Manual

HIQuad®X

Maintenance Manual

Contact

HIMA Paul Hildebrandt GmbH

P.O. Box 1261

68777 Brühl

Phone: +49 6202 709-0

Fax: +49 6202 709-107

E-mail: info@hima.com

Document designation	Description
HI 803 212 D, Rev. 1.02 (1948)	German original document
HI 803 213 E, Rev. 1.02.00 (1948)	English translation of the German original document

Table of Contents

1 Introduction

This document describes all relevant activities for servicing and operating safety-related HIQuad X controllers.

- Chapter 2 lists the activities in a table.
- Chapter 3 describes the proof test.
- Chapter 4 lists the manuals to be observed and other applicable documents.
- Chapter 5 includes maintenance action details.

1.1 Target Audience and Required Know-How

This manual is aimed at the planners, design engineers, programmers and maintenance personnel of automation systems. Specialized knowledge of safety-related automation systems is required.

Additional knowledge is necessary for maintenance activities on the HIQuad X system hardware and software, e.g., for reading and evaluating diagnostics.

For work on safety-related automation systems, the safety standards demand proof of the qualifications required for maintenance personnel.

Qualified HIMA service personnel can be requested to perform maintenance tasks in accordance with the manufacturer's instructions. HIMA also offers specific training seminars to qualify the maintenance personnel.

HIMA recommends the following seminars for performing maintenance tasks:

- **FS 101** Functional safety for maintenance and operation
- **PT 240** SILworX HIQuad X Maintenance

1.2 Writing Conventions

To ensure improved readability and comprehensibility, the following writing conventions are used in this document:

Bold	To highlight important parts. Names of buttons, menu functions and tabs that can be clicked and used in the programming tool.
Italics	Parameters and system variables, references.
`Courier`	Literal user inputs.
RUN	Operating states are designated by capitals.
Chapter 1.2.3	Cross-references are hyperlinks even if they are not specially marked. In the electronic document (PDF): When the mouse pointer hovers over a hyperlink, it changes its shape. Click the hyperlink to jump to the corresponding position.

Safety notices and operating tips are specially marked.

1.2.1 Safety Notices

Safety notices must be strictly observed to ensure the lowest possible risk.

The safety notices are represented as described below.

- Signal word: warning, caution, notice.
- Type and source of risk.
- Consequences arising from non-observance.
- Risk prevention.

The signal words have the following meanings:

- Warning indicates hazardous situations which, if not avoided, could result in death or serious injury.
- Caution indicates hazardous situation which, if not avoided, could result in minor or moderate injury.
- Notice indicates a hazardous situation which, if not avoided, could result in property damage.

⚠ SIGNAL WORD

Type and source of risk!

Consequences arising from non-observance.

Risk prevention.

NOTICE

Type and source of damage!

Damage prevention.

1.2.2 Operating Tips

Additional information is structured as presented in the following example:

i The text giving additional information is located here.

Useful tips and tricks appear as follows:

TIP The tip text is located here.

1.3 Safety Lifecycle Services

HIMA provides support throughout all the phases of a plant's safety lifecycle, from planning and engineering through commissioning to maintenance of safety and security.

HIMA's technical support experts are available for providing information and answering questions about our products, functional safety and automation security.

To achieve the qualification required by the safety standards, HIMA offers product or customer-specific seminars at HIMA's training center or on site at the customer's premises. The current seminar program for functional safety, automation security and HIMA products can be found on HIMA's website.

Safety Lifecycle Services:	
Onsite+ / On-Site Engineering	In close cooperation with the customer, HIMA performs changes or extensions on site.
Startup+ / Preventive Maintenance	HIMA is responsible for planning and executing preventive maintenance measures. Maintenance actions are carried out in accordance with the manufacturer's specifications and are documented for the customer.
Lifecycle+ / Lifecycle Management	As part of its lifecycle management processes, HIMA analyzes the current status of all installed systems and develops specific recommendations for maintenance, upgrading and migration.
Hotline+ / 24 h Hotline	HIMA's safety engineers are available by telephone around the clock to help solve problems.
Standby+ / 24 h Call-Out Service	Faults that cannot be resolved over the phone are processed by HIMA's specialists within the time frame specified in the contract.
Logistics+/ 24 h Spare Parts Service	HIMA maintains an inventory of necessary spare parts and guarantees quick, long-term availability.

Contact details:	
Safety Lifecycle Services	https://www.hima.com/en/about-hima/contacts-worldwide/
Technical Support	https://www.hima.com/en/products-services/support/
Seminar Program	https://www.hima.com/en/products-services/seminars//

2 Operating and Maintenance Activities

The operating and maintenance activities of the individual system components are listed in the following sections.

2.1 Activities Recurring in the Short Term

The HIQuad X system must be tested by the operator at short recurring intervals in line with the Automation Security policy. The operator must specify the test details in a security risk analysis; refer to the automation security manual (HI 801 373 E).

2.2 Activities Recurring on an Annual Basis

The chapter specifies the activities recurring on an annual basis.

2.2.1 Mechanical Test (Visual Inspection)

The table specifies the maintenance activities for the mechanics:

Activity	Who	Reference
Check the module screws for firm connection, tighten if necessary.	Operating company, assembler, maintenance personnel	D1
Check the cable plug screws for firm connection, tighten if necessary.	Operating company, assembler, maintenance personnel	D1
Check the data cables for firm connection, including to the communication modules.	Operating company, assembler, maintenance personnel	D1
Check the fans for proper function.	Operating company, assembler, maintenance personnel	

Table 1: Annual Activities for the Mechanics

2.2.2 Power Supply Test

The table specifies the maintenance activities for the power supply:

Activity	Who	Reference
Check the 230 VAC/24 VDC power supply for compliance with tolerances, 24 VDC, -15…+20 %, r_p ≤ 5 %.	Operating company, assembler, maintenance personnel	D1
Visually check the 24 VDC distribution. Check any existing decoupling diodes for proper function.	Operating company, assembler, maintenance personnel	D1
Check the 24 VDC/5 VDC power supply of the F-PWR 01 power supply units for compliance with the voltage range, 5…5.4 V.	Operating company, assembler, maintenance personnel	D1, D6
Check the 5 VDC voltage supply of the extension racks for compliance with the voltage ≥ 4.85 V.	Operating company, assembler, maintenance personnel	D1
Check the redundant supply for proper function.	Operating company, assembler, maintenance personnel	D1

Table 2: Annual Activities for the Power Supply

2.3 Activities Recurring in the Long Term

The chapter specifies activities recurring in the long term.

2.3.1 Hardware

The table specifies the maintenance activities for the hardware:

Activity	Who	Reference
At an operating temperature of > 40 °C: Replace the K 9203A and K 9202B fans every **2.5** years.	Operating company, assembler, maintenance personnel	
At an operating temperature of ≤ 40 °C: Replace the K 9203A and K 9202B fans every **5** years.	Operating company, assembler, maintenance personnel	
In the case of a safety-related application in accordance with SIL 3, check the F 3430 relay module for proper function every **5** years.	HIMA	D6
In the case of a safety-related application in accordance with SIL 2, replace the F 3430 relay module every **20** years.	HIMA	D6
In the case of a safety-related application in accordance with SIL 2, check the H 4116 relay in terminal housing for proper functioning every **5** years.	Operating company, assembler, maintenance personnel	D7
In the case of a safety-related application in accordance with SIL 2, check the H 4134 relay in terminal housing for proper functioning every **5** years.	Operating company, assembler, maintenance personnel	D7
In the case of a safety-related application in accordance with SIL 3, check the H 4135A relay in terminal housing for proper functioning every **5** years.	Operating company, assembler, maintenance personnel	D7
In the case of a safety-related application in accordance with SIL 2, check the H 4135A relay in terminal housing for proper functioning every **20** years.	Operating company, assembler, maintenance personnel	D7
In the case of a safety-related application in accordance with SIL 3, check the H 4136 relay in terminal housing for proper functioning every **5** years.	Operating company, assembler, maintenance personnel	D7
In the case of a safety-related application in accordance with SIL 2, check the H 4136 relay in terminal housing for proper functioning every **20** years.	Operating company, assembler, maintenance personnel	D7
Replace the H 7034 mains filter every **10** years.	Operating company, assembler, maintenance personnel	D7, Chapter 5.2
Replace the H 7035 mains filter every **10** years.	Operating company, assembler, maintenance personnel	D7, Chapter 5.2
Due to the short lifetime of the electrolytic capacitors, replace the F-PWR 01 power supply unit every **10** years.	Operating company, assembler, maintenance personnel, HIMA	D7, Chapter 5.5

Activity	Who	Reference
At an ambient temperature of > 40°C (maximum temperature within the control cabinet or directly below the module), replace the electrolytic capacitors on the F-PWR 02 buffer module every **5** years. At an ambient temperature of ≤ 40 °C, replace the electrolytic capacitors every **10** years.	Operating company, assembler, maintenance personnel, HIMA	D6, Chapter 5.6
Replace the electrolytic capacitors[1)] on the F 3237 I/O module every **10** years. For maintenance, send modules to HIMA.	Operating company, assembler, maintenance personnel, HIMA	D7
Replace the electrolytic capacitors[1)] on the following I/O modules every **20** years: F 3238, F 3240, F 3248, F 3325, F 3335, F 3349, F 3430, F 5220, F 6217, F 6705 and F 6706. For maintenance, send modules to HIMA.	Operating company, assembler, maintenance personnel, HIMA	D7
[1)] The lifetime of electrolytic capacitors depends on the temperature Typical manufacturer specifications: > 10 years at an operating temperature of ≤ 40 °C.		

Table 3: Activities for the Hardware Recurring in the Long Term

2.3.2 Proof Test

The table specifies the activities for the proof test:

Activity	Who	Reference
The proof test interval must be in accordance with the interval required by the application-specific safety integrity level (SIL). The complete safety functions within the HIMA safety-related system must be checked during the proof test.	Operating company, assembler, maintenance personnel	N2, D2 Chapter 3.1

Table 4: Proof Test

2.4 Activities as Required

The chapter specifies activities to be carried out as required.

2.4.1 Hardware

The table specifies the activities for the hardware:

Activity	Who	Reference
Replace the modules.	Operating company, assembler, maintenance personnel	D1, D6 Chapter 5.4

Table 5: Activities for the Hardware to Be Carried out as Required

Only personnel with knowledge of ESD protective measures may modify or extend the system or replace modules.

NOTICE

Damage due to electrostatic discharge!

- **When performing the work, make sure that the workspace is free of static, and wear a grounding strap.**
- **If not used, ensure that the component is protected from electrostatic discharge, e.g., by storing it in its packaging.**

Use a grounding strap and connect it to the ESD connection point on the control cabinet before touching the module to preclude any potential residual charge during module replacement. This also applies when inserting the plugs of cables and data lines.

If the control cabinet is not provided with an ESD connection point, get in contact with a grounded part of the control cabinet before touching the module.

Avoid any direct contact with electronic module components and their PCBs. Only touch the modules by their handles.

2.4.2 Software

The table specifies the maintenance activities for the software:

Activity	Who	Reference
Loading the user program.	Operating company, assembler, maintenance personnel	D3
Load new operating systems.	Operating company, assembler, maintenance personnel	D1, Chapter 5.7
Change the system parameters.	Operating company, assembler, maintenance personnel	D1, D2, D5, D6

Table 6: Activities for the Software to Be Carried Out as Required

3 Proof Test (in Accordance with IEC 61508)

HIMA safety systems must be subject to a proof test in regular intervals. The proof test interval for HIMA controllers must be in accordance with the interval required by the application-specific safety integrity level (SIL). The proof test must comply with the applicable safety standards.

Refer to the functional safety data manual (HI 803 233 E) for the safety-related characteristic values of HIMA's HIQuad X system.

3.1 Proof Testing

The proof test is performed by powering off and on again the controller. When the controller is restarted, all electronic components (e.g., memory and processors) are initialized and all diagnostic tests are performed simultaneously.

To perform the proof test

1. Power off the controller (Power OFF).
2. Power on the controller (Power ON).
   ☑ Restart completed.
3. After the restart, read out the following diagnostic information and check for error entries:
   - LEDs on the modules.
   - Warning and error counter in the Control Panel.
   - Diagnostic files of the processor modules.

Proof test as a part of the functional test (loop test)

Proof testing can be dispensed with if the complete safety functions between field level and controller are tested with sufficient testing depth within the specified intervals. The test of the complete safety functions includes all field devices connected to the controller, such as sensors and actuators.

The input and output modules of the safety controller can be tested independently of one another. The safety controller's application logic test is completed through a CRC check with the version comparator.

When testing analog signals in HIQuad X modules, a sufficient testing depth is achieved by:

- Running through the nominal range, e.g., 0/4…20 mA, and simultaneously checking the switching thresholds.
- Underrunning the open-circuit limit, e.g., ≤ 3.6 mA.
- Overrunning the short-circuit limit, e.g., ≥ 21.0 mA.

When testing binary signals in HIQuad X modules, a sufficient testing depth is achieved by:

- Checking the switching thresholds for high and low levels.
- Checking for open-circuits, if possible.
- Checking for short-circuits, if possible.

When testing counter signals in HIQuad X modules, a sufficient testing depth is achieved by:

- Checking the switching thresholds for high and low levels.
- Checking the signal nominal range at 1 %, 10 %, 50 % and 100 %.
- Checking for open-circuits (line breaks), if possible.
- Checking for short-circuits, if possible.

The frequency values, in particular the error bits and value changes, must be checked and documented for 30 s each.

While testing the complete safety functions, the controller's response must be monitored using the SILworX programming tool. Significant channel information such as error states, channel values, open-circuits or short-circuits, must be monitored and documented.

If errors occur, they must be promptly removed (< MTTR for high demand mode) and the corresponding tests must be repeated.

4 Other Applicable Documents

The following table specifies other applicable documents.

Reference	Standard/Document ID	Description
N1	IEC 61511-1, Section 12	Functional safety - Safety instrumented systems for the process industry sector - Part 1: Framework, definitions, system, hardware and software requirements
N2	IEC 61508-4, Section 3.8.5	Proof test
D1	HI 803 211 EE	HIQuad X system manual
D2	HI 803 209 E	HIQuad X safety manual
D3	HI 803 233 E	HIQuad X functional safety data manual
D4	HI 801 373 E	Automation security manual
D5	---	SILworX online help
Reference	Standard/Document ID	Description
D6	**HIQuad X module manuals**	
	HI 803 215 E	F-CPU 01
	HI 803 224 E	F-COM 01
	HI 803 219 E	F-IOP 01
	HI 803 225 E	F-PWR 01
	HI 803 227 E	F-PWR 02
	HI 803 028 E	F 3221
	HI 803 175 E	F 3224A
	HI 803 176 E	F 3236
	HI 803 177 E	F3237
	HI 803 178 E	F 3238
	HI 803 179 E	F 3240
	HI 803 180 E	F 3248
	HI 803 181 E	F 3322
	HI 803 182 E	F 3325
	HI 803 183 E	F 3330
	HI 803 184 E	F 3331
	HI 803 185 E	F 3333
	HI 803 186 E	F 3334
	HI 803 187 E	F 3335
	HI 803 188 E	F 3349
	HI 803 189 E	F 3422
	HI 803 190 E	F 3430
	HI 803 191 E	F 5220
	HI 803 192 E	F 6215
	HI 803 193 E	F 6217
	HI 803 194 E	F 6220

Reference	Standard/Document ID	Description
	HI 803 195 E	F 6221
	HI 803 196 E	F 6705
	HI 803 197 E	F 6706
	HI 800 303 E	F 7133
D7	**Additional manuals or data sheets**	
	HI 803 229 E	H 7034
	HI 803 231 E	H 7035
	HI 803 007 E	H 4116
	HI 803 025 E	H 4134
	HI 803 003 E	H 4135A
	HI 803 009 E	H 4136

Table 7: Other Applicable Documentation

5 Maintenance Actions in Details

This chapter describes individual maintenance actions for the components of the system.This chapter describes individual maintenance actions for the components of the HIQuad X system.

i Only qualified personnel may perform maintenance actions to supply, signal and data lines, taking all ESD protection measures into account. Personnel must be electrostatically discharged prior to any direct contact with these supply or signal lines!

5.1 Replacing the Fans

The frequency with which the fans are replaced depends on the operating temperature.

HIMA recommends replacing the system fans in intervals in accordance with Table 3:

For details, refer to the data sheets of K 9203A, K 9202B and K 9212.

For the replacement of old fans, contact HIMA technical support.

NOTICE

Electrostatic discharge!

Failure to comply with these instructions can damage the electronic components.

- **Prior to working with HIMA components, touch an earthed object.**
- **Make sure that the workspace is free of static and wear a grounding strap.**
- **If not used, ensure that the device is protected from electrostatic discharge, e.g., by storing it in its packaging.**

5.2 Replacing Mains Filters

The HIQuad X system must be protected against transient voltage peaks in accordance with the industrial environment. To protect the system on the long term, the plug-in mains filters must be replaced depending on their industrial environment, however, after 10 years at the latest.

If energy-rich transient interfering pulses in the voltage supply cannot be excluded, the mains filters may also be replaced earlier. Interfering pulses slightly reduce damping of the mains filters.

HIMA recommends using system downtimes to replace the mains filters (H 7034, H 7035).

Due to the structure of the H 7034, H 7035 mains filters with plug-in terminal blocks for L+, L- and the signaling contact, the mains filters can also be replaced in system operation within a short time (< 5 minutes). If the mains filters are replaced during system operation, transient electrical disturbances are not filtered out and may affect the system.

To replace mains filters

1. Remove terminal block no. 13…16.
2. Remove terminal block no. 1…4 (L+).
3. Remove terminal block no. 5…8 (L-).
4. Loosen the mains filter from the DIN rail. To this end, press the plate down with a slotted screwdriver and remove the mains filter from the DIN rail.
5. Place the mains filter with the upper notch on the DIN rail and press it downwards until it snaps into position.
6. Insert terminal block no. 5…8 (L-).
7. Insert terminal block no. 1…4 (L+).
8. Insert terminal block no. 13…16.

► Mains filter is replaced.

5.3 Replacing the Electrolytic Capacitors of the Modules

The lifetime of electrolytic capacitors depends on the temperature, therefore they must be replaced in accordance with the specifications in Table 3.

To replace the electrolytic capacitors, the I/O modules must be sent to HIMA. Use the original product packaging or an equivalent EMC-protected packaging. HIMA replaces the electrolytic capacitors at a charge.

5.4 Replacing Modules

Defective modules must be replaced with modules of the same type or with approved replacement models.

When replacing modules, observe the instructions specified in the system manual (HI 803 211 E) and safety manual (HI 803 209 E). For the approved hardware revision indexes and firmware versions, refer to the TÜV version list of the HIQuad X system.

The following points must be adhered to when mounting and removing modules:

- Strictly observe the following instructions when removing and reinserting the modules of the HIQuad X system.
- Quickly disconnect the modules from the backplane to avoid faulty signals in the system that could cause its shutdown.
- Only use the module in the designated slot.

i HIMA cannot be made liable for consequential loss caused by improperly removing and reinserting the modules.

NOTICE

Damage to bus and power sockets due to module jamming!

Failure to comply with these instructions can damage the controller.

Always insert the modules in the racks carefully.

Tools:

- Screwdriver, cross PH1.

5.4.1 Replacing I/O Modules

If a fault occurs or maintenance work is necessary and the output modules need be replaced, the service mode option on the I/O processing module (F-IOP) must be activated beforehand; refer to the safety manual (HI 803 209 E) for details. The prerequisite for this is that the *Deactivate Service Mode Push-Button* system parameter is not set to TRUE.

To replace I/O modules

1. Start the service mode on the I/O processing module (F-IOP) located in the rack of the I/O module to be replaced.
   - Press the service push-button (SERV) for 2 s to 7 s.
   - Or start the service mode via PADT in the online view of the Hardware Editor. To this end, right-click the I/O processing module (F-IOP) and select *Maintenance/Service* from the context menu. In the next dialog box, click the *Start Service Mode* command.
     If a PADT is connected to the controller, it is easier to activate and deactivate the service mode via the PADT.

   ☑ The *Service Mode Active* system parameter is TRUE.
   ☑ When the I/O processing module operates in service mode, the red LEDs *Slot* and *Chn* are blinking.
2. Completely release the fastening screws from the I/O module to be replaced.
3. Remove the I/O module with inserted cable plug from the rack. Then unscrew the cable plug.
4. Insert the new I/O module without cable plug and screw it in place. Observe the description provided in the system manual!
5. Plug in the cable plug and screw it in place.
6. Repeat steps 2 through 5 for each module to be replaced.
7. Quit the service mode.
   - Press the service push-button (SERV) for 2 s to 7 s.
   - Or start the service mode in the online view of the Hardware Editor using the *Initiate termination of service mode* PADT command.

   ☑ The *Service Mode Active* system parameter is FALSE.
   ☑ The LEDs of the I/O processing module report the regular module and channel diagnosis.

► The I/O modules have been replaced and are operating again without faults.

For further details on the service mode, refer to the F-IOP 01 manual (HI 803 219 E).

5.4.2 Replacing the F-CPU 01 Processor Modules

The HIQuad X system allows for redundant operation of processor modules. If a redundant processor module is available, a processor module can be replaced during operation while maintaining the fully system functionality.

Make sure that the redundant processor module is operating without malfunction. To this end, observe the LEDs:

- The green *RUN* LED must be lit.
- The red *Error* LED must neither be lit nor be blinking.
- The yellow *Ess* LED must neither be lit nor be blinking.

⚠ WARNING

Replacing a non-redundant module during operation can impair the functionality of the controller or even cause it to fail.

Removal:

1. If used, remove the patch cables.
2. Completely release the fastening screws from the module.
3. Push the red release button bottom up to unlock the extractor handle.
4. Completely push the extractor handle upwards to rapidly separate the module from the backplane. This avoids faulty signals.
5. Press the extractor handle down once again until it snaps into position.
6. Remove the module from the rack holding it by the extractor handle.

► The module is removed.

Installation:

1. Check the mode switch and configure it in accordance with the application.
2. Pull back as far as possible the fastening screws on the module's front plate.
3. Carefully insert the module into the guiding rail of the intended slot and push it in the rack as far as it can go.
4. Push the red release button bottom up to unlock the extractor handle.
5. With your thumbs, press the module carefully, but quickly inwards as far as it can go to ensure that no faulty signals are triggered within the system.
6. Press the extractor handle down until it snaps into position.
7. Tighten the fastening screws of the module (max. 0.35 Nm).
8. If used, insert the patch cable.

► The module is mounted.

5.4.3 Replacing the I/O Processing Module (F-IOP 01)

This chapter describes how to mount and remove an I/O processing module.

Before replacing an I/O processing module, take the impact of this action on the system operation into account.

- When the I/O processing module is removed, the I/O modules installed in the rack are switched off.
- If additional I/O processing modules are only connected to a system bus via the I/O processing module to be replaced, they are first switched off (mono system) and then the module is removed. Refer to the safety manual (HI 803 2011 E) for details.

Removal:

1. Remove the patch cable.
2. Completely release the fastening screws from the module.
3. Completely push the extractor handle upwards to rapidly separate the module from the backplane. This avoids faulty signals.
4. Remove the module from the rack holding it by the extractor handle.

► The module is removed.

Installation:

1. Ensure the rack ID settings on the DIP switch comply with the application and if not, adjust them accordingly.
2. Pull back as far as possible the fastening screws on the module's front plate.
3. Carefully insert the module into the guiding rail of the intended slot and push it in the rack as far as it can go.
4. With your thumbs, press the module on the extractor handle carefully, but quickly inwards as far as it can go.
5. Tighten the fastening screws of the module (max. 0.35 Nm).
6. Insert the patch cable.

► The module is mounted.

5.4.4 Replacing the Communication Module (F-COM 01)

This chapter describes how to mount and remove a communication module.

Before replacing a communication module, take the impact of this action on the system operation into account.

- If the system is not structured redundantly, the external communication is interrupted.
- If the system is structured redundantly, ensure fault-free communication through the redundant communication module.

To remove communication modules

1. Pull off the communication cable from the front plate.
2. Completely release the fastening screws from the module.
3. Push the red release button bottom up to unlock the extractor handle.
4. Completely push the extractor handle upwards to rapidly separate the module from the backplane. This avoids faulty signals in the system.
5. Press the extractor handle down once again until it snaps into position.
6. Remove the module from the rack holding it by the extractor handle.

► The communication module is removed.

To insert communication modules

1. Pull back as far as possible the fastening screws on the module's front plate.
2. Insert the module into the guiding rail of the intended slot and push it in the rack as far as it can go.
3. Push the red release button bottom up to unlock the extractor handle.
4. With your thumbs, press the module carefully, but quickly inwards as far as it can go to ensure that no faulty signals are triggered within the system.
5. Press the extractor handle down until it snaps into position.
6. Tighten the fastening screws (max. 0.35 Nm).
7. If provided, insert the Ethernet and fieldbus cables.

► The module is mounted.

5.4.5 F 7133 Power Distribution Module

This chapter describes how to mount and remove an F 7133 power distribution module.

Before replacing an F 7133 power distribution module, take the impact of this action on the system operation into account.

- Since each F 7133 power distribution module supplies 4 I/O slots with 24 V, the corresponding I/O modules are disconnected from the supply voltage and are therefore out of operation.

To remove the power distribution module

1. Release the fastening screws from the module.
2. Remove the module from the rack.
3. Unplug the Faston female connectors.

► The module is removed.

To insert the power distribution module

1. Plug in the Faston female connectors.
2. Insert the module and screw it tightly.

► The module is inserted.

5.5 The F-PWR 01 Power Supply Unit

The F-PWR 01 power supply unit must be replaced in accordance with Table 3 so that HIMA can replace the electrolytic capacitors on the power supply unit.

Before replacement, the following points must be observed:

- If the replacement is performed during operation, the remaining power supply units in the rack must be able to supply the total load current of the 5 V supply voltage.

Removal:

1. Completely release the fastening screws from the module.
2. Push the red release button bottom up to unlock the extractor handle.
3. Completely push the extractor handle upwards to rapidly separate the module from the backplane. This avoids faulty signals in the system.
4. Press the extractor handle down once again until it snaps into position.
5. Remove the module from the rack holding it by the extractor handle.

► The module is removed.

Installation:

1. Pull back as far as possible the fastening screws on the module's front plate.
2. Insert the module into the guiding rail of the intended slot and push it in the rack as far as it can go.
3. Push the red release button bottom up to unlock the extractor handle.
4. With your thumbs, press the module carefully, but quickly inwards as far as it can go to ensure that no faulty signals are triggered within the system.
5. Press the extractor handle down until it snaps into position.
6. Tighten the fastening screws (max. 0.35 Nm).
7. If provided, insert the Ethernet and fieldbus cables.

► The module is mounted.

5.6 F-PWR 02 Buffer Module

The F-PWR 02 buffer module must be replaced in accordance with Table 3 so that HIMA can replace the electrolytic capacitors on the buffer module.

Before replacement, the following points must be observed:

- If the replacement must be performed during operation, the buffer module must be replaced immediately to restore the availability of the redundant racks.

Removal:

1. Completely release the fastening screws from the module.
2. Push the red release button bottom up to unlock the extractor handle.
3. Completely push the extractor handle upwards to rapidly separate the module from the backplane. This avoids faulty signals in the system.
4. Press the extractor handle down once again until it snaps into position.
5. Remove the module from the rack holding it by the extractor handle.

► The module is removed.

Installation:

1. Pull back as far as possible the fastening screws on the module's front plate.
2. Insert the module into the guiding rail of the intended slot and push it in the rack as far as it can go.
3. Push the red release button bottom up to unlock the extractor handle.
4. With your thumbs, press the module carefully, but quickly inwards as far as it can go to ensure that no faulty signals are triggered within the system.
5. Press the extractor handle down until it snaps into position.
6. Tighten the fastening screws (max. 0.35 Nm).
7. If provided, insert the Ethernet and fieldbus cables.

► The module is mounted.

5.7 Loading Operating Systems

As part of product maintenance, HIMA is continuously improving the operating systems of the modules. HIMA recommends using system downtimes to load the current version of the operating system into the modules.

The module must be in the STOP state to be able to load an operating system.

i The current operating system versions of modules are displayed in the SILworX Control Panel. The type label specifies the delivered module version.

5.8 Replacing Base Racks and Extension Racks

If base rack or extension rack is defective, it must be replaced. Replacing of base racks or extensions racks is only permitted in the de-energized state.

Prior to shutting down the PES, check the impact that this may have on the safe function of the entire plant!

Appendix

Glossary

Term	Description
AI	Analog input
AO	Analog output
ARP	Address resolution protocol, network protocol for assigning the network addresses to hardware addresses
COM	Communication module
CRC	Cyclic redundancy check
DI	Digital input
DO	Digital output
EMC	Electromagnetic compatibility
EN	European standard
ESD	Electrostatic discharge
FB	Fieldbus
FBD	Function block diagrams
HW	Hardware
ICMP	Internet control message protocol, network protocol for status or error messages
IEC	International electrotechnical commission
Interference-free	Inputs are designed for interference-free operation and can be used in circuits with safety functions
MAC	Media access control address, hardware address of one network connection
PADT	Programming and debugging tool (in accordance with IEC 61131-3), PC with SILworX
PELV	Protective extra low voltage
PES	Programmable electronic system
R	Read, the variable is read out
R/W	Read/Write, column title for system variable type
Rack ID	Rack identification (number)
r_P	Peak value of a total AC component
SC/OC	Short-circuit/open-circuit
SELV	Safety extra low voltage
SFF	Safe failure fraction, portion of faults that can be safely controlled
SIL	Safety integrity level (in accordance with IEC 61508)
SILworX	Programming tool
SNTP	Simple network time protocol (RFC 1769)
SRS	System.Rack.Slot, addressing of a module
SW	Software
TMO	Timeout
W	Write, the variable receives a value, e.g., from the user program
WD	Watchdog, device for monitoring the system's correct operation Signal for fault-free process
WDT	Watchdog time

Index of Figures

Index of Tables

Index

MANUAL

HIQuad X Maintenance Manual

HI 803 213 E

For further information, please contact:

HIMA Paul Hildebrandt GmbH
Albert-Bassermann-Str. 28
68782 Brühl, Germany

Phone: +49 6202 709-0
Fax +49 6202 709-107
E-mail: info@hima.com

Learn more about HIQuad X online:

www.hima.com/en//

www.hima.com