals

3.3 Software source

Basis for the software approval are the following software releases.

Product	System	Version	CRC
AMCPU-RA-BS	GuardPLC2000	v6.28	0x1753b55c
MAXICPU-RA-BS	GuardPLC1200	v6.28	0xb0d3e2d9
MAXICPU-HA-BS	GuardPLC1600, 1800	v6.28	0x2df13f83
RIONCCPU-HA-BS	GuardPLC Distributed I/O	v6.28	0xcf090c0f

Table 3: Released software source

4 Test and test results

Based on the Change & Impact Analysis [H3] the software modifications were examined theoretically. The measures for failure avoidance according to the IEC 61508 [1], SIL 3 forms the basis of this approval.

During the approval the following steps were carried out:

- Inspection of the manufacturer documents
- Analysis of the software modification
- Inspection of the carried out software tests

4.1 Inspection of the manufacturer documents

Beginning with the primary documents [H1, H4] and the Change & Impact Analysis [H3] the changed documents were inspected.

During the inspection of the documents the following items were considered:

- Version management of the documents
- Unambiguous attributes
- Comprehensibility
- Completeness of the specification and documentation

Contradictions within the documents were discussed with the manufacturer and corrected where necessary.

The inspection of the manufacturer documents was concluded with a positive result.

4.2 Inspection of the software changes

Based on the Change & Impact analysis [H3] the documented critical software modifications have been examined and evaluated regarding the safety impact. In addition the modification was compared to the already approved release [P3].

Corresponding to the documented modification [H3] the test specification of the modules were inspected regarding the coverage of the carried out changes.

The theoretical approval of the software was finished with a positive result.

4.3 Inspection of the software tests

According to the modification the software tests were adapted respectively extended. The complete software package passes through an automated software test. The results have been recorded by the manufacturer.

According to [H1] the test specification including the test records [H2] was provided to the Test Institute. The test records was examined for completeness and accurateness.

The inspection was completed with a positive result.

4.4 Inspection of the measures for failure avoidance

A separate Management of Functional Safety audit was carried out on the already certified QM system of the manufacturer to proof the application and effectiveness of the measures to avoid failures during the safety lifecycle. The results of this audit are documented in a separate report [P4, P5]. In summary the audit demonstrated that HIMA complies with the safety lifecycle requirements of IEC 61508.

The results of the approvals [P1, P2] are still valid.

4.5 Inspection of the measures to detect and control failures

The measures to detect and control failures according IEC 61508, SIL 3 are implemented according to the requirements.

The results of the previous approval [P1, P2] are still valid.

5 Summary

The reviews of the software modification have shown, that the software package AM2000/MAXI/RIO/RIO-NC - CPU v6.28 is furthermore suitable for applications up to SIL 3 according to IEC 61508.

The type approval has been carried and is documented in [P1, P2].

The actual version of the valid firmware can be obtained from the firmware release list, released by the manufacturer and the Test Institute.

Cologne, 2005-09-15
TIS/ASI/Kst. 968 bu-nie

The expert

A handwritten signature in blue ink that reads 'Oliver Busa'.

Dipl.-Ing. (FH) Oliver Busa