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1 New Revision (08.17), for BS41q/51q V7.0-8, CRC AF31

This document describes the enhancements and new functions of revision (08.17) with respect to the previous revision.

- Chapter 3 describes the new functions and improvements.
- Chapter 4 specifies the restrictions applying to revision (08.17).
- Chapter 5 describes the migration procedure from the previous release.

Note: In the following sections, HIMA software function blocks from the ELOP library (*Elop-Lib*) are referred to as HIMA function blocks.

2 Compatibility

Revision (08.17) may only be used with the central modules F 8650X and F 8652X, and the current version of ELOP II, see Table 1.

Module / programming tool	Type	Version
Central module (CU)	F8650X, F8652X	BS41q/51q V7.0-8 (08.17)
Co-processor module (CM)	8621A	BS51-CM V6.0-6 (9808)
Ethernet module (EN-M)	F 8627X	BS V4.22
PROFIBUS module (PB-M)	F 8628X	BS V4.22
ELOP II	Software	Rev. 5.6 Build 1501.9810IV1

Table 1: Versions Required for (08.17)

3 Improvements of Revision (08.17)

This chapter describes the improvements of revision (08.17) with respect to the previous revision (07.30).

3.1 New Functions

- 1** The safety-related communication protocol HIPRO-S was revised.
HIPRO-S can communicate via serial interfaces (RS485) and via Ethernet.
The protocol variant that was already available in previous operating systems is referred to as HIPRO-S.
- 2** HIPRO-S V2 is the new implementation of the safety-related communication protocol.
It meets the most recent standards IEC 61508: Ed2, IEC 61784-3: Ed2 and is prepared for Ed3.
HIPRO-S V2 is a protocol variant that can only be used via Ethernet. A communication connection cannot use both protocol variants simultaneously; both partners must use the same variant.
Different protocol variants can be used for different communication connections. Observe the HIPRO-S V2 manual (HI 800 723 E).
HIMA recommends using HIPRO-S V2 instead of HIPRO-S!

3.2 Further Improvements

- 1 No error stops when navigating through the structure tree of the diagnostic display
In the previous versions, navigating through the structure tree of the diagnostic display could result in an error stop if the sequence of certain operating steps was often repeated.
- 2 The central module continues to operate when the position of switch 1 is changed on the F 8650X and F 8652X modules
In the previous versions, changing the position of switch 1, e.g., due to a fault, could cause the central module to enter the error stop. In rare cases, the other central module could also stop causing the system to temporarily fail.
Behavior of the current version:
 - Changing the position of the DIP switch during redundant operation no longer causes a difference in memories. The central module that detects a change reports error code 25 in the error code history and remains in the RUN state. The switch position applying during the last start-up when the supply voltage was connected, remains valid and unchanged.
 - Redundant operation to a running controller can no longer be initiated if the switch position differs on the two central modules. The booting central module enters the error stop with error code 24 and the other central module continues to run in the MONO state.
 - A changed DIP switch position only becomes effective after the central module is reset by connecting the supply voltage.
 - The effects of the DIP switches (baud rate, stop bits, parity, BN, ID,), can be read from the diagnostic display on the central module. For further details, refer to the operating system manual (HI 800 105 E).[HE25777]
- 3 No restart of a central module when differences in memories exist
 - A difference in memories no longer causes the central module to restart, but results in a redundancy loss. Both central modules report the difference in memories by issuing error code 17 in the error code history. One of the two central modules enters the error stop with error code 15, the other central module continues to run in the MONO state.[HE25777]

3.3 Improvements when Loading the User Program

- 1 No controller failure when reloading the user program with changed data block lengths of HIPRO-S import and export areas
In the previous versions, a reload performed to load changed data block lengths of HIPRO-S import and export areas could result in an error stop with error code 172. A reload of changed HIPRO-S data block lengths was not permitted. If ELOP II offered the option, the controller failed.
In the current version, the first loaded central module enters the error state with error code 92 during the reload. The other central module remains in the MONO state. The controller does not fail. [HE27456]

3.4 Communication Protocol Improvements

The current operating system rectifies the behavior of HIPRO-S. Data transfer inconsistencies and time-inconsistent behavior could be observed in the HIMA testing laboratory. No observations in the productive environment are known to HIMA.

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- 1** Reestablishment of a HIPRO-S connection and discard of the received data after interruption
After interruption of a HIPRO-S connection due to interference or expiration of the monitoring time, the previous versions accepted the received data if it matched the data received before the interruption.

The current version only accepts the data sent after an interruption if the connection has been established properly.

- 2** Data sent via serial HIPRO-S connection is consistent
In the previous version, an inconsistency could occur when data of a HIPRO-S message was transmitted via the serial bus (transmission triggered by the PES master). If the HIPRO-S message data was transmitted while the user program logic was creating data, a part of the transmitted data blocks was already built and the rest was still in the state of the previous cycle. The error did not occur when HIPRO-S was used via Ethernet.

In the current version, data is ensured to consistently originate from one cycle.

- 3** Starting redundancy operation does not affect the HIPRO-S time monitoring
In the previous versions, if redundant operation started (the state changed from MONO to RUN), time monitoring was restarted. This could improperly extend the validity of the process data previously received by the value of the configured monitoring time.

- 4** Losing redundancy does not affect the HIPRO-S time monitoring
In the previous versions, the HIPRO-S time monitoring could exhibit leaps in time of +/- 0.9 seconds if redundancy was lost (failure of central module 1). This could improperly extend the validity of the data received last.

Note: The largest error results if redundancy is lost when the hour changes.

- 5** HIPRO-S time monitoring starts properly
In the previous versions, the HIPRO-S time monitoring started with a delay of one cycle.

- 6** A reload of the user program does not affect the HIPRO-S time monitoring
In the previous versions, time monitoring was restarted when performing a reload of the user program. This could improperly extend the validity of the process data previously received by the value of the configured monitoring time.

4 Restrictions of Revision (08.17)

4.1 Restrictions Related to Inputs and Outputs

- 1 Output values from output modules of type F 3330...F 3335, F 3348 and F 3430 are retained despite the output modules having been deleted from the configuration

User program changes, in which output modules of type F 3330, F 3331, F 3333, F 3334, F 3335, F 3348 or F 3430 are deleted from the configuration, do not alter the state of the physical modules. If the outputs of the specified types were activated before the program change, they remain activated after the change. This state is maintained as long as the 5 V power supply is on. The outputs adopt the previous state if only the 24 V power supply is switched off and on again.

Workaround: Prior to performing a change connected with a module deletion, ensure that the outputs to be deleted are deactivated.

If possible, shortly switch off the 5 V power supply after the change. [Restriction]

- 2 Set the safety and watchdog time values in a relation of at least 3:1 to ensure a faultless operation of the F 5220, F 6220 and F 6221 modules.

Otherwise, a temporary interference causes communication with the central modules to be interrupted, thus resulting in the module failure.

Workaround: Check the safety settings. If the cycle time raises, increase the watchdog time as well. If needed and feasible, take the relation safety time/watchdog time ≥ 3 into account. [Restriction]

- 3 Redundant module connection of F 3331 or F 3334 causes faulty open-circuit detection in one of the two channels. This is caused by an overlap of the two test pulses.

Workaround: Use the HB-BLD-4 function block and use only the values after completely evaluating the outputs *Fault Channel 1...Fault Channel 8* in the user program. [Restriction]

- 4 Starting up again modules of type F 6213 and F 6214

If noise blanking is set to 0, the *ACK* acknowledge key must be pressed twice.

If noise blanking is set to a value > 0 , error code 197 is logged as an entry in the error code history.

Workaround: Set noise blanking to a value > 0 . If this is not possible, activate the acknowledge key twice.

- 5 Starting up again modules of type F 6217

If noise blanking is set to 0, the *ACK* acknowledge key must be pressed twice.

If noise blanking is set to a value > 0 , error code 197 is logged as an entry in the error code history.

Workaround: Set noise blanking to a value > 0 . If this is not possible, activate the acknowledge key twice.

- 6 Starting up again modules of type F 6705

If noise blanking is set to 0, the *ACK* acknowledge key must be pressed twice.

If noise blanking is set to a value > 0 , error code 197 is logged as an entry in the error code history.

Workaround: Set noise blanking to a value > 0 . If this is not possible, activate the acknowledge key twice.

4.2 Restrictions with Respect to Function Blocks

- 1 In one case, error code in HF-AIX-3 function block is not correct

If an F 6221 module configured in ELOP II is removed from a subrack, the associated HF-AIX-3 function block issues 23 to the *Error Code* output instead of 2.

Workaround: When evaluating the error code in the user program, do not check for a specific value [HE27505].

- 2 In certain cases, the error code in the HB-RTE-3 function block is not correct

If an external line fault occurs in a module of type F 3235, F 3237 or F 3238, the associated HB-RTE-3 function block may sometimes issue a wrong error code to the *Error Code Mod.* or *Error Code red.Mod.* output:

- *n2* instead of *n3*
- *n3* instead of *n2*

n indicates the number of the channel in which the fault occurred.

After acknowledging the error, the correct error code is issued if the fault is still present.

Workaround: When evaluating the error code in the user program, do not check for a specific value.

4.3 Operational Restrictions Related to the User Program

- 1 Controller failure due to Upload→Code in connection with ELOP II V3.0, V3.5

When executing the Upload→Code function in the Control Panel of ELOP II V3.5 and V3.0, the controller may fail with error code 5.

The use of the Upload→Code function for reading back the project data from within the controller must be avoided. This function is no longer available in ELOP II V4.1 and higher.

Workaround: Avoid using the Upload→Code function. Use ELOP II, V4.1 and higher, if possible. [Restriction]

- 2 Controller Failure in Connection with Single Step Mode and Modbus Master (HK-MMT-3 function block in use)

If a controller is operated in single step mode for testing, while a Modbus master is active, the controller may fail with error code 172.

Workaround: Prior to starting the single step mode, deactivate the Modbus master function by setting the *Enable* input to FALSE on all the function blocks of type HK-MMT-3.

- 3 In certain cases, online change of system parameters may have no effects

The *Change System Parameters* dialog box can be activated in the ELOP II Control Panel. The **Safety** tab is used to change safety parameters during operation. If *Parameter online change* is deactivated and is transferred to the controller, these parameters can no longer be changed online.

This, however, cannot be recognized from the tab content. For this reason, it is still possible to use the functions for changing and transferring the parameters to the controller during operation. Nevertheless, the controller ignores further online changes, if the *Parameter online change* was deactivated.

Additional online changes can only be performed again if the *Parameter online change* option located in the user program is reactivated and is loaded into the controller by performing a download.

Workaround: Note down the settings for the safety parameters prior to deactivating the *Parameter online change* option. [HE19818, Restriction]

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4 Controller failure in connection with mono reload and extensive changes

A reload performed to a mono controller via Ethernet may cause the controller to fail with error code 5.

Workaround: Prior to performing a reload with extensive changes, test the effects on a test system. If necessary, distribute the changes over multiple reload procedures.

5 Force flag is transferred from the deleted to the added variable

If a forced variable is deleted from the hardware assignment and a reload is performed to load this change, the physical input keeps the force flag and the force value.

In ELOP II, this has the effect that the deleted variable is no longer visible in the Force Editor.

If a forced input is assigned a given variable at a later point in time and a reload is performed, this variable is forced immediately after the reload process is completed! This may impact the safety of the plant.

Workaround: Stop forcing prior to loading the user program with the deleted variables!

[HE19938, restriction, applies for all ELOP II versions, including V.5.1 730 IV3. With newer ELOP II versions, forcing of deleted variables can also be stopped from within the Force Editor upon completion of the loading process.]

6 Large force images cannot be loaded into the controller

The operating system refuses to load large force images with more than 60 modified forced variables.

Workaround: Perform major changes to the force image in smaller steps with a maximum of 60 changes each. [HE19490]

4.4 Restrictions Related to Communication Protocols

1 Siemens communication protocol 3964R

The Siemens communication protocol 3964R is based on a point-to-point connection via RS232. During active communication, sporadic interference may occur. Communication resumes automatically.

Workaround: None [Restriction]

2 Malfunctions related to Modbus function codes 5, 6 and 8

When Modbus communication runs via the central module's serial interfaces, malfunctions may occur with the Modbus function codes 5, 6 and 8.

This only applies if the serial interfaces are redundantly connected. Function codes 5, 6 and 8 can be used without restrictions if the serial interfaces of the communication module are used or if the interfaces are not redundantly connected.

Workaround: Replace this function codes with other ones as follows.

- Instead of function code 5, use function code 15 and set the number of variables to 1.
- Instead of function code 6, use function code 16 and set the number of variables to 1.
- Instead of function code 8, use function code 15 or 16 and set the number of variables to 1. [Restriction]

3 Duplicate responses for Modbus function code 1 (read coils)

Modbus function code 1 provides duplicate responses if all the following conditions are met:

- Modbus is redundantly connected via the interfaces of the F 8621A module.
- The response length is identical to the request length.

Workaround: Set the number of values read with a request, outside the range 17...24 to ensure that the response and request lengths differ.

Note: 8 digital values are packed in one byte. [HE25191, Restriction]

4 Event loss related to Modbus function codes 65, 66, 67

While reading events using Modbus function codes 65, 66 and 67 via redundant connections to the co-processor module F 8621A, events may sporadically be lost.

Workaround: Other connections:

- Mono connection via interfaces of the F 8621A module or
- Redundant connections via the interfaces of the central modules F 8650X, F 8652X [HE06595, Restriction]

5 Controller failure in connection with slave response time set too low

If the maximum slave response time is set too low in a Modbus master, the controller may fail with error code 125. The maximum slave response time can be configured on the *Max. Response Time Slave in ms* input of the HK-MMT-3 function block.

Workaround: Determine the response time properly. Take the safety margin into account. The calculation rule is described in the online help of the HK-MMT-3 function block.

6 Simultaneous use of serial HIPRO-S communication and HIPRO-S via Ethernet is not allowed for the same connection

Serial HIPRO-S communication and simultaneous transmission of HIPRO-S data via Ethernet to the same partner is not allowed.

Interference may result and the HIPRO-S communication may be interrupted.

Workaround: Use the HK-COM-3 function block to prevent safety-related HIPRO-S communication via Ethernet for a connection with serial data transmission (triggered by the PES master). Refer to the HIPRO-S V2 manual (HI 800 723 E) for details.

5 Migrating from a Previous Revision

The migration is performed by loading the new operating system, either online or offline.

Prior to loading the new operating system into a central module, the following points must be observed:

- For central modules with an operating system up to BS41q/51q V7.0-8 (07.30), first import the stand-alone loader; refer to the *Supplementary sheet of the HIMA standalone loader for HIQuad central modules* (HI 800 627 E) for details.
- For the online replacement of the operating system, refer to the description provided in the operating system manual (HI 800 105 E) and the rules for upgrading HIPRO-S to HIPRO-S V2 specified in the HIPRO-S V2 manual (HI 800 723 E).
- The restrictions as of Chapter 4, in particular Chapter 4.4, Point 6, must be observed. The described workaround must be applied prior to migrating.
- During migration in connection with running HIPRO-S communication and the used of the HK-COM3 function block, ensure that the HK-COM3 inputs with new function are not in use during the migration process.

6 References

- Operating System Manual BS41q/51q V7.0-8, Document Number HI 800 105 E
- Supplementary Sheet of the HIMA Standalone Loader for HIQuad Central Modules, Document Number HI 800 627 E
- ELOP II Version 5.6 Build 1501.9810IV1 Release Notes, Document Number HI 800 694 E
- ELOP II Version 5.6 Build 1501.9810IV1 Online Help
- HIPRO-S V2 Manual, Document Number HI 800 723 E