Content

1 New Version of the Operating System

- *Important note: Imperatively use this version 3.8 instead of the previous version 3.6, see Chapter 2!*

Version **3.8** for HIMax controllers

This document describes the new functions of version 3.8, its restrictions and improvements compared to previous versions:

- Chapters 2 and 3 describe the new functions and improvements.
- Chapter 3.3 specifies the existing restrictions.
- Chapters 4 and 5 describes the procedures to migrate from the previous versions.

2 Remarks about Version 3.8

Compared to version 3.6, the following problems were removed:

- Safety-relevant problem in version 3.6 with safe**ethernet** connections
  The problem could occur with safe**ethernet** connections to other HIMax or HIMatrix controllers, except for remote I/Os, if the loaded project configuration contained the following communication connections:
  - safe**ethernet** connection to OPC server
  - safe**ethernet** connection to HIMax o HIMatrix controller with data transfer occurring in one direction only

  In this case, the fragment management of version 3.6 did not operate as intended and could cause error stops or lead to spuriously increased receive timeout values.
  The problem has been eliminated in version 3.8. [HE16998]

- Error stop when reloading I/O modules
  If during a reload an I/O module does not respond to a request from the processor module, an error stop occurs.
  The problem has been eliminated in version 3.8. [HE16930]

3 Extensions of Version 3.x Compared to 2.x

Version 3.x contains the following new functions:

- Multitasking
  Up to 32 user programs can be simultaneously run on a processor module.
- Support of the following new I/O modules:
  - X AO 16 01
  - X-DI 16 01
  - X-DI 32 03
  - X-DI 64 01
  - X-CI 24 91
  - X-DO 12 02
  - X-DO 24 02
  - X-DO 32 01
- Reload of I/O modules
  I/O modules and base plates equipped with I/O modules can be added to a configuration or deleted from it by performing a reload.
- Configuration of further functions of the Ethernet switch in processor and communication modules:
  - Port-based VLANs for separating sub-networks
  - Port mirroring for network diagnosis
  - LLDP (Link Layer Discovery Protocol) for network topology recognition
- Improvements with communication protocols
  - Redundant Modbus slave
    The Modbus slave can be configured for twofold redundancy, in which case the HIMax system manages the redundancy.
  - New PROFINET IO communication protocol, controller and device

3.1 Further Improvements

- Enhanced performance with the sequence of events recording (SOE).
- Enhanced performance for reload. The status bar associated with the reload is more detailed and shows the different reload phases.
- safeethernet communication with HIMatrix controllers with operating system version 6 or lower (configured with ELOP II Factory).

- The communication time slices for the processor module may be longer than the watchdog time pf the processor module.
- Reload can also be performed if a user program in in the STOP or ERROR state.
- Triggering the Error LED upon low voltage
  If low voltage was detected on the supply, only the Error LED on the X-DO 24 01 output module blinks, i.e., the Field LED no longer blinks.
- Blinking 2 operates synchronously with Blinking 1.
- No restrictions when reconfiguring safe**ethernet**
- The online changes performed to Ethernet and switch parameters are maintained after restarting system bus and communication modules.
- If the target cycle time is set to a value > 0 ms, the new parameter "Target Cycle Time Mode" determines how the target cycle time should be maintained. The following settings are possible:
  - Fixed: The cycle time is maintained to the value set.
  - Dynamic: The cycle is processed as quickly as possible, but the target cycle time is maintained, even during a reload and the synchronization of processor modules.
- Essential LED is permanently lit - no blinking if no redundant module is configured.
- Executing the STOP command also deletes the configuration on the following module types:
  - System bus module
  - Communication module
  - I/O modules
- It is possible to increase the watchdog time online and to reduce it back to the planned value (e.g., to complete the reload).
- System messages warning about over temperature can be suppressed

3.2 Problems Resolved

- Value of state variables if faults occur
  In the previous version, if a channel error occurred in the analog input modules X-AI 32 01 and X-AI 32 02, the global variables assigned with the channel state variables -> *State LL, -> State L, -> State N, -> State H, -> State HH*, were set to their initial value instead of the safe value FALSE.
  The problem has been eliminated in version 3.x. [HE16041]
- Adoption of initial values if the system bus connection is disturbed
  If the safety time for a HIMax system is set to a value > 2 * watchdog time (WDT), noise blanking for the connection between I/O module and processor module is active. Only if the noise blanking is configured for the I/O module, the blanking of connection noises also operates properly for channels.

In the previous version, if no noise blanking was configured for the affected I/O module and given permanent connection noises or a connection loss, it was possible that the initial or safe values were adopted with a delay of up to a CPU cycle.
The connection noise blanking for module-specific or submodule-specific data also led to delayed values if the connection was disturbed.
The problem has been eliminated in version 3.x. [HE16113]

- Delay when processor modules are synchronized
  This problem occurred in the previous version every time that the following condition was met: FTT - 2*WDT > $^1/_3$ *FTT_{Max} with FTT_{Max} = 22 500 ms.
  When a processor module is synchronized to another processor module in the RUN state, a mistake could occur under the following conditions:
  - Noise blanking was active for the connection to at least one I/O module.
  - When the noise blanking ceases, the noise still existed.

  In such a case, one of the processor modules no longer took part in redundancy and tried a new synchronization.
  Further, this could cause the module to adopt the initial or safe values with a certain delay. This effect depended on the safety time (FTT) and the watchdog time (WDT) that had been configured for the resource.
  If FTT - 2*WDT > 1/3 *FTTMax, it was possible that the initial or safe values were not adopted until the noise blanking ceased the next time.
  The problem has been eliminated in version 3.x. [HE16133]

- Project configuration with too much retain data
  A project configuration exceeding the maximum storage capacity for retain data (32 KB for HIMax), was not considered as faulty in the previous version and thus not rejected when it was loaded into the controller.
  Such a configuration caused the controller to reboot.
  The problem has been eliminated in version 3.x. [HE14908, HE14942, HE14973]

- Changes to local retain variables and reload
  In the previous version, if the retain attributes for local variables were changed *without* simultaneously modifying the program logic, a warm start performed after reloading the changes into the controller resulted in errors associated with the variables. For instance, these retain variables could receive incorrect values.
  The problem has been eliminated in version 3.x. [HE15030]

- Noise blanking for open-circuit monitoring
  In the previous version, a change to the resource's watchdog and/or safety time could cause the noise blanking for the open-circuit monitoring to be active for too long. After the change, this delay in noise blanking could result in a worst case value of up to *safety time - 2*watchdog time* for both time parameters.
  The problem has been eliminated in version 3.x.

- System variable "Program_Reloadcycle"
  In the previous version, in the following cases, the system variable "Program_Reloadcycle" remained set to TRUE for an excessively long period:
  - Redundancy loss during reload.

- Controller set to STOP during reload.
- Loading another program through a download during reload.

The problem has been eliminated in version 3.x.

3.3 Restrictions

- The operating system version 2.14 or higher must be installed on both controllers to ensure that a safe**ethernet** connection to a HIMax controller can start operation.
- A processor module located in a HIMax system maintains its IP settings if it is removed and reinserted into another slot allowed for processor modules of the same system.
  This only applies if no project configuration was loaded between removing and reinserting the processor module. After loading a new project configuration or inserting the processor module into another HIMax system, the processor module adopts the project configuration currently loaded in the system.

4 Migration from V.2.x and 3.6 to V.3.8

If possible, HIMA recommends upgrading the operating systems of X-CPU 01, X-SB 01, X-COM 01 and possibly 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. The OS loader upgrade can be skipped to avoid reducing redundancy for an unnecessarily long period. The OS loader should be upgraded at the next earliest opportunity.

No further actions may be performed on the system during the upgrading process!
Prior to upgrading the operating systems, the HIMax system must be in a faultless state!

4.1 Procedure

One module in the RUN state may only be upgraded if the module that was lastly upgraded is once again completely operating!

The order described below must be absolutely observed! The difference from the normal procedure is that the processor module is updated first such that the entire system update process proceeds faster.

1. Upgrade the first processor module, then
   a. upgrade the operating system
   b. Restart the module. From now on, when the module is running in OS loader mode, it is only accessible via the default IP address. The normal operating system now uses the previously configured IP address.
   c. Upgrade the OS loader. From now on, the module is once again accessible via the configured IP address.
2. Upgrade the remaining processor modules. To do this, perform the steps a-c such as described for the previous modules.

Note: The simultaneous use of processor modules with different operating system versions is only allowed for the duration of the upgrade!
Note: If safe**ethernet** is used, the processor modules must be upgraded one after the other, without performing any actions in between!

3. Upgrade the system bus modules. To do this, perform the steps a-c such as described for the previous modules. First upgrade the modules on slots 1 in all base plates, and then the modules on slots 2.
4. Upgrade the communication modules. To do this, perform the steps a-c such as described for the previous modules.
   Make sure that the communication connections are re-operating properly prior to upgrading the next module!
5. Upgrade the I/O modules. To do this, perform the steps a-c such as described for the previous modules

With the exception of processor modules, modules with different operating system versions (V2 and V3) may be operated within a given system!

5 Migration from V.1.10 and 31.22 to V.3.8

SILworX version must be changed when migrating to HIMax firmware version 3.8, since SILworX version 1.12/1.20 can only co-operate with HIMax version 1.10/1.22 and SILworX version 2.36 and higher can co-operate with HIMax version 3.8.
All HIMax system modules must be migrated to version 3.8:
The migration procedure corresponds to that described in the *Release Notes for SILworX V.2.36 and V.2.46* and has to be adhered to.

The migration from versions 1.10 and 1.22 to version 3.8 may only be performed if the system is stopped!