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## 1 New SILworX Version

- Version **4.64** for:
  - HIMax controllers, firmware version 2.0 and beyond.
  - HIMatrix controllers, CPU operating system version beyond 7.0 and COM operating system version beyond 12.0.

This document describes the new functions of version 4.64, its restrictions and improvements compared to previous versions:

- Chapters 2 and 3 describe the new functions and improvements.
- Chapter 4 specifies the current restrictions of version 4.64.
- Chapter 5 describes the migration procedure from a previous version.

## 2 Improvements of V.4 Compared to V.3

This chapter describes the enhancements and extensions of main version 4 compared to main version 3.

### 2.1 *Support of New HIMax V.4 Features*

SILworX supports the following additional HIMax version 4.x features:

- New, I/O module X-AI 16 51, SIL 1
- New, standard I/O modules:
  - X-AI 32 51
  - X-AO 16 51
  - X-CI 24 51
  - X-DI 32 51
  - X-DI 32 52
  - X-DI 64 51
  - X-DO 12 51
  - X-DO 32 51
- New PROFIsafe communication protocol via PROFINET
- HIMax system with network structure, setting the system bus latency

### 2.2 *Support of New Features for HIMatrix Devices with Layout 3*

SILworX supports the new devices with layout 3:

- F10-PCI 03
- F30 03
- F31 03
- F35 03
- F60 03

### 2.3 *Additional Import/Export Functions*

- Import/export of XML files to/from the Hardware Editor

### 2.4 *Initial values for elements with Struct and Array variables*

Each individual sub-element of a Struct or Array variable can now be assigned an initial value. The sub-element must have an elementary data type.

## 2.5 *Enhancement of the Version Comparator*

- The representation of the version comparison is like an editor with detail views. The user program comparison and module comparison can be performed
- New detail views for comparing the following I/O modules of the HIMax system:
  - X-AI 32 01
  - X-AO 16 01
  - X-CI 24 01
  - X-DI 32 01
  - X-DI 32 02
  - X-DI 64 01
  - X-DO 24 01
  - X-DO 32 01
  - X-DO 12 01
  - X-DO 12 02
- New detail view for comparing the logic in POU instances

## 2.6 *Presentation and Handling*

- The status bar indicates the current system and connection states, highlighting the different texts in different colors.
- The *Search and Replace* dialog box can now also be used for tree diagrams and tables.
- The Goto functionality is possible into the online view. Goto into the Hardware Editor and safeethernet Editor was improved.
- Structure tree elements can now be managed with more flexibility, e.g., the tree elements **Hardware** and **safeethernet** can be copied and archived.
- The F1 key for opening the online help is now supported in all editors.
- The online diagnostic view includes a symbol indicating the state of the read-out process, e.g., reporting that messages have not yet been read.
- User-defined data types can be created within libraries at any project level.
- The validity range for global variables can be modified, e.g., through deletion and addition.
- Automatic allocation of value field data types in accordance with the entered value.
- Improved structured representation of local variables in the Force Editor through arrangement in accordance with POU instances.
- Improved representation of the processing sequence consisting of network and sequence number, e.g., 1/4 indicates network 1, 4th network element. This information can also be printed.

- More detailed information in the reload dialog box, including CRC, creation time of the generated code, and the minimum operating system version required for the loaded and for the new configuration, respectively.
- A confirmation prompt appears prior to discarding restorable projects that are found when SILworX is started.
- Improved representation of online values of VAR\_INPUT  
SILworX displays the online values of VAR\_INPUT variables even in the following cases:
  - The variable is associated with a filled, embedded value field.
  - The variable's input is unconnected or hidden. In this case, the initial value is displayed.
  - The variable is of a structure data type. The online values of the elements are displayed.

### **2.7 Enhanced Performance**

Example: during the creation of documents, it is now possible to open the editor.

### **2.8 System Requirements**

The computer used to install SILworX must comply with the following system requirements:

Minimum requirements

- Intel Pentium 4
- 256 MB RAM memory available
- 500 MB hard disk space available
- 1024 x 768 pixel monitor resolution
- Ethernet Interface
- Windows XP Professional (32-bit), at least SP2
- Windows 7 Professional/Ultimate (64-bit), tested with Ultimate

Recommended requirements

- Intel core i5-2400
- 4 GB RAM memory available
- 10 GB hard disk space available
- 1368 x 768 pixel monitor resolution (16:9)
- Ethernet Interface
- Windows 7 Ultimate (64-bit)

### **2.9 Improvements Compared to Previous Versions**

Refer to the release notes for V.3.38 for more information on the extensions and improvements of version 4 compared to the previous versions.

## 3 Corrected Problems of Version 4.64

*This chapter lists problems within previous versions that have been resolved in this version 4.x.*

### 3.1 Improvements Potentially Resulting in a Changed CRC

*If the problems of previous versions specified in this paragraph are eliminated in version 4.x, the CRC of converted project may change.*

- Negative values during the definition of scalar events  
In previous versions, if negative thresholds were used for scalar event variables of type INT, the configuration thresholds were set to 0.  
This improvement causes a change in the CRC. To prevent the CRC from changing, the negative thresholds can be set explicitly to 0. [HE20383]
- Faulty sub-slot in projects with PROFIsafe modules  
In the previous version, an error message reporting an invalid sub-slot number appeared when loading a project with PROFIsafe modules. The problem has been eliminated in the current version.  
This improvement causes a change in the CRC. [HE18492]
- PROFINET project is language-dependent  
A project includes the following elements:
  - a PROFINET controller
  - a download configuration created with the English SILworX versionBased on this information, the previous version was not able to create reloadable code in the German version. The problem has been eliminated in the current version.  
This improvement causes a change in the CRC. [HE19787]
- Invalid configuration of the connection abort behavior in the Modbus master  
In the previous version, the behavior of the Modbus master at connection loss was set to *Use Initial Data* in the configuration file instead of *Retain Last Value*. The user cannot configure this setting.  
The problem has been eliminated in the current version.  
This improvement may cause a change in the CRC. In most cases, this CRC change can be avoided or undone through a suitable configuration. Please contact HIMA support for help. [HE18203]
- An excessively long alarm text for events causes a compiler warning  
When configuring an event, the text for the alarm and for the return to the normal state was automatically composed of variable name, description and state; excessively long texts were truncated. During code generation, the previous version used the long name instead of the truncated text, and thus generated a warning. This warning could not be removed, since the texts are not editable. In the current version, the state descriptions remain empty. For this reason, the problem does no longer occur.  
This improvement causes a CRC change in the OPC server (not in the resource). [HE17890]

### 3.2 Improvements of FBD Editor

- If input connectors are cut and pasted, the logics is "destroyed".  
In the previous vesion, cutting and pasting an input connector caused it to be reset to its default name and the corresponding output connector was lost.  
The problem does no longer occur in version 4.64. [HE11563]
- SILworX terminates after copy and paste  
In the previous version, SILworX terminated after copying and pasting a logical network, if all following conditions were fulfilled:
  - The network contained a value field.
  - For the value field, an OLT field and an assigned comment existed.

Another action such as moving the variable led to the termination.  
The problem does no longer occur in version 4.64. [HE17261]

### 3.3 Improvements with Respect to Online View and Test

- The value of array elements cannot be displayed during the online test  
The previous SILworX version could not display the value of individual array elements during the online test.  
The problem does no longer occur in version 4.64. [HE14990]
- Selection of multiple modules or remote I/Os in the online view of the Hardware Editor  
In the previous version, the selection of multiple modules or remote I/Os (multiselection) did not function properly. Attempting to open the context menu for several selected modules or remote I/Os resulted in only one context menu of an arbitrary object opening. Operational errors could thus occur easily, particularly since all remote I/Os are selected when the online view is opened.  
The problem does no longer occur in version 4.64. [HE16851]
- Erroneous representation of a not loaded (copied) project during online test  
In the previous version, if a copy of the project loaded in the controller was used for the online test, objects may be displayed with errors. Examples:
  - Invalid colors of lines representing digital values (powerflow).
  - Online test fields are empty.

Additionally, warning messages could be displayed in these cases such as "The displayed variable names may be obsolete since they refer to a resource configuration with identical CRC, but different serial number as the loaded configuration."

This occurred if a copy (e.g., safety copy) of the project loaded in the controller is used for the online test instead of the project itself.

The problem does no longer occur in version 4.64. [HE17649]

- Force state of a partially visible variable is not updated  
In the previous version, the force state of a variable was not updated, if the variable is only partially visible.  
The force dialog box also did not update the force switch state.  
The problem does no longer occur in version 4.64. [HE17872]

- Opening the online test for function blocks takes a long time  
In the previous version, it took a long time to open the online tests for the function blocks. The problem occurred when the function block was used at least several hundred times, depending on the computer in use.  
The problem does no longer occur in version 4.64. [HE17237]

### **3.4 Improvements of OPC Configuration**

- More than four OPC servers can be configured.  
In the previous version, it was possible to configure more than four OPC servers for alarms and events, and to compile the project successfully. Four of those OPC servers could safely connect to the resource, the remaining, however, have connection problems.  
The problem does no longer occur in version 4.64. [HE14543 ]
- Structured global variable and OPC server  
In the following cases, the Force Editor of the previous version could display an incorrect variable path for structured global variables exchanged with the OPC server:
  - After renaming the structured global variables.
  - When referencing other global variables.The problem does no longer occur in version 4.64. [HE16768]

### **3.5 Improvements of Communication**

- Structures in the Modbus slave  
In the previous version, global variables with structures as their data type could not be transferred to the Modbus slave since their elements were not assigned proper offsets.  
The problem does no longer occur in version 4.64. [HE16360]
- PROFINET: ARUIDs after copying a controller  
In the previous version, after copying a controller, it could happen that the ARUIDs were no longer unique in the PROFINET configuration.  
The problem does no longer occur in version 4.64. [HE16453]

### **3.6 Improvements with Respect to Structure Data Types**

- Assignments to structure variables and changes (e.g., renaming elements)  
In the previous version, changes to a structure data type, e.g., renaming its elements, caused the deletion of assignments to variables of this data type within the hardware or in the protocols.  
The problem does no longer occur in version 4.64. [HE15095]
- Sequence of structure elements  
The previous version set up an arbitrary sequence for structure elements, e.g., when changes were made. The sequence resulting from the offset calculation for the TCP/SR protocol thus differed from the sequence required for the elements.  
The problem does no longer occur in version 4.64.  
For projects converted from version 3, SILworX adjusts the sequence number to the sequence used, thus maintaining the CRC. [HE16910]

### 3.7 Improvements for Projects with H1Max Controllers

- SILworX terminates after ungrouping redundant I/O modules  
SILworX terminated during a save operation in the Hardware Editor, if the following conditions were met:
  - The online view was opened.
  - An I/O module that was member in a redundancy group or the entire redundancy group was deleted.

The problem does no longer occur in version 4.64. [HE17330]

- Deleting base plates destroys redundancy groups of I/O modules  
In the previous version, if base plates with inserted modules were deleted, SILworX did not check whether the inserted modules form redundancy groups with modules on other base plates. As a result, the project contained deleted redundancy groups and was therefore corrupted.

The problem does no longer occur in version 4.64.

- After deleting base plates, the function for creating new base plates does not function correctly.  
In the previous version, if multiple base plates were not selected consecutively and were deleted, no new base plate could be created in the affected project file.

The problem does no longer occur in version 4.64. [HE17337]

### 3.8 Further Improvements

- Version comparator provides invalid information during module comparison  
When comparing modules, the previous version of the version comparator identified the X-DI 32 02 digital input module channels as AI Channel... since internally, this module operates in analog.

The problem does no longer occur in version 4.64. [HE14494]

- The Hardware Editor cannot copy any base plates  
In the previous version, the Hardware Editor could neither copy base plates individually nor as a group.

The problem does no longer occur in version 4.64. [HE15972]

- It takes too long to open the Documentation Editor  
When opening the Documentation Editor, SILworX first prepares the documentation without offering the user any sign of progress and only then opens the editor. For large projects, this waiting time could last in the previous version approximately 30 minutes. During this period, the PC load was extremely high and SILworX could not be used.

The problem does no longer occur in version 4.64. [HE16047 ]

- CSV files cannot be opened in Excel and imported into SILworX simultaneously  
In the previous version, it was not possible to import a CVS file into SILworX if it was already open in Microsoft Excel.

The problem does no longer occur in version 4.64. [HE16134]

- PES password length during SILworX conversion from version 4.x to version 3.x  
SILworX version 2.x accepted PES passwords with more than 32 characters. When converting the project to version 3.38, such a password remained valid,



even in the controller. Since in SILworX version 4.x, the input box for the password only allows 31 characters, it is no longer possible to open the project with the corresponding user account or log in to the controller.

Workaround: Prior to converting, reduce the password to  $\leq 31$  characters. If required, repeat the conversion. [HE16838]

- It is possible to access functions and function blocks of other resources  
After moving a function or function block type from one resource to another, the function or function block type in the previous version could still be used in connection with the original resource, although the resource was out of scope. This could result in errors, e.g., in the following case:

- A function block type is defined in a configuration library.
- A function block of this type is used in a resource A.
- The function block type is moved to a resource B (using cut and paste).

Resource A continued to reference the original function block type. After moving the function block type, a newly created type that was valid for resource B and had the same name, was not taken into account when editing or generating code.

The problem does no longer occur in version 4.64. [HE17533]

- It is possible to access global variables of other resources  
The previous SILworX version did not check the scope of global variables that were used in function blocks as VAR\_EXTERNALs. This could result in errors, e.g., in the following case:
  - A global variable is defined in a resource A and is used in a function block within the resource.
  - The global variable is moved to a resource B (using the cut and paste functions of the global variable container).

SILworX continued to compile the original resource A correctly although the global variable was no longer defined.

The problem does no longer occur in version 4.64. [HE17784]

- Code is not generated for looping SFC networks  
The previous SILworX version did not generate the code for steps that have the input and output connected to the same transition and therefore forming a loop. The problem does no longer occur in version 4.64. [HE17743]
- The dialog box for safety parameters always displays TRUE instead of the current value  
In the previous version, the *Start Allowed* parameter in the dialog box for setting the safety parameters of a user program was always set to TRUE and ignored the value used in the controller. This behavior could have the following consequences:
  - If the parameter had the value FALSE and one tried to set it to TRUE, SILworX displayed the message "Change at least one safety parameter..."
  - When changing another parameter, SILworX set the *Start Allowed* parameter back to TRUE, if it was set to FALSE in the controller!

The problem does no longer occur in version 4.64. [HE17746]

## 4 Restrictions of the Version 4.64

*When using SILworX version 4.64, take the following restrictions into account.  
If the following instructions are observed, the restrictions have no influence on safety  
and on the availability of the code generated for a HIMax controller.*

### 4.1 Restrictions with Respect to Structure Data Types

- Elements of structure variables used as index  
It is not possible to use elements of variables with structure data type as array index.

### 4.2 Further Restrictions

- Representation of system variables with offline simulation  
In the offline simulation, the value of the program's digital system variables is represented in the invalid color.  
Workaround: Connect the system variable to a value field. After this connection, SILworX displays correct colors. [HE15396, HE17033, Restriction]
- Retain attribute of timer function blocks is not safe  
Timer function blocks cannot be correctly used with the retain attribute. If a timer function block is used with the retain attribute, the time counter may adopt any potential value after a warm start.  
Workaround: Do not use timer function blocks with the retain attribute.  
[HE17252]
- No test of successive use of selection and simultaneous nodes  
Using selection and simultaneous nodes within the same hierarchy causes deadlocks. SILworX does not report this problem. Workaround: Do not use selection and simultaneous nodes within the same hierarchy. [HE17716]
- No global variable warning symbols in the online cross-references  
If the initial value of a global variable is changed, SILworX 4.64 does not display any exclamation point in the online cross references. [HE20311]
- Name of POU help file name can always be changed.  
The help file name can also be changed for POUs, even though this should not be possible:
  - Read-only POUs
  - POUs with know-how protection. [HE20154]
- Display of global variables that are used as VAR\_EXTERNAL  
If global variable with non-elementary data type (Struct, Array) are used as VAR\_EXTERNAL, the FBD Editor for sub-elements **does not** display the values entered in the column: *Initial Value*, *Description*, *Additional Comment* and *Technical Unit* [HE19688].

- SILworX terminates if output structure variables are used  
SILworX allows one to reference the output parameter A of a function block instance X in the format «X.A». Attempting to reference all output parameters as structure X, causes SILworX to terminate. [HE20256]

### 4.3 Basic Restrictions

The restrictions described in this chapter are fundamental in their nature. They relate to properties of the resources that SILworX requires to run, e.g., the PC operating system. For this reason, it is unlikely that these restrictions will be lifted in the foreseeable future.

- Base points of analog values are read as REAL  
SILworX reads the values specified for base points of an analog value (at 4 mA and 20 mA) as REAL. They are, however, further processed as LREAL. LREAL can also be used in the user program. This restriction is only relevant with very large or very small base point values. [HE16388]
- Logic operations of BOOL variables having values that do not originate from safety-related communication, can provide results that differ from those expected.  
The cause is that the coding of BOOL values used in the external system deviates from the coding used in the HIMax.  
Two workarounds are possible:
  - The external system only transmits 0 for FALSE and 1 for TRUE
  - A correction circuit is implemented in the user program for all relevant BOOL variables to normalize the value to 0 or 1:  
*non-normalized variable* -> AtoByte function block -> AtoBOOL function block -> *normalized variable* [HE13042, Restriction].
- Is it impossible to save changes in an Editor?  
After specific changes made within an Editor, the message "Impossible to save changes" appears while attempting to save. After confirming the message, however, the changes are saved.  
If the Editor is then closed and re-opened, the message "The required data is being processed" appears.  
Examples of changes in which this problem occurs are the cyclic renaming of variables (A => B, B => C, C => A).  
Workaround: Avoid exchanging names.  
If required, restart SILworX. [HE11613, Restriction]
- Variations of the cycle time during LREAL calculations.  
The cycle times can vary strongly during calculations with variables of type LREAL. To measure the watchdog time, the cycle time must be determined under realistic conditions.  
[HE12115, Restriction]
- Sequential function chart: Step-internal TON starts a cycle later than normal TON  
A reload is performed and leads to the following changes:
  - A new step is added and must be active immediately after the reload.
  - A TON function block with the input set to TRUE is added.

The step-internal TON then starts one cycle later than the TON function block in the program logic. [HE16288, Restriction]

- Use of hardlocks  
Licensing SILworX using hardlocks (U3 USB sticks) is managed differently among the various operating systems:
  - With Windows XP, hardlocks can only be used to license SILworX to users with administrator rights, but not for power or standard users.
  - With Windows 7, hardlocks can be used to license SILworX to all types users.

Workaround for Windows XP: Use softlock licenses or other USB sticks. [HE17056, Restriction]

- DIV\_TIME with REAL typecast reports an error on ENO for divisor := +/-INF  
The DIV\_TIME function from the standard library improperly sets the ENO error output ENO to FALSE and reports therefore an error under the following conditions:
  - The IN2 input (divisor) is of type REAL.
  - The value of IN2 is +/-INF. [HE15199]
- Handling of VAR\_INPUT variables in connection with user-defined function blocks  
With user-defined function block, SILworX handles VAR\_INPUT variables differently, depending on how the inputs are wired:
  - If the inputs are wired with variables of a default data type, SILworX transfers the value of the variable to a copy within the function block (call by value). Changes to the original variables have no effects on this copy.
  - If the inputs are wired with variables of a user-defined data type, SILworX transfers a reference to the variable (call by reference).  
If the variable is a global variable, take into account that it can be modified in the function block. Additionally, a global variable can be used in a function block as VAR\_EXTERNAL. Changes to such variables are effective immediately when the corresponding VAR\_INPUT variable is read in the function block. As such, the value can change while executing the function block. [HE17740]
- Reconnecting the diagnostic view causes a module login, instead of a system login.  
If the diagnostic view is opened during a system login and the connection is closed, SILworX offers the module login when attempting to re-establish the connection. [HE11926]
- Online help associated with a POU not printable  
The document management cannot print the content of the online help associated with a user-defined POU. [HE14244]
- Various elements of a structure variable cannot be written simultaneously from different sources  
The user program and the hardware or communication cannot simultaneously write to two different elements of the same structure variables.

Workaround: Use different structure variables for those elements written to by the user program and for those elements written to by the hardware or communication. [HE15700]

- ENO output in connection with user-defined function blocks may be overwritten. With user-defined function blocks, in which the ENO output is only dependent on the EN input, ENO may be set to FALSE during a reload. Such function blocks do not themselves write to ENO. [HE19129]

## 5 Migration from one Previous Version to Version 4.64

Observe the following procedure to migrate from version 2.36 or below to version 4.64:

- Generate all resources prior to conversion. This allows potential deviations after the conversion to be detected during generation.
- Prior to converting, save the project, e.g., on a data medium.
- Open the project in version 4.64 and convert it.
- Since the conversion is extensive, check the project integrity after completing the conversion.
- Generate the code in version 4.64 to detect potential errors and check if CRCs changed.
- Remove detected errors and re-generate the code to detect changed CRCs.
- If no CRC changes are detected, the migration was completed successfully.
- If CRC changes are detected, verify whether they can be accepted.
- If this is the case, the migration was completed successfully.
- If they cannot be accepted, continue to work with corresponding previous version.

### Notes on Conversion:

- The conversion is performed for versions 2.46 and V.2.52 such that the generated configurations remain identical. The exceptions are described in Chapter 3.1. The changes from version 2.36 to version 2.46 are described in the release notes for version 2.46.
- Depending on the project size, the conversion can take several hours.
- If one of the resources contained in the project to be converted has a user management scheme, the conversion adds a PADT user management scheme to the project and creates for each user of one resources a PADT user and a PADT user group with all rights.  
If this is not required, all PES user management schemes must be deleted from the project prior to converting. This has, however, the effect that no reload can be performed after the next code generation.