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1 New Version

- ELOP II Factory version 4.1 build 6150
- Hardware management (C3) version 8.58

This version can be used for HIMatrix controllers and remote I/Os with CPU operating system versions prior to 7.0 and COM operating system versions prior to 12.0.

Before installing a new version, uninstall all previous ones.

This document describes the new functions of hardware management V8.58, its restrictions and improvements compared to the previous version:

- Chapter 2 defines the changes.
- Chapter 3 specifies the existing restrictions.
- Chapter 4 describes the migration to the new version.

2 Changes Compared to the Previous Version

- Support of the large storage model for CPU operating system 6.100, which can be used for devices with layout 2.
- Enhanced code generation performance.
- Corrected problem transporting variable values.
In the current version, the problem that variable values were no longer transported between the following project parts as occurred in versions 8.30, 8.36, and 8.52 has been removed:

- User program
- Standard communication protocols
- **safeethernet** between controllers

The problem only occurred in rare cases, and only when values were exchanged between the named project parts. One prerequisite was that a large number of variables, at least 256, was configured for transmission in one direction between two project parts.
[HE15450]

3 Restrictions

3.1 Restrictions with Respect to Data Types

- Calculation inaccuracy with REAL and LREAL values
The inaccuracy of REAL and LREAL values, as described in IEC 559, may result in considerable deviations from the actual result.
Requirements:
 - Use of complex calculations.
 - Input values that differ from one another by orders of magnitude.
 - Big difference between input and output values.In particular, the inaccuracies affect the trigonometric functions ACOS, ASIN, ATAN, COS, SIN, TAN because other arithmetical functions are used to calculate the output value.
To get useful results, the input value of these functions should be within the natural range $(0 \dots 2 \cdot \pi)$.
- Calculations of INTEGER or time values in conjunction with REAL or LREAL values
If REAL and LREAL values are used to calculate INTEGER or time values, calculation inaccuracies also occur. These inaccuracies may cause overflow or underflow if the values are close to the range limits of the data type.
- Change of certain initial values for signals of REAL or LREAL data type.
Due to PC constraints, the Little Endian format is used in ELOP II Factory. The Big Endian format is used in HIMatrix.

Software changes to ELOP II Factory V4.1 with Hardware Management V8.58

For this reason, ELOP II Factory switches the byte order of the initial value when generating code for HIMatrix. The initial value, however, is still interpreted as a REAL number.

If an initial value with a special bit pattern is interpreted as sNaN (signaling Not a Number) due to the changed byte order, the PC processor converts it to a qNaN (quiet Not a Number) and thus changes it.

The range of value of NaN is defined in IEEE 754/IEC 60559 while the signaling bit depends on the processor. The most significant bit of the mantissa is used for current PC processors.

Bit pattern of the affected initial value with respect to REAL

The affected values are distributed over the entire range of values of the data type.

All initial values with the bit pattern xxxx ... xxxx 10xx xxxx x111 1111 are changed. The bits set to 1 in byte 0 and byte 1 are mapped to byte 3 and byte 2 during the conversion from Little Endian to Big Endian.

With this special bit pattern, all exponent bits are set to 1 and the PC processor interprets this as an sNaN.

A copy process follows, which is understood by the PC processor as a REAL operation and explains why the PC processor changes the sNaN to a qNaN, i.e., the signaling bit is set from 0 to 1.

In the HIMatrix interpretation, the changed bit (represented in red) has a significance of 2^{-9} .

This change results in a maximum deviation of 0.2 %.

Table 1 shows the modification of the affected bit pattern changing from 64,333 to 64,458.

	Byte 3	Byte 2	Byte 1	Byte 0
Input	01000010	10000000	10101010	01111111
<i>Conversion from Little Endian to Big Endian</i>				
Result	01111111	10101010	10000000	01000010
<i>The value is recognized as sNaN and converted to qNaN</i>				
Result	01111111	11101010	10000000	01000010
Interpretation as number in HIMatrix	01000010	10000000	11101010	01111111

Table 1: Change for the Affected Bit Pattern

Bit pattern of the affected initial value with respect to LREAL

All initial values with the bit pattern xxxx ... xxxx 1111 0xxx x111 1111 are changed. The bit with significance of 2^{-41} is the signaling bit and results in a relative deviation of 2^{-41} .

Detection of the deviation

The deviation from the defined initial value can be detected through a value check in the target hardware performed in the ELOP II Factory Force Editor.

Correction through changed bit pattern

The next smallest value can be used as the substitute value for the initial value. xxxx ... xxxx 10xx xxxx x111 1111 -> xxxx ... xxxx 10xx xxxx x111 1110

Reference

Specification INTEL processors:

Intel® 64 and IA-32 Architectures Software Developer's Manual

Combined Volumes: 1, 2A, 2B, 2C, 3A, 3B and 3C

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<http://www.intel.com/content/dam/www/public/us/en/documents/manuals/64-ia-32-architecturesoftware-developer-manual-325462.pdf>

- DATE, DATE_AND_TIME, TIME_OF_DATE, and STRING
The use of variables of data types DATE, DATE_AND_TIME, TIME_OF_DATE, or STRING is not permitted. If such variables are used, the code generation is aborted with an error message.

3.2 Restrictions for Function Blocks/Logics

- Data type converting functions ANYTOXXX
If input values are outside the range of values for the target data type, the output value depends on the controller. For HIMatrix controllers, REAL and LREAL values above the range of values for the target data type are limited to its maximum value.
- PACK function block
The function block has n inputs (n = 2, 4, 8) IN(0) to IN(n-1) and one output consisting of m bytes (m = 1, 2, 4, 8).
 - If n = m, IN(0) is the least significant byte, IN(n-1) is the most significant byte of the output value.
 - If n < m, the n least significant output bytes are assigned the input values, the most significant bytes (byte m-n to byte(m)) are initialized with 0.
 - If n > m, the inputs IN(0) to IN(n-1) are transferred into the output value.
- Function block UNPACK2/4/8
The function block has n outputs (n = 2, 4, 8) OUT(0) to OUT(n-1) and one input consisting of m bytes (m = 1, 2, 4, 8).
 - If n = m, the least significant byte of the input is transferred into OUT(0), the most significant byte to OUT(n-1).
 - If n < m, the n least significant bytes are transferred into the outputs OUT(0) to OUT(n-1).
 - If n > m, the bytes of the input value are transferred into OUT(0) to OUT(m-1), OUT(m) to OUT(n-1) are initialized to 0.
- Output ENO and assignment of value fields
If the output ENO of a function block is FALSE, its outputs are not assigned to value fields. Additionally, assignments from these value fields to other value fields within the same network are not performed.

3.3 Restrictions with Respect to Project Management

- Backup of the project drive
Performing a server backup of the project directory or drive while the project is opened may have the consequence that the project data can no longer be correctly accessed after the backup. Data base errors -2017 or -2032 may occur. It is possible that several read or write accesses to the project may be performed correctly before the error occurs.
Workaround: Close the project during the backup and perform the backup using "Archive..." in the Project Management.
- Storage of the project on a network drive
Storing the project on a network drive may cause problems if the connection is lost. The error is intercepted by an assertion such as:
"Assertion(BDP_Poet::End (err) failed!
err: -64 /
..." [HE7675]

3.4 Restrictions with Respect to Signal Import

- Signal import using inappropriate separators
Signal import is faulty if separators, which are also contained in the text, are used.
Workaround: When creating the import file, only use a separator that is not contained in the text. [HE7529]

3.5 Restrictions with Respect to Import of Peer-to-Peer Connections

- Import of peer-to-peer connections needs two tries to work correctly.
Importing a peer-to-peer connection, which did not yet exist in the project, results in delivering the default values instead of the exported values for the following parameters:
 - Response Time [ms]
 - ReceiveTMO [ms]
 - ProfileA second import of the same file will set the exported values for the specified parameters.
Workaround: When importing new peer-to-peer connections into a project, import them twice. Each further import of the same connection will operate correctly. [HE17544]

3.6 Restrictions with Respect to the Online Tools

- Online Test
If a resource is created while the online test is running for other resources, the online test can only be started for the new resource once the online test has been closed for the other resources.

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- Dialog box for connection parameters
When using the *Connection Parameters* dialog box in connection with controllers equipped with operating system version 3, the following restrictions apply:
 - Reading out the controller via MAC address overwrites the field *MAC Address* with incorrect values.
 - Setting the SRS via the MAC address is not possible. A text message appears in the log book stating that no text is available.
 - Reading via IP address is not possible. ELOP II Factory receives no answer from the resource.
- Too many opened online tools
Due to limited Windows resources, ELOP II Factory can no longer be operated if too many Control Panels are opened (more than 20...25). [HE7332]
- Screensaver
If the screensaver is activated or deactivated, the connection may be lost. [HE7622]

4 Migration to the new Version

The new version can convert projects from previous versions.

It can generate code for both previous operating system versions and version 6.100 supporting the large storage model.

To adapt an existing project to the new operating system version, new code must be generated. For the code generation, set the large storage model in the type instance settings of the program. After this step, ELOP II Factory creates a new CRC for the large storage model during code generation.