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1 The New HIMax Operating System V6

The released minor versions of V6 are identifed through the operating system version number of the X-CPU 01 processor module.

1.1 Operating System Versions of the Module Types

The new V6 includes the following operating system versions:

- V6.30 for processor modules X-CPU 01: himaxcpu0x_ha1_bs_v6.30.ldb
- V6.30 for processor modules X-CPU 31: himaxcpu3x_ha1_bs_v6.30.ldb
- V6.36 for communication modules: himaxcom_ha2_bs_v6.36.ldb
- V6.6 for I/O modules SIL 3: himaxio_ha1_bs_v6.6.ldb
- V6.6 for I/O modules SIL 3, SOE, counter, X-HART and X-MIO: himaxio_ha3_bs_v6.6.ldb
- V6.6 for I/O modules SIL 1 and NonSIL: himaxio_ha2_bs_v6.6.ldb
- V6.30 for system bus modules X-SB 01: himaxsb_ha2_bs_v6.30.ldb

1.2 Overview

These release notes describe the new functions and improvements of V6 compared to the previous version:

- Chapter 2 describes the new functions of V6.
- Chapters 3 and 4 present the improvements and the resolved problems.
- Chapter 5 specifies the current restrictions.
- Chapters 6 and 7 describe the procedures to migrate from the previous versions.
- Chapter 8 provides references.

1.3 Compatibility

V6 supports all the functions of V1...V5.

In systems with X-CPU 01, I/O modules, system bus modules and communication modules can be operated within a system using different operating system versions (V2.x, V3.x V4.x V5.x and V6.x). HIMA recommends upgrading to the current version.

2 New Functions of V6

V6 features the following new functions:

2.1 The New Processor Module, X-CPU 31

X-CPU 31 is a combined processor and system bus module (4 x RJ-45, SIL 3)

In systems with the X-CPU 31 processor module, modules of type X-SB 01 and X-COM 01 must contain an operating system and an OS loader (OSL) upgraded to V6 or higher. HIMA recommends using V6 and higher also for the operating system of I/O modules!

2.2 Reload Functionality

HIMax V6 and higher features the following new capabilities:

- Reload of the safe**ethernet** configuration
- Reload of the configuration for alarms and events.
- Cold reload

  Modules that are not capable of reload, e.g., due to an older operating system version, are first set to STOP during the reload procedure and then to RUN again. Depending on redundancy and module type, setting to STOP and RUN can occur automatically or be done manually. The code generation provides information about which modules are stopped and started automatically and which ones must be stopped or started manually. The reload process only starts and stops modules after being released by the user.

3 Improvements of V6.26

V6.26 contains the following improvements:

3.1 Safety-Relevant Restrictions Removed

1 SIL 3 applications of the X-CI 24 01 counter module

SIL 3 applications of X-CI 24 01 up to V5.x were only allowed with the following settings:

- Counter mode set to single edge.
- No deviation allowed.

  System variables *Max. Dev. IO [UDINT]* → and *Max. Dev. CPU [UDINT]* → set to 0 for each channel.

- Automatic restart disabled for all the channels.
  System variable *Restart [BOOL]* → set to TRUE for each channel.

If the frequency was below 500 Hz, it was possible that one pulse was not counted.

If the module was operating in double or quadruple edge counter mode, it was not able to record any deviation. For this reason, these modes of operation were not allowed for SIL 3 applications.

These restrictions no longer exist in operating system versions V6.x of the HIMax I/O modules!

2 For I/O modules X-DO 24 01, X-DO 24 02, X-DO 32 01 and X-DO 12 02, the interval for short-circuit and open-circuit tests can be set to more than 32 seconds.

3.2 System Functions

1 The *Read-Only in RUN* system variable also blocks STOP

In doing so, the command for stopping the system is rejected if the user has operator rights. [HE22271]

2 Watchdog time not exceeded during the reload clean-up phase

In versions prior to V6, if the watchdog reserve time was very low, it could very rarely occur that the flash file system caused the watchdog time to be exceeded during the reload clean-up phase. This caused the PES to enter the ERROR STOP state. [HE20739]

3 Program states deviating from the system state are displayed as system error or system warning

Program states deviating from the system state are displayed in the Control Panel as system error or system warning in accordance with their classification.

(The *System* LED is activated accordingly). [HE21048]

4 Memory occupied by a user program displayed as entire memory blocks

The CPU operating system manages the storage space occupied by the user program in storage blocks. The value displayed for the storage space occupied by a user program is calculated based on the size of all the storage blocks. In contrast to previous versions, this value includes the unused storage space in the last storage block. [HE18538]

5 Statistics data for connections to PADTs and remote I/Os can be reset [HE21180]

6 The configured communication time slice *Max.Com. Time Slice ASYNC [ms]* is considered in the displayed *Watchdog Time Reserve [ms]*

The setting for the communication time slice can be changed through a download and through a reload.

If the actual residual time is sufficiently high to allow a reload, V6.x accepts a reload even if the displayed *Watchdog Time Reserve [ms]* is = 0.

Restriction [HE23372]

7 Module faults can now be reset in X-CI 24 01

In the previous version of X-CI 24 01, module faults of the following type could not be reset:

- Reference voltage for open-circuits
- Reference voltage for short-circuits
- Module plugged in [HE19836]

8 Operation possible during reload and synchronization

HIMax accepts operating commands from the PADT, even in the following phases:

- Download of the reload configuration
- Reload clean-up

- Synchronization of a processor module [HE21615, HE21616]

9 LED signaling for local forcing corresponds to LED signaling for global forcing

[HE19935, HE20733]

10 The reload process resets the parameters changed online in all the user programs

A reload in the previous version did not reset the parameters changed online in the user programs, for which no change had to be loaded, to the value set in the configuration. A reload in V6 sets all the parameters changed online to the value defined in the configuration. [HE23655]

11 The demo license warning disappears if *Maximum System Bus Latency* is set to zero

The previous version did not delete the demo license system warning if the following sequence was applied:

- Despite not having a remote rack license, *Maximum System Bus Latency* was set to a value ≠ 0.
- *Maximum System Bus Latency* was again set to 0 during operation. [HE23193, HE23194, HE23310]

12 Fault tolerance no longer achievable through noise blanking if no valid value is set for *Maximum System Bus Latency [µs]*.

If *Maximum System Bus Latency [µs]* is set to an invalid value, delayed messages are discarded. In the previous version, noise blanking was used to process these messages in the following cycle.

Notice: Set Maximum System Bus Latency [µs] to a correct value.

13 Synchronization of processor modules after aborted reload and subsequent STOP is always possible

In versions ≤ V5, processor modules in the STOP state could not be synchronized, if a previous reload was aborted with errors.

Notice: The problem was removed in V6. However, the problem may still occur when migrating to V6, as long as there are processor modules with an operating system prior to V6. [HE25636]

3.3 Communication

1 Default Setting of LLDP change to *Deactivated*

LLDP must be activated or configured if it is to be used in a project in connection with a processor or communication module.

In versions up to V6, LLDP was set to *Activated* by default.

2 If a fieldbus interface is used, ComUserTask activates the corresponding LED

If ComUserTask uses the communication module's fieldbus interface, the corresponding LED is activated.

If a communication error occurs in ComUserTask, the operating system increases the current and the historic count of communication warnings. [HE20898]

3 The minimum value for the ComUserTask schedule interval is 2 ms

2 ms can be set in ComUserTask as the minimum value for *Schedule Interval [ms]*.

4 Send blockades in connection with redundant Modbus do not result in redundancy loss for the processor modules

In very seldom cases, send blockades within the HIMax system bus of the V5.14 version could cause redundancy degradation for the processor modules. This occurred in configurations with a redundant Modbus. [HE24878]

3.4 Redundancy of Processor and System Bus Modules

1 The system bus LED is yellow if the module is not running in system operation

Like on an X-CPU 31, the system bus LED on the X-CPU 01 is yellow if the module is not running in system operation.

2 Stopping a system bus module set to *Responsible* is possible

This is requisite for cold reload.

3 System operation ensured even if one of the racks with processor modules is powered down

If a HIMax system contains two racks with processor modules, one of the two racks with processor modules can be powered down. In doing so, the processor modules on the remaining rack continue to run in system operation if the following conditions are ensured:

- The responsible system bus modules are distributed in rack 0 and rack 1.
- The racks are wired so that no disturbance may affect both system busses within the watchdog time.

4 Improvements of V6.30

1 No HIMax system stop due to aborted reload

If the I/O modules affected by the reload process contained an operating system version prior to V6 and reload was aborted, they remained in the RUN RELOAD state. When further reloads were started, all V6.26 processor modules rebooted thus causing the system to stop! [HE25342]

Notice:

In PES with operating system V6.30 and higher, a reload is aborted if a warning message providing the option to abort the process appears during reload and one of the following conditions applies:

- The reload should change the configuration of an I/O module with an operating system version prior to V6. The I/O module can be in the STOP or RUN state.
- The reload should add an I/O module with an operating system version prior to V6.

An I/O module with an operating system version prior to V6 can be removed through a reload.

2 Proper behavior after changes performed to a safe**ethernet** connection

The following actions caused the HIMax system malfunction:

a The code generation setting for a safe**ethernet** connection is changed from **Prior to V6** to **V6 and Higher.**

b Code is generated with activated **Prepare Reload** option.

c The resource configuration is loaded into the PES.

The malfunction depended on the loading process type:

- Loading through **Download** resulted in the **subsequent** system stop.
- Loading through **Reload** caused the system to no longer enter system operation after a later restart if the supply voltage had been switched off and on again. In this case, the PES configuration had to be deleted and loaded again.[HE25343]

3 Proper behavior when exchanging the roles of timing master and timing slave for safe**ethernet**

A reload for a safe**ethernet** connection behaves properly, if the following actions are simultaneously performed:

- The roles of timing master and timing slave are exchanged.
- The configured times are changed.

[HE25053]

5 Improvements of V6.36

This version applies to the operating system of the communication module.

1 A communication module can be equipped with PROFIBUS master and slave

An X-COM 01 can be simultaneously equipped with one PROFIBUS DP master fieldbus submodule and one PROFIBUS DP slave fieldbus submodule. [HE25664]

2 safe**ethernet** connection established even under unfavorable conditions

In V6.36, a safe**ethernet** connection is established even under the following conditions:

- The response timeout is set to a value that is only sufficient in favorable cases.
- The Ethernet connection is affected by interferences.

[HE25826]

6 Restrictions of V6.26

6.1 Restriction Relevant to Availability

The restriction described below may affect the availability of the HIMax system!

1 Stop of the HIMax system due to aborted reload

If the I/O modules affected by the reload process contain an operating system version prior to V6, they remain in the RUN RELOAD state after the reload is aborted. When additional reload processes are started, all V6.26 processor modules reboot thus causing the system to stop!

I/O modules are not only affected by the reload process if changes were performed to module-specific parameters, but also if changes were performed to the following parameters:

- Temperature monitoring of the corresponding rack
- Voltage monitoring of the corresponding rack
- Rack name

Prior to starting the reload, a version comparison must be performed to determine which I/O modules will be affected by the reload process.

Workaround: If possible, upgrade the I/O modules to V6 or higher prior to performing the reload.

Otherwise, performe the following changes as separate reload processes:

- Changes to safe**ethernet**
- Changes to or addition of I/O modules
- Removal of modules

If the parameters mentioned above (temperature monitoring, …) are to be changed and the system contains I/O modules with an operating system version prior to V6, the system bus and communication modules must be stopped and subsequently started manually prior to performing a reload.

If this situation occurs, please contact HIMA technical support! [HE25342]

Removed in V6.30 and higher

2 Changing the roles of timing master and timing slave in connection with safe**ethernet** reload

If a safe**ethernet** reload simultaneously changes the roles of timing master and timing slave as well as the configured times, the new times set for the new timing master becomes effective immediately after completion of the reload process. This also applies if no reload has yet been performed for the new timing slave, i.e., if the slave configuration has not yet become effective. No consequences such as connection loss have to be expected.

Workaround: Change the roles and time values during two separate reload processes. [HE25053]

Removed in V6.30 and higher

6.2 Restrictions Affecting System Operation

1 Malfunction of the HIMax system V6.26 when changing the safe**ethernet** connection

The following actions cause the HIMax system malfunction:

a The code generation setting for a safe**ethernet** connection is changed from **Prior to V6** to **V6 and Higher.**

b Code is generated with activated **Prepare Reload** option.

c The resource configuration is loaded into the PES.

The malfunction depends on the loading process type:

- Loading through **Download** and system start resultes in the **subsequent** system stop.
- Loading through **Reload** causes the system to no longer enter system operation after a later restart if the supply voltage has been switched off and on again. In this case, the PES configuration has to be deleted and loaded again.

Workaround:

- If the system may be stopped, generate code with deactivated **Prepare Reload** option and perform a download after the upgrade to **V6 and higher**.
- If reload is necessary, it must be performed twice:

a Perform a first code generation with activated **Prepare Reload** option.

b First load through reload.

c Perform a second code generation with activated **Prepare Reload** option.

d Second load through reload.

A subsequent restart results in system operation. [HE25343]

Removed in V6.30 and higher

6.3 Restrictions of the Communication Module's Operating System

1 A communication module cannot be equipped with PROFIBUS master and slave

An X-COM 01 may not be simultaneously equipped with one PROFIBUS DP master fieldbus submodule and one PROFIBUS DP slave fieldbus submodule. [HE25664]

Removed in V6.36 and higher

2 safe**ethernet** connection is not established under unfavorable conditions

A safe**ethernet** connection is not established if the following conditions are met:

- The response timeout is set to a value that is only sufficient in favorable cases.
- The Ethernet connection is affected by interferences.

[HE25826]

Removed in V6.36 and higher

7 Restrictions of V6.x

The following restrictions apply to the operating systems of processor modules.

7.1 Restriction of V6.26 and Higher

1 Deletion of safe**ethernet** connections through reload hinders synchronization

The deletion of safe**ethernet** connections through a reload process can hinder the synchronization of additional processor modules.

As a **workaround**, perform one of the following actions:

- Perform a new reload, through which the transport channel no longer in use is used again; if required, as a dummy connection (safe**ethernet** or non-safety-related protocol).
- Restart the operating system or perform the user program download: [HE24860, HE25725]

7.2 Restriction of V6.30

1 Increase of the cycle time due to update to the current version

When updating the operating system version of the PES, the cycle time of the user program may increase, but no more than 6 ms, if the following conditions are met:

- The operating system is upgraded from V2.14 to V6.30 or higher, e.g., to the current version.
- The system parameter *Max. Duration of Configuration Connections [ms]* is set to a value greater than 6 ms.

[HE25684]

8 Migration from V2.x through V5.x to V6

HIMA recommends upgrading the operating systems of X-CPU 01, X-SB 01, X-COM 01, and of the I/O modules when the system is stopped.

Particular care must be taken if the upgrade has to be performed while the system is operating as described in Chapters 8.1 and 8.2. The OS loader upgrade can be skipped to avoid reducing redundancy for an unnecessarily long period. The OS loader should be upgraded when the system is stopped at the next earliest opportunity.

No further actions may be performed on the system during the upgrade process!

Prior to upgrading the operating systems, the HIMax system must be in a fault-free state!

8.1 Upgrading a Module

The section below describes the upgrade procedure for a single module. Since I/O modules have no IP address, the remarks on IP address do not apply to them.

1. Upgrade the operating system of the module.
2. The module restarts.

   If a fault occurs while loading the operating system, the OS loader is started. If the OS loader was not upgraded at this point, the module is only accessible via the standard IP address.

   The HIMax operating system immediately uses the previously configured IP address.
3. Upgrade the OS loader, if its version is not yet V4.10. The OS loader operates again with the configured IP address.
4. Wait until the module is completely running again in system operation. In particular, the process data communication for processor and communication modules should be completely re-established.

This results in the upgrade of a single module.

8.2 Upgrading the Entire System

The next module in the RUN state may only be upgraded if the most recently upgraded module is completely operating again!

The order described below must be absolutely observed!

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i The order in which the modules are to be upgraded has changed.

The entire system is to be upgraded in the upgrading order specified for the modules and described in Table 1. The upgrading procedure described in Chapter 8.1 must be observed for each module.

Step	Modules to be upgraded	Notes
1.	All I/O modules	The current OS loader version of the I/O modules with HIMaxIO_HA1_BS and HIMaxIO_HA3_BS is V6.0. The current OS loader version of the I/O modules with HIMaxIO_HA2_BS is V6.0.
2.	All processor modules	The current OS loader version of the processor module is V6.0.
	Notes: ▪ *The simultaneous use of processor modules with different operating system versions is only allowed for the duration of the upgrade!* ▪ *If safe**ethernet** is used, the processor modules must be upgraded one after the other, without performing any actions in between!*	
3.	All system bus modules	To upgrade, if the operating system version of the X-SB 01 is not V4.18. First upgrade the modules on slots 1 in all racks, and then the modules on slots 2. The current OS loader version of the X-SB 01 is V6.0.
4.	All communication modules	The current OS loader version of the X-COM 01 module is V6.0.

Table 1: Upgrading Order of the Modules

I/O modules, system bus modules and communication modules can be operated within a system using different operating system versions (V2.x, V3.x, V4.x, V5.x and V6.x).

This does **not** apply to processor modules! Processor modules must be upgraded to the same version. Until this is done, this is signaled by a warning.

Observe the restrictions for the operating system versions currently in use!

9 Migration from V1.x to V6

SILworX version must be changed when migrating from operating system V1.x to V6.

HIMax modules with operating system V1.x cannot be used together with HIMax modules with operating system V2.x and higher!

The migration procedure for SILworX projects corresponds to that described in the release notes for SILworX V2.36 and V2.46 and has to be adhered to.

The upgrade from V1.x to V6 may only be performed if the system is stopped!

10 References

- HIMax system manual, document number HI 801 001 E
- HIMax X-CPU 31 manual, document number HI 801 355 E